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K21

HOW EFFECTIVE COMMUNICATION CAN DRIVE IMPROVEMENTS IN AQUATIC ANIMAL WELFARE

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Abstract
Concern over the welfare of aquatic animals has grown dramatically in recent years. Prior to 2002 it was thought that fishes could not perceive pain and cultural references as well as dietary choices seem to reflect less care for these aquatic animals. However, the identification of nociceptors in the rainbow trout and subsequent work on responses to painful treatment demonstrated that fish were able to experience discomfort associated with tissue damage. This has led to dramatic changes in the way fishes are considered in public opinion and with respect to their treatment in aquaculture, fisheries and in the laboratory. This presentation will focus on how effective communication with scientists, animal technicians, industries, government, and regulatory bodies as well as the media can drive the dissemination of information regarding the science behind fish welfare and can lead to improvements in the treatment of aquatic animals. Recognition of pain in fishes has been made easier by a number of studies focusing on behavioural and physiological indicators to improve pain assessment. Analgesic drugs prevent responses to pain in fishes and these can be used to inform pain management protocols in the laboratory. To overcome barriers to improving the care and welfare of fishes it is important that there is effective communication between animal carers and researchers so that pain management strategies can be adopted. How scientific findings can be used to change public opinion and have a cultural impact will be highlighted and related to current concerns over other aquatic species.

K31

MORE THAN 3RS – THE PRINCIPLES OF HUMANE EXPERIMENTAL TECHNIQUE

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Abstract
Animal research is regulated under the premise that any harm imposed on animals must be indispensable. This is also the legal basis of the 3Rs principle (replace, reduce, refine), which serves to minimize harm to animals in research. However, the 3Rs are just one among several ethical principles needed to determine the indispensability of animal research. Ultimately, the decision is taken by ethical deliberation in a harm-benefit analysis (HBA). Yet unless study findings are valid and reproducible, animals are harmed without producing any benefit. Sources of poor reproducibility include poorly validated animal models (poor construct validity), a lack of scientific rigor (poor internal validity), and rigorous standardization (poor external validity). I have therefore proposed the 3Vs principle for assessing the scientific validity of animal research. Moreover, the 3Vs together with the 3Rs and the HBA represent the principle of proportionality by which funders, regulators, and editors can formally assess the indispensability of animal research. Thus, to be deemed indispensable, a study needs to be suitable (determined by the 3Vs), necessary (determined by the 3Rs), and reasonable (determined by an HBA). Finally, as important societal interests determine the legitimate aims of animal research, we should treat results from animal research as common (public) goods. This further implies that animal research must be transparent, collaborative, and efficient, the very principles of Open Research. Therefore, responsible animal research also includes preregistration of study protocols, unconditional data sharing, and comprehensive reporting of all results.

K41

CHALLENGING THE NORM – THE VALUE OF DATA SHARING, TRANSPARENCY AND OPENNESS

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Abstract
Progress implementing the Three Rs concept of replacement, reduction and refinement in the pharmaceutical industry has been limited by lack of access to unpublished data. Activities of animal rights groups deterred scientists from engaging openly about their work with laboratory animals.

A European pharmaceutical industry working group, together with ECVAM, developed guidance for the administration of substances and removal of blood, including routes and volumes.

A handbook of pre-clinical continuous intravenous infusion in rodents and non-rodents assembled data from laboratories in Europe, Japan and USA.

Collaboration of European pharmaceutical industry and animal welfare groups has demonstrated the worth of sharing unpublished data from toxicology studies to achieve reduction and refinement. This work focused on the use of the dog as the non-rodent species required for regulatory approval of medicines.

The choice of the non-rodent species in pharmaceutical toxicology is a complex decision based on consideration of animal welfare, practicality, and scientific rationale. A Points to Consider document was produced in conjunction with the UK Home Office.

As Convenor of a FELASA working party, guidance on the continuing education and training of those working with laboratory animals was produced and was incorporated into the Commission's Education & Training Framework document.

More recently, as Convenor of a FELASA/ECLAM/ESLAV working party, the Commission's Severity Assessment Framework document was expanded and further illustrated using animal models. This formed the basis of European workshops.

S2A1.1

FULL COST ACCOUNTING NOT ONLY IMPROVES COSTS, BUT ALSO ANIMAL WELFARE AND JOB SATISFACTION

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Abstract
Animal facilities face the ever-increasing challenge of running an effective and well-organised programme. The operation of animal facilities is extraordinarily expensive. Those (academic) facilities that have implemented a recharge system for their clients have (mostly) never properly calculated the actual cost of running the facility. The price is often set politically, frequently with nothing more than a guess to satisfy the needs of users and management alike. The actual costs are almost never transparently presented or discussed. This too often leads to misunderstandings about what proper full cost accounting can provide – namely, a perfect tool for managing the facility and motivating animal care staff. We have developed an institute-wide full cost analysis and recharging system to transparently and effectively manage each of our scientific facilities, including the animal facility. By disclosing actual costs, we have understood that the more animal care staff provide experimental services, the more cost-efficient the facility becomes. This benefits our scientists (better and more comprehensive service), our institute (cost-efficient animal facility) and most importantly the animal care staff (more interesting work, better motivation, integral part of scientific projects).

In this presentation, I will explain the advantages of full cost accounting and give examples of how to calculate prices. I will also show how this can be introduced as part of global institutional budgeting. I will show how transparent full costing leads to better animal welfare, less animal use and better motivated animal care staff – and a facility that is cheaper to run overall.

S2A1.2

NOT ALL INDIVIDUALLY VENTILATED CAGING SYSTEMS ARE CREATED EQUAL

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Abstract
The scientific community utilizes the IVCs or Individually Ventilated Caging systems in a general manner. However, the use of these general terms does not adequately describe the caging systems. The type of IVC utilized may impact facility design, operational planning, and, most importantly, study reproducibility. The presentation will review the history of rodent caging systems including IVCs and a formal classification system for IVCs that encompasses an array of different approaches and technologies, each with different risk/benefit tradeoffs. There are six parameters in the classification system including airflow mechanics, rack ventilation, air change rates, cage design, intra-cage air flow dynamics, and other parameters when assessing microenvironmental conditions. These six parameters should be considered when evaluating IVC systems and the methods employed to meet performance specifications and comparing different system types between studies.

S2A1.3

COMMUNICATION PIPELINE FOR *IN VIVO* IMAGING SERVICES

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Abstract
During the last years, the rapidly evolving imaging technologies have become valuable tools in research. Small-animal imaging modalities provide high-resolution, real-time, images, offering the opportunity of longitudinal, quantitative, non-invasive monitoring of disease progression in different animal models. In parallel, *in vivo* imaging applications lead to reduction of variability and significant animal reduction, by replacing phenotyping methods and assays that require euthanasia.

The most commonly used imaging modalities are endoscopy, x-ray imaging, optical imaging, ultrasound imaging, computed tomography, magnetic resonance imaging, as well as positron emission tomography and single photon emission computed tomography.

For *in vivo* imaging facilities, effective communication is an essential tool that ensures that the management team (scientists-in-charge, operational managers, technicians), the animal welfare team and the researchers (internal, external, students) are on the same page at all times. Successful communication is necessary at different stages, such as the experimental design, the animal transfer, the imaging services delivery, and the reporting and may be achieved via standardized procedures, which provide specifications and step-by-step instructions for all operations and activities.

Good communication plays one of the most crucial roles in operating *in vivo* imaging facilities and achieving high-quality research.

S2A1.4

CONSIDERATIONS WHEN DESIGNING AND OPERATING A NEW SPF (POULTRY) FACILITY

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Abstract
The Pirbright Institute conducts research into, and surveillance of, viral diseases of livestock. One of the main objectives of which is to provide countermeasures aimed at preventing and controlling these diseases. An important part of this program of work is the use of animals, which have historically been housed in high containment facilities. More recently, a requirement for producing Specific Pathogen Free (SPF) embryos and SPF hatched birds was identified and a facility was designed built, commissioned, and put into operation.

Compared to high containment facilities, the design and operation of which are regulated by many national and international texts, there are relatively few specifications for the design and operation of SPF facilities – in particular for farmed animal species such as poultry. As a result and given the high containment nature of the other animal facilities at the Pirbright Institute, the elements of the SPF facility design and operation were considered using similar approaches in place for the high containment facility – a relatively novel approach.

During this talk, the main risk pathways identified which could result in compromising SPF status of the animal facility will be discussed, as well as giving an overview of the various engineering and procedural controls which have been implemented to manage these risks. In particular, controls on preventing entry of SPF listed pathogens via equipment, air and water will be discussed.

S2A1.5

ANIMAL FACILITY 2.0 – INTEGRATING NEW TECHNOLOGIES IN IN VIVO RESEARCH

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Abstract
"Pushing the boundaries" was the ambitious goal of the new in vivo research building "IVR" at the Roche Innovation Center Basel – creating the best possible research environment, setting the animals and employees at the center of each activity, while bringing the in vivo research groups closer together in a shared and centralized environment.

Since 2021, the animal facility has been fully operational, and digitalization and automatization are supporting research and animal care at a new level.

Customized building software infrastructure coordinates several automatized processes, delivering fully transparent and real-time environmental data and study room information (including alarms if limits are exceeded), connects robotics, access control, environmental condition settings, and the animal husbandry database. Automatization of cage cleaning and building logistics takes over heavy work from caretakers, improving ergonomics. Exposure of staff to hazards as well as the risk of introducing infectious agents has been reduced to a minimum. Full flexibility applies to the physical setting of the study and housing rooms, reduces efforts, and costs for refurbishments and thus prepares the infrastructure for future needs and for full digitalization and additional automatization. Dedicated training tools visualize the relevant information to users.

The transparent, accessible, real-time information, as well as the gained workplace quality allow focusing on the animal and the research. The light and open design of the building, combined with a space sharing approach, promote spontaneous communication, collaboration, collective learning and physically showcase transparency in sensitive research with animals.

S2A2.1

TUNNEL- VERSUS TAIL-HANDLING IN A MOUSE BREEDING FACILITY: TIMECOSTS AND BEHAVIORS IN DIFFERENT STRAINS

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Abstract
Handling of laboratory mice influences their behavior and well-being. Catching and lifting the mice by the tail has been a standard method for decades. However, tail-handling was shown to cause anxiety and stress when compared to alternative handling methods like the use of a tunnel. Since tunnel-handling is considered to be non-aversive and positively influence animal welfare, this handling techniques has become more common recently.

The implementation of non-aversive handling methods in large breeding facilities is a particular challenge for animal welfare officers, facility managers, and caretakers. Besides animal care procedures and tunnel purchase costs, the needs of the scientists must be considered. These parameters may contrast with the welfare potential of tunnel-handling.

The option of introducing tunnel-handling during breeding and husbandry of mice prior to the experiment was piloted in a large, central breeding unit. The method was tested in comparison to tail restraint on 150 weanlings from three mouse strains over 9 weeks in routine husbandry. The cages were equipped with a transparent plastic tunnel that was used to transfer the animals weekly. The caretakers recorded the duration of each transfer, animal health, behavior of the animals before, during and after capture.

Statistical analysis of the data is currently in progress. Duration of transfers and effects of handling methods, mouse strain, and time on the animals' behavior will be presented.

S2A2.2

RABBIT HUMAN HABITUATION PROGRAM DURING BREEDING REDUCED SIGNIFICANTLY STRESS RELATED SIGNS DURING ACCLIMATIZATION PERIOD

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Abstract
Rabbits are a species naturally very sensitive to stress. This stress is a source of complications for the work with these animals in laboratory settings, both in their relations with humans and on the quality of the scientific results of the research. To reduce this stress and increase animal welfare, we designed a rabbit human habituation program during breeding period, from birth to transport into experimental facility.

The program consists in a holistic approach for positive human-rabbit bonding. It starts from birth with an impregnation program of human contact in the nestboxes 4 times/week for 4 weeks. From weaning, the proper habituation program begins with weekly positive interaction of individual petting for 2 weeks. Most of the rabbits are sold from this age. If not sold, any manipulation will be followed by a petting session. Females that are kept longer entered back into the regular habituation program from week 12 until sold with weekly positive interaction.

The effect of this program was monitored with several clinical stress indicators observed during acclimatization period. The study was designed as a double-blinded randomized study. The rabbits evaluated came for 4 different breeding areas with the habituation program implemented only in one area. Evaluators were blind on which area the program was applied. After 16 months and more than 2400 rabbits evaluated, results showed a significant decrease in stress scores of rabbits sourced from the habituation area with total disappearance of aggressive behaviors such as biting while initial scores were maintained from other areas.

S2A2.3

POSITIVE REINFORCEMENT TRAINING AS A REFINEMENT TOOL IN FELINE EXPERIMENTAL STUDIES

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Abstract
For many veterinary clinical research studies involving cats, replacement and reduction is not yet feasible. Therefore, refinement is a valuable option. To avoid risk-associated repeated anaesthesia, the training of laboratory cats for clinical examination and blood collections using positive reinforcement (PR) with food rewards is contributing to the refinement of the studies and provides both physical and mental enrichment for the cat. We describe two different approaches of cat training using positive reinforcement and food rewards. 1) A tuna paste used as a target stick and as a food reward simultaneously and 2) a target stick and a clicker sign followed by a solid dry food reward. Both approaches were successfully used in kittens (8 weeks of age and older) and adult cats in various studies on infection diseases, where clinical examinations and repeated blood collections were essential. The training has the advantages that laboratory and clinical results are not influenced by anaesthesia, it results in lower costs (less drugs and staff-time), and it reduces potential anaesthesia-associated distress in the cats. Furthermore, repeated anaesthesia is avoided which can result in drug tolerance necessitating continuously increasing drug dosage. PR training allows the conduction of studies that require repeated blood collections over an extended period while ensuring cooperation of the cats. The PR training contributes to a continuous socialisation of the cats towards humans and the human-animal bond is positively strengthened. This is further beneficial for staff morale, while the culture of care is integrated into the study design.

S2A2.4

IMPROVING HUMAN-ANIMAL INTERACTIONS FOR RESEARCH PIGS: HABITUATION TO SLING RESTRAINT FOR BLOOD COLLECTION

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Abstract
Pigs are useful research models, but interactions between humans and untrained pigs can be aversive. Frequent negative interactions can disrupt behavior, physiology, and research quality. The goal of this study was to refine restraint techniques through habituation. A total of 44 Göttingen minipigs were used. Pigs were 4mo and observed for 14 days prior to study start. Control pigs (C) received no habituation, while treatment pigs (T) received 3 min of habituation for 6 days. Food rewards were used to habituate pigs to human presence, touch, and restraint in a hammock sling. On day 13, pigs were restrained for blood collection. Serum was analyzed for cortisol levels. Pigs struggle behavior in the sling was scored. On days 12 and 14, a human approach test (HAT) was conducted. Latency to touch the human was scored. Data were analyzed using linear mixed models. Response variables were latency to touch (s), plasma cortisol levels (ug/dL), and duration of struggle (s). Fixed effects included treatment and sex. On day 12, there were no differences in the HAT ($P = 0.339$). On day 14, T pigs had shorter latency to touch the human ($P = 0.003$). T pigs also had lower plasma cortisol levels during blood collection ($P = 0.001$). There was no effect of habituation on struggle behavior in the sling ($P = 0.169$) and no sex effects. These results demonstrate that short periods of consistent habituation can have positive effects on human-pig interaction in research facilities. However, additional training sessions may be needed to see calmer animal behavior in the sling.

S2A2.5

TRAIN THE TRAINER: WHAT IS NEEDED TO TRAIN GOATS FOR EXPERIMENTS?

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Abstract
Training animals to accept human intervention reduces stress. This improves welfare especially in animal experiments. Effective training needs skillful trainers. They need an understanding of the learning principles and animal communication. What is needed to become a good trainer?

The objective here was to evaluate two "train the trainer" methods: a 2-day- workshop and self-directed learning via books and video tutorials. Participants were to learn how to train a goat to jump on a pedestal, place its chin on the participants hand (chin target), stand still to be manipulated at *Vena jugularis* region.

We recruited 27 persons (23 female; 4 male). Five had no experience with animal training before, 11, 2 and 5 had at least one, five or more than 10 years of experience with animal training, respectively. The strongest motivation to participate in this project was handling goats (n = 11) and learning about animal training (n = 12). Participants were randomly allocated to the training methods, with each participant training one goat over a period of 14 days. Goats included in this study were approx.4 months old (12 castrated males, 15 females). The final training session was filmed and analyzed.

All but one goat learned to jump onto the pedestal, 18 goats put their chin on the trainer's hand. Although 21 tolerated to be touched in the neck region, only two learned to stand still. There was no obvious difference in training success between both learning groups, but the majority failed to reach the training goal (standing still) completely.

S2A4.1

PLANNING AND DESIGNING THE GREEN VIVARIUM: TOWARDS MORE SUSTAINABLE BIOMEDICAL RESEARCH

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Abstract
Many organizations seek to develop, plan and build/remodel less environmentally impactful or 'green' vivaria; however, assembling the various green options is challenging. This comprehensive session will review various vivaria systems, inputs, and outputs to provide attendees with detailed green vivaria considerations with a few examples peppered in. The objective is to provide contemporary information on building or remodelling vivaria to be more stainable. The session comprehensively outlines key vivaria components that could yield a 'greener', cost-effective, and more sustainable vivaria, that provides optimal animal care, a pleasant working environment, and facilitates preventative maintenance. Detailed topics include key vivarium costs, key equipment review, sanitation, heating, ventilation, and air conditioning (HVAC), housing, utilities, and structural components. The target audience is those considering new construction, building renovations, or those seeking green upgrade options in an existing vivarium.

S2A5.1

THE SHEEP AS AN EXPERIMENTAL MODEL FOR PERIPHERAL NERVE INJURY AND REGENERATION STUDIES

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Abstract
Nerve injuries occur frequently affecting both humans and animals. Despite advances in microsurgery, an effective therapy that promotes regeneration of the injured peripheral nerve and allows full functional recovery has not been established, so the development of animal models remains necessary. The sheep model is considered a good translational option since it presents peripheral nerves with anatomical and physiological characteristics, similar to humans. However, there are no well-established protocols for the study of peripheral nerve injury and its regeneration in this species.

The aim was to establish a surgical protocol to perform lesions of varying severity on the peroneal nerve in sheep, to optimize the methodology of supervision, functional, ultrasound and electrophysiology tests, and to perform histological and immunohistochemical techniques to evaluate nerve regeneration.

Peroneal nerve resection was performed under anesthesia in 20 *ripollesa* sheep and it was repaired by an autograft. Monthly functional tests were performed to evaluate locomotion, proprioception, withdrawal reflex and muscle loss. Electrophysiological and ultrasound tests were performed at 6.5 months and at the end of the follow-up, set at 9 months. Samples of the peroneal nerve, tibialis anterior muscle and skin were obtained for histological and immunohistochemical analyses.

Results showed the sheep is a good model for long-gap nerve injuries. No significant clinical signs were observed, and animals were able to stand and walk and have good mobility. The functional tests allowed the evaluation of recovery and regeneration. Electrophysiological test allowed the evaluation of reinnervation, and ultrasound allowed to measure muscle atrophy.

S2A5.2

MEDICAL IMAGING AS A MEANS OF UNDERSTANDING SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2 INFECTION

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Abstract
Modern veterinary medicine attempts to mitigate the absence of communication between animals and veterinarians by application of diagnostic techniques. Medical imaging, such as X-rays, computed tomography (CT), and positron emission tomography–computed tomography (PET-CT), are non-invasive imaging techniques widely used in veterinary pulmonary research and medicine that substitute part of classical history taking in human patient settings. These techniques have recently been applied in studies of severe acute respiratory syndrome coronavirus 2-exposed (SARS-CoV-2-exposed) nonhuman primates to add meaningful translational readouts of lung disease that complement physical examination, clinical laboratory, virologic, and immunologic evaluation.

Our systematic review identified medical imaging of SARS-CoV-2-exposed nonhuman primates to uniquely enable high-resolution qualitative and quantitative characterization of disease that is otherwise clinically invisible, and potentially to provide user-independent and unbiased evaluation of both therapeutic and prophylactic treatments. However, we also found high variability in image acquisition and analysis protocols among studies. These findings suggest that medical imaging of adequate resolution is an important tool to qualitatively characterize disease and to reliably measure quantitative, unbiased, longitudinal readouts of disease evolution or changes upon therapeutic intervention, with an eye to human translation. Thus, medical imaging will be an increasingly important component of the nonhuman primate modelers' toolkit. Our findings also uncovered an urgent need to improve standardization in the acquisition and analysis of medical images of the lung in nonhuman primate models of SARS-CoV-2 infection. Based on the current published literature in this field, some key principles, and specific recommendations (applicable beyond SARS-CoV-2 infection models), were determined.

S2A5.3

PRE-IMMUNIZATION WITH INACTIVATED PATHOGENS RECAPITULATES ADULT HUMAN IMMUNE TRAITS IN LABORATORY MICE

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Abstract
Laboratory mice show poor translation to humans within a range of pre-clinical fields, which might be due to lack of pathogen exposure, which results in a level of $CD8^+$ effector memory T cells more comparable to newborns than to adult humans or pet shop mice. However, reintroducing pathogenic antigens could therefore re-introduce diseases, immunity, and immune function. We used ultraviolet irradiation to inactivate the following pathogens: mouse adenovirus type 1, minute virus of mice, mouse hepatitis virus, Sendai virus, Theiler's encephalomyelitis virus (GD 7), and *Mycoplasma pulmonis*. Hereafter, we mixed the inactivated antigens with the adjuvant Addavax®. A subcutaneous injection twice with two weeks interval with 10 μg of each pathogen generated a quantity of $CD8^+$ effector memory T cells significantly higher than untreated mice, and 82.3% of the mice were comparable with mice from a pet shop. This can become an important tool for the artificial creation of 'dirty mice' to obtain a higher translation from mouse studies into humans.

S2A5.4

IS SWEET CONSUMPTION UNDER THIRST AND HUNGER REALLY A GOOD INDICATOR OF DEPRESSION?

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Abstract
A common method for modelling depression in rats is to subject them to daily stressors over several weeks, at the end of which, a set of tests is used to assess depression-like behaviors. One common test measures the amount of sweet solution the animals drink as a telltale of their hedonic state. In other words, if stressed animals drink less sweet solution than unstressed animals, they are experiencing less pleasure, hence depression. Notwithstanding, it is common practice to use long periods of food and water deprivation before the test, which introduces hunger and thirst as confounding factors to its interpretation. Since taste is enough to elicit a pleasurable experience, are these long periods of deprivation necessary, or even sensible? To find out, we aimed to assess how reliably a decrease in sweet consumption is found when short periods of deprivation are used instead. We analyzed published studies that performed at least two weeks of stress in rats and employed only short periods of

deprivation (≤ 6 hrs.) before the consumption test. 1,719 reports were identified via key databases. Only 143 reports fulfilled all criteria and were included for data extraction and analysis. 82.1% were excluded on long periods of deprivation. I will present what we have learned through analyzing these papers for bias and quality of reporting and what the pooled data tells us about the performance of the test under little to no thirst/hunger and the factors that introduce high variability to the results.

S2B2.1

THE GREEN CHAMPION INITIATIVE AND LEAF

J. Kerr[1]
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Abstract
LEAF is a standard for sustainable laboratory operations, emphasising on conventional laboratories. LEAF, short for the Laboratory Efficiency Assessment Framework, was developed by sustainable UCL and shared among many academic institutions. Laboratory Animal Sciences are often side stepped when discussions about sustainable labs are bought up, due to the niche nature of the work. With the concerns of many about the climate and ecological emergencies affecting the world, the green champion initiative was born among the animal care staff at UCL. The aim is to look at LAS as a whole, and evaluate just what can be changed, whilst striving to maintain the high levels of care as normal. In collaboration with Sustainable UCL, the green champions have been working on addressing the environmental impact of LAS and doing what is needed to reduce carbon emissions whilst maintaining high quality research.

S2B2.2

THE ENVIRONMENTAL IMPACT OF LAS: 3R – REDUCE, REUSE, RECYCLE – WHAT DO YOU DO?

J.-P. Mocho[1]
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Abstract
Have you ever been shocked by the amount of plastics to recycle after an experiment? This question is just one of many that we should think about regarding the environmental impact of research. What if that impact is higher than its potential benefits for human health? These questions reveal a poorly discussed ethical concern of research. Let's tackle the challenge and be proactive about reducing the environmental impact of Laboratory Animal Science. First, let's get inspiration from initiatives blooming worldwide to provide resources of information and data, to reduce the greenhouse effect of gas anaesthesia, to stop single-use plastics in universities, to reduce water use and effluent discharge, to better control power consumption, or to adjust deep freezers' temperature and reduce their carbon footprint. Then, let's set bridges between disciplines and explore key concepts of environmental science, waste recycling, and transport carbon footprint. For example, the use of calculators and coefficient to translate energy consumption into e-CO2 depends on the local and national context, and we will explore data relevant to these variations. By the end of the presentation, stakeholders will be empowered with knowledge allowing assessment, communication, and reduction of the environmental impact of animal facilities.

S2B2.3

ENVIRONMENTAL IMPACT OF BIOSECURITY: AUTOCLAVE VS. GREENER OPTIONS FOR DISINFECTION

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Abstract
Depending on model health-related requirements, animals are maintained in cleaned then either disinfected or sterilized cages. In most cases, only washing and disinfection are necessary, whereas cages are often autoclaved, which requires high steam, water, and energy consumption. This adds to the carbon footprint of the animal facility in a useless and very significant way. Other options are now available, such as thermal disinfection and hydrogen peroxide treatment. Correctly used, they can achieve over 5 log reduction of microbiological load and constitute very relevant alternatives to autoclaves when cage sterilization is not required. Moreover, these disinfection systems have much lower resource needs than autoclaves, allowing revisiting biosecurity programs with a carbon footprint in mind. Taking the example of an average animal facility and considering the reduction of e-CO2 as a major output, we will first see that adapting autoclaving routine can significantly reduce the carbon footprint. Second, we will compare equipment and process environmental impact and estimate the specific advantages of washer-disinfector use for thermal disinfection. The use of this solution can be validated and controlled with quantitative biological indicators (for ''performance qualification'' of the process, allowing to demonstrate its efficacy) and carbon footprint assessments. At a project design stage, resource consumption estimation can be essential, including with single-use cages when applying options to reduce their environmental impact. Through these scenarios, attendees will learn revisiting their disinfection barriers and work solutions with greener eyes. The great thing is that it also leads to cost reduction both operational and capital expenditures.

S2B3.1

REFINEMENT OF THE RAT CONTUSION MODEL OF THORACIC SPINAL CORD INJURY

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Abstract
Spinal cord contusion injury in rats is the most used model and it has played a major role in the translation of therapies to human patients. Laminectomy is an integral part of model development, which can have an impinging impact on the welfare parameters of the animals and this point is scarcely studied. Effects of analgesia on the model are also poorly reported. Crl: WI female rats (n = 48, 9–12 weeks old, 240–280 grams) were equally assigned after blocking and randomization to (a) conventional laminectomy, (b) dental burr assisted laminectomy, (c) conventional laminectomy with spinal-cord contusion and (d) dental burr assisted laminectomy with a spinal-cord contusion. Basso Beattie Bresnahan (BBB) score, postoperative body weights, rat grimace scale, open cage, and home cage activity during dark and light phases were studied at 1, 7, 14, 21, 28, and 56 days postoperatively. Novel object recognition, mechanical allodynia were evaluated at day 56 and surviving neurons and the area of vacuolation was evaluated terminally. Results suggest that the mechanization of laminectomy, using the motorized dental burr, causes less pain and improves post-operative weight gain and activity during the dark phase, indicating a better state of welfare in comparison with the conventional technique. The BBB scores, novel object recognition, mechanical allodynia, and histopathological parameters did not differ between the techniques indicating that there is no alteration in the functional outcome of the model.

S2B3.2

IMPROVING NON-TERMINAL BLOOD SPECIMEN QUALITY IN MICE

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Abstract
Background: Non-terminal blood sampling in laboratory mice is a very common procedure. Different sampling sites and methods have been compared with the aim of improving animal welfare but without reaching a consensus. Moreover, studies mostly overlooked the quality of blood specimens collected while the main pre-analytical concern with mouse EDTA blood specimens for hematology analyses is platelet aggregation, which is known to cause analytical errors.
Objectives: To find a non-terminal blood sampling method with as few as possible adverse effects on mice and very few or no platelet aggregates.
Methods: Two collection sites, four sampling methods and three antiaggregant (Iloprost, Cangrelor, Aspirin) drugs were tested and compared on 80 isoflurane anesthetized C57BL/6J male and female mice, based on platelet aggregates on blood smear and platelet, WBC, and RBC counts. In addition, the quality of the blood collection process was scored, and adverse effects recorded.
Results: Platelet aggregation was lower in specimens collected from the jugular vein than from the facial vein, with no effect of the sampling device nor of any antithrombotic additive. Highly aggregated specimens were significantly associated with lower platelet counts whereas aggregation had no effect on WBC or RBC counts. Adverse events during sampling were significantly associated with more numerous platelet aggregates.
Conclusion: The jugular vein is thus a satisfactory sampling site in mice both in terms of animal welfare and low *in vitro* platelet aggregation. Using antithrombotic agents appears unnecessary whereas improving sampling conditions remains a key requirement to ensure EDTA-blood specimen quality in mice.

S2B3.3

REFINEMENT OF TAMOXIFEN ADMINISTRATION IN MICE VIA ENCOURAGED VOLUNTARY CONSUMPTION OF PALATABLE FORMULATIONS.

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Abstract
The development of novel therapies occasionally requires the treatment of preclinical mouse models with drugs, often administered via oral gavage. More respectful and compassionate administration methods have been developed but these are mostly incompatible with water-insoluble drugs such as tamoxifen. For more than 20 years tamoxifen has been administered to Cre-ER^{T2}/loxP transgenic mouse models to induce spatiotemporal gene modification. More animal-friendly procedures for the administration of tamoxifen should achieve necessary systemic drug concentration while reducing administration-related stress. Such an improvement would not only benefit animal welfare but also guarantee more reliable experimental conditions. Based on a previously published refinement method (Scarborough, 2020) we developed palatable formulations to encourage voluntary consumption of tamoxifen by mice. We assessed the voluntary acceptance of the new tamoxifen formulations for each mouse during training and treatment. Using two different mouse models the efficiency of inducing expression of Cre-ER^{T2}/loxP regulated reporters by optimized tamoxifen formulations given through voluntary feeding was compared to that following oral gavage administration in oil. Serum concentrations of tamoxifen metabolites were quantified using an in-house developed *in vitro* cell assay. We observed

that sweetened milk or syrup-based formulations encourage most mice to voluntarily consume tamoxifen. However, only sweetened milk formulations were statistically non-inferior to oral gavage administration in terms of Cre-ER^{T2}mediated loxP-site recombination. The new palatable formulations not only encourage voluntary consumption of tamoxifen, but they also allow control of time point and dosage of administration while improving laboratory animal welfare and thus reliability of the experimental outcomes.

S2C1

EVOLVING EDUCATION TO MEET CURRENT AND FUTURE NEEDS

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Abstract
IAT Education (https://iateducation.co.uk/) Level 2 and Level 3 programme delivers the knowledge to ensure that the EU Directive requirements on having suitable qualified animal care staff is met. L2 provides the entry levels for animal care staff to work unsupervised. With L3 building on that knowledge/skill base. These can be delivered both online and, in the classroom, whilst maintaining the integrity of the Learning Outcomes.

Changes were in two key areas, the first of which was delivery, which moved from the classroom to being wholly online, with tutors delivering sessions virtually and by providing more online material. This move to a blended style of teaching meant students could complete online work within a time frame.

The second area was around the assessment of students needing to complete an End Point Assessment, (EPA) for which there are both practical and theoretical elements to the EPA.

Pre-Covid, an assessor would go to the student's place of work, watch them perform given tasks, question them around the ways and background knowledge of what they were doing followed by a more in-depth "professional" discussion to ascertain the student's broader comprehension of the subject and experience.

With the advent of better platforms such as ACE360, Moodle, SharePoint, Zoom and Teams, EPAs were carried out very successfully using remote access. Unforeseen benefits also became apparent. For example, recording the task and interview allowed assessors to revisit the student's answers during the post assessment discussion.

S2D1.1

HOW TO IMPROVE INSTITUTIONAL COMMUNICATIONS ON ANIMAL RESEARCH

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Abstract
With the assistance of the European Commission, the European Animal Research Association (EARA) has been assessing the websites of European institutions that carry out biomedical research using animals. The study reveals how many institutions carry a recognisable statement on their websites explaining their work or carry images related to animal research. EARA has now assessed the websites of over 1500 European institutions. The website study has helped EARA identify areas of good practice on communications and openness in the life sciences and where improvement is needed. The results help EARA provide guidance on best practice to its member organisations. In the digital world, communicating to the public on the importance of animal research via websites is an important way of increasing understanding and awareness of the work of the life sciences sector. In this session, EARA will guide attendees through how any institution can establish good practice for a long-term communications strategy, by revealing the findings of the latest EARA institutional website study. This will include highlighting the steps that any institution needs to take to put in place a robust and effective communications website platform on animal research, and preparing for and handling crisis communications situations, such as undercover filming. By reference to best practice, we will highlight the Five Steps any institution should take to establish effective communications. The audience for the session will be those seeking to improve institutional communications on animal research, this will include researchers, institutional officials, laboratory animal technicians and communications staff.

S2D2.1

NORECOPA: WORKING FOR GLOBAL COMMUNICATION BETWEEN ALL STAKEHOLDERS

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Abstract
Norecopa is a consensus platform for animal research and testing, with representatives of all four major stakeholders on its Board. It maintains a comprehensive, up-to-date website which aims to communicate high-quality information about the care and use of animals in research, including ways of implementing all of the 3Rs.

The Norecopa website (https://norecopa.no) benefits from a network established by its staff since the 1980s, although Norecopa itself was not founded until 2007. Currently, the site has approx. 9,000 pages. Several databases are embedded in the website, among others:

- NORINA – an overview of approx. 3,000 alternatives or supplements to animal use in education and training, for all levels from school dissections through undergraduate education to practical training of animal care staff and scientists
- TextBase – a listing of approx. 1,500 textbooks and other literature within Laboratory Animal Science and related subjects
- 3R Guide – approx. 400 quality guidelines on all aspects of animal care and use, collected worldwide in collaboration with the National Agricultural Library, USA
- Several datasets produced by the European Commission's Joint Research Centre

Norecopa also manages a number of resources which help to achieve this aim. These include:

- a comprehensive Webinars and Meetings Calendar
- a Refinement Wiki
- the website of the International Culture of Care Network
- an interactive global map of 3R centres and LAS organisations
- the PREPARE guidelines for planning animal experiments

The Norecopa website aims to be "a one-stop shop" for those looking for guidance on how to advance the 3Rs in preclinical research.

S2D2.2

COLLABORATING TO ADVANCE THE 3RS IN NORTH AMERICA & BEYOND

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Abstract
Scientific research is committed to forward progress. One key aspect of this forward progress is via the implementation of the 3Rs (refinement, reduction, and replacement) which are a key part of humane animal research and quality science. However, widespread implementation of 3Rs practices can be challenging especially when working independently. The North American 3Rs Collaborative is a non-profit organization whose mission is to advance science, innovation, and research animal welfare through collaborative 3Rs initiatives. Our strategy is to identify and promote 3Rs techniques that have strong evidence, big impact, and real-world practicality. All of our initiatives focus on learning from and collaborating with experts across industry, academia, and government. Learn about our current initiatives focused on key 3Rs techniques such as replacement of live sentinel rodents with environmental health, refined handling of mice via tunnels, microphysiological systems, translational digital biomarkers, compassion fatigue resiliency, and creation of a 3Rs certification course.

S2D2.3

ADVANCING 3RS: THE NATIONAL RESEARCH PROGRAMME 79 OF THE SWISS NATIONAL SCIENCE FOUNDATION

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Abstract
In 2021 the Swiss National Science Foundation (SNF) has launched the National Research Programme 79 "Advancing 3Rs – Animals, Research and Society" (NRP 79). With a total budget of 20mio CHF, it is the aim to innovate and implement 3R strategies and reflect 3R research within a time frame of five years. In this talk, the main objectives and initiatives planned in the NRP 79 will be presented. The NRP's overarching goal is to develop innovative methods and instruments that will ensure that the number of animal experiments as well as the number of animals used in university and private-sector research in Switzerland will be measurably and significantly reduced. Three main research modules were identified, namely "innovation," "implementation" and "ethics and society." Whereas "innovation" and "implementation" focus on improvements in practice, the third module "ethics and society"" brings the perspective of the humanities and social sciences into the NRP 79. It aims to address the ethical, psychological, legal, social, historical, cultural, and economic aspects of animal experimentation and 3R research. With these three focal points (innovation, implementation and ethics and society) the NRP 79 promises, on the one hand, to provide new insights and progress in 3Rs research and, on the other hand, to design forward-looking strategies for 3Rs research in general. This is done against the background of recent societal developments in the human-animal relationship and its political regulation.

S2D2.4

3R REPORTING IN PRECLINICAL ANIMAL STUDIES IN 2009 AND 2018 – A NATIONWIDE STUDY

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Abstract
Implementing 3R initiatives benefit animal welfare and science. Investigations suggest researchers will rely on recommendations from peers regarding 3R initiatives. A simple 3R implementation pathway may hence be through communication of 3R approaches in published primary literature. This nationwide study investigated the extent to which the 3Rs were reported in peer-reviewed preclinical animal research. Progression was investigated by comparing reporting in the years 2009 (before ARRIVE guidelines) and 2018.

A systematic search retrieved all relevant studies with at least one affiliation to a Danish university. Five hundred publications were included by random sampling.

The reporting of 3R initiatives was low with limited improvements. Searching for the 3R concept as a word retrieved no results in 2009. This increased to 3.2% in 2018. Publications reporting 3R

related sentences increased from 7.6% in 2009 to 30.8% in 2018, hereof reporting of reduction increased from 2.4% to 8.0%, refinement increased from 5.2% to 14.4%, and replacement was not reported at all. Poor reporting of details was prominent. In the publications reporting on reduction, the used methods were only mentioned in 0.4% of the publications in 2009 and 4.4% in 2018. Refinement methods were only mentioned in respectively 3.6% and 8.4% of the studies.

Reporting of 3R initiatives in preclinical publications is currently insufficient to guide researchers on 3R implementation. We advise that 3R reporting is enforced in combination with additional strategies e.g., education and interdisciplinary collaboration in order to stimulate the understanding of the benefits of 3Rs methods and how to apply them.

S2D2.5

COVID-19: LABORATORY ANIMAL USE AND NON-ANIMAL METHODS IN THE DYNAMICS OF A PANDEMIC

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Abstract
The COVID-19 pandemic has resulted in a worldwide avalanche of research activities on studying the SARS-CoV-2 virus characteristics, the pathogenicity of the disease and the R&D of prophylactic (vaccines) and therapeutic (drugs/antibodies) compounds. Studies in laboratory animals and in non-animal methods have been part of these activities. The Netherlands National Committee for the protection of animals used for scientific purposes (NCad) has been asked by the responsible Minister to provide an in-depth review on lessons learned from the pandemic. Focus is on animal and non-animal models being used in COVID-19 studies and on the regulatory process in authorizing marketing of drugs and vaccines.

To this end, NCad did a literature search and had interviews with experts representing the COVID-19 research landscape: fundamental and applied virology, vaccinology, pharma industry, regulatory authorities, funding bodies and NGO's. Also, two literature studies were conducted to substantiate the information on the availability, opportunities and limitations of non-animal methods; one on *in vitro* models and a study on analytical methods.

In this presentation we will share the information from the review and provide an overview of the animal models and non-animal models being used in COVID-19 research. Particularly, we will discuss strategies to reduce or replace animal used in pandemic infectious diseases, ranging from the One Health principle, a critical analysis of the pre-clinical and clinical testing process for product licensing to an optimization of existing non-animal methods. We realize that recommendations will have limited value for COVID-19 but do have value for future pandemics.

S2D2.6

SPEED UP AND VALUES UP? CHANGES IN ANIMAL STUDIES USE DURING COVID-19 VACCINE APPROVAL

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Abstract
Background: On 21 December 2020, the European Commission granted conditional marketing authorization for the BNT162b2 COVID-19 vaccine 'Comirnaty', also known as the Pfizer/BioNTech vaccine. This happened only ten months (instead of the usual ten years) after scientists first identified SARS-CoV-2. Many have suggested that the changes in required animal tests have sped up the development of Comirnaty and other vaccine candidates.
Methods: We ask: how have regulatory agencies and pharmaceutical companies dealt with requirements concerning *in vivo* animal models in the expedited approval of vaccine candidate 'Comirnaty'? We answer this question by interviewing stakeholders at the European level (n = 11 representing five stakeholder groups in eight interviews and two written statements) and analyzing relevant documents (n = 171).
Results: Stakeholders observed significant changes in regulatory procedures and requirements for the 'Comirnaty' vaccine. Specifically, the European Medicines Agency (EMA) 1) allowed a portion of the preclinical *in vivo* animal experiments to be performed *after* the start of Phase I or II clinical trials, 2) used a rolling review procedure, and 3) promoted the use of data obtained by non-animal methods. Pharmaceutical companies actively anticipated such changes and contributed data from alternative sources.
Conclusions: Our analysis shows how the EMA shortened its approval timeline in times of crisis by reducing the number of animal studies and promoting alternative methods. It also highlights the readiness of pharmaceutical companies to contribute to these changes actively. Future research could investigate to what extent this may hold for future situations.

S2D4

TO INVOLVE AND ENGAGE TARGET GROUPS FOR POSITIVE CHANGE

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Abstract
In this session, we aim to inspire others through our work on strategic communication in practice. The Swedish National Committee and the Swedish 3Rs Center use a communication strategy as a common base for all our activities, to clarify what goals and effects we want to achieve and how to work to achieve them.

After our session, you have gained an insight into how to involve your target group at an early stage, to ensure that the outcome is relevant and useful to them. For example, we have published recommendations on group housing of male mice and a guide for marking and tagging of fish – projects that involved our target groups from day one.

We will also present the work with a national strategy for replacement of animal testing; how we act to make sure that all stakeholders are involved. The involvement is crucial in order to achieve a successful strategy with a potential for positive change.

One of the tasks that we are dedicated to is to create neutral arenas where diverse groups can meet and share competence and experience under the premise of equal value. To create an inclusive climate, one needs to work with communication. We make sure that researchers from different fields come together, to work together. One example of such collaboration is an ongoing film project that involves both researchers using animal models and those using non-animal models, to make sure the message is clear and relevant for the target group.

S2D5.1

TAKING ON THE CHALLENGE OF OPENNESS AT A LARGE US PUBLIC UNIVERSITY

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Abstract
The University of Washington is a publicly funded institution with an extensive research program that includes animal use and is home to one of the seven US National Primate Research Centers. Due to on-going and increasing pressure from groups opposed to use of animals in research and concerns brought to the faculty senate, the provost assigned a task force to evaluate the university's communications about the use of animals in research.

The group convened in 2020 and consisted of representatives from several university departments and the Institutional Animal Care and Use Committee. The assignment was to provide recommendations on best practices to counter misinformation and to proactively communicate research accomplishments. The task force provided a 10-point recommendation list to the provost. Key points included establishing and sustainably funding a standing committee with strong leadership, with the express purpose of encouraging openness around animal research at the university. This new committee is charged with development of a website and media relations strategy for proactive public outreach to legislators, stakeholders within the university including faculty and students, as well as the general public. The office of Assistant Vice Provost for Animal Care, Outreach, and the 3Rs has been newly established and will be putting the recommendations into action. A discussion of ongoing and proposed activities will be provided.

S2D5.2

TRANSPARENCY: ADAPTED BROADENED COMMUNICATION LEADS TO BETTER ACCEPTANCE

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Abstract
Experimental research is absolutely necessary if we still want to improve health in humans and animals. Whereas most scientists agree with this conclusion, this is not the case for all people non directly involved with research. For this reason, at Lille University Hospital, we decided to broaden all ways of communication towards public. We thus invited patients enrolled in clinical trials to share experiences with researchers and clinicians by offering them to visit the animal facilities. We also invited children to discover experimental research. Media and students made articles explaining the advantages of experimental research with good feedbacks from readers. We also started to give lectures to students involved in animal science about communication, so that they get a dedicated background and feel at ease to speak with non-scientist people openly. The links and continuity between animals and humans are fully demonstrated with many explanations and clear examples in general life. We also joined a national program focused on simulation (plastic and animals) taught to medical students and especially those involved with interventional medicine and surgery. We finally decided to register all our first-year PhD students to our local course on animal research so that they are as early as possible ready for interacting with everyone.

We are absolutely conviced that the more we explain our research, the more people understand and validate the use of animals to help cure living beings.

S2D5.3

LOST IN TRANSLATION? FACILITATING COMMUNICATION BETWEEN ANIMAL AND MEDICAL RESEARCH ETHICS COMMITTEES

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Abstract
Translation of animal to human studies forms an essential part of (bio)medical research. Both medical and animal research ethics committees evaluate whether proposed experiments in humans and animals are ethically acceptable. This is of special interest

for newly developed pharmaceutical drugs or medical devices, where clinical literature might be lacking. The aim of our study was to assess the current ethical evaluations in the chain of development of new therapies. A pilot study with interviews among members of Dutch medical research ethics committees, focused on how results from animal studies are taken into consideration. There appeared to be no standard methodology nor harmonized guidelines and each committee has their own expert(s) to evaluate animal data. A need for harmonized guidelines/procedures and adding preclinical expertise to the medical research ethics committees was identified. As animal ethics committees also weigh the potential translational ability of animal models for human health and diseases, an exchange of knowledge between the two types of ethics committees was initiated. Two focus meetings were organized with participation of members from Dutch animal and medical research ethics committees. These meetings led to an interesting exchange of information and experiences. Results of these two meetings will be presented. For example, input from the medical side into animal ethics committees would be welcomed and vice versa. It is considered useful to continue this dialogue and exchange, also internationally, as this will lead to a further cross-fertilization of benefit to both animals and humans as well as the corresponding ethics committees.

S2D5.4

JUGGLING LEGAL ROLES: ANIMAL WELFARE OVERSIGHT AND AWB TASKS

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[2]*Vrije Universiteit, Amsterdam, Netherlands*
[3]*Utrecht University, Utrecht, Netherlands*
[4]*Royal Netherlands Academy of Arts and Sciences, Amsterdam, Netherlands*
[5]*Biomedical Primate Research Centre, Rijswijk, Netherlands*
[6]*Amsterdam UMC, Amsterdam, Netherlands*

Abstract
A licence holder shall have at least one person on site who can oversee the welfare and care of the animals (art. 24.1a, Directive 2010/63/EU). In the Dutch Experiments on Animals Act, this person is described in art. 13f3a. These animal welfare officers (AWO) combine the oversight on welfare with tasks derived from their central role in the AWB (e.g. following projects and implementing 3Rs). Additionally in the Netherlands the AWO is formal advisor to the animal ethics committee and is responsible for the statistical reporting.

The AWO therefore needs a range of knowledge on animal welfare, laboratory animal science, the regulatory framework and just as important should be able to implement policies and inspire people working in the field of animal experimentation towards a culture of care. These officers should therefore be strong communicators at all levels.

We focus in this presentation on the communication skills we have specified as learning goals in a formal education program. These skills have a basis in the knowledge as described by module 1–50 in the education and training framework. In addition, interpersonal skills will be trained like auditing, problem solving, empowerment and conflict management.

This will give the AWO tools to act as a team player in the AWB and an advisory partner in the research community ranging from animal caretaker to licence holder. This formal education program is thereby an investment in a culture of care towards welfare of staff and animals and responsible use of animals in research.

S2D7.1

COMMUNICATION BETWEEN ESTABLISHMENTS AND COMPETENT AUTHORITIES IN FAVOUR OF ANIMAL WELFARE

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Abstract
Member States' central and local competent authorities safeguard animal welfare via the implementation of Directive 2010/63/EC. The Directive has been into full force since 2013 and includes mechanisms that ensure not only supervision of user breeder and supply establishments but also interactive communication via the official procedures that are foreseen.

Competent authorities are responsible for the dissemination of information regarding the implementation of relevant legislation in all types of establishments. Furthermore, in many Member States their representatives actively participate in all meetings of project evaluation committees. Fruitful discussions regarding the design of the protocol, the application of 3Rs, the adequate explanation of potential benefits and objectives of the protocols as well as the rational estimation of harms, take place between researchers and representatives of competent authorities. Either at a local or at a central level the latter have an invaluable experience regarding all authorized projects in their district and are fully aware of the special circumstances in each country. Project evaluation includes the approval of a non-technical summary of the project. Competent authorities publish them and perform further scrutiny during this process. Retrospective assessment also involves the collaboration of competent authorities with researchers, since this procedure involves review on the issues raised by the assessment process. National Committees, by their definition promote consistency on care and use of animals in collaboration with AWBs and create pathways of communications with them. Finally, official inspections also provide interaction between establishments and all levels of competent authorities.

S2D7.2

EXPECTATIONS FOR INTERNAL COMMUNICATIONS IN ANIMAL CARE AND WELFARE PROGRAMS

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Abstract
Internal communications are fundamental for the successful operation of the animal care and use program in an institution. There are several actors in the program that need to communicate with each other effectively: the institutional manager, the animal welfare body or equivalent, the veterinary service, the animal care staff, the researchers, the maintenance service, the environmental health and safety service, and if it exists, the quality assurance unit.

These communications are basic to prevent or act in situations that directly affect animal welfare, for example between animal care personnel and researchers, and the veterinary service. Others are necessary for the progress of the 3Rs in the institution and the implementation of corrective measures when necessary, for example between the Animal Welfare Body or equivalent and the institutional manager. And still others are necessary for the safety of the staff, such as those connected with health and safety professionals, or the proper functioning of the animal facilities, with the maintenance service.

Although the need of effective internal communications in an Institution seems to be an obvious goal, frequently communication procedures are not clearly defined and therefore not in practice, resulting in internal program malfunctions that may endanger the animals wellbeing and the personnel safety.

This presentation will define the expectations and key communication pathways needed between animal program stakeholders and will bring up examples of typical malfunctions of internal communication in an institution.

S2D7.3

THE ROLE OF DESIGNATED VETERINARIANS AS ADVOCATES FOR ANIMAL WELFARE

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Abstract
Designated Veterinarians (DVs), due to the nature of the veterinary profession and the role assigned to them by national legislation and international guidelines, form the bridge between caretakers, technicians, researchers, management, authorities, and animals; they are expected and appointed to safeguard laboratory animal welfare. Duties arising by the legislation for DVs focus on providing consultation for the welfare and treatment of animals. Usually, they include input to the institutional animal welfare body and project evaluation process, where DVs contribute their valuable expertise for refining animal care and use and improving experimental design. Clinical duties involve overlooking animal use for procedures such as administration of substances, anaesthesia, surgery, application of humane endpoints, euthanasia and providing veterinary care, while many veterinarians also perform procedures and experimental surgery and train research personnel. While performing all the above tasks, DVs consciously and unconsciously instil a culture of care, inspire the application of the principle of replacement, reduction and refinement, and embody the 3Ss of good science, good sense and good sensibilities. The role of the DVs is interconnected with advocating for animal welfare, either by voicing welfare concerns, addressing laboratory animal science and medicine queries, or just leading by example. This reality exposes DVs to challenges of coping with compassion fatigue, improving communication, negotiation and leadership skills and keeping their own education and training up to date to successfully fulfil this duty which is both evident and hidden in all others.

S2D8.1

ROLE OF THE DESIGNATED VETERINARIAN – FELASA-ECLAM-ESLAV WORKING GROUP

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Abstract
Article 25 of Directive 2010/63/EU requires Member States to "*ensure that each breeder, supplier and user has a designated veterinarian (DV) with expertise in laboratory animal medicine, charged with advisory duties in relation to the well-being and treatment of the animals*". In 2021, FELASA, ECLAM and ESLAV set up a joint working group (WG) to consider how the role and responsibilities of the DV are currently met across Europe.

Whilst European professional guidance on the role and responsibilities of the DV has been published there remains a lack of harmonisation on the implementation of Directive 2010/63/EU Art. 25. The role and extent of the DV's authority currently depends on national and local initiatives, potentially leading to significant variability between establishments. In addition, the lack of definition of the role and its inherent responsibilities can lead to the independence of the veterinarian being compromised and potential conflicts of interest.

Therefore, there is need for greater agreement on the role of the DV across Europe. Recommendations put forward by FELASA, ECLAM and ESLAV could establish the basis for a consensus and help veterinarians working in laboratory animal medicine and science by providing a simple guidance document.

The task of this WG is to develop recommendations for the DV role. Towards this, a survey was conducted amongst professionals in the field to gain information on how the DV role is currently implemented across Europe.

This talk will present the findings of the survey and discuss preliminary conclusions arising from these.

S2D8.2

LABORATORY ANIMALS' WELFARE DURING TRANSPORTATION: KEY ONLINE RESOURCES FOR END USERS AND TRANSPORT STAKEHOLDERS

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Abstract
Over the past recent years, several initiatives have emerged at national and international levels putting more emphasis on the critical role of transportation in the supply of laboratory animals to research facilities. As for all activities involving the use of animals for the benefit of humans, there is an increasing societal concern and highest consideration for animal welfare standards is required to ensure sustainability.

In this context, AALAS and FELASA jointly established a working group (WG) on the transport of laboratory animals who was tasked to set up recommendations related to good transport practices.

During this presentation, participants will be introduced to general and species-specific considerations for the welfare of animals during transport, based on literature review and case reports. They will also be educated to the online resources that will be made available to the research community thanks to the webpage developed by transportation task force. In addition, some concrete, real-life experience illustrations will be given, providing attendees with up-to-date practical information they should be aware of when they ship animals and/or request animals to be shipped.

S2D8.3

LEADING EFFECTIVE CHANGE IN YOUR ORGANISATION

C. Back[1]
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Abstract
Paradoxically, the one *consistent* feature of every working environment is *continual change*. This means the successful organization must be flexible and adaptable – a responsive organization. However, people are often afraid of change because it means learning new (and initially difficult) ways of working and behaving, and outcomes are not always clear. They are used to practices, traditions, and ways of doing things which – even if they are not working very well – are so deeply ingrained in the organisation that they can be difficult to identify let alone change.

To lead change in an organisation is a challenge of the first order. Defining the main problem areas, then creating the energy needed within the organisation to drive through necessary change is a process that takes focus, energy and a clear timeframe. Based on management specialist Philip Kotter's eight step process and many years of personal experience this presentation describes the key steps necessary to implement change effectively.

S2D8.4

LEVERAGING TECHNOLOGY: AN APPROACH FOR PERFORMING ANIMAL WELFARE DUE DILIGENCE FOR EXTERNALIZED INVIVO WORK

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Abstract
In vivo work is being contracted with external third parties globally, creating the need to ensure animal welfare at external institutions is evaluated and any associated risks are mitigated. This presentation will focus on a multi-step process for assessing external research activities and third-party in vivo programs with the objective of ensuring robust animal welfare and refinement of practices affecting animal welfare. Briefly, an introduction of the aims of the process: the identification of the industry needs for a unifying, streamlined platform for assessment and due diligence of third-party partners and the choice of a platform will be presented. Then, the process of managing third parties in the platform and the review process for externally placed work will be presented. Specifically, how the platform is used to allow research initiators to request and submit study proposals, to request work to be placed at externalized third parties for subsequent review and approval and give an overview of the success of the program from the users' perspective. The presentation will conclude with the description of the assessment of third-party partners, including the completion and review of a virtual assessment, using the study proposal to perform a risk analysis to prioritize site visits, selection and training of site visitors and finally reviewing the site visit process.

S2E1.1

ANISHARE: AN OPEN-SOURCE SOFTWARE TO IMPROVE THE USE OF SURPLUS LABORATORY ANIMALS AND ORGANS

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[4]*Max Planck Institute for Biological Cybernetics, Tuebingen, Germany*

Abstract
Introduction: Scientists are required to comply with the 3Rs when conducting animal experiments. Strategies to implement the "R" for "Reduction" include improved statistical planning, optimized breeding schemes, and replacement of animals or isolated organs. In the breeding of genetically modified lines, despite optimal planning, many animals are born that may have an

undesirable genotype or sex. Often these surplus animals cannot be used in the actual experiment and are therefore killed without further use.

While sharing and exchanging unused animals within or outside of research institutes would meet the ethical and legal requirements to make the best use of animals, the practical organization and information flows can be challenging. Software solutions can help to communicate and facilitate sharing and incentivize scientists to engage.

Methods and Results: We developed a user-friendly open-source web-based software called AniShare to support and facilitate the exchange of information regarding animals available for sharing within scientific institutes. The application provides the ability to share both animals and organs while considering all required documentation. AniShare can be used for different animal species and offers the possibility of further customization.

In a further step, we connected Anishare with commercially available animal management databases to further automate the process.

Conclusion: AniShare is freely available through published source code and can be easily implemented in every type of facility. All facilities are required to apply and continuously optimize the 3Rs. Therefore, AniShare can be an easy-to-adopt 3R initiative that contributes to promote animal welfare and an institutional "Culture of Care".

S2E1.2

TELE-EMBRYO: A SERVICE TO PROMOTE REDUCTION AND REFINEMENT IN REDERIVATIONS

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Abstract

Rederivation is, to date, the only reliable method to introduce genetically altered lines into a SPF animal facility without compromising its health status. *In vitro* fertilization with sperm from a male donor is a safe and fast method since epididymis can be shipped from almost everywhere providing fertile sperm up to 192 hours after collection. However, in homozygotic strains, or double and triple mutants, this approach requires intensive breeding afterwards, producing a lot of surplus animals before the original genetic background can be recovered. In such scenario, embryo transfer is the more sensible alternative. The CNB-CBMSO Transgenesis Service has established a service of embryo collection, Tele-embryo, that replaces the breeding of health compromised mice lines in the quarantine of our animal facilities. Tele-embryo offers our customers the in-situ collection of embryos at the institution of origin when it is located in Spain, and they are not able to collect and to ship fresh or frozen embryos. The process is time consuming for the personnel of the Service, requiring a full-day travel with equipment, but in exchange, we avoid the transport, housing, and production of mice cohorts potentially infected in our quarantine. This approach does not compromise efficiency compared with in-door rederivations and it saves time and animals. We will present efficiency examples of both approaches confirming its feasibility and comparing internal costs and number of animals required, that justifies the extra effort of in situ collection.

S2E1.3

OBJECTIVE OF 50% REDUCTION IN 10 YEARS IN A PHARMACEUTICAL COMPANY

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Abstract

The responsible use of animals is essential to fulfil the obligations of quality, safety and efficacy of Sanofi medicines and vaccines. **Animals remain a small but an integral part of a comprehensive research and testing strategy** that also includes non-animal methods, digital approaches, and clinical research. All models are complementary to address scientific questions. Convergence of the read-outs is sought to move R&D projects forward, relying on good science, without excluding animal models.

Sanofi publishes the number of animals used and the global reduction. In the last 7 years, a reduction of 45% has been reported. To maintain the efforts of decreasing the proportion on in vivo models and of phasing in more new approach methodologies in a more structured and proactive manner, a **corporate policy on the Integrated Research and Testing Strategy (IRTS)** has been drafted (available in sanofi.com).

As a key element of the Policy, the Bioethics Committee of Sanofi has endorsed a formal **global commitment to the 50% reduction of animal use.** The 50% reduction is calculated by comparing the use of animals in research, development, analytical testing, and quality control between 2020 and 2030. It includes animals used by Sanofi (Sanofi sites) and those used on behalf of Sanofi (CROs and external partners).

This ambitious objective has been approved by the main functions, R&D and Industrial Affairs. Each function is working on the **operationalization of the policy** to achieve that goal by setting its governance, specific deliverables, indicator of performance, technology projects, scientific collaborations, regulatory approaches.

S2E1.4

REDUCTION OF THE USE OF ANIMALS FOR VACCINE EVALUATION: ACHIEVEMENTS AND PERSPECTIVES

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Abstract

GSK identifies, develops, and manufactures innovative medicines, vaccines and consumer healthcare products. GSKs animal studies are conducted with high standards of humane care and treatment.

These studies represent a small but vital part of our procedures to develop future products and perform the mandatory release of vaccines.

GSK's moral and scientific responsibility led to a company-wide strategy and program to set up state of the art non-animal technologies to test the safety and efficacy of new and existing vaccines.

Active engagement in collaborative studies to identify alternative methods as well as transparent communication to regulators on equality or even superiority of those methods allows to reach a collective agreement. This is a cornerstone of GSK strategy to reduce the use of laboratory animals in vaccine release by 75% until 2025.

In this talk you will see concrete examples of how replacement, reduction and refinement resulted in a reduced animal use by more than 30% in the last years. This use of alternatives has in addition allowed to release vaccines faster, with less variable methods and in a leaner procedure demonstrating that modernization is a win-win for patients, regulators, and manufacturers.

While the work toward non-animal-based research and development continues, GSK is committed to a culture of care, acting ethically and practicing good animal welfare when animal use is still inevitable.

S3A3.1

JOINT EFFORT OF 3 BELGIAN ACADEMIC INSTITUTIONS TO STANDARDIZE PROSPECTIVE SEVERITY ASSESSMENT

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Abstract
According to the directive, experimental procedures must be classified as non-recovery, mild, moderate or severe. Examples of procedures and models with their severity are, however, sparse leading to an inconsistency in severity reporting between different countries and institutions. Even within institutions (and ethical committees) the risk of inconsistency exists when a severity classification system lacks, especially in large academic institutions with many different models, procedures, and species. To overcome this within KU Leuven, we started developing a severity classification system based on the guidelines compiled by Norecopa in 2019. In order to benchmark our classification system, we quickly collaborated with 2 other Belgian academic institutions: Ghent University, faculty of Medicine & Health Sciences and VUB.

This project started with an inventory of all models and procedures studied and performed @ KU Leuven (largest institution). These were then classified as mild, moderate or severe based on the Swiss, German, EU and UK references. For procedures where references were missing or which were classified differently, severity was based on professional judgement of the AWOs/vets of the institutions. When reaching consensus, this was proposed to and approved by the AWB and institutional ethical committee.

As a result, we have now a severity classification system wherein all procedures and models of 3 academic institutions are included. It consists of 4 main categories (procedures, measurements & tests, disease models, animals) and 16 subcategories wherein procedures and models are grouped based on common denominators and wherein severity of progressive disease models is based on clinical symptoms.

S3A3.2

IMPROVED ASSESSMENT OF SEVERITY SCORE SHEETS BY MEANS OF AN ADVANCED ANALYTICAL DASHBOARD

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Abstract
Directive 2010/63/EU introduced requirements for the classification of the severity of procedures to be applied during project authorisation processes for the use of animals in scientific procedures and to report actual severity experienced by each animal. These requirements offer opportunities to consider procedures' adverse effects and how these can be reduced to minimize animals' welfare consequences. Better reporting of adverse effects should help in refining future procedures, benchmarking good practice, and better define severity limits and humane endpoints.

With the aim to improve the process necessary to evaluate severity scores, an analytical dashboard implemented with an advanced analysis system platform was created. First, raw data were extracted from the company repository, then severity scores, based on two performance indicators, were computed: body weight loss and clinical observations, associating specific scores to clinical signs. Based on the total daily sum of these scores, different severities are attributed to each animal. Next, an advanced analytical dashboard was developed, allowing scientists to efficiently visualize and evaluate the severity reached by all animals. This gives the possibility to navigate each animal's clinical status details during every phase of preclinical studies, both on-demand and retrospectively.

Thanks to cutting-edge technology tools, the overall quality process has been highly improved, reducing time needed to collect, analyse, and report all the individual data. The automatization of the whole process helps in replacing paper with analytics tools, further allowing the evaluation of several studies in just few minutes with more precision and with an intuitive and dynamic approach.

S3A3.3

ESTIMATING SEVERITY MEANS ESTIMATING CUMULATIVE SEVERITY

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Abstract
Harmonisation of severity assessment is relevant for the harmonisation of project evaluation. Cumulation of severity is often a neglected aspect in severity assessment. The focus is mostly on the suffering caused by single events and not on the effect of all the events together. We suggest shifting the focus to the animal. If actual severity reflects the highest severity including any accumulation of lesser events, so should the estimation of severity when applying for a project license.

Factors that should be part of the assessment:

- Any suffering related to the procedure.
- Cumulative effects of interventions that have occurred prior to the procedure even if they are under the threshold for being in itself a procedure but are additional to the 'normal' life as a laboratory animal.
- Adequate refinements that may lower the severity, and adequately chosen humane endpoints.
- Sensibilization as a result of previous procedures, but also habituation e.g. by training.
- Positive (and negative) experiences not related to the experiment that may adhere to the general wellbeing and therefore might influence how an animal will react to new events.
- Suffering due to genetic modification or a disease or as a consequence of an additional restraint in natural behaviour (e.g. isolation).
- Welfare implications of capture, captivity and handling for animals taken from the wild.

The presentation will introduce the concept of cumulative suffering into the severity assessment, discusses the relevant factors that should be incorporated and presents the tools that can be used.

S3A3.4

SEVERITY ASSESSMENT IN A MURINE MODEL OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Abstract
The basis for implementing the 3R-Principle in animal-based research is the detection of burdens imposed on the animals and the assessment of these burdens' severity.

This requires evidence-based methods that allow for the detection of all burdens, especially those not openly communicated by the animals. The use of these methods to characterize animal models, regarding their impact on animal welfare, is another critical point.

In this study, a well-established murine model of cardiopulmonary research was used, to integrate a system for detecting individual voluntary wheel running (VWR), a novel method of severity assessment. In a side-by-side comparison with established methods (video monitoring of homecage-behaviour, behavioural testing, measurement of fecal corticosterone metabolites, serotonin- and dopamine concentration in various brain areas, histological evaluation of the olfactory epithelium.), a holistic approach was applied. This allowed to assess potential burdens not routinely detected in the communication between animals and experimentator.

With the results obtained, the applicability of VWR as a method of severity assessment is further evaluated and its use in cardiopulmonary research is assessed. Furthermore, the results make it possible to characterize the animal model, regarding its severity and potential refinement aspects. The approach implemented can be further applied to other models and fields of research.

S3A3.5

DESIGNING A SCORE SHEET FOR WELFARE ASSESSMENT OF THE EMERGING FISH MODEL *NOTHOBRANCHIUS FURZERI*

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Abstract
In the last few years, the African killifish, *Nothobranchius furzeri,* has emerged as an important model system for the study of vertebrate ageing. Indeed, despite its short median lifespan of 3 and 7 months, it recapitulates several hallmarks of age-dependent phenotypes and pathologies. *Nothobranchius furzeri* is an annual fish that inhabits seasonal freshwater ponds in the southeast of Africa and is characterized by rapid growth and early sexual maturation, therefore it is currently considered the shortest-lived vertebrate that can be bred in captivity. The goal of our work was to determine a well-designed score sheet for *N. furzeri.* To standardize and formalize severity classification of the applied procedures on the basis of estimated levels of pain, suffering and distress, score sheets are commonly designed to record the impact of experimental procedures on animal behavior and welfare. First, we identified four parameters (behavior, swim, body condition and clinical signs) to detect any kind of alteration and any symptoms that can potentially affect them. Then, we defined a numerical scoring ranging from 0 to 3 in order to weigh each symptom. Finally, based on symptoms sum up we established the best solution to apply to

reduce animal suffering, including humane endpoints. Total score can vary from 0, implying no action, up to values higher than 8, representing our humane endpoint which requires fish euthanasia. This simple scoring tool can be a real asset for long-term monitoring of individual animal welfare being also suitable to be easily integrated into routine management practices.

S3A3.6

COMPARATIVE SEVERITY ASSESSMENT OF GENETIC, STRESS-BASED AND PHARMACOLOGICAL MOUSE MODELS OF DEPRESSION

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Abstract
The use of animal models in neurosciences is pivotal to gain mechanistic insights into complex functions and dysfunctions of behavior. Since animal models are mostly based on mimicking the human condition, various forms of physical and/or psychological stress are inherent to a variety of psychiatric animal models. In this study, we compared the severity of different approaches to induce depression in mice: mutagenesis (GluA1 knockout) to immobilization stress or stress-induction via stress-hormone treatment. While genetic alterations could represent a lifelong burden, the temporary intervention might only affect a limited duration. We used behavioral and physiological parameters (e.g. nest building, burrowing, body weight and fecal corticosterone metabolite concentrations) to determine the wellbeing in male and female mice. This data was further used to perform an evidence-based estimate of severity by using a composite score for relative severity assessment (RELSA). We found that even though restraint stress and supplement of corticosterone both aimed at the stress development, the latter affected the wellbeing much stronger, especially in females. Restraint, however, did lead to less pronounced effects in females. A recovery from both stress treatments was possible in both sexes. GluA1 KO mice and interestingly their wildtype littermates showed impairment of wellbeing, at a comparable level to the immobilization experiments in males – female GluA1 and wildtype littermates were slightly more affected than males.

S3B1.1

CULTURE OF CARE – SETTING THE SCENE

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Abstract
Directive 2010/63/EU gives animal welfare considerations a high priority in animal care and use practices in Europe. This legal framework is an agreement between society and the research community on how animals can be used in research and testing. A solid culture of care is a cornerstone of this agreement, implemented through the work of all involved in the use and care of animals throughout the establishment, requiring strong leadership from the management. Concerns over the culture of care can and will threaten this trust. In contrast, all benefit from a good culture of care – animals, science, organisation and its members, and society.

Culture of care is also a central theme covered by the various guidance documents developed together by Member State authorities, user community and key stakeholders. Competence is fundamental for an individual to actively contribute to a good culture of care. Several open access tools have been developed to help build a solid competence base across the EU. Finally, it is important that culture of care extends from animals to those working with animals – to care for the carer builds resilience to compassion fatigue and a strong basis for a continued compassionate attitude towards animals trusted in one's care.

S3B1.2

DOING THE RIGHT THING: COMPETENCE AND A CULTURE OF CARE

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Abstract
The essential role of competence assessment to ensure the basis for appropriate care and performance of procedures cannot be underestimated. How should competence be assessed and what tools are available, what are DOPS and how can these be used to promote a good culture of care?

Assessment is an integral part of learning and in a good culture of care should take place in an open, supportive environment. In this model, the tutor acts as facilitator or mentor, supporting students in their learning but giving them ownership of, and responsibility for, their educational experience. It is a mature conversation, a collaborative inclusive learning partnership, which fully replicates learning in the workplace. The learner has the opportunity to make mistakes, reflect on these, and apply their learning going forward. Formative assessment is an integral part of this journey.

Finally, through summative assessment, the learner can demonstrate that they have achieved the required standard of competence for the task, thus assuring both scientific quality whilst safeguarding the welfare of any animals involved. DOPS assessment evidences not only the knowledge and manual skills for the task but the professional behaviours required for working responsibly in the in-vivo setting. Using evidence-based methods such as DOPS, we ensure that the whole assessment process is inclusive, transparent, and robust.

An excellent culture of care in learning and assessment instills in the the learner to take responsibility for their actions, reflect on their own abilities and to challenge constructively, embedding the 3Rs in all that they do.

S3B1.3

THE DIFFERENCE TWO HANDS CAN MAKE

N. Dennison[1]
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Abstract
This presentation will discuss how the University of Dundee changed from traditional handling methods to tubing and cup handling for mice in the context a Culture of Care.

The initial trial was driven by the Designated Veterinarian (DV) and the senior animal technician of one facility. A team approach to discuss concerns and to gain buy in achieved the support of the junior technicians, researchers, and management to undertake the initial two-week trial. Having demonstrated success, the trial was extended across the University, with "Champions" identified to support staff having difficulties and targeted meetings with those reluctant to engage or with concerns. All our facilities now routinely handling by tubing/cupping and have done so for more than 18 months.

The value of the change has gone well beyond the observable welfare benefits to the animals. The University has improved its profile locally and nationally, helping build our reputation for promoting animal welfare. Researchers find training in handling easier; the presence of the tube seems to give them more confidence and the incidence of bites has reduced. The technicians feel empowered to drive refinements and collaborative working with researchers has improved. There have been no detectable negative effects on any models. The refined handling methods have helped with the compliance of animals for unrestrained blood sampling; a method that reduces stress and which we know gives better data. It has been a win-win change and our Culture of Care has been enhanced.

S3B1.4

WALK THE EXTRA MILE FOR REHOMING

P. Van Loo[1], M. Janssens[1] and W. de Leeuw[1]
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Abstract
All animals count, no matter how small. As we are making efforts to rehome cats, dogs, and non-human primates, why don't we make the same efforts for mice and rats? This thought inspired us to set-up a rehoming programme for rodents in 2019. Of course, there were hesitations in the beginning. Would the animals be well cared for, which criteria should animals and adopters meet, what would it cost in terms of time and money, and who would pay? But the idea that we could give many of these lovely critters a new home turned all noses in the same direction. Animal caretakers, management, researchers, and AWB-members gladly join forces to make the programme a success and expand it to all animal species in our care, with over 400 mice, 750 rats and 100 animals of other species such as chicken, hamster, guinea pig and zebra finch rehomed over two years. The presentation will highlight how the programme contributes to the culture of care in our facilities, by bringing colleagues together and as a group making a good home for the animals possible.

S3B1.5

A PERFORMANCE INDICATOR TO SET CORPORATE PROGRAM: FROM LOCAL ACTIONS TO GLOBAL COMMITMENTS

T. Decelle[1]
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Abstract
The culture of care is more and more common concept. EFPIA Research and Animal Welfare network have worked to determine criteria to set and assess a culture of care program. The global Culture of Care programme as developed by Sanofi aims at structuring the approach by defining specific actions, engaging actors at all levels, educating professionals, increasing awareness, and measuring the progress. A quantification of culture of care was performed for the first time in 2018. In 2021, a new assessment was carried out to appraise the evolution of individual engagement and company commitments. Defining this scoring system as a key performance indicator is a formal way to track progress and determine a program for improvements. This program will be developed by the GloCal approach with a 2-year orientation plan: global/corporate commitments and support, local engagement and actions relying on all animal personnel.

The 2-dimension score of culture of care becomes a management tool to drive future progresses and engage all professionals in the same direction: the welfare of animals.

S3B2.1

EXPECTATIONS OF THE EUROPEAN COMMISSION TOWARDS THE ANIMAL WELFARE BODY

S. Louhimies[1]
[1]*European Commission, Brussels, Belgium*

Abstract
Directive 2010/63/EU recognises that animal welfare considerations should be given the highest priority in all animal care and use practices. One of the principal structures within the legislation to facilitate this, is the requirement for each establishment to set up an Animal Welfare Body. Animal Welfare Bodies are expected to provide advice on the welfare and care of the animals, the application of the Three Rs, review management and operational processes, follow the development and outcome of projects, and advise on rehoming. This is a key structure in developing and maintaining a good Culture of Care and bringing Three Rs to life in the day-to-day activities of the establishment.

The work of the AWB has already been recognised as contributing actively to a good culture of care and implementation of the Three Rs. However, some challenges have also been reported. The main issues hindering their effectiveness relate to the available resources and additional (non-core) tasks entrusted upon Animal Welfare Bodies by the establishment. The presentation will discuss these challenges and potential solutions to ensure the effectiveness of animal welfare bodies for the benefit of animals, the Three Rs and science.

S3B2.2

THE NATIONAL NETWORK OF ANIMAL WELFARE BODIES IN DENMARK

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Abstract
The individual Animal Welfare Bodies (AWB) accumulate a lot of useful skills, competencies, learning and knowledge. Networking with other AWBs is a fast and efficient way to share these assets and to learn from others.

The presentation will go through how the Danish network for AWBs was set up, what it is working with and how the above-mentioned assets are shared within and outside the network. The presentation will also outline which outcomes the network has achieved and tips of what works well and what to avoid will be presented by case stories. Finally, the presentation will include the top line results of a recent national survey on how the Danish AWBs are organised, how they use different communication channels and the tasks they work with.

S3B2.3

THE NATIONAL NETWORK OF ANIMAL WELFARE BODIES IN FRANCE

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Abstract
The French Network of Animal Welfare Bodies (RN-SBEA) has been set up in 2019, following a symposium organized in 2017 by AFSTAL and GIRCOR about ethics and animal welfare in research. This symposium and a survey made at the same time showed the need to create a national network for AW. This network aimed to allow the sharing of experiences, references resources and good practices for those who participate. The coordinating body of the network is made up of 6 members, all members of an AWB and coming from different backgrounds.

The network set itself various objectives when it was created with the mission of providing service to AWBs through the development of a toolbox where everyone can choose those that suit them best.

More than 350 AWB are already members of the RN-SBEA.

Among actions already made, we could cite a full survey made on needs and expectations of AWB in France (it also helped the network to prioritize its actions), a shared website with the Ethics Committee Network, regular Newsletters and practical sheets, organization of 2 annual meetings (2020 and 2021), presentations at various meetings.

The current main project of the RN-SBEA is to write and publish a "Guide" that could help AWB to be effective, especially in regards of the regulatory defined missions. The RN-SBEA would like also to take over the AFSTAL team in charge of AWB workshops.

The network receives the support of the 3 associations which contributed to its creation: AFSTAL, GIRCOR and OPAL.

S3B2.4

EXAMPLE OF AN AWB NETWORK – THE BELGIAN ANIMAL WELFARE BODY PLATFORM

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Abstract
The Animal Welfare Body (AWB) platform in Belgium was founded in 2017 following a kick-off meeting organized by the Belgian Council for Laboratory Animal Science (BCLAS) to determine whether an AWB platform would be viable.

The Belgian AWB platform is set up as a working group of BCLAS and is representative for the three regions (Brussels, Flanders, Wallonia) and for AWBs operating in Academia and Industry. The platform objectives include the promotion of networking and exchange of information, to provide training, and to help set up good practices for AWBs, if possible, in partnership with the Regional Authorities.

So far, the platform has set up several interactive workshops aimed to improve overall AWB efficiency and has helped BCLAS to set up an internet forum to facilitate the exchange of information and expertise between people involved in AWBs and Ethical Committees and in the management, care and use of lab animals. Currently there is a request from the regional competent Authority in Flanders to collaborate on a guidance document for AWBs.

The Belgian AWB platform is confronted with some challenges (e.g. regional and language issues, COVID-19, core team members busy agenda's, no AWB 'membership'), but has already proven, thanks to the help of many volunteers in the core team, to be a valuable aid in promoting exchange of information thereby supporting further harmonization on how AWB tasks and responsibilities should be understood and helping AWBs to be successful.

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S3B3

COMMUNICATION AND IMPLEMENTATION OF HUMANE KILLING OF LABORATORY FISH (FELASA WORKING GROUP RECOMMENDATIONS)

J.-P. Mocho[1], R. McKimm[2], J. Ramos[3], P. Rengtved Lundegaard[4], V. Jencic[5], K. von Krogh[6] and FELASA Working Group
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[5]*University of Ljubljana, Ljubljana, Slovenia*
[6]*von Krogh Consult, Oslo, Norway*

Abstract
The session will present the recommendations from the FELASA working group on methods of humane killing of laboratory fish. The recommendations are based on the latest data of anaesthetic overdose efficacy and electrical stunning in zebrafish. The comparison of these data with other data on hypothermic shock or averseness of commonly used anaesthetics opens the door to new perspectives on the debate of humane killing of fish in research. Communication, whether it is external (e.g. public perception, competent authority guidance) or internal (e.g. compliance with protocol to warrant efficacy, animal welfare and health and safety) is key to all methods of humane killing of laboratory fish, and this is the thread we will follow during the session. First, we will focus on the interpretation of fish experience by scientists and by the public. This will lead to examples of misguidance by legislators and regulators regarding hypothermic shock. Then, we will introduce the concept of electrical stunning, show promising data for its use in zebrafish, and evoke internal and external communication challenges for its implementation in aquatic facilities. This will highlight how internally standardised practice is necessary to ensure optimal procedure. A particularly relevant example is the use of lidocaine at the relevant pH to induce a prompt overdose of anaesthesia. Indeed, recently published data on the screening of anaesthetics' efficacies for humane killing of adult and larval *Danio rerio* in several facilities will allow us to illustrate the challenges of communication between research groups and the risk of hasty conclusions.

S3B4.1

THE IMPORTANCE OF GENETIC BACKGROUND IN MOUSE MODELS

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Abstract
Thorough biological characterization of animals is critical to ensuring that research observes the principles of the 3Rs. It is increasingly recognized that the genetic background (i.e., all genomic sequences other than the gene(s) of interest) can have profound influences on the phenotype of mouse and rat model. There are many published articles in the literature that show mutations (spontaneous or chemically induced), transgenes, and targeted alleles (knockouts and knockins produced through ES cells or CRISPR/Cas system) that are moved onto a different background can show a change in phenotype. Additionally, the use of genetically altered mice with mixed backgrounds can also impact the reliability of experimental results. The use of SNP panels with markers evenly spaced across the genome allows for characterization of the genetic background of mouse models and for comparison to commonly used inbred laboratory strains. Such panels can also be used in the development of congenic strains by marker-assisted backcrossing which will shorten the number of generations required to reach congenic status and lower the number of animals used in the process. By properly characterizing and controlling for the genetic background of their mouse models researchers can increase the rigor and reproducibility of their results and contribute with the reduction of mice used in research.

S3B4.2

THE IMPORTANCE OF MICROBIOME ANALYSIS IN ANIMAL CHARACTERIZATION

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Abstract
Thorough biological characterization of animals is critical to ensuring that research observes the principles of the 3Rs. Decades of research have demonstrated that the microbiome is an essential component of animal characterization, as changes in the microbiome can cause phenotypic differences within an experiment, or across experiments, which can lead to the misinterpretation of results. By defining and monitoring the microbiome composition of strains, researchers can protect their experimental reproducibility and minimize outliers.

The advancement of sequencing technologies has enabled the investigation of the gut microbiome with unprecedented resolution and throughput with substantial reductions in cost. Furthermore, modern software allows immediate data analysis and complex statistical calculations, reducing the need for dedicated bioinformatics expertise. These developments allow for widespread, regular analysis of the gut microbiome in standard animal characterization protocols. These data have also allowed a deeper understanding of the role and impact of the gut microbiome to animal health and disease. Capturing and reporting microbiome composition will allow for more robust data interpretation and transparency across the scientific community.

S3B4.3

IMPROVING REPRODUCIBILITY IN MOUSE MODELS: THE IMPORTANCE OF MULTI-LEVEL COMMUNICATION FOR REDUCING GENOTYPING INCONSISTENCY

S. Jacquot[1], N. Chartoire[1], A. Jeanblanc[1], V. Rousseau[1], Y. Herault[1] and G. Pavlovic[1]
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Abstract
Genotyping is an essential step in animal research but often wrongly considered as straightforward and easy. Researchers are very attentive to the reliability of data from their experimental protocols but establishing a reliable genotyping protocol is generally low on their priority list. In addition, the genotype of the animals used during phenotyping cohorts is not always verified. Furthermore, it has been shown that 15% of the lines deposited in public repositories do not carry the mutation specified by the depositor.

Educating all actors, from the caretaker to the scientist, on the importance of the genotyping step is a simple way to improve the quality of genetically altered animal experiments. Through several complementary communication methods, we are trying to improve the dissemination of good genotyping practices and to develop caretaker competencies. For example, by increasing interactions with the caretakers (regular meetings, evaluation of each team member's constraints), we were able to reduce the genotyping inconsistencies from 10 to 6%. We will illustrate here:

- importance of biopsy size and type and the key role of good communication between services in the development of non-invasive sampling.
- importance of cleaning instruments during sampling by showing caretakers the significant impact of the resulting contamination.

Second, we published a reliable and adaptable genotyping protocol that includes many tips and tricks[2]. Finally, we try to reach the broader scientific community by hosting webinars sharing best practices in genotyping and by offering on-site training sessions.

S3B4.4

QUALITY MANAGEMENT, A WAY TO IMPROVE THE 3RS IN THE ANIMAL FACILITIES

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Abstract
The idea of the 3Rs has been increasingly implied in the scientific community in recent years. The 3Rs include Replacement and Reduction of animal experiments per se as well as Refinement of the methods applied in animal experiments and in the husbandry and care of animals in order to reduce animal suffering to a minimum. The last years have shown that communication about direct Replacement methods is more popular and has a longer tradition than discussions about Refinement.

This could be due to a better measurability of the success of Replacement methods. However, it is more difficult to prove the effects of Refinement on animal studies. Despite urgent efforts to replace or at least minimize animal experiments, Refinement is the only way to ensure the welfare of animals during an experiment. The improved methods in husbandry and experimentation automatically lead to a Reduction in the number of animals in individual experiments.

With the implementation of the right key figures of an ISO Quality Measurement system, improvement of Refinement strategies during housing, breeding and during experiments are easily to assess. With the "Animal Protection Certificate", developed by the 3Rs Austria center it is possible to effectively evaluate any kind of refinement measures. This will improve the animal welfare in animal research facilities during housing and during animal experiments.

S3B4.5

EXCHANGE OF EXPERIENCE ON CRITICAL INCIDENTS WIH THE HELP OF CIRS-LAS IMPROVES ANIMAL WELFARE

S. Bischoff[1] and A. Enkelmann[1]
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Abstract
Improved animal welfare is the goal of everyone involved in an animal experiment – from the project management to the scientists to the animal caretakers and veterinarians. We can only achieve this goal with good communication and cooperation at all levels. Communication should also include the possibility of open constructive discussions about critical incidents in the context of an animal experiment or animal husbandry.

The CIRS-LAS portal can be used for an exchange about critical incidents, possible solutions and improvements even beyond one facility. On CIRS-LAS.de, you can search a database for critical incidents that affect your own field of work. Furthermore, you can enter a critical incident yourself, anonymously if you wish. As a registered user, you can exchange and discuss information with other users. In this way, the repetition of failed attempts can be prevented, and transparency can be significantly increased.

The transparent communication about critical incidents and failures helps to work with more confidence and to feel the important culture of care in the own working environment. Research in the database in the run-up to a study as well as pro-active communication increases the quality of scientific studies.

Active participation in CIRS-LAS.de leads to a global exchange on improvements in laboratory animal science and thus to improved animal welfare. At the same time, everyone can contribute to transparent communication in laboratory animal science and improve the quality and safety of their work.

S3B5.1

REHOMING LAB ANIMALS: DOING THE RIGHT THING

M. Janssens[1]
[1]*Utrecht University, Utrecht, Netherlands*

Abstract
All animals count, no matter how small. As we are making efforts to rehome cats, dogs, and non-human primates, why don't we make the same efforts for mice and rats? Because they are smaller? And what about fish, pigs and chickens? Do we treat them differently because they are used for food? Ethically, there is no difference between different vertebrate species. They are all individuals whose lives matter to them. The speaker will advocate the inclusion of all species used as laboratory animals in institutional rehoming schemes, based on ethical theory.

S3B5.2

GENERAL CONSIDERATIONS FOR THE REHOMING OF ANIMALS USED FOR SCIENTIFIC AND EDUCATIONAL PURPOSES

C.P.H. Moons[1], L.F. Mikkelsen[2], J. Boxall[3], A. L. Louwerse[4], M. Roth[5], A.M. Spiri[6] and E. Ecuer[7]
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[7]*Vet'Astrée Consultance, Saint-Étienne-le-Molard, France*

Abstract
The EU Directive 2010/63/EU contains the first legal framework for rehoming animals used for scientific and educational purposes. Research on rehoming practices and outcomes is increasingly available (Doring et al. 2017; Skidmore and Roe 2020). In 2018, a FELASA Working Group was convened to develop rehoming recommendations. This presentation discusses the general protocol.

The protocol first outlines four key issues that need to be considered to promote animal welfare when rehoming: (1) The physical and mental health of the animal must allow rehoming. An animal is not always required to be in perfect health as e suitability of an animal for rehoming often depends on the match between animal and adopter. The Working Group provides general considerations that can be tailored for each animal available for rehoming, rather than strict criteria for animals to be rehomed or for adopters; (2) The difference between environments pre and post rehoming, which will be greater for some species (e.g., dog and cat) than others (e.g., horse); (3) The adopter's expectations, which must be checked and discussed; and (4) The costs of rehoming. Institutions must carefully consider these and inform potential adopters who will bear them for the rest of the animal's life.

Rehoming should only occur if it is in the best interest of the animal. The Animal Welfare Body must advise on socialization and rehoming schemes development, and we recommend that the Designated Veterinarian be also involved in rehoming decisions. A rehoming contract transferring animal ownership and stating transfer conditions should be issued.

S3B5.3

REHOMING LAB ANIMALS – STRATEGIES AND PARTNERSHIPS

P. Van Loo[1], M. Janssens[1] and W. De Leeuw[1]
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Abstract
The EU directive 2010/63/EU stipulates that animals used in procedures may be re-homed, provided that the health of the animal allows it, there is no danger to public health, animal health or environment, and the well-being of the animal is safeguarded. The Australian Code for the Care and Use of Animals for Scientific Purposes goes beyond that, stating that opportunities to re-home animals should be considered wherever possible. As far as we know, no other legislation includes a paragraph on the re-homing of laboratory animals. Nevertheless, good re-homing schemes contribute to a culture of care that many research institutes are attempting to cultivate. Existing re-homing schemes have largely focused on species such as dogs, cats, and non-human primates. But what about other animals? Can we safely re-home rodents, chicken, and other species? Since 2019, the Animal Welfare Body Utrecht – in close cooperation with the animal facilities and several animal advocate organizations- has expanded their re-homing scheme to all laboratory animals.

In this presentation, we offer insight in our strategies and partnerships, highlight how we ensure that the welfare of rehomed lab animals is safeguarded, and share the views and experiences from animal caretakers, adopting homes and intermediary organizations, including the media. In an interactive part of the presentation, the public is invited to share their opinions and experiences with regard to rehoming different species.
Acknowledgements: This project is supported by Animal Rights, animal shelter 'Het Knagertje', and the Dutch Society for the Protection of Animals.

S3B5.4

REHOMING OF CATS–IMPORTANT CONSIDERATIONS TO MAKE THE STORY A SUCCESS

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Abstract
According to Directive 2010/63/EU there is a high public concern for the fate of animals used for scientific and educational purposes and rehoming at the end of a scientific procedure is considered an option. Rehoming might not be of direct financial interest for laboratories, but through the establishment of a culture of care, staff morale could be positively influenced, which provides indirect benefits. Common pet animals such as cats are of special public interest and therefore the FELASA working group on rehoming of animals used for scientific purposes presents species-specific guidelines covering important considerations of rehoming cats.

The basis for a successful rehoming program is the age-appropriate socialisation of the living and non-living environments of kittens, which should begin shortly after birth and continue into adulthood. At the end of a study, the cat's age, health, emotional and mental state should be reviewed and carefully matched to a new owner taking into consideration several factors such as the housing situation, the owner's lifestyle or the presence of resident animals or small children in the new home. Appropriate environmental enrichment in the new home is extremely important for cats because most behavioural problems arise from living in a deprived environment, and an adopter's misunderstanding of and inappropriate reaction to the natural behaviour of the cat. Rehoming of cats will only be successful if co-habitation with humans is successful. The difference between the laboratory and the rehoming environment is a key factor and must be addressed.

S3B5.5

CONSIDERATIONS FOR REHOMING OF MICE, RATS AND RABBITS

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[7]*Vet'Astrée Consultance, Saint-Étienne-le-Molard, France*

Abstract
The EU Directive 2010/63/EU allows animals used for scientific and educational purposes to be rehomed, if appropriate, after consideration of the welfare of the animal to be rehomed and any potential risks to the environment. In 2018, a FELASA Working Group was convened to develop rehoming recommendations. According to the results of a survey of FELASA members (to be published separately) mice, rats and rabbits are among the species most commonly rehomed, so the FELASA working group on rehoming of animals used for scientific purposes presents species-specific guidelines for rehoming these species.

Understanding the natural habitats of small mammals and the difference between their natural and captive environments facilitates understanding of their environmental needs and promotes animal welfare (McBride, 2017). This presentation will highlight the key points of the background and socialisation of each of these species and how these points influence the screening and preparation of each species for rehoming.

S3B6.1

CONSIDERATIONS FOR THE REHOMING OF PIGS, MINIPIGS, HORSES AND CAMELIDS

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Abstract
Directive 2010/63/EU of the European Parliament and the Council of 22nd September 2010 states that at the end of a procedure, the most appropriate decision on the future of an animal previously used or intended for use in scientific procedures should be taken on the basis of animal welfare and potential risks to the environment. Rehoming may be an option, provided the health of the animal allows it, there is no danger to public health, animal health or the environment and if appropriate measures have been taken to safeguard the wellbeing of the animal.

This presentation, based on the work by the "FELASA Working Group on Recommendations for the Rehoming of Animals used for Scientific and Educational Purposes", will discuss species-specific considerations for the rehoming of pigs, minipigs, horses and camelids.

Rehoming of large animal species, especially farm animals, differs significantly from rehoming of other species such as dogs and cats, due to the requirement for a more agricultural housing environment in compatible groups. In addition, national and international legislation, especially for health surveillance and welfare reasons, regulates the housing, care, and transport of farm animals within and between countries. The possibility that farm animals could enter the food chain should also be addressed prior to rehoming and selection of an adopter. Finally, the ability of horses to be used for riding significantly enhances their chances of being rehomed. This criterion should, if possible, be evaluated and is an important parameter in ensuring successful rehoming.

S3B6.2

RE-HOMING OF SMALL LABORATORY SPECIES – A UNIVERSITY PERSPECTIVE

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Abstract
Although re-homing former laboratory animals, such as cats and dogs, has been practiced in some laboratories on a voluntary basis for decades and some national recommendations for the placement of laboratory animals exist, efforts to re-home laboratory animals have been further stimulated by the publication of Directive 2010/63/EU in the EU Member States. For Switzerland,

there is currently no national recommendation on the re-homing of laboratory animals.

While there are some well-known re-homing programs for cats and dogs, the re-homing of smaller laboratory animals such as rodents or rabbits, on the other hand, is less well known. In autumn 2018, a collaboration between the Swiss Animal Protection (SAP/STS) and the University of Zurich resulted in a re-homing project with the aim of giving rodents and rabbits from animal experiments a new life in private homes. For experimental and legal reasons not all laboratory animals can be re-homed after the experiments. However, until now several hundreds of rabbits, rats and mice have already been successfully re-homed. The re-homing project receives great support from the experimental animal husbandries and the research groups involved.

In this talk, I will present the prerequisites, challenges and potential of the UZH re-homing program.

S3C1

USE OF SURVEY DATA TO FORECAST FUTURE TRENDS IN LABORATORY ANIMAL SCIENCE

A. Turner[1] and S. Westlake[1]
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Abstract
Meeting the needs of the laboratory animal community is a complex and consequential assignment, one that the American Association for Laboratory Animal Science tackles through research. As an international membership association of professionals employed around the world in academia, government, and private industry, AALAS provides educational materials to laboratory animal care professionals and researchers, administers certification programs for laboratory animal technicians and managers, publishes scholarly journals, supports laboratory animal science research, and serves as a forum for the exchange of information and expertise in the care and use of laboratory animals. Continual research to identify trends and needs in the field drives the products and services that AALAS provides and serves as the foundation for programmatic decision-making and resource allocation.

Types of research strategies, including financial and human resource requirements, will be presented by the Executive Director and Professional Services Director of AALAS. The interpretation and application of research findings and pitfalls to avoid will be discussed. Examples of research strategies used by AALAS will illustrate the impact of research on association products, programs, and services. Such examples will include recent studies on diversity and inclusion and its effects on policies, employment trends identified through a triannual compensation survey, enhancements to AALAS education and certification programs resulting from a job analysis survey, and the routine assessment of the quality and relevance of specific AALAS programs through research processes.

This session will be relevant for the lab/facility/operations managers, program directors, and leaders of FELASA component associations.

S3C3.1

IMMUNE SUFFICIENT MICE: FAMOUS MICE, NAMES AND VARIANTS

C. Brayton[1]
[1]*Johns Hopkins University, Baltimore, United States*

Abstract
Session 1 will focus on immune sufficient (immune competent) mice. Common strains such as 129, BALB/c, C57BL/6, FVB/N, NOD will be emphasized, along with some of their common substrains, and their research relevant phenotypes, genotypes, and correct nomenclature that should be used in publications. Nomenclature for common genetic manipulations will be discussed also. Audience participation will be encouraged.

S3C3.2

IMMUNE DEFICIENT MICE: FAMOUS MICE, NAMES AND VARIANTS

C. Brayton[1]
[1]*Johns Hopkins University, Baltimore, United States*

Abstract
Session 2 will focus on immune deficient mice in common use. Nude, Scid, NODscid, NSG, NOG, NCG, NRG, NSGS will be discussed, along with some of their history, research relevant variations, research applications, and a few common complications encountered in working with them. Audience participation will be encouraged.

S3D1.1

EVALUATION OF PERFORMANCE OF DIFFERENT ETHICAL REVIEW AND OVERSIGHT PROCESSES

J. Guillén[1] and G. Borkowski[2]
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[2]*AAALAC International, Frederick, United States*

Abstract
AAALAC International is a non-profit organization that evaluates and accredits research, testing and educational animal care and use programs around the world, including more than 100 in 20 European countries. The ethical review and oversight processes are key elements of a program, and therefore are thoroughly assessed during the accreditation process. Legal approaches to ethical review and oversight vary across geopolitical areas, creating a heterogeneous landscape of processes, also in Europe in spite of the umbrella of Directive 2010/63/EU. In AAALAC's interpretation, ethical and oversight processes must first comply with applicable legislation (engineering standards), but also they must be effective (performance standards). To evaluate the efficacy of

each system and be consistent in the assessments, AAALAC relies on a performance-based approach which focuses on the outcome of the process, as AAALAC considers that the same satisfactory outcome can be achieved by different procedures. How AAALAC assesses on the ground the combination of legal compliance and the efficacy of ethical review and oversight processes in the European context, will be described. The questions that AAALAC evaluators will use to evaluate them can also be a very useful self-evaluation tool that local ethics committees, animal welfare bodies or equivalent institutional bodies can use internally.

S3D1.2

EVALUATION TOOL TO ASSESS THE STRENGTHS AND WEAKNESSES OF AN ETHICAL REVIEW SYSTEM

G. De Vroey[1]
[1]*JANSSEN RESEARCH & DEVELOPMENT (Johnson & Johnson), Beerse, Belgium*

Abstract
There are several operating methods for the ethical review process implemented in the different European countries, going from national, regional to local ethics committees as well as any combination of these.

Belgium is a country that has implemented ethics committees at a local level. The way how independence, impartiality and competency have been addressed will be highlighted. An evaluation tool has been developed on behalf of the Flemish Authorities on Animal Welfare, to assess this local operating method for ethical review for their strengths and weaknesses.

This tool could also be used to assess as objectively as possible the strengths and weaknesses of any other operating method, as being operated in the other European countries.

S3D1.3

RESOURCES AND COMPETENCIES OF ETHICAL REVIEW BODIES

P. Hawkins[1]
[1]*RSPCA, Southwater, United Kingdom*

Abstract
Project evaluation must include a harm-benefit analysis, to assess whether the harms to the animals can be justified by the expected outcome, taking into account ethical considerations. This is done by the competent authority, but local bodies (referred to here as Ethical Review Bodies, ERBs) may also undertake harm-benefit analyses and ethical review. Examples of ERBs include the UK Animal Welfare and Ethical Review Body (AWERB), some Animal Welfare Bodies (AWBs) and Animal Ethics Committees (AECs).

Whatever its format, and position in the project authorisation process, the ERB will need a clear definition and concept of 'ethics'. It is often believed that 'doing ethics' just means applying the 3Rs, but this is not the case. Ethical review also goes beyond the harm-benefit analysis because there are often wider ethical issues that also need to be considered in order to identify what, all things considered, is the right decision.

To identify and address all of these aspects, ERBs need members with different competencies including animal behaviour and welfare, the 3Rs, education and training, relevant scientific fields, and identifying ethical issues. Diverse priorities and perspectives regarding animal use are also needed, as are appropriate personal qualities and 'soft skills'. The ERB also needs to be strongly and transparently supported by higher management. This includes providing adequate leadership and support, with an appropriate budget and recognition for ERB members. This presentation aims to help those involved with ERBs identify additional resources, or competencies, they may need in order to work more effectively.

S3D1.4

INDEPENDENCE, IMPARTIALITY AND TRANSPARENCY OF ETHICAL REVIEW BODIES: STATE OF PLAY IN FRANCE

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Abstract
French ethics committees for the protection of animals used for scientific purposes were born in 1990–92 in private companies, at the initiative of professional organisations (GIRCOR/GRICE) and the building of a network of regional committees for public institutions started in 2000, encouraged by the Ministry for Research. This organisation was completed with two national committees on support to public policies, respectively for animal protection in science (CNEA, 1989) and for ethical reflection (CNREEA, 2008). A national charter on the ethics of animal experimentation was published in 2008 and updated in 2014. Following the Directive 2010/63/UE, the existing local and regional ethics committees were recognized as competent authorities for evaluation of research projects involving animals, a dedicated structure of the Ministry for research being the only competent authority for authorisation of research projects.

As a history's legacy, the ethics committees are numerous (N = 125) and very diverse in their level of activity and mode of functioning. In order to homogenise the ethical evaluation of research projects, the criteria for assessing the quality of ethical evaluation are questioned to serve as guidelines for an evolution of the current organisation. These criteria are based on the 'principles for an effective evaluation process' published by the European Commission, with an emphasis on collegiality and expertise (both in science and ethics), independence and impartiality (lack of conflict of interest), transparency and sufficient resources.

S3D2.1

PREDICTING ANIMAL TO HUMAN TRANSLATION: A PILOT STUDY USING QUALITATIVE COMPARATIVE ANALYSIS

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Abstract
Drug development suffers from high attrition rates; promising drug candidates fail in clinical trials. Low animal-to-human translation may impact attrition. We previously summarised published translational success rates varying from 0% to 100%. Based on analyses of individual factors, we could not predict translational success.

Several approaches exist to analyse effects of combinations of potential predictors on an outcome. In biomedical research, regression analysis (RGA) is common. However, with RGA it is challenging to analyse multiple interactions and specific configurations (≈ combinations) of predictors, which could be highly relevant to translation.

Qualitative comparative analysis (QCA) is an approach based on set theory and Boolean algebra. It was successfully used to identify specific configurations of factors predicting an outcome. We reanalysed the data from our preceding review with a pilot QCA. This QCA resulted in the following formula for successful translation:

~Old*~Intervention*~Large*MultSpec*Quantitative

Which means that the combination of relative recency (~ means not; >1999), analyses at event or study level (not at intervention level), n < 75, inclusion of more than one species and quantitative (instead of binary) analyses always resulted in successful translation (>85%). Other combinations of predictors showed less consistent results. An RGA on the same data did not identify any of the included factors as significant contributors.

While these data were not collected with the QCA in mind, we show that the approach is viable. At the conference, we will further explain the QCA and discuss how it can be a highly promising approach to furthering the field.

S3D2.2

BARRIERS AND OPPORTUNITIES FOR USING HUMAN MATERIAL IN RESEARCH

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Abstract
Introduction: The Netherlands National Committee for the protection of animals used for scientific purposes (NCad) is investigating possibilities to increase the use of human material in scientific research with the idea that removal of barriers for the use of human material may reduce the use of lab animals.
Methods: We carried out a literature search and interviews to obtain insight into the Dutch playing field. We focused on Dutch and European laws, findability, accessibility, and availability of human material for scientific research, national initiatives working on improvements in this plane, and compared the situation to other countries within and outside the EU.
Results and conclusion: First results indicate that different Dutch laws apply to use of human material for scientific purposes, which makes the playing field unclear and fragmented. Findability of human material needs improvement. The accessibility to the material is mainly through cooperation with other researchers, medical doctors, and pathology departments. There is unused potential for use of human material in research. Several national initiatives are working on streamlining and uniformizing processes and infrastructure and increasing the access to human material. The picture of the Netherlands seems to be similar to that of other EU and non-EU countries.

S3D2.3

UTRECHT ROUND TABLES ON THE TRANSITION TOWARDS NON-ANIMAL METHODS

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Abstract
The Dutch government has established a Transition Programme for Innovation without the use of animals (TPI). This initiative has been both applauded and criticised. Utrecht University, the University Medical Centre Utrecht and the University of Applied Sciences Utrecht have joined forces in TPI Utrecht to support the transition in an inclusive way. We are trying to create a safe environment for all parties involved, as we all strive for scientific excellence, helping patients and not causing suffering. Diversity makes us stronger, therefore we seek for inclusion of differences as an aspect of a Culture of Care.

Communication is a central element in our activities. One of our communication activities is bringing people together in Round Tables. We approached all the relevant research and education groups and visited them in an open atmosphere. During 2021, we were able to visit 11 groups. The participants listened to each other's goals, concerns, needs, and comments, and reacted to each other respectfully. In this way we raised awareness, cleared away misunderstandings, made TPI accessible and laid a foundation for fruitful collaboration in the future. This year we are organizing Round Tables Plus around specific topics, cutting across the groups we visited in 2021, and making sure all relevant parties who can bring the topic further are sitting at the table. We would like to share our experiences with the audience and learn from each other.

S3D2.4

BEYOND ANIMAL TESTING INDEX: BENCHMARKING RESEARCH INSTITUTES ON CONTRIBUTIONS TO ANIMAL-FREE INNOVATION AND 3RS

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Abstract
The transition to animal free innovation is on the political agenda within and outside The Netherlands. The '*Beyond Animal Testing Index*' (BATI) is a benchmarking instrument designed to provide insight in the activities and contribution of research institutes in the transition to animal free innovation. The BATI allows participating organizations to learn from each other and thereby stimulating continuous improvement.

The BATI was developed analogous to the Access to Medicine Index, which benchmarks pharmaceutical companies on their efforts to make medicines widely available in developing countries. In 2018, the pilot started with designing the BATI in collaboration with stakeholders among which universities and funding organisations. In 2020–2021, the pilot was conducted with three academic medical centres in the Netherlands.

The pilot demonstrated the usability of the BATI as a benchmarking tool. Analyses were performed over five different domains, including 'management', 'research and development' and 'training and education'. Furthermore, the BATI provides an internal, as well as an external stimulus to share, learn and improve institutional strategies towards the transition to animal free innovation. The BATI also identified gaps in the development and implementation of 3R technologies. Hence, the BATI is a suitable instrument for monitoring the effectivity of policies. The pilot study has resulted in the BATI 1.0 version, ready to be used for future benchmarking on a larger scale.

S3D2.5

THE VIRTUAL HUMAN PLATFORM AS A NEW APPROACH TO TAKE ON ANIMAL-FREE FUTURE CHALLENGES

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Abstract
Although laboratory animal experiments have provided much information about human diseases etiology, and treatment in the past, the urge to further reduce animal testing is increasing. The main drivers are ethical considerations and scientific reasons. Moreover, studies have shown that the accuracy and translatability of animal (toxicological) tests to predict reliable outcomes, appears to be limited. The Virtual Human Platform (VHP) is an innovative approach that will combine data from human physiology, chemical characteristics, and perturbations of biological pathways, in an integrated manner for safety assessments. Via developments in computational and data science, *in vitro* and *in silico* modelling and transition management, a virtual human will be developed as the new reference completely based on human data. To raise the awareness and to create acceptance for VHP by regulatory agents, researchers and by students, novel technological approaches and new teaching and learning modules need to be developed. These models are for example new massive open online courses (MOOCs), workshops, summer- and elective courses and new educational programs. Students (BSc, MSc, PhD) and professionals work on authentic societal- and scientific dilemmas via (individual) project-based programs and challenged based education in mixed multidisciplinary learning teams. Through co-creation with stakeholders, VHP integrates innovations to make animal testing less necessary in the future. Education and training in these new technological approaches, prepares students and professionals of today, for future challenges in a rapidly changing scientific field.

S3D3.1

RISKS OF BIAS AND HOW TO FIND THEM (IN ANIMAL STUDIES)

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Abstract
Bias in an unintentional systematic error which causes a deviation in a study's results. If a study is at risk of bias, its internal validity is compromised and our confidence in the results ("Are these results true?") is reduced. This threatens the study's value for human health and the ethical use of animals. Measures to reduce risks of bias and improve research rigor, such as blinding, randomization and preregistration are essential to preserve internal validity. However, these measures are still not common practice. In a recent poll among 100 animal researchers, a lack of education on these concepts was voted the number 1 hurdle to implementing measures to improve research rigor! However, it takes a village to raise a child: if all staff involved (e.g. animal caretakers, technicians, animal welfare officers and researchers) are knowledgeable about the concept of internal validity, they can work together to increase the implementation of measures to reduce bias. This lecture explains the concepts of internal validity, selection bias, performance bias, detection bias, attrition bias and selective outcome reporting, fully tailored to animal studies using examples from daily practice. It also elaborates on (overcoming hurdles in) the implementation of measures to reduce bias.

S3D3.2

SYSTEMATIC REVIEWS OF ANIMAL STUDIES: INSPIRING COMMUNICATION ABOUT GOOD RESEARCH PRACTICES

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Abstract
Background: The Netherlands Organisation for Health Research and Development, ZonMw, has funded training and coaching in performing preclinical systematic reviews since 2012. We conducted a qualitative study to evaluate the impact of this funding by assessing the effect of the systematic reviews on researchers and their research during the period 2012–2020.
Methods: An online survey was sent to grantees to investigate their experience of conducting a systematic review and its impact on their attitudes and subsequent (animal) research. In-depth interviews were conducted with a sub-group.
Results: Respondents reported that conducting a systematic review changed their views on the quality of animal studies generally and taught them relevant skills. They related how they shared their newly acquired knowledge with their teams and used their new insights to improve their subsequent studies e.g. better design, conduct, reporting. They reported advocating for change among their peers, e.g. by publishing opinion papers, and explained that their review findings inspired new primary animal and human studies as well as preclinical systematic reviews. Participants suggested their field would benefit if more researchers were able to conduct and understand the value of systematic reviews. They proposed that this could be achieved by making systematic reviews part of the curriculum and a mandatory part of funding applications.
Conclusions: Training and coaching in systematic reviews positively impacted animal research quality, transparency, and awareness in this case study. Greater use of preclinical systematic reviews is likely to encourage the further spread of good practice in animal research.

S3D3.4

"COMMUNITIES FOR OPEN RESEARCH SYNTHESIS" – A COMMUNITY APPROACH TO STRENGTHEN EVIDENCE FROM ANIMAL RESEARCH

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Abstract
Systematic review and meta-analysis are evidence synthesis tools that can help to address 3Rs-related questions and reduce waste in animal research by identifying where new research is warranted and preventing unnecessary duplication. Evidence from systematic reviews has helped to inform animal research improvement strategies including reporting guidelines and study registries. These tools also act as an evidence-based bridge to translate findings from animals to humans. However, this bridge is routinely missing in preclinical research. Currently, justification for the animal experiments required during preclinical drug development and decisions about when testing should advance to the clinic are routinely based on selective literature citation. This contributes to translational failure and means that many animal studies do not effectively advance our knowledge base.

Here, we introduce Communities for Open Research Synthesis (COReS), an Open Science-based framework to initiate systemic change in how preclinical animal evidence is translated into improved health outcomes for humans. We plan to integrate preclinical systematic review into the research pipeline through a three-pillar approach comprising education, infrastructure, and community-building. We will provide accessible systematic review education to increase competence. Software, methods support, and a communication platform will enable collaborative, community-led synthesis of animal evidence within biomedical fields. COReS will connect primary researchers, evidence synthesists, and other stakeholders to facilitate decision-making in research prioritisation and ensure that all animal research is fully justified and appropriately designed to address critical knowledge gaps.

COReS represents a sustainable, scalable framework to increase the scientific value of animal research and improve translational research outcomes.

S3D3.5

ESTIMATING TRANSLATIONAL EFFECTIVENESS THROUGH AN EXPERT INFORMED METRIC IN A PRECLINICAL RESEARCH UNIT

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Abstract
Challenges in clinical translation have motivated world-wide initiatives that aim to increase quality and rigor in preclinical studies. In that line, we work towards implementing a preclinical research unit (PRU) to assess and improve robustness of preclinical evidence to benefit researchers through a support measure already in early stages.

To achieve this, the PRU will act as a hub that connects different stakeholders to ensure and provide guidance towards robust evidence and clinical translation. This includes building a communication structure and an environment of trust and collaboration.

Complementary, we assess and accompany projects based on a best practices framework for translational preclinical research with a metric to assess translational success at its core. This metric is based on an initial sample of use cases where we

determined key parameters for robustness and translational validity. From this, we developed our target-oriented metric to estimate the likelihood for clinical translation. This metric is also used to counsel scientists with respect to the (animal)model, statistics, experimental design, robustness, and the role or need of replication studies. In a typical setup, after an initial assessment of the current knowledge base and experiments conducted by researchers, a process can be initiated that brings together complementing expertise from different areas (e.g., biostatistics, meta-research, core-facilities) that are usually not part of every preclinical research group. The quality controlled and robust evidence from the process we describe here will be valuable for the scientific community, instill trust in potential sponsors, and putatively increase chances for translational success.

S3D3.6

TWO-STEPS LICENSE REQUESTS TO INCREASE TRANSPARENCY AND REDUCE FALSE POSITIVE REPORTS: EXPLORATORY VS CONFIRMATORY STUDIES

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Abstract
In the last few years, social mistrust in biomedical science has increased dramatically. Reasons for this are at least in part to ascribe to scientists and science communicators that fail to acknowledge the exploratory nature of most scientific reports, that often turn out having limited, if any, external validity. Indeed, a majority of published papers in biomedicine claim discovery and confirmation in the same report. This circular reasoning, where findings are used at the same time to build a model and as evidence for its validity, strongly contributes to the reproducibility crisis that affects also preclinical studies. Confusion between exploratory and confirmatory studies in preclinical research is also indirectly supported by current procedures for legal licensing of animal experiments that fail to take into account this essential difference. We propose the implementation of two completely different procedures for the request of licenses that formally classify studies under exploratory and confirmatory. The former would undergo a simplified procedure, aiming at establishing the elective experimental conditions, precise dependent variables, and sample sizes, suitable to conduct a second-step, confirmatory study. This latter would make the object of a separate license request application, and the protocols should be deposited with the obligation to report procedure compliance and results to Authorities. Notably, confirmatory studies should maximise external validity. These differential procedures are expected to improve transparency and communication between researchers and animal welfare authorities; in addition, they would endorse the « registered reports » publication policy that is currently under consideration by many publishers

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S3D4.1

THE ROLE OF NON-TECHNICAL SUMMARIES IN EFFECTIVE COMMUNICATION ON ANIMAL RESEARCH TO THE PUBLIC

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Abstract
The animal research community is moving towards openness and transparency both through voluntary activities and compliance with legal requirements. Non-technical project summaries (NTS) represent the most visible legally required element for openness and transparency on animal research in the European Union (EU), and the ALURES Statistical EU Database is now the practical tool for making information on all NTS available to several potential audiences, after the publication of the COMMISSION IMPLEMENTING DECISION (EU) 2020/569 of 16 April 2020.

The intended purpose of the NTS is not only to inform the general public, but also politicians, non-governmental organizations, and even they can be useful to the research community as an easy accessible sharing point for 3Rs initiatives. To facilitate the understanding of NTS by the public and other lay audiences, several guidance documents on NTS writing have been developed. A working Group organized by the European Animal Research Association (EARA), published in 2018 a Guidance document to improve the language and understanding of NTS for the general public, that will be discussed.

However, in spite of the existence of legal instructions and guidance documents, there are still important questions for discussion concerning the purpose and effectiveness of the NTS, such as: Are the public actually interested in knowing about animal research projects details? Do interested public know about the existence of NTS and how to access them? Are we addressing the right audience when producing guidance on NTS writing? Are researchers actually interested in improving NTS?

S3D4.2

BENEFITS OF AND EXPECTATIONS FOR IMPROVING TRANSPARENCY THROUGH NON-TECHNICAL PROJECT SUMMARIES

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Abstract
Transparency is one of the corner stones of the legislation allowing the use of animals in research and testing to take place in the European Union. In line with that, one of the three key aims of Directive 2010/63/EU was to significantly improve transparency of the use of animals in research and testing – an area in which EU has effectively delivered, setting an example for others to follow. Not only are detailed annual statistics on animal use published through an open access database, researchers are also required to provide a clear and easily understandable non-technical project summaries of new projects authorised to use live

animals. Since July 2021, these NTS are now also available through an open access EU database, ALURES NTS.

The presentation will lay out the legal framework in the EU on the requirement for and the content of non-technical project summaries. It also provides an overview of the recently developed EU guidance to help researchers to draft clear, succinct, and informative NTS for the benefit of public, policy makers and others interested in why and how animals are still needed in research and testing.

S3D4.3

NGO PERSPECTIVE: DO SUMMARIES IMPROVE TRANSPARENCY OF WHERE, WHY AND HOW ANIMALS ARE USED?

K. Taylor[1]
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Abstract
To improve the transparency of animal research, Directive 2010/63/EC requires Member States to publish non-technical summaries (NTS) of authorised projects involving animals. Article 43 asks that this summary include information on the objectives of the project, including the number and types of animals to be used, the predicted harm and benefits and a demonstration of compliance with the 3Rs. As an animal protection NGO, we have an interest in understanding the scale of animal research and compliance with the 3Rs. Our initial analysis of the quality of the NTS in 2016 was disappointing (Altex 2018, 35(2),193-210). However, in 2020 the Commission published an Implementing Decision that required Member States to submit the NTS centrally for projects authorised after January 2021, using the open access ALURES NTS EU Database. It also provided a template to improve the quality and consistency of the NTS between Member States. In this presentation, we perform an analysis of a sample of NTS to assess whether there has been an improvement in the quality of the NTS and in transparency generally as a result.

S3D4.4

TALKING ABOUT HARMS

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Abstract
Recent years have seen increasing awareness and acknowledgement of the need for, and importance of, openness around the use of animals in science. There has also been much reflection around ensuring that information about animal use is both balanced and accessible.

Providing 'balanced' information means being clear about the purposes of animal use; being realistic about the potential benefits; and being honest about limitations of animal research. It also means accurately portraying standards of regulation, science, and animal welfare; acknowledging the ethical dilemmas involved; and being open about what animals experience – including the nature and level of any suffering. This last aspect – talking about harms to animals – remains a particular challenge for many.

Previous 'public dialogue' workshops, that have asked members of the public what openness means to them, have reported that 'there should be a willingness to show the public what the animal suffering involved actually looks like'. There are many opportunities and mediums for organisations to do this, including via the non-technical summaries (NTS) submitted and published alongside every project authorised in the EU and UK.

But standards of NTS writing vary considerably. Many are still written in language that is too technical and completely inappropriate for their purpose, or they fail to include relevant or meaningful information. This presentation will highlight examples of good practice, as well as common shortcomings, and will also highlight helpful initiatives and guidance in this area.

S3D4.5

ADDRESSING THE 3 RS IN NON-TECHNICAL PROJECT SUMMARIES

T. Bertelsen[1]
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Abstract
Communicating to the public about laboratory animal welfare issues and the application of the 3 Rs in Non-Technical project Summaries (NTS) is important to ensure and increase openness and transparency.

This presentation will go through the importance of communicating and explaining the value of addressing the 3 Rs and animal welfare aspects in an efficient and transparent manner. The presentation will also go through general recommendations (using plain language free of jargon and technical terminology in the NTS) as well as specific guidance (how to translate each of the 3 Rs into lay person language in the NTS) with special emphasis on explaining implemented Refinement initiatives, e.g. related to the scientific procedures and the housing and care of the animals, and also how to explain the benefit of using Humane Endpoints as well as how potential harm has been minimised.

S3D5.1

WHERE HAVE ALL THE MICE GONE? – A PUBLICATION RATE STUDY

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Abstract
Preclinical research using animals is both championed as essential and criticised as unethical and ineffective. One concern about the validity of animal studies as an evidence base is that they are affected by publication bias: the phenomenon that a large proportion of the studies performed are never published, for instance because they have neutral or unexpected results. One way to

identify publication bias is through a publication rate study, in which animal study protocols are tracked from the study application to their publication or non-publication. This allows us to calculate a publication rate, compare the content of protocols and publications, and evaluate reporting biases. We have tracked a set of animal study protocols approved in the University Medical Center Utrecht in the Netherlands to assess whether these led to a publication with a follow-up period of 7 years. We found that only 60% of all animal study protocols led to at least one publication (full text or abstract). Strikingly, a total of 5,590 animals were used in the studies, of which only 26% was reported in the resulting publications. These findings underline the need for preregistration of animal studies, in view of the risk of reporting and publication bias in preclinical research. We plea that all animal study protocols should be prospectively registered on an online, accessible platform to increase transparency and data sharing.

S3D5.2

PRECLINICALTRIALS.EU: THE BENEFITS OF PREREGISTRATION AND THE INFLUENCE OF AUTHORITIES AND PEERS

J. Menon[1]
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Abstract
Poor translational rates raise concerns toward the quality and relevance of animal studies, supporting the call for improvement, such as preregistration of animal studies. Since its first recommendation in 2000, preregistration has proved beneficial in clinical trials and might benefit preclinical research similarly by addressing openness, reporting and study quality.

In 2018, the first online registry dedicated to animal research was launched: www.preclinicaltrials.eu. It aims to provide a comprehensive overview of all animal studies, including those with lower chances of being published (e.g., interrupted studies, negative data). By giving open access to these data, this initiative supports the reduction of publication bias, aims to prevent involuntary duplication of animal studies, and may help the community to utilise valuable data that is often overlooked or dismissed.

Despite these benefits, the number of registered animal studies is relatively low, but slowly improves thanks to new incentives.

Since the platform's launch, the preclinicaltrials.eu team stimulated preregistration with the help of numerous stakeholders. Positive results are already observed with Dutch funders exerting requirements for researchers to comply with preregistration. Moreover, the cooperation of ethics committees and scientific institutes facilitate the process and its promotion (e.g., inclusion of preregistration in university courses). As awareness grows, researchers worldwide showed their enthusiasm to (pre)register, resulting in over 100 published protocols on the platform from 24 different countries. The registry started in the Netherlands, where its sustainability relies on governmental support, but aims to further expand its influence abroad by extending its ambassadors network and international collaborations.

S3D5.3

RESEARCHERS' ATTITUDES TOWARD PREREGISTRATION

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Abstract
Background: Preregistration appears to be a promising method to improve quality and transparency in animal research and is believed to improve translational success. However, the poor number of registered protocols shows that its implementation is challenging. We performed a qualitative study to understand why animal researchers do not preregister.
Methods: A survey was disseminated among researchers involved in animal studies to investigate their views on issues hampering translational, their perception if preregistration can improve translational success and understand their concerns about preregistration.
Results: Sixty-two respondents reported several issues hampering translation research. Most important issues are the use of unvalid models, flawed studies designs, issues related to publication (incomplete reporting, publication bias), irreproducibility, suboptimal conditions under which experiments take place (e.g. insufficient training of staff) and the pressure to succeed. Preregistration is claimed to improve study design, increase collaboration, reduce the number of animals, and increase reproducibility. Researchers fear to share preliminary ideas and claim preregistration can be a threat to intellectual property. Researchers are worried about the administrative burden of preregistration.
Conclusion: Preregistration is claimed to improve several issues that are currently hampering translational research. Increasing protection of researchers' ideas and limiting of the administrative burden are important factors to improve support among animal researchers.

S3D6.1

ENSURING VALUE IN RESEARCH FUNDER FORUM PRECLINICAL WORKING GROUP: COMMUNICATION BETWEEN FUNDERS AND DISCIPLINES

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[7]*ZonMw, The Hague, Netherlands*

Abstract
The Ensuring value in Research Funder Forum (EViR) is a global organisation facilitating communication and exchange of good practices between funders and patient organisations in health research. Ten guiding principles for good funding practice in health research have been formulated (https://evir.org/our-principles/). Initially the focus has been on clinical studies, but since several years discussions have been ongoing to include the preclinical field as well. In 2020 a preclinical working group was founded in order to study how the 10 guiding principles can also be implemented for preclinical health research. In 2022 a survey will be held among funders in the preclinical field, both EViR members as well as non-members, to make an inventory whether they are already applying actions in the field of the 10 guiding principles, and if yes, what their experiences are. This survey can help to learn about good practices from other funders and implement each other's good initiatives. As an example, ZonMw has since 2012 financed a special program on preclinical systematic reviews, mentioned in EViR guiding principle number 2, and a recent impact study revealed the positive impact this has on both research as well as researchers (Menon JML et al. PloSOne 2021). Preregistration (Principle 5) has made a start both in the Netherlands (https://preclinicaltrials.eu) as well as in Germany (https://www.animalstudyregistry.org). By stimulating communication between funders and stakeholders, and between the preclinical and clinical disciplines, more value in research will become achievable.

S3D6.2

RANDOMICE, A USER-FRIENDLY RANDOMIZATION TOOL IN ANIMAL RESEARCH

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Abstract
Careful design of experiments using living organisms is of critical importance from both an ethical and a scientific viewpoint, thriving to reduce animal usage without affecting the translational value. Randomization should, whenever possible, be an integral part of such experimental design as it ensures that any known and unknown covariates that introduce bias, are randomly distributed over the experimental groups, which increases the internal validity and reproducibility of the experiment (Hooijmans, 2014). To minimize the sample size, one might take randomization one step further by controlling for baseline biological variation. This can be done by first defining blocks to create balance in baseline characteristics (Festing, 2014), followed by random assignment of the blocks to the various control and intervention groups. In the current study we have developed a novel, user-friendly randomization tool, that allows researchers to easily randomize animals into blocks, identify well-balanced random block divisions based on ranking by differences in mean and standard deviation, and subsequently randomly allocate the blocks to the experimental groups. In this tool we have also incorporated features that aid researchers in refining their experiments, e.g. by taking physical markers such as ear clips into account during division. In addition, the latest version allows for filtering results by the distribution of categories, e.g. nest of origin or cage, to further minimize the influence of unknown covariates. The resulting open-source software tool that we have named RandoMice (van Eenige, 2020), makes randomization time-efficient and easy-to-use. RandoMice can be downloaded and installed for free from https://github.com/RvE54/RandoMice.

S3D6.3

INFORMING SAMPLE SIZE CHOICES FOR CONFIRMATORY PRECLINICAL STUDIES.

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Abstract
Preclinical research distinguishes between exploratory and confirmatory stages. Central to this distinction is the question how an

initial exploratory study can inform a confirmatory study and consider limited resources and ethical considerations. Particularly, researchers need to decide a) which criterion is critical to initiate a confirmatory study and b) how exploratory effect sizes and uncertainties in initial studies inform confirmatory studies. Based on published empirical data, we simulated two preclinical research scenarios to investigate different approaches regarding their effectiveness to identify relevant effects. We compared a conventional p-value based decision-criterion with a criterion based on a-priori determined smallest effect sizes of interest (SESOI), mimicking approaches from clinical trials. Using the SESOI criterion, twice as many initial studies proceeded to confirmation. This resulted in an increased likelihood that a significant finding reflected a relevant true effect while reasonably limiting samples sizes. This positive predictive value was increased over and beyond the prior probability to detect such an effect and importantly also beyond the standard scenario. We highlight further advantages of our novel approach regarding additional critical measures such as the diagnostic value and impact on estimate precision. This is complemented by extending this approach to multi-center trials including systematic heterogenisation of experimental parameters. Overall, we propose a novel, simple to apply approach to plan confirmatory studies that will provide valuable guidance to both researchers and regulatory authorities.

S3D6.4

COMMUNICATING STUDY OUTCOMES: SIGNIFICANCE AND POWER ARE NOT ENOUGH

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Abstract
Reports of failed attempts to replicate key studies in biomedical research as well as meta-analyses of retrospective power of published studies in neurobiology and cancer research have led to the notion of a severe reproducibility crisis in biomedical research. According to the prevailing view, this crisis is mainly caused by lack of scientific rigor in experimental conduct, low statistical power, analytical flexibility, and publication bias. Yet, another reason for this perceived crisis might be a widespread misconception of hypothesis testing and which conclusions can be drawn from it. P-values and power are both conditional probabilities. The former is the probability of getting a positive result given that there is no effect, while the latter is the probability of detecting an effect given that there is an effect. As such, those conditional probabilities must always be interpreted within the context of a base rate of effects being present or absent. Doing this, we must acknowledge the false discovery rate (FDR) and the positive predictive value (PPV) as important indices for assessing the credibility of research findings. The sole reliance on significance, as usually observed for the reporting of effects, and on power, as frequently requested for sample size calculations for study applications, is unwarranted. A focus on the positive predictive value can show us that even moderately powered studies can be very informative if the base probability for finding an effect is sufficiently high and it challenges the argument that lack of power is the main driver of replication failure.

S3D6.5

NAVIGATING PRECLINICAL CONFIRMATORY MULTICENTER TRIALS

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Abstract
Many discoveries fail in clinical studies despite promising preclinical evidence. Even though biological complexity and poorly understood disease pathology account for some of the failures, preclinical evidence often lacks desired robustness required for successful translation. Reasons include low sample sizes, selective reporting, publication bias and consequently inflated effect sizes. Even though there is growing consensus that **preclinical evidence will be strengthened by confirmatory multicenter studies**, there is little guidance as to what comprises such a confirmatory study and when it should be included in the research trajectory.

To close this gap, relevant stakeholders (statisticians, clinicians, scientists, animal welfare officers and funders) for preclinical research developed joint recommendations that are solution-oriented and compatible with the 3Rs. We outline a strategy that provides decision critical guidance on when to start and subsequently how to plan a confirmatory study. With respect to initiating such a study, we defined minimum criteria and strategies to strengthen validity e.g., through within-lab replications and refinement of study design. Once sufficient evidence is collected, planning a confirmatory multicenter study involves sample size calculations that need to consider the inherent uncertainty of initial studies by considering a shrinkage of the previous observed effects. To further optimize evidence generation in a confirmatory study regarding the underlying knowledge claim, we discuss triangulating evidence from flanking experiments, biomarkers, and disease relevant diagnostics.

In summary, this best practice guide highlights how a close interaction and discussion between statisticians, preclinical scientists, and clinicians already at an early stage benefits a preclinical research trajectory.

S3D7

INTERDISCIPLINARY DIALOGUES AROUND ANIMAL RESEARCH AND CARE

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Abstract
The objective of this session is to address how researchers and practitioners can work together and across disciplines on topics of animal research and care.

We will explore the different ways in which practices of animal research and care have become the focus for interdisciplinary dialogue between the arts, humanities, the social and natural sciences. These include but are not limited to: visual artists collaborating with animal researchers or social scientists, film and performance as method for ethical reflection on human/animal relations, story-telling techniques to facilitate ethical reflection with animal technicians and to facilitate new conversations with patients involved in biomedical research and interdisciplinary dialogues around animal research. Taken together, these methods have been used to engage people with often challenging aspects of animal research: the relationship between animal research and human wellbeing, what it means to train people to work with laboratory animals, what it may be like to be a laboratory rat, and how to involve people affected by health conditions in conversations around animal research in ways that are meaningful to them.

We explore some of these practices through papers reflecting on our and others' experiences of organising and being involved in interdisciplinary dialogues around animal research. As well as an introduction to these initiatives, we hope that conference participants will also benefit by engaging with the unexpected conversations, interactions and new topics that can often emerge from these interdisciplinary dialogues, and that have not previously taken place in the unique context of a FELASA congress.

S3D7.1

DIAGRAMMING DIALOGUES: REIMAGINING CONVERSATIONS AROUND PATIENT INVOLVEMENT AND ANIMAL RESEARCH

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Abstract
Public debates around animal research are often expected to take a familiar shape, with pro-research perspectives counterpoised to anti-animal research positions. The aim of these encounters is to exchange views or persuade; however, they can entrench opinions as people speak in different registers and struggle to listen to each other. These polarised debates can be particularly challenging for people affected by health conditions, in whose name much biomedical research is carried out, but who can find their personal stories of illness or ambiguities about animal research appropriated to bolster existing positions. In this paper, we draw on research from the Animal Research Nexus project (https://animalresearchnexus.org/projects/engagement-involvement), which explored the rise of practices of Patient and Public Involvement (PPI) around laboratory animal research in the UK. Through interviews, site visits, and workshops we traced how patients were contributing to research through sitting on funding panels and steering committees, shaping research questions and reviewing research proposals, and taking part in research visits and talks. We found expectations for PPI around animal research were multiple, with funders, researchers, and others looking to patient involvement to address different gaps, from translational relevance to public understanding. However, we found people affected by health conditions frequently struggled to feel seen and heard in ways that were appropriate for them. In this paper, we introduce these different perspectives and explore how interdisciplinary social diagramming methods can be used to help visualise the relations between them and reimagine new kinds of dialogue across them.

S3D7.2

THE MOUSE EXCHANGE: WHAT CAN CURIOSITY-DRIVEN PUBLIC-ENGAGEMENT ACTIVITIES CONTRIBUTE TO WORK AROUND ANIMAL RESEARCH?

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Abstract
Despite efforts by the industry to be more open about the use of animals in research, we agree with Holmberg and Ideland (2012) that opportunities for the public to learn about it are limited by the traditional public engagement format, plus this is coupled with barriers around public willingness to learn about something that stirs up complex feelings. In response we have created a public engagement activity to manage negative feelings like distrust, suspicion, and anxiety often associated with animal research, allowing participants to feel in control of their learning. It departs from knowledge-deficit engagement models.

The Mouse Exchange (Mx) approaches openness by shining a light on the making and supply of animals used in research, rather than on the experiment itself. Participants can explore ethics expressed through the practices of making, supplying, and caring for research animals. The Mx has no script, but rather instead creates a space where participants converse and craft, becoming curious, creative, and imaginative about the topic as a felt research mouse forms in their hands. Through the crafting an attachment can form between maker and mouse that gives participants a different stake in animal research. We argue that the Mx develops techniques for how to engage publics in animal research, and it also can have a legacy in changing scientific communication by scientists and engagement professionals – the Slow Ritual of Care workshop is a spin-off that is beginning to address this.

S3D7.3

WORKING ON THE EDGE – TRANSFORMING HUMAN/NON-HUMAN RELATIONSHIPS THROUGH NON-TRANSACTIONAL INTERDISCIPLINARY PRACTICE

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Abstract
Interdisciplinary approaches bring new ways to engage with human/animal relationships, yet many initiatives are in practice transactional, limited to one actor providing something the other needs. This paper will argue that the greatest benefits from interdisciplinary working require a level of risk taking and trust that moves beyond transactional arrangements to the development of deeply collaborative interdisciplinary practices that can be transformational. It discusses the work of artists and researchers whose engagement with and reflection upon animal research goes beyond communicating scientific values to developing a critical dialogue with the field (High 2004–6, Caodie 2012, Coates 2015, Kramer 2013). Further, it proposes that engagement with animal research can be controversial and challenging in ways that have the potential to transform human/non-human relations (High 2009–19, Gruber 2020, Sebjanic 2018, MacCormack 2014). We present the short course, *Alive Together* (Olsson and Mackenzie, 2020–21), as an example of interdisciplinary practice that encourages practitioners to move to the edge of their respective practices and in doing so, has the potential to be transformational for both course participants and for human/animal relationships. Through the example of one project, *RatHum*, this paper will demonstrate how *Alive Together* challenges disciplinary approaches to understanding human/animal relationships through the provision of deep engagement with new skills, time for relationships to be nurtured and grow, and space for developing collaborative projects generated through trust and respect, rather than transactional needs. Such approaches actively critique existing ways of working and lead to processes, practices and outcomes that transcend disciplinary boundaries.

S3D7.4

SUBTLE SOUNDS_QUEER LAUGHTER

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Abstract
Many creatures and materials operate in a sonic range that is beyond our human hearing, communicating in an ultrasonic or subsonic range of frequency. Human's hearing spectrum is between 20Hz–20kHz. Ultrasonic vocalized sounds and communication exist side-by-side our own limited audible range, perceived only subtly by us. What are the erotics of these sounds? What is the power in them? Artists Kathy High with Michelle Temple, sound technologist Matt Wellins, audio engineer Eric Rosenthal and scientist Jeffrey Burgdorf, are working on developing tools to engage with this hidden audio world. One project to date has been "Rat Laughter" that uses recorded ultrasonic rat giggles to compose a chorus of laughter for laboratory rats to enjoy. "The use of vocal indicators of various other emotional states in other species has helped reveal emotional circuits that may be of importance in understanding the ancestral sources of human emotionality" (Brudzynski et al., 1995; Jürgens, 2002; Newman, 1988; Panksepp, 2007). This research allows us to be aware of our deepest connection to non-human life and the vast amount of information we do not know. Or as philosopher Timothy Morton asks in his essay "What is Dark Ecology?": "Ecological awareness forces us to think and feel at multiple scales, scales that disorient normative concepts such as 'present,' 'life,' 'human,' 'nature,' 'thing,' 'thought' and 'logic.'" Listening to rat laughter "translated" perhaps puts the listener in the position of an "other" species and allows us to engage with their play.

S3E1.1

CAN THERMAL SUPPORT DURING ANESTHESIA INDUCTION MINIMIZE BODY TEMPERATURE LOSS OVER THE WHOLE PROCEDURE?

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Abstract
The application of heat during anesthesia induction is not common practice. Mice lose body temperature (T_b) quickly and air movement can exacerbate this, putting mice at a thermal deficit prior to surgery. We hypothesized that the method of heating would affect T_b during anaesthesia induction, maintenance, and recovery. Mice (C57BL/6NHsd-6M/6F; Hsd:Athymic Nude-Foxn1nu-6M/6F; N = 24) were randomly assigned a treatment in a factorial design: Thermal chamber (TC;ambient temperature;$T_a = 28.8°C$); Heating pad (HP;mobile induction chamber placed on an electric heating pad;$T_a = 28.4°C$); Control (Ctrl;$T_a = 21.6°C$). An RFID chip collected T_b for each mouse every 20s. Mice were anesthetized with isoflurane in their induction treatment (3min), one at a time, then maintained under anesthesia for 10min on a circulating hot water pad (T = 33°C). After 10min, the mouse was left on the heating pad to recover with oxygen and time to ambulation recorded. Data were analyzed with a General Linear Model. During induction, Ctrl mice lost significantly more T_b (-2.5°C) than TC (+ 0.4°C) and HP mice (-1.6°C) but TC and HP were not different. During maintenance, Crtl mice recovered somewhat (+1°C) but their T_b was still lower than mice from other treatments. Nude mice consistently had a lower T_b than C57BL/6 mice, regardless of treatment or anesthesia phase. C57BL/6 mice in the Ctrl group took longer to ambulate than HP and TC mice, but treatment did not affect Nude mice. Provision of heat during induction, regardless of type, can help reduce T_b loss overall during an anesthesia event.

S3E1.2

ANAESTHESIA INDUCED MEMORY IMPAIRMENT: THE SILENT VARIABLE

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Abstract
Anaesthesia is one of the main routine procedures in zebrafish (*Danio rerio*) used to provide analgesia and/or immobilize them for tissue collection, substance injection, imaging, etc., reducing stress and suffering. One of the requirements for anaesthesia refinement is to use anaesthetics without side-effects, avoiding influencing research data, and compromising animal welfare. Anaesthesia has been associated with cognitive deficits in humans and other animals. This impairment can introduce unwanted alterations in our model, leading to less translational research, and behavioural alterations. Thus, our goal was to assess whether the anaesthetic combination of propofol and lidocaine (P/L), and the standard anaesthetic MS222 induced memory impairment in adult zebrafish. Sixty 5–8-month-old zebrafish were randomly divided between a control group and 2 experimental groups (MS222 and P/L; anaesthesia applied immediately after the conditioning trial) and tested in the one-trial inhibitory avoidance task. Here, animals had to learn to associate a mild electric shock (3.3 ± 0.3V and 2A for 5sec) to a black compartment, avoiding it in the next day of testing. Then, animals were sacrificed by rapid cooling, and synaptosomes extracted to quantify proteins associated with memory using Western Blot. Behaviourally, only the zebrafish treated with P/L did not avoid the black compartment, showing learning impairment, while the Ca2+/calmodulin-dependent protein kinase II alpha levels were decreased in the MS222 and the P/L groups. Summing, a biologically relevant effect on zebrafish memory was observed 24h after P/L administration, while MS222 also induced alterations at the molecular level.

S3E1.3

EFFECT OF ISOFLURANE OR KETAMINE/ XYLAZINE ON THE MURINE IMMUNE RESPONSE TO INFLUENZA VACCINATION

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Abstract
Ketamine/xylazine (KX) and isoflurane are among the most used anesthetics in mouse research. Some evidence indicates that these drugs can alter the functionality of the immune system. However, little information is available about the effect of their prolonged and repeated administration on mouse vital parameters and on the immune response. To clarify these aspects, we measured vital parameters and assessed immune functionality in the popliteal lymph node (pLN) of mice vaccinated against influenza virus and anesthetized for two hours with isoflurane or KX. We initially evaluated the minimal KX dose for surgical tolerance. Our results showed that KX anesthetized mice presented under-physiological levels of oxygen saturation (SpO2) and did not survive anesthesia. Importantly, administration of external oxygen restored SpO2 and reduced mortality. Moreover, we characterized the motility patterns of immune cells in the pLN using 2-photon intravital microscopy, a powerful technique that allows in vivo imaging at cellular level in organisms. Following this approach, we observed significant differences in the directionality and speed of neutrophils, T cells and B cells, in association with the anesthetic protocol employed. Interestingly, these observations correlated with the different levels of the inflammatory cytokines Interferon-γ and Interleukin-6 induced by KX and isoflurane. Additionally, the number of dying cells in the pLN, measured by flow cytometric analysis, significantly increased in all the anesthetized mice compared to the control group. In conclusion, we found that isoflurane shows a reduced effect on the vital parameters, and it is more suitable for immune studies compared to KX.

S3E1.4

ANAESTHESIA AND ANALGESIA FOR CATTLE, SHEEP, GOATS AND PIGS USED IN BIOMEDICAL RESEARCH

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Abstract
This FELASA Working Group (WG) aims to establish guidelines for anaesthetic and analgesic technique selection in mammalian farmed animals used in biomedical research. Guidelines will be established for: 1) procedures conducted under regional anaesthesia; 2) immobilization; 3) physiological monitoring; 4) complications and their management; 5) pain management; 6) anaesthetic and peri-operative analgesic technique selection; 7) refinement options when analgesic use is confined.

The scientific literature concerning farm animal anaesthesia and analgesia focuses on neonatal husbandry procedures, e.g., castration, not neonates or adults undergoing major experimental procedures. However, numerous published recommendations common to both medical and veterinary anaesthetic practice exist that are relevant and applicable. The WG will capitalize on

personal experiences and selected published guidelines to produce the final recommendations. The document will not re-iterate details of favoured techniques but provide guidelines for conducting safe anaesthesia in experimental farmed animals. Recommendations will recognize the importance of legislation and the 3Rs, whilst ensuring unconfounded scientific outcomes. Two further points will be emphasized: 1) the importance of attaining competence in anaesthesia through consultation with, and, or recruitment of suitable expertise; 2) the anaesthetic and analgesic technique for an animal in a given experiment must be agreed upon by those responsible for animal welfare and those conducting the experiment.

The work is ongoing and despite a considerable paucity of pertinent data, the WG is on schedule to synthesize current (medical and veterinary) recommendations with personal experience and ensure the WG's remit is met.

S3E1.5

REFINEMENT OF POST-OPERATIVE PAIN MANAGEMENT IN GÖTTINGEN MINIPIGS

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Abstract
Relieve of Post-operative pain in Göttingen Minipigs, analgesics are usually provided intravenously (i.v.) or more typically intramuscularly (i.m.) 3–4 times daily which carries a risk of breakthrough pain at the end of each injection interval. Therefore, minimizing inflict discomfort in the pigs and less invasive analgesic regimes with longer duration of action are relevant to investigate. The aim was to evaluate the analgesic efficiency of transdermally delivered long-acting fentanyl (patch or pour-on solution) and buprenorphine (patch) in Göttingen Minipigs.

Large group of Female minipigs undergoing ovariectomies (OVX) were allocated to four analgesia protocols; i.m. buprenorphine (0.05 mg/kg) q6-7h, fentanyl patches (25 μg/hr), low dose buprenorphine patch (35 μg/hr) or high dose buprenorphine patch (52.5 μg/hr). The efficacy was evaluated by a subjective pain scoring (Visual Analog Scale) approximately 6, 13 and 20 hrs after surgery.

TD buprenorphine 5.25 μg/kg/h significantly alleviated post-operative signs of pain-related behaviour compared to standard treatment with i.m. buprenorphine at all observation time points. Buprenorphine patches 3.5 μg/kg/h provided better analgesia compared to i.m buprenorphine at 13 and 20 hours whereas fentanyl (2.5 μg/kg/hr) did not perform better than i.m buprenorphine.

In conclusion, TD buprenorphine dose at 5.25 μg/kg/hr provided reliable analgesia while eliminating i.m. injections, indicating that use of these TD patches is a refined method of administering post-operative analgesia in Göttingen Minipigs. To support those data, we are now investigating the PK profile of the buprenorphine patch in a new group of minipigs undergoing OVX, results will be ready for discloser June.

S3E2.1

FIGHTING AGAINST THE ODDS: ESTABLISHMENT OF A NEW GERMFREE ANIMAL FACILITY DURING GLOBAL PANDEMIC

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Abstract
The global pandemic dramatically changed our lives and everyone in the world is probably still looking for a "new normality". Meanwhile, science never stopped, and research fields needed to continue working in order to face the new common enemy.

In 2019, the German Research Foundation under Germany's Excellence Strategy funded the Cluster of Excellence "Balance of the Microverse" at the Friedrich Schiller University. The aim of the Cluster is to understand the formation and balance of microbial consortia, and their interactive networks and offer solutions for fighting disease and environmental dysbalance. One of the financed projects was the opening of a gnotobiotic mouse facility with a breeding core unit of germfree animals.

The efforts required for establishing a top-notch animal facility from scratch are numerous, but particularly during the world crisis we have found ourselves facing problems which no one ever encountered before.

We achieved our goal by an immense work of proactive collaboration and transparent dialogue among all the parties involved. Communication has been the keystone that allowed us to successfully breed our germfree mice, to start collaborating with different research groups, and to complete experiments in gnotobiotic mice already by the end of 2021.

We think that sharing our experience could be useful to all facility managers and/or veterinarians who are dealing with similar difficulties.

S3E2.2

BACTERIAL VIABILITY MONITORING AS A SCREENING TOOL FOR DETECTION OF CONTAMINANTS IN A GERM-FREE HUSBANDRY

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Abstract
Hygienic monitoring (HM) of germ-free (GF) mouse colonies is exceptionally challenging. The test accuracy of the applied diagnostic methodology has to be outstanding to provide a proof of absence of all living microorganisms and confirm the germ-free status of the animals. In this context, microscopy of native intestinal content serves as a highly sensitive diagnostic tool for the detection of bacterial contaminants. However, with this method

residual microorganisms may be detected. To overcome this risk of false positive results, we complemented our analyses with a bacterial viability staining of the intestinal content of germ-free mice.

Intestinal contents of GF mice were analyzed by bacterial culture and phase-contrast microscopy. Additionally, 16S rRNA PCR analysis and metagenomic sequencing were performed. To distinguish between live and death bacteria, intestinal content was stained by a Bacterial Viability Kit and analyzed by fluorescence microscopy.

While culture medium proved sterility of a sample material, scattered bacterial structures were detected during microscopic analysis, indicating a potential contamination of GF animals. Molecular techniques pointed to a presence of environmental bacteria. However, fluorescence microscopy revealed the presence of only dead (double-stained) bacteria in all samples. Likewise, nonviable bacteria have been identified in samples obtained from irradiated feed, probably being the source of bacterial structures found in GF mice. Altogether, detected bacterial structures were proven to be nonviable and therefore should not be interpreted as isolator contaminants.

Thus, in our hands, bacterial viability staining served as a highly valuable screening tool, enhancing diagnostic quality of the HM of GF colonies.

S3E2.3

MONITORING OF GNOTOBIOTIC EXPERIMENTS PERFORMED IN MICROISOLATOR CAGES

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Abstract

Gnotobiotic animals have become a powerful tool for investigating functionality of host-microbe interactions. The increased demand for gnotobiotic experiments resulted in the development of short-term maintenance systems. The success of gnotobiotic experiments relies on well-established operating and monitoring protocols. However, current recommendations for monitoring of gnotobiotic animals are focused on routine monitoring of germ-free (GF) colonies reared in isolators. Thus, we evaluated the value of different methods that can be applied for microbiological monitoring in the experimental setting. We collected fecal samples from GF mice as well as mice carrying synthetic microbiomes and analyzed fecal suspensions by culture-dependent and -independent methods. The presence or absence of contaminants in GF animals can be easily monitored by preparation of wet mounts and Gram staining of fecal samples. The presence of specific microorganisms can be confirmed by PCR-based methods, and thus these methods can be applied to monitor cross-contamination occurrence. Unspecific contaminants need to be identified with methods such as next-generation sequencing. However, when using PCR-based methods it is important to consider that residual bacterial DNA detected likely originates from food, bedding, or reagents and is not interpreted as true contamination. From our experience, the risk of introducing contaminants in microisolator cages is higher than is isolators. However, the adherence to strict operating protocols can minimize the contamination. We identified spore-forming bacteria from defined bacterial communities as major contaminants of animals housed in microisolator cages. In our experience, microisolator cages represent an appealing, cost-effective and space-saving alternative to isolators for performing gnotobiotic experiments.

S3E2.4

LOSS OF OLIGO-MOUSE-MICROBIOTA *LACHNOSPIRACEAE* MEMBERS DOES NOT INCREASE THE SUSCEPTIBILITY TO MURINE NOROVIRUS-TRIGGERED COLITIS

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Abstract

The composition of complex commensal microbiota is crucial in the development of inflammatory bowel disease (IBD). Environmental factors such as norovirus infection is known to influence and exacerbate the development of IBD. Our developed model for studying experimental IBD encompasses three main factors: defined microbiota (Oligo-Mouse Microbiota (OMM)), a genetically susceptible host (C57BL/6J.129P2-*Il10*^{tm1Cgn}, B6-*Il10*$^{-/-}$) and murine norovirus (MNV) as an environmental trigger. Our previous studies revealed that MNV increases severity of colitis in a microbiota composition-dependent manner. In a further study, bacterial *Lachnospiraceae* family was associated with beneficial effects on colitis severity. Hence, we sought to investigate the possible protective role of *Lachnospiraceae* representatives within the OMM consortium. Germ-free B6-*Il10*$^{-/-}$ mice were colonized with OMM10, a minimal microbiota lacking the two *Lachnospiraceae* members. After the microbiota had stably colonized, mice were chronically infected with MNV and samples were collected for analyses.

Colon and caecum tissues were analysed for the gene expression levels of proinflammatory cytokines and barrier determining factors using qPCR approach. H&E staining of both colon and caecum tissues were performed to assess the levels of histopathological lesions. Histological assessment showed no significant difference between OMM12- and OMM10-colonized mice after MNV infection. Gene expression analyses of proinflammatory cytokines and tight junction genes showed also no significant differences between OMM12 and OMM10. These results show that MNV does not exacerbate colitis severity after the removal of *Lachnospiraceae* members.

To conclude, the *Lachnospiraceae* members, *Blautia coccoides* and *Enterocloster clostridioformis*, do not decrease the susceptibility to MNV-triggered colitis.

S3F1.01

DEVELOPMENT OF AN ANATOMICAL AND PHYSIOLOGICAL NON-HUMAN PRIMATE RESPIRATORY MODEL TO STUDY AEROSOL DEPOSITION

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Abstract

The respiratory tract, an important body's gateway for aerosol, can be exposed to various types of toxics such as pollutants or pathogens, or used as a route for inhaled drugs and therapeutics particles.

Preclinical studies using animal models are essential and, in some cases, mandatory (FDA) to study, understand and predict the main effects of aerosols in the upper and lower respiratory tract.

The macaque has been identified as a relevant animal model for inhalation studies, but is expensive and difficult to access. It therefore appears necessary to use alternative methods for preliminary studies in order to reduce the number of animal experiments.

In this context, we have developed a plastinated anatomical and physiological respiratory model using 3D printing from a live macaque's scans from the head to the first bronchial divisions.

To validate this model, a comparative study between the aerosol deposit obtained with the 3D plastinated model and the deposit obtained with three macaques was carried out by scintigraphic imaging. Three particle size ranges targeting differently uppers and lowers respiratory deposition were used (10μm, 1.4μm and 0.4μm).

The results showed a relatively good prediction of the 3D model in predicting the deposition in the whole airway. Thus, at present, this is a good alternative model of the total amount deposited in the Respiratory Airways. However, the 3D model overestimated the deposition in the Lower Respiratory Airways.

S3F1.02

ENHANCING ANIMAL WELFARE BY OLFACTORY ENRICHMENT: THE IMPACT OF SOILED BEDDING ON ABNORMAL REPETITIVE BEHAVIORS

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Abstract

Standard housing conditions of experimental mice in biomedical research are often poorly aligned with the physiological needs of the animals. Consequently, animals may experience stress leading to the development of different types of behavioral abnormalities. Abnormal repetitive behaviors (ARBs) are often observed in laboratory rodents. ARBs include i.) stereotypies, defined as invariantly and inappropriately repeated set of movements ii.) impulsive/compulsive behaviors, such as barbering. Mice produce olfactory signatures, known as pheromones, which are used to communicate social information. Allogrooming and urination result in pheromones being deposited in the nest sight and bedding material. However, in conventional mouse husbandry routines that specifically aim for a "clean environment", soiled bedding is regularly discarded and replaced. Soiled bedding sentinels have long been an integral part of laboratory animal husbandries, in order to monitor hygiene levels in experimental animals. The aim of this study was to assess stress levels in litter sentinel mice using neutrophil/lymphocyte ratios (N/L ratio), fecal corticosterone metabolites (FCMs), and behavioral/health monitoring. Neutrophil/lymphocyte ratios and corticosterone metabolites in feces did not show significant differences, however, their variances differed significantly and the number of mice showing barbering and bar mouthing behavior was significantly reduced in the soiled bedding group.

Results from this study could help pave the way for new olfactory enrichment methods to refine housing conditions and enhance the welfare of laboratory mice.

S3F1.03

REFINING THE WEANING AGE OF RHESUS MACAQUES DESTINED FOR USE IN NEUROSCIENCE RESEARCH

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Abstract

In the UK, rhesus macaques (*Macaca mulatta*) that are used in research must be purpose bred under Schedule 2 of the Animals (Scientific Procedures) Act 1986. Most macaques supplied to UK institutions for use in neuroscience research originate from the

Medical Research Council's Centre for Macaques (CFM). At the CFM, macaques are kept in one-male multi-female breeding groups and any individuals that are destined to be supplied will eventually be separated from their natal group and placed into same-sex 'weaning' groups. Current guidelines advise that macaques should be kept in their breeding groups for as long as possible, and that maternal separation (henceforth, weaning) should not occur prior to 10–14 months of age. It is a requirement for licensed establishments to continually address principles of the 3Rs (the replacement, refinement, and reduction of animals in research), and the age at which macaques are weaned has been identified as a promising candidate for refinement. There is a lot of evidence that very early weaning or adverse rearing conditions have serious negative and long-lasting consequences on monkeys' behaviour and health. To take a few examples, very early weaning is associated with behavioural disturbances; less sociable monkeys; monkeys that are neophobic; higher probability of being wounded; and increased prevalence of alopecia. The aims of this project are to collect behavioural, cognitive, and health data to test the hypothesis that weaning macaques later than current UK guidelines will produce significant welfare benefits for individuals throughout their life from birth to laboratory.

S3F1.04

OPTIMIZATION OF SKIN SENSITIZATION TESTING STRATEGY *IN VITRO* FOR MEDICAL DEVICE EXTRACTS

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Abstract

Before marketing, medical devices have to be tested in accordance with ISO EN 10993-10 to avoid skin sensitization. This standard predominantly refers to *in vivo* tests, however, it doesn't exclude the use of alternative *in vitro* methods, which have been sufficiently technically and scientifically validated. It is foreseen that due to the complexity of the sensitization endpoint, combination of several methods will be needed to address all key events of the skin sensitization AOP. The objective of this study was to evaluate the sensitization potential of 97 commercially available samples of medical devices using a combination of *in vivo* (LLNA DA, OECD TG 442A), *in chemico* (DPRA, OECD TG 442C) and *in vitro* (LuSens, OECD TG 442D) methods with the aim to enhance the testing strategy for safety assessment of medical device extracts, to optimize the test and extraction procedures and to extend the applicability domains of separate *in vitro* methods recently successfully validated for chemicals. A good agreement between *in vitro* and *in vivo* results was achieved regarding the absence of skin sensitization potential; however, discrepancies in positive classifications have been recorded. The mismatch between *in vitro* and *in vivo* results might be caused by specific response of the immune system of the living organism, however, the in vitro methods are suggested as feasible for bottom-up skin sensitization testing, starting with *test* methods accurately identifying non-sensitizing medical device extracts. Supported by ERDF/ESF project "International competitiveness of NIPH in research, development and education in alternative toxicological methods" (No. CZ.02.1.01/0.0/0.0/16_019/0000860).

S3F1.05

LONG-TERM ANALGESIA FOLLOWING A SINGLE APPLICATION OF A FENTANYL TRANSDERMAL SOLUTION IN PIGS

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Abstract

Introduction: In animal research, obtaining efficient pain control is regulatory but challenging. The gold-standard pain management consists mainly of repeated buprenorphine injections, stressful for the animals and that can affect the research protocol. An optimal formulation of analgesic drugs for laboratory animals is needed. This is why we investigated how Recuvyra®, a Fentanyl Transdermal Solution (FTS), validated in dog perioperative pain management, could provide sustained analgesia after a single topical administration in minipigs in a surgical context.

Methods: Firstly: choice of the most appropriate dose to use in five non-operated minipigs. Plasma fentanyl dosages were performed during 4 days, at full (2.6 mg/kg) and half dose (1.3 mg/kg).

Secondly: efficacy of the FTS in a perioperative period. The FTS was blotted on the skin in a single application 20 minutes before the surgical incision in six minipigs benefited from a laparotomy. Plasma fentanyl dosages, clinical examination and pain assessment were performed for 7 days.

Results: Firstly: all fentanyl concentrations reached the Minimum Effective Concentration (MEC) in pigs ($\geq$0.2 ng/mL) throughout the 4 days.

Secondly: all the plasma fentanyl concentrations remained above the MEC up to 7 days post-administration at half dose. Clinical and pain evaluations showed an efficient and constant pain control, and few adverse events were observed.

Conclusion: We confirmed the efficacy of the fentanyl transdermal solution at 1.3 mg/kg in pigs throughout at least 7 postoperative days following laparotomy. This analgesic drug formulation could be universally used in animal research to provide optimal perioperative pain management.

S3F1.06

3R REFINED AND IMPROVED INTRATHECAL ADMINISTRATION IN THE RAT

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Abstract
Intrathecal administration of fluids directly into the cerebral spinal fluid of the subarachnoid space can be used to bypass the Blood-Brain Barrier. Methods described in literature are invasive with considerable animal discomfort from neurological signs up to death, with low success rates: direct puncture 26.7%, laminectomy 46.7%, non laminectomized 73.3%. We improved the surgery by making it less invasive, causing as little trauma as possible and with 100% success rate. Rats recovered very fast, gained weights, and showed explorative behaviour. There were no failures during surgery and no subsequent animal losses occurred. We successfully established a reliable minimally invasive cannulation technique into the subarachnoid space of the rat. This method was validated using PET imaging.

S3F1.07

THE HUMAN GUT ORGANOID, A PROMISING MODEL TO STUDY ENTEROVIRUS INFECTION AND DISEASE PATHOGENESIS

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Abstract
Enteroviruses (EVs) are a major source of human infections worldwide, with a broad spectrum of disease symptoms, from diarrhoea and skin rash to more severe disease like meningitis and paralysis. Elucidating EV pathogenesis has been limited by the lack of suitable models that faithfully mirror normal human physiology and pathophysiology. Organoids are stem cell-derived in vitro 3D organ models and an excellent system that has potential for studying on EV-host interaction, virus evolution, and antiviral compound testing on a human system.

The 3D gut organoids are an "inside out" representation of human physiology with the basal side on the outside facing the environment and the apical side facing the inwards. During culture, the organoids are "opened up" and cultured as a monolayer on transwells to establish viral infection. The monolayers were apically exposed to EV-A71 and subsequent viral replication was assessed by quantifying the viral RNA and virus replication at several time points.

Using the monolayer transwell system we show that EV-A71 infects the epithelium monolayers from the apical surface. We will present data on infection of the monolayer model with EV-A71, cell tropism of the virus, and monolayer permeability.

The human gut organoid-derived model is a powerful model for studying enterovirus infection and related disease pathogenesis. Continued development of the organoids cultures by including components of the normal host tissue microenvironment such as immune cells, will facilitate and simplify studies on human viral pathogenesis, and improve the development of platforms for pre-clinical evaluation of vaccines, antivirals and therapeutics.

S3F1.08

3D PRINTED RODENT SKIN-SKULL-BRAIN MODEL: A NOVEL ANIMAL-FREE APPROACH FOR NEUROSURGICAL TRAINING

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Abstract
In neuroscience, stereotactic brain surgery is a standard yet challenging technique for which laboratory and veterinary personnel must be sufficiently and properly trained. There is currently no animal-free training option for neurosurgeries; stereotactic techniques are learned and practiced on dead animals.

We have used 3D printing technologies to create rat and mouse skin-skull-brain models, specifically conceived for rodent stereotaxic surgery training. Based on high-resolution microCT 3D models and using specialized material, we created 3D printed replicas that provide the most accurate haptic feedback.

In order to probe the usability of our rat and mouse 3D printed models, ten qualified rodent neurosurgeons performed a variety of stereotaxic surgeries on these. Participants evaluated models' fidelity compared to cadaveric skulls and their appropriateness for educational use. Both 3D printed skin-skull-brain models received an overwhelmingly positive response. They were

perceived as highly realistic replicas, offering an excellent alternative to cadaveric skulls for training purposes. Given the use of adequate 3D printers and materials, our 3D models can be created rapidly and cheaply.

In conclusion, our real-size 3D printed replicas could enable cost- and time-efficient, animal-free neurosurgery training. They can be absolute replacements for stereotaxic surgery techniques practice including but not limited to craniotomies, screw placement, brain injections, implantations, and cement applications. This project is a significant step forward in implementing the replacement, reduction, and refinement (3Rs) principles to animal experimentation. Our 3D printed models could lead the way to the complete replacement of live animals for stereotaxic surgery training in laboratories and veterinary studies.

S3F1.09

PILLTECH – A REFINED, METABOLIC INERT AND ANIMAL WELFARE FRIENDLY TOOL FOR ORAL DRUG DOSING

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Abstract

Oral drug dosing (ODD) in rodents is a common practice in preclinical studies. Gavage (GAV) is the current ODD's gold-standard methodology despite frequent traumatic complications (e.g. gastroesophageal injury) and reports of harmful influence across multiple physiologic systems (e.g. metabolic, endocrine, immune). The blatant disregard of these facts continues to introduce data bias and narrow scientific endpoints, thus hindering preclinical results' translation. Voluntary alternatives to GAV are scarce and often lack dosage precision, require animal restraint, single housing and are metabolically disruptive. Consequently, we have recently developed an innovative technology – PILLTech – for ODD aimed to provide a refined voluntary, stress-free, safe, and metabolically inert alternative to GAV. Herein, we aimed to validate PILL tech suitability in a challenging animal model of metabolic disarrangements – type 2 diabetes mellitus (T2DM) induced by high-fat diet (45%) combined with a single low-dose streptozotocin (25mg/Kg, i.p.). Metformin (METF), 500mg/Kg, was the antidiabetic drug elected, orally administered by GAV or PILL tech for 6 weeks. Forty Wistar rats were randomly divided in 4 groups (n = 10/group): CTL/T2DM/T2DM+METF-GAV/T2DM+METF-PILL. Intraperitoneal glucose/insulin tolerance tests were carried out at week 0, 8 and at the final endpoint the following biochemical analysis were performed to evaluate the dynamic blood sugar and lipid metabolism: fasting blood glucose/insulin, total cholesterol, and triglyceride contents. We observed similar METF efficacy in aforesaid metabolic parameters when METF was administered through GAV or PILL, highlighting PILL tech potential in preclinical metabolic assays while enhancing animal well-being and in vivo data accuracy. Acknowledgments: Refinement Prize 2021 (EPAA).

S3F1.10

3R BLACKBOARD: A PLATFORM FOR ANIMAL AND ORGAN SHARING

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Abstract

Since the embedding of the principles of the 3Rs (Replacement, Reduction and Refinement) in national and international regulations on the use of animals, scientists have been challenged to find ways to reduce the number of animals in their research. Here, we present a digital platform, called '3R Backboard', linked to a laboratory animal management system, which facilitates sharing of surplus biological materials from animals (e.g. tissues, organs and cells) to other research teams. A pilot study of this approach conducted in an academic environment presented strong evidence of the approaches' effectiveness and resulted in a notable reduction in the overall numbers of animals used for research. Over a period of 19 months, we recorded 46 entries with an average of 5.57 mice per entry and a total of 256 mice. Nearly half of the time mice were made available (47.8%) they were shared by two to six licensees including the individual providing the animals. In total, 97 mice out of 256 offered (37.9%) were shared for extraction of multiple tissues. Most importantly, utilization of this sharing approach saved 140 mice (97 multi-used mice x 1.45 average number of extra users per mouse). Moreover, it reduced animal costs for licensees and offered the opportunity for scientists to generate additional data, set new collaborations and to harmonize their protocols.

S3F1.11

GIGGLING TOGETHER – STRESS REDUCTION OF APPRENTICES AND RATS BY TICKLING

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Abstract

It is important to us to point out to our apprentices that laboratory animals communicate in many ways that we cannot perceive straight away, but that we can make it visible by technical equipment.

This is why we have implemented the rat tickling technique in our animal handling courses. The technique improves animal welfare by making the animals less stressed and less afraid of humans. To check if the technique is performed well and the rat

is comfortable, the frequency of 50kHZ is the key indicator, made audible with the help of an ultrasonic device. Here it can also be observed very well that the apprentices are excited and happier when they hear the sound. As a result, the apprentice's focus shifts away from their own stress/fear of making mistakes to an interaction with the rats- a relationship evolves rather than fearing each other.

When performing the technique, the apprentices learn to read the rat's body language and consequently better evaluate the emotional state of the rat. They will know when it is better to take a break and give the rat some time to relieve stress and anxiety.

S3F1.12

3RS IMPORTANCE IN PRACTICAL TEACHING: STUDY OF CARDIORESPIRATORY PHYSIOLOGY WITH A NON-INVASIVE TELEMETRIC JACKET

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Abstract
A 3R approach is essential when thinking of maintaining practical experimental education on laboratory animals at University, especially for integrative physiology teaching.

This work gives an example of this approach with a study aiming at evaluating the implementation of a practical experiment on physiological adaptation to controlled exercise, using a cardiorespiratory connected jacket for small mammals and a treadmill.

Two males wistar rats (360 gr, 14/16 weeks, reused from a previous study) were accustomed to the jacket and the treadmill. Twelve students from a professional "physiology and pharmacology" bachelor degree were divided in pairs. For two weeks, each pair was daily asked to equip the animals with the jacket and carry out a standardized exercise protocol. They finally answered a questionnaire to assess their experience as experimenter.

Although only two animals were used during the sessions, all the students got the opportunity to equip and study freely moving animals. The telemetric jacket allowed them to record the expected increases of heart and respiratory rate at the different imposed running speeds. In the questionnaires, the severity of the procedure was evaluated to light (average mark of 1.25± 0.09(SD)/ 5 (0-light, 5-severe)) which indicated a very good acceptance and perception by the students.

To conclude, the study of cardiorespiratory physiology using non-invasive monitoring jacket allowed to reduce the number of animals used and refine the practical work procedure. This approach could be replicated on a larger scale (more students) or to study different physiological conditions during university courses.

S3F1.13

3D-PRINTED RODENT MODELS – A PRACTICAL IMPLEMENTATION OF THE 3RS IN LAB ANIMAL TRAINING

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Abstract
There is a constant need to perform intravenous (i.v.) injections on mice and we recognized the urge to optimize trainings for this demanding task. Learning to perform i.v. injections into the lateral tail veins of a mouse can be challenging due to a heavy reliance on precise hand-eye coordination, the right "feeling" upon injection and very limited spatial tolerances. Performing this technique reliably usually requires numerous repetitions and therewith animals. Moreover, the acquired injection skills need to be maintained by repeated training sessions.

Current developments in 3D printing technologies and materials offer great potential for realistic training models in the field of laboratory animal sciences. In a collaboration between a rodent core facility (ZIRP) and an additive manufacturing facility (AddManFactory), we combined our knowledge about the specific requirements of training rodent experimental procedures with the expertise of state-of-the-art 3D printing to create realistic 3D printed mouse tails. These artificial tails (containing vessels filled with artificial blood) can be used for i.v. injection trainings to a) train dexterity, b) familiarize with the necessary equipment and c) learn the technique step by step for as many repetitions as necessary before the training on live animals. Artificial mouse tails present an excellent opportunity to implement animal-free learning tools into the training of basic skills required for many rodent experiments, thus reducing the number of animals used for training as well as the suffering of mice used for the final (in vivo) training step.

S3F1.14

THE ROLE OF NONINVASIVE MULTI-MODALITY IMAGING TO IMPLY 3R PRINCIPLE IN CANCER RESEARCH

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Abstract
Cancer is the second cause of death in developed countries. Translation cancer research requires *in vivo* models that mimic cancer development in man in terms of malignant progression, metastases, and chemotherapy resistance. Small animal models are increasingly recognized as powerful discovery tools in cancer

research. One of the limitations in using experimental animals is the need to sacrifice animals at several time points to follow the disease onset, progression, and subsequently the treatment efficacy. Consequently, each study requires a large number of animals. Non-invasive imaging techniques are important tools for providing quantitative *in vivo* data, repetitively, on biochemical, genetic, and/or pharmacological processes in the same animal.

In the present study, we applied multiple non-invasive imaging technologies to obtain quantitative anatomical, functional and molecular information in animal models for both solid tumours and non-solid tumours. By integrating multiple imaging modalities: optical imaging (OI), ultrasonography (US), photoacoustic imaging (PAI), magnetic resonance imaging (MRI), and positron emission tomography (PET), we were able to 1) follow tumour development at an early stage, 2) quantify tumour size, 3) measure tumour perfusion, 4) measure tumour hypoxia and 5) determine tumour metabolism. Such longitudinal study allows precise monitoring of cancer progression, response to therapy as well as imaging biomarker identification (refine). This strategy provides accurate and reproducible results with low individual variation by using each animal as its own control (refine). We conclude that using non-invasive imaging techniques can substantially reduce the number of used experimental animals which is in full agreement with the 3R principle.

S3F1.15

HOUSING EFFECTS ON CORTISOL AND BODY FAT LEVELS IN CAPTIVE FEMALE RHESUS MACAQUES

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Abstract
Macaques are commonly used non-human primates in biomedical research. They naturally live in large social groups, yet biomedical studies often require group-living animals to be pair-housed in a controlled environment. A change in the environment causes short-term stress, but some individuals may even experience long-term stress when they are not able to adapt properly. This has a negative impact on animal welfare and can adversely affect study results. Since macaques cannot communicate to us how they perceive their environment, other measures need to be used as indicators for refinement. This study uses cortisol and body fat levels to investigate the long-term effect of a change from group- to pair-housing in 32 female rhesus macaques (*Macaca mulatta*), thereby aiming to identify risk factors for long-term stress in pair-housing. Cortisol levels were extracted from hair samples, while body fat levels were quantified with anthropometric measurements and computed tomography. Cortisol levels were higher in pair-housing compared to group-housing, while body fat levels did not substantially differ. The change in cortisol was independent of age, dominance rank and baseline cortisol level, while the change in body fat was significantly related to dominance rank in the social group and baseline body fat level. There was high individual variation, but no significant correlation between cortisol and body fat levels could be detected. Thus, this study found no clear risk factors for long-term stress in pair-housing. Still, the individual variation shows that some macaques have a higher adaptive ability than others, providing possibilities for future refinement studies.

S4A1.1

ASSESSING PHYSIOLOGIC AND BEHAVIORAL EFFECTS OF THE RESIDENT-INTRUDER PSYCHOSOCIAL STRESS PARADIGM

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Abstract
The resident-intruder test (RIT) is a behavioral paradigm used to assess psychosocial stress in vivo. In this study, we sought to determine severity level (mild, moderate, or severe) based on how quickly mice returned to baseline, physiologically and behaviorally, post-RIT. Six-week-old male mice of one outbred and one inbred strain (Crl:CD1, C57BL/6NCrl, $n = 8$ each) with pre-implanted telemetry for temperature, heart rate, and blood pressure underwent baseline behavioral (time-to-integrate-nest-test (TINT), sucrose preference) and physiologic assessments (telemetry recording, fecal cortisol) after a one-week facility acclimation. Within strains, mice were randomly assigned as resident or intruder and underwent a 15-minute RIT. Continuously measured blood pressure, heart rate, and body temperature were all significantly higher immediately post-RIT ($p < 0.05$) and normalized within 4 hours. Repeated fecal cortisol (8, 24, 48-hour) was insignificant from baseline. Nest-integration failed to occur in 51% of mice immediately post-RIT, and TINT-positive mice demonstrated significantly prolonged integration times until 48 hours. Normalization of binary TINT assessments to baseline (100% integration) was correspondingly achieved at 48 hours. Similarly, the joint probability of failing to consume sucrose and taking longer to do so relative to baseline was significant up until 48 hours post-RIT. Taken together, despite returning to physiological baseline within 4 hours post-RIT, mice were behaviorally affected for at least 48 hours. We conclude that the RIT paradigm should be classified at least as moderate within the severity categories based on short-term moderate physiological and psychological distress and long-term mild psychological distress.

S4A1.2

MONITORING ANIMAL BEHAVIOR DISTURBED BY CONSTRUCTION ACTIVITIES

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Abstract
Experiments with stressed mice can lead to biased results. Construction activities can cause stress in experimental animals: Demolition, compaction of backfilled soil, drilling in concrete, etc. It has also been reported that breeding may collapse during construction activities.

When construction work cannot be avoided in the vicinity of laboratory animals, conflicts between science and construction arise that are difficult to resolve. The following measures could disarm these conflicts: Noise mitigation planning, vibration damping, documentation of (expected) disturbances, and informing scientists for subsequent interpretation of possibly biased results.

Sound and vibration threshold values for human perception are well established, but not for laboratory rodents. It was shown that the circadian movement pattern of mice is a sensitive indicator of stress that can be collected entirely automatically 24/7. We have acquired such systems to enable a correlation of construction activities and stress. All hardware components are located outside the mouse cage, which is why the mice are completely undisturbed by the technology used.

Unexpectedly, the noise and vibrations in the normal operation of the animal housing were more prominent than the disturbances from construction activities outside the animal housing. Metal object handling (>90dbA) and slamming of massive fire doors (>1.4mm/s) were the strongest noise and vibration measured. In contrast, most construction activities cannot be measured in this background noise. Ideally, as the data grows, we will be able to mitigate noise and acceleration of the normal work, to distinguish "good" from "bad" construction activities and define thresholds according to animal perception.

S4A1.3

MODULATING CAPTIVE MAMMALIAN SOCIAL BEHAVIOR: A SCOPING REVIEW ON OLFACTORY TREATMENTS

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Abstract
Many species communicate via olfaction; therefore, odor signals could improve captive animal welfare by reducing aggression and promoting socio-positive behavior. However, to fully gauge the potential benefits of odor manipulations, existing literature must be evaluated, and quality weighed. Accordingly, a systematic search and scoping review was conducted to summarize prevalent methods, treatment outcomes, and modulating factors in existing literature on how intraspecies odors impact social behavior. Articles from a systematic search of three databases were included 1) if they were published in a peer reviewed journal, 2) used a terrestrial mammalian species, and 3) contained original data evaluating how odor signals from the subject species directly affected non-reproductive social behavior. Two researchers screened all articles, one extracted data, and both assessed reporting quality using the SYRCLE risk of bias tool. Sixty-three articles were included based on these criteria. Most subjects were sexually mature, male rodents. Urine was the most common odor source and aggression was measured most often. Overall, urine and saliva treatments had a variable effect on aggression, while urine typically increased scent marking and social investigation behavior. Concerningly, most articles showed unclear or high risk of bias. Data from this review highlights a need for additional research on how odor signals from sources other than urine affect behavior and how socio-positive behaviors are affected. Further, it emphasizes the need for more transparent reporting: the current body of literature hinders each experiment's quality assessment and how much weight each outcome should be given pertaining to our understanding of olfactory communication.

S4A1.4

FROM MATING TO MILK ACCESS: A JOURNEY THROUGH REPRODUCTIVE VOCAL COMMUNICATION IN MICE

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Abstract
Vocalizations play a central role in rodent communication, especially in reproduction related behaviours. We here present a review based on 50 papers of experimental or observational studies.

In adult laboratory mice, the emission of ultrasonic vocalizations (USVs) has been observed in courtship and mating behaviour, especially by male mice, which possess distinctive individual signatures and can influence female choice in mating partner, impacting reproductive success. Furthermore, more recent research present evidence that vocal communication also plays a role in parental cooperation, with the finding that female mice communicate vocally with male partners to induce paternal behaviour.

Infant vocalizations form the other important part of reproductive vocal communication. Although born deaf, neonatal mice are able to vocalize since birth and by doing so they modulate maternal behaviour. As an altricial species, successful mother-infant communication is crucial for survival.

Three main types of infant vocalizations have been identified and characterized. The more thoroughly studied pure USVs are related to stressful situations (e.g. cold, isolation, handling,

presence of unfamiliar males or predators), which usually elicit maternal search and retrieval. The less studied include broadband spectrum signals, emitted when pups are cleaned postpartum and which inhibit biting and injury by adults, and "wriggling calls", emitted during suckling, which release maternal behaviour (such as licking).

Social context as well as individual characteristics such as genotype, age and sex are known to modulate vocalizations in mice. Mouse vocalizations are gaining research interest and represent an important tool to assess social interactions and emotional states, and to assess and monitor animal welfare.

S4A2.1

GETTING MORE FROM YOUR BEHAVIOR: USING POSE ESIMATION WITH SUPERVISED AND UNSUPERVISED MACHINE LEARNING

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Abstract
One core component of animal welfare is the 3 R principle. While a complete replacement of animals is unfeasible in fields of behavioral research the "reduce" and "refine" components are tangible and technological advances offer solutions that are not yet fully integrated into normal lab practices. In this session, we will provide a technical overview of some of these new technologies. We will explore how pose estimation (DeepLabCut) can be applied to raw videos to gather a wealth of information that was previously inaccessible. Further, we show how these pose estimates can then be used in combination with supervised and unsupervised machine learning methods to refine and improve detection of known behaviors and enable the detection of potential novel phenotypes. We will also discuss the expertise a lab currently needs to efficiently implement these methods, and how this is becoming feasible for most labs in the very near future.

S4A2.2

HOME CAGE MONITORING OF ANIMALS TO INFORM WELFARE NEEDS

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Abstract
The MRC Harwell institute focuses on the generation and phenotyping of genetically altered (GA) mouse models to study the relationship between genes and disease. Many of the models studied are completely novel, some with progressive conditions such as neurodegenerative diseases, diabetes, and diseases of aging. Therefore, much effort is directed towards monitoring the welfare of mice.

Conventionally the welfare of the mice is assessed through daily cage side assessment, where the animal care worker examines the cage and only opens it if there is an obvious cause for concern or at cage change. Whilst this is a very effective way of identifying obvious welfare concerns such as wounds and weight loss, subtler indicators of welfare (such as a reduced activity) can be missed altogether. We have already shown that simply moving the cage from one rack location to another within the same room is enough to disrupt mice for up to an hour, therefore it is likely that cage side checks do not recapitulate what is actually happening within an undisturbed cage.

It is also important to note that mice are nocturnal animals. Therefore, many behavioural phenotypes will actually be expressed in the dark phase, where they go unobserved. Remote home cage monitoring can over-come these issues and identify areas of concern in the maintenance of GA mice or post-procedural care.

Here we show examples and demonstrate the utility of using home cage monitoring for mouse welfare, collecting scientifically relevant data at earlier timepoints and supporting earlier interventions.

S4A2.3

TOWARDS AN AUTOMATED FACIAL EXPRESSION ANALYSIS IN MICE USING DEEP LEARNING

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Abstract
The Mouse Grimace Scale (MGS) is a coding system for facial expression analysis of pain in mice and is widely accepted as welfare indicator. To facilitate and improve the use of the MGS, we aimed to develop a facial expression recognition software for mice. To this end, we utilized an image dataset of adult male and female C57BL/6JRj mice, that were either untreated, anesthetized (with isoflurane or ketamine/xylazine) or castrated (under isoflurane anaesthesia, meloxicam, lidocaine/prilocaine). The dataset was divided into two categories, i.e. "post-surgical/anaesthetic effects present" and "no post-surgical/anaesthetic effects present". A binary classifier was trained to differentiate between the two categories. We used three convolutional neural network (CNN) architectures (two pre-trained state of the art deep CNN: ResNet50 and InceptionV3; one CNN of our own design without pre-training). When the network was provided multiple images per mouse, an

accuracy of up to 99% was achieved. A feature visualization technique (Deep Taylor decomposition) indicated that the decision of the network was mainly based on image areas depicting the mouse faces. Our first steps towards a fully automated facial expression recognition software contributes to refining pain and stress assessment in laboratory mice.

Funding: Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy – EXC 2002/1 "Science of Intelligence" – project number 390523135. Images and MGS scores were obtained from the Berlin-Brandenburg research platform BB3R funded by the German Federal Ministry of Education and Research (grant number: 031A262A).

S4A3.1

ASSESSING BEHAVIOUR FOR RODENT WELFARE MONITORING

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Abstract
In contrast to the traditional focus on physical and clinical indicators of poor health and condition and the avoiding or reducing of negative welfare states, modern animal welfare concepts highlight the importance of tools to measure and to promote positive welfare states in laboratory animals.

Important achievements have been made to assess pain and other negative affective states in laboratory rodents in the last decades, but it is only recently that the biology of positive emotions in (humans and) animals has been gaining more interest. Thereby, the need for promotion of positive affective states for laboratory rodents is also gaining more acceptance, and methods allowing the assessment of affective states in rodents have been increasingly introduced. In this overview talk, I will present common and emerging methods to assess positive and negative affective states in laboratory rodents. I will focus on the implementation of behavioural methods into applied refinement research to identify achieved progress as well as the future potential of these tools to improve rodent welfare in research.

S4A3.2

CAN HAIR STEROIDS PROVIDE INFORMATION REGARDING EFFECTS OF ENVIRONMENT ON RODENTS WELFARE AND BEHAVIOR?

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Abstract
In-depth welfare assessment in laboratory rodents is both an ethical necessity and a legal requirement, thus the scientific community is constantly searching for precise and accurate markers to evaluate it.

Steroid hormones modulate the communication between inner and outer environments, playing a pivotal role in several biological patterns including stress and sexual behavior.

Rodents show a peculiarity in steroids physiology, with corticosterone being the main glucocorticoid involved in direct homeostasis/stress conditions, as opposite to other mammals where it is cortisol. Dehydroepiandrosterone (DHEA), on the other hand, is generally involved in both stress and reproductive patterns, but is not synthetized in adrenal glands when it comes to rodents. Finally, sexual steroids (i.e. testosterone, oestrogen) pivotal for the reproductive cycle, are also involved in the modulation of behavior upon binding receptors within the CNS.

Steroids are quantifiable in different matrices including plasma, feces, urine, saliva, and also fur. The latter represents a non-invasive sample, indicative of longer timespans and not influenced by acute stimuli and circadian rhythms well known for steroids in blood.

Literature shows how different environmental conditions, stressors and genotypic/phenotypic characteristics can induce changes in hair steroids profiles of various species, but studies focusing on laboratory rodents are currently few. By analyzing what is already known, we will try to understand if rodents' hair can provide information regarding environmental changes and how the different steroids can be indicative of welfare and behavioral patterns, with the final aim of understanding the capabilities of such tool for welfare assessment in laboratory rodents.

S4A3.3

CLICKER TRAINING FOR LABORATORY RODENTS – COGNITIVE ENRICHMENT AND BEYOND

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Abstract
Training of laboratory animals, as also required by the European Union Directive 2010/63/EU, is a promising refinement tool for small laboratory rodents. Especially positive reinforcement training, which has proven to be effective and animal friendly, has the potential to improve the well-being of the animals. Clicker training is a form of positive reinforcement training, where a 'click' serves as a time bridge between the rewarded behavior and the upcoming reward, allowing quick and precise reinforcement. (Clicker) training can be easily implemented for mice, rats and hamsters.

Training can generally serve as a cognitive enrichment and improves habituation to humans. Furthermore, the training procedures can easily be adapted to be used for care, management, and also experimental procedures. The option for voluntary cooperation in procedures has proven to reduce anxiety associated behaviors and the positive contact between the animal and the experimenter enhances the voluntary interaction of the animal with the experimenter. Furthermore, trained animals, not trying to bite or to escape, improve the ability to perform experimental procedures in the best possible way. Overall, training contributes to the well-being for both, laboratory animals and the experimenter, and thus contributes to a culture of care.

S4A3.4

RODENTS HANDLING AND TRAINING FOR STRESS-FREE PROCEDURES

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Abstract
This presentation gives you an overview of the management and training of laboratory animals at RISE, Research Institutes of Sweden, Chemical and Pharmaceutical Safety, Södertälje, Sweden. Proper housing, gentle handling and training of the laboratory animals provide a positive experience from the very beginning when animals arrive at their new animal facility. Creating trust and recognition in the relationship between the handler and the animal is important to reduce stress-related behaviour during the study. This can be achieved with a few shorter training sessions before the start of the study. Other benefits of training are reduced risk of injury and failure during test procedures, as well as more accurate clinical observations.

3R/animal welfare is a cornerstone of our work. We have created working material which we will show in the presentation. Our instructional films of training can be useful in your work to facilitate the introduction of suitable techniques and training elements in your animal laboratory environment.

S4A4.1

ASSESSMENT OF INDOOR AIR QUALITY AND CONSEQUENT RECOMMENDATIONS FOR GROUP-HOUSED MACAQUES

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Abstract
Excessive exposure to inhalable dust, endotoxin and ammonia may lead to respiratory diseases in both humans and animals. Therefore, animal housing facilities must be consistently and sufficiently ventilated to provide for the health and well-being of animals and caretakers. However, laboratory animal guidelines lack evidence-based recommendations for controlling air quality in non-human primate breeding facilities. We assessed the air quality in indoor enclosures of group housed macaques at the BPRC and provide recommendations.

In the indoor enclosures, inhalable dust, endotoxin, and ammonia were measured for several days and nights. A smoke test was performed to detect air flow currents. In addition, two caretakers were equipped with portable measuring devices to measure exposure during their daily work routine.

Mean ammonia, dust and endotoxin concentrations in the animal facilities did not exceed 2 ppm, 0.08 mg/m^{3}and 29.08 EU/m^3 respectively. The mean dust concentrations were significantly higher during daytime than night-time. Measurements on the caretakers showed mean dust and endotoxin concentrations of 4.2 mg/m^{3}and 439.0 EU/m^3 respectively. The smoke test revealed a sub-optimal air circulation as the airflow was obstructed or lingered in the enclosures

For humans, the occupational value limits are: ammonia = 20 ppm, inhalable dust = 10 mg/m^3 and endotoxins = 90 EU/m^3. The monkey enclosures are well within these limits, but this is not the case for the endotoxin exposure of caretakers. Recommendations for improvements are provided. Nevertheless, further research is necessary to determine population value limits for non-human primates.

S4A4.2

IDENTIFYING RISK FACTORS FOR FIGHT INJURIES IN A BREEDING COLONY OF RHESUS MACAQUES

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Abstract
One of the biggest welfare concerns (and targets for refinement) in a breeding colony of rhesus macaques is the number of fight-related injuries. As part of a colony review and our culture of care we looked back at 10 years of injury and productivity data for macaques housed in breeding and stock groups to identify which animals were most at risk for injury and how colony management factors might influence the injury rates (whilst also considering their effect on productivity). For each animal we looked at the number of injuries sustained between 2008 and 2017. We identified that adult females in breeding groups were the most at risk population within the colony. For this subpopulation we used mixed effect models to identify the factors that best correlate with 1) the number of injuries and 2) the productivity. Unsurprisingly one of the biggest effects on injury rate was the introduction of a new male to a breeding group and this also corresponded to an increase in productivity in the group. Other factors such as group size, age of the animals and whether the females within a group are related or not all had an effect. We also identified dental issues in the breeding males as possible reasons for injuries in the group (injury rate decreased after dental treatment in a case study of 18 breeding males). We conclude by looking at how we use these data to communicate colony management decisions to animal care staff and others.

S4A4.3

DETECTION OF NEUTRALIZING ANTIBODIES AGAINST ADENO ASSOCIATED VIRUS SEROTYPE-2 AND 9 IN NHP SERA

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Abstract
Adeno-associated viruses (AAVs) are harmless viruses which are critical components in the development of gene therapies. Most of over 200 current gene therapy trials employing viral vectors are based on AAV vectors. A big challenge in these trials is immunogenicity, i.e., presence of AAV neutralizing antibodies (NAb's). NAb's may interfere with vector distribution altering transduction and transgene expression both in humans and NHP's thus undermining the potential efficacy of the drug. Out of 13 serotypes, AAV2 and AAV9 are the best studied so cell-based assays were developed for them. Multi-tech multi-day qualification studies were performed to assess diagnostic sensitivity, diagnostic specificity, reproducibility, and ruggedness of the in vitro AAV2 and AAV9 NAb assays. Cells incubated with eight known positive and eight known negative samples were infected with AAV2 or 9-CAG-Luciferase providing a luminescent readout of infections. In addition, to assess AAV2 and AAV9 titer assays, four samples with high titer were serially diluted 2-fold up to 1/5,120. Results from the qualification of the AAV2 and AAV9 NAb assays showed high sensitivity, specificity, and reproducibility. Overall, diagnostic sensitivity and specificity of the AAV2 and AAV9 NAb assays were found to be $>$ 95% and $>$99%, respectively. Analytical specificity (selectivity) of the screening assays was also very high with no or low cross-reactivity observed by other AAV serotype antibodies. In conclusion, cell based AAV2 and AAV9 NAb assays were qualified which are highly sensitive and specific for routine screening for the presence of neutralizing antibodies in NHP serum.

S4A4.4

THE NEXT LEVEL OF POSITIVE REINFORCEMENT: A PERSONALIZED TRAINING APPROACH FOR NON-HUMAN PRIMATES

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Abstract
Training non-human primates (NHPs) to cooperate with routine scientific, husbandry and veterinary procedures is recommended as good practice by many regulations and guidelines. Positive reinforcement training (PRT) is considered the gold-standard of training methods. However, the scientific literature related to this topic is sparse, and active and voluntary participation of NHPs in procedures in biomedical research is not systematically achieved for various reasons.

We developed a program to train a group of 12 cynomolgus macaques to participate voluntarily in a number of different experimental procedures. These included entering different housing rooms on command, presenting extremities for examination or blood collection, and even presenting the head for oral gavage. These animals are now being routinely and repeatedly used in pharmacokinetic study activities.

Our training approach not only focuses on positive reinforcement, but furthermore splits the tasks to be learned in small steps that are faster to achieve. By dividing a task in small increments of steps and then teaching one step at a time until the desired behavior is achieved, the training can be tailored to the individual animal, its individual needs and speed of learning.

By sharing this specific training concept with the broad scientific community, we hope to provide a simple recipe for training non-human primates for a variety of different tasks.

S4A4.5

THE RELIABILITY AND VALIDITY OF THE CYNOMOLGUS MACAQUE GRIMACE SCALE

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Abstract
In the past decade, the use of grimace scales for quantifying pain of research animals has become a useful tool. Through the development of a Cynomolgus Macaque Grimace Scale (CMGS) the reliability and validity of the tool were measured. Macaques ($n = 43$) were continuously video recorded opportunistically 24h before and 48h following an electroencephalogram transmitter implant surgery. For ethical reasons, to develop the tool, pain was assessed using anticipated breakthrough pain based on pharmacokinetic evidence following analgesic administration. Macaque images retrieved from various timepoints ($n = 1940$) were randomized and scored by raters blinded to time and animal ($n = 12$) using the CMGS. Continuous focal animal sampling of all behaviour patterns (135h) was performed by one observer blinded to time and animal. Inter- and intra-rater reliability for each facial action unit (orbital tightening, eyebrow lowering, lip tightening, and hunched posture) was assessed using a two-way random-effects model for absolute agreement. Results demonstrated overall good inter- (ICC average action unit mean $\pm$ SD: 0.67 ± 0.28) and intra-rater reliability (ICC single mean $\pm$ SD: 0.79 ± 0.14). Construct validity was assessed using a Mann-Whitney U test. Results demonstrated that behavioural trends correlated with grimace scores (rho $= 0.22$–0.35, $p < 0.001$). Criterion validity was assessed using Gaussian linear mixed models and demonstrated an increase in grimace scores up to 17h post-op ($p < 0.001$) and significant differences in general and pain-associated behaviours compared to

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baseline ($p < 0.05$). These findings suggest that the CMGS is a valid and reliable tool that is important to refine perioperative care of research primates.

S4B1.1

"A ROSE BY ANY OTHER NAME"... DESIGNATED VETERINARIAN/NAMED VETERINARY SURGEON IN THE UK

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Abstract
In common with the requirements of Directive 2010/63/EU and the UK's Animals (Scientific Procedures) Act (ASPA) a Designated Veterinarian (DV) is mandated in the Licence issued to scientific Establishments. The DV (Named Veterinary Surgeon, NVS in the UK) is responsible for advising on the health and welfare of animals kept at the Establishment and is also an integral member of the team supporting its Animal Care & Use Programme.

An NVS must be a member of the Royal College of Veterinary Surgeons and is expected to have additional expertise in the species used or bred at the Establishment and/or in laboratory animal medicine. The UK's Competent Authority, the Home Office, further mandates that each NVS must attend a training course, approved by the Royal College of Veterinary Surgeons, in order to fulfil the role. We're fortunate in the UK that there is training available for NVSs, which not only provides a good grounding in the ASPA and its guidance, but also covers the 3Rs and ethical use of animals, as well as providing a basic understanding of how animal facilities operate. Although NVSs comprise only around 0.5% of all UK vets, an open and friendly network of NVSs exists in the UK to provide additional support to colleagues.

Education is our future and making available training, not only in lab animal medicine, but also in the daily functions and practical issues that a DV will encounter can only be beneficial to vets and the animals for which they care.

S4B1.2

A POINT OF VIEW FROM SPAIN

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Abstract
Spanish legislation about animal experimentation is a transposition of European Union legislation. A Designated Veterinarian (DV) is required in all the Establishments with a main animal health role.

Animal welfare supervision and participating to the Institutional ethics committee are other tasks where veterinarians spend time. In many of the institutions the Animal Care and Welfare Officer (ACWO) and the DV are the same person. Thus, veterinarians dedicate much of their working time to check animal welfare, provide research support and, as member of the ethics committee, to evaluate animal projects and monitoring development of authorised projects. This creates a constant communication with the investigators responsible for the projects.

In Spain, the DV is frequently also the manager of the animal programme (budgets, personnel management and staff training), which creates a conflict of interest between the tasks of management and those of welfare and animal health.

The competent authority supports the DV role, although the other functions and responsibilities performed and held by veterinarians can create a confusing environment.

Veterinarians have gradually been incorporated into the world of animal experimentation, but it is still a small professional field in Spain. There are no records on how many veterinarians are working in the field and it is difficult to find continuous professional development opportunities to maintain legal DV requirements. Professional associations provide basic support on these matters.

Animal care, medicine and health should be the essential functions and responsibilities of the DV and harmonised accordingly.

S4B1.3

THE DESIGNATED VETERINARIAN IN LUXEMBOURG

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Abstract
Art. 25 of Directive 2010/63/EU stipulates that "*each breeder, supplier and user has a designated veterinarian* (DV) *with expertise in laboratory animal medicine, (...) charged with advisory duties in relation to the well-being and treatment of the animals.*" This requirement was transposed into national law.

Just as in the Directive, the only legal obligation of establishments is to ensure that veterinary care is available at all times. The only responsibility strictly referred to the DV is the input to the animal welfare body.

Permission to practice veterinary medicine underlies specific conditions and is issued by the Ministry of Health. For the role of the DV, no formal specific requirements are requested. Some administrative obligations of veterinary surgeons are handled by the Collège Vétérinaire and a personal introduction to its board is organized.

Given the size of the country, only 3 people are currently working as DV. There is no national association in laboratory animal medicine (LAM) or laboratory animal science (LAS) and therefore all of them are ESLAV members and members of other LAS associations in order to be informed and exchange with experienced colleagues.

Inspections of establishments are carried out by the Administration of Veterinary Services (competent authority for animal health, protection, and welfare). Although regular contact exists, it is mostly related to the authorization of projects or inspections. Closer and more collegial interaction with the DVs is lacking but would be appreciated as this would help to empower their position in the establishments and thus facilitate their roles.

S4B1.4

THE ROLES OF DESIGNATED VETERINARIAN IN CROATIA

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Abstract
Croatia became the 28th Member State of the EU when it joined on July 1st 2013. Same year the new Directive 2010/63/EU became effective, and its new requirements were transposed into the Croatian legislation, including the provision of postgraduate LAS training at the national level by the local course providers, a novelty in Croatia at that time. In 2014, the National Competent Authority (Ministry of Agriculture) constituted the first ever National Ethics Committee (NEC), appointing its members and designating it an advisory role.

In compliance with the Directive requirements, the end users were required to appoint a designated veterinarian (DV).

The DV role/s, depending on the size and the nature of the end user's core business can differ greatly, both in scope and volume, but main one is to provide the advice in relation to the wellbeing and treatment of the animals.

Furthermore, DVs perform a number of overlapping roles like those of a:

- Researcher (e.g. Study Director in charge of *in vivo* projects)
- Manager (animal facility manager, project manager)
- Practitioner, conducting the Quality Assurance and the Quality Control of activities involving animals and animal by-products, conducting SOP revisions, internal inspections, vendor inspections, etc
- Animal Welfare Officer
- Training Officer
- Compliance Officer
- Institutional Ethics & NEC member, often with a role of the NCA liaison, with membership in expert working groups appointed by the NCA.

Last, but not least, DVs in Croatia are active members of national and international LAS and other scientific associations.

S4B1.5

THE ROLE OF DESIGNATED VETERINARIAN IN GREECE

A. Zacharioudaki[1]
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Abstract
According to Presidential Decree 56/2013 (PD), "breeder, supplier and user establishments have a designated veterinarian (DV) with expertise in laboratory animal medicine, with advisory duties for the well-being and treatment of animals". The DV is the only expert mentioned in national legislation for this role and must fulfil at least the minimum requirements of training required by Directive 2010/63/EU and the PD for research personnel. The DV is a *de jure* member of the institutional Project Evaluation Committee and Animal Welfare Body.

The Geotechnical Chamber of Greece handles the statutory registry of veterinarians, while enrolment to Hellenic Veterinary Medical Association is required upon graduation. Neither so far promoted laboratory animal medicine, however new graduates' interest is increasing. Greek DVs are active with Hellenic Society of Biomedical and Laboratory Animal Science and European Society of Laboratory Animal Veterinarians, for exchange of expertise and information.

DVs work closely with veterinarians of Greek competent authorities who are collegially available for advice and support the DV role. Central competent authority of Directorate for Veterinary Care, Drugs and Veterinary Applications under the Ministry of Rural Development and Food, overlooks legislation, coordinates annual use statistics and non-technical-summaries. Regional Veterinary Services participate in Project Evaluation Committees of region's establishments, register, and inspect establishments.[2]

Current legislation set sound base for the role of the DV in Greece, and further endorsement is necessary. Permanent full-time employment of DVs at every establishment and management acknowledgement of DV authority has proven crucial for the adequate performance of DV duties.

S4B1.6

THE ROLES OF ATTENDING VETERINARIANS IN THE UNITED STATES

F. Benavides[1]
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Abstract
Federal regulations (PHS and USDA) require the appointment of a DVM to serve on the Institutional Animal Care and Use Committee (IACUC) with the authority and responsibility for activities involving animals. The Animal Welfare Act and the *Guide for the Care and Use of Laboratory Animals* defines the **Attending Veterinarian (AV)** as a graduate veterinarian who has received training or experience in the care of the species and has direct or delegated authority for activities involving animals. This responsibility extends to monitoring and promoting animal well-being at all times. The AV will be a voting member of IACUC and is expected to have regular communication with IACUC and Institutional Official (authorized to legally commit to animal welfare regulations).

Requirements and roles of the AV:

- Have experience, training, and the expertise necessary to appropriately evaluate the health and well-being of animals, and potential adverse clinical complications from experimental procedures.
- Be involved in all institutional plans involving renovation/construction of facilities in which animals are housed.
- Have access to all animals and sufficient authority, as provided by the institution, to treat an animal and relieve severe pain or distress (including euthanasia).
- Have input in protocol reviews, the development of study removal criteria, and responsible conduct of research activities.

- Provide prevention, control, diagnosis, and treatment of disease, comprising daily observation (including weekends and holidays).
- Oversight husbandry, housing, preventative medicine, health surveillance, sedation, anaesthetic, analgesic, handling, and immobilization.
- Provide guidance to principal investigators and oversight of surgery programs (major versus minor procedures) and perioperative care.

Besides, the "LAS Vet family" strengthens the competencies of the designated veterinarian through networking.

We will share our experience and show how teamwork and communication are key to success in addition to scientific and veterinary skills.

S4B2.1

INTRODUCTION TO THE SESSION – WORKING TOGETHER TO END 'SEVERE' SUFFERING

B. Reed[1] and P. Hawkins[1]
[1]*RSPCA, Horsham, United Kingdom*

Abstract
Any level of pain, suffering or distress experienced by laboratory animals is obviously a concern for everyone, but 'severe' suffering is of greatest concern; there is widespread support for working to end severe suffering within the scientific community. This session aims to facilitate better communication between people with different roles, with a focus on working together more effectively to reduce – or ideally, end – severe suffering. We will hear the perspectives of scientists, animal technicians, designated veterinarians, regulators, and Animal Welfare Body (AWB) members, all of whom bring complementary expertise, on how further progress can be made towards achieving this important goal. This short opening presentation will set the scene, and highlight the key aims, for the session. More information and helpful resources on this topic can be found at: www.focusonseveresuffering.co.uk

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S4B2.2

THE DESIGNATED VETERINARIAN, A TEAM PLAYER IN THE REFINEMENT OF SEVERE PROCEDURES

E. Bouchoux[1]
[1]*Sanofi R&D, Vitry-sur-Seine, France*

Abstract
Beyond the clinical care missions and advisory duties in relation to the animal welfare as required by the Directive 2010/63/EU, the designated veterinarian's scope is usually much broader (ESLAV/ECLAM/LAVA/EVERI Recommendations for the roles, responsibilities and training of the laboratory animal veterinarian and the designated veterinarian under Directive 2010/63/EU).

At the interface between the different technical and scientific teams, and as an active member of the ethics committee and the animal welfare body, the designated veterinarian plays an extensive role in the refinement of severe procedures: training, anaesthesia, pain management, endpoints determination, clinical follow-up, project ethical review...

S4B2.3

REDUCING SUFFERING AND IMPLEMENTING REFINEMENTS IS A TEAM EFFORT

L. Horan[1]
[1]*University of Strathclyde, Glasgow, United Kingdom*

Abstract
As the manager of a multidiscipline animal research facility, and a Named Animal Care and Welfare Officer (NACWO) under the Directive, I feel I have a responsibility to help bring people together from relevant roles to discuss, review, challenge and refine current practice for any protocol/study, but this is especially important if it is assessed as being a potentially 'severe' model.

Of course, the process of refinement of any protocol or 'study plan' starts for us when the project licence is drafted. All protocols are closely scrutinised by the Named Veterinary Surgeon (NVS) and the NACWO, and the Named Information Officer (NIO) will undertake a literature review, to identify any further scope for reducing severity. The application then flows to our Animal Welfare Body who look more closely at the ethical issues involved and take in a further range of views on whether and how the 3Rs principles have been fully applied. From there, if considered satisfactory from a local institution perspective, the application will be sent to the competent authority (the UK Home Office) for formal evaluation, and, if a licence is authorised and the scientist is ready to begin, a 'pre-start' meeting will be held with the research group, the NACWO and NVS.

In this presentation I will discuss my perspective on some of the communication routes involved and the opportunities they offer for promoting refinements and will share some practical approaches we have applied to refine a mouse model of toxoplasmosis, and pulmonary artery banding in rats.

S4B2.4

A CULTURE OF DARE – ANIMAL WELFARE BODIES AND THE END OF SEVERE SUFFERING

N.H. Franco[1]
[1]*i3S – Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal*

Abstract
With the enactment of the 2010/63/EU Directive, Portugal went from having neither Animal Welfare Bodies (AWBs) nor mandatory ethics committees, to having a National Network of AWBs (RedeORBEA), each responsible in their establishments for

promoting animal welfare and the 3Rs, as well as for evaluating animal research projects before, during, and after their execution. This resulted in a cultural change from mere compliance with (at the time scarce) legislation to an ever-improving Culture of Care to meet the demands and expectations that came with the new Directive, with AWBs as its main driving force. The Portuguese case-study not only illustrates how meaningful progress can be achieved in a relatively short timeframe, but also highlights the central role of AWBs in improving principles and practice. Likewise, if we are to end severe suffering, AWBs will be expected to play a pivotal role in this ambitious endeavour. This talk will present testimonies from AWBs members on how severe suffering is perceived and addressed in their establishments, and on what they consider to be the main hurdles and opportunities in regard to the end of severe procedures. The importance of establishing effective communication between stakeholders to reduce the severity of procedures will be discussed, with a focus on the empowerment of the animal care staff, and the building of mutual trust and respect between stakeholders. Finally, perceptions of AWBs regarding the feasibility of ending severe procedures will be a starting point for discussing more readily achievable milestones on the road to this goal.

S4B2.5

COMMUNICATION FACILITATED ON REDUCING AND FINALLY ENDING SEVERE SUFFERING

L. Røge Lund[1]
[1]*The Danish Animal Experiments Inspectorate, Copenhagen, Denmark*

Abstract
The Danish 3R-center, The Danish National Committee and the Danish competent authorities cooperated in analyzing the 2015 laboratory animals statistics regarding all animals reported as having suffered severe severity.

The reported animals were divided into three groups: Animals found dead in the cage, animals from procedures not licensed to go to severe suffering (but unintentionally did) and animals from procedures licensed to go to severe suffering.

All license holders from the last group were identified and qualitative interviewed regarding the possibility to refine their models and set earlier humane endpoints. Or maybe switch to models with lower severity.

This investigation was repeated with the 2020 statistical information.

The results of the two investigations were the used to communicate the possibilities to refine, reduce and finally end severe procedures and models. This was done using the webpages of the three institutions, mini-symposiums, and direct information to AWB's. Furthermore, the National Committee has issued a statement encouraging the National Competent Authority to continue to have special focus on procedures with severe suffering and to use the findings of the investigation to challenge license holders to continue to refine models.

S4B3.1

FELASA TODAY AND TOMORROW – HOW CAN YOU CONTRIBUTE?

B. Pintado[1], J.-P. Mocho[1], M. Perse[1], K. Abelson[1], S. Vidal[1], M. Gyger[1], M. Dorsch[1] and FELASA Executive Committee
[1]*FELASA, Brussels, Belgium*

Abstract
The Federation of European Laboratory Animal Science Associations (FELASA) is currently composed of 22 member associations representing 29 countries. Since its creation in 1978, FELASA has represented the common interest of its members for the furtherance of Laboratory Animal Science (LAS) in Europe and beyond. Laboratory animal scientists work towards ensuring optimal conditions for the humane use of animals for research in a 3R and ethically responsible framework. FELASA is particularly active to promote good practice through the organisation of conferences and workshops, production of recommendations by expert working groups, and accreditation of education and training programs. During this presentation, we will explain how FELASA works, so that scientists, and other stakeholders involved with the use of animals in research and education, can understand better how to interact with FELASA, to participate in its events and activities, and to follow FELASA's guidance and achievements. We will also highlight how FELASA adapts to nowadays challenges and proposes further developments.

S4B3.2

HOW YOU CAN CONTRIBUTE TO ICLAS

C. Pekow[1]
[1]*International Council for Laboratory Animal Science, Brussels, Belgium*

Abstract
The International Council for Laboratory Animal Science (ICLAS) was founded in 1956 by UNESCO, the Council of International Organizations in Medical Science (CIOMS), and the International Union of Biological Sciences. Members are nations, scientific associations, and research institutions. ICLAS' mission is to promote the development of laboratory animal science (LAS), particularly in areas with emerging economies, as well as to collaborate in harmonizing aspects of LAS that can improve research animal welfare and science. Each new Governing Board works to collaborate with ICLAS' members to promote initiatives that strengthen the ICLAS mission. ICLAS and FELASA collaborate on a number of initiatives. Every ICLAS member association is encouraged to collaborate and seek ICLAS support. Examples of initiatives include scientific meetings, workshops, development of educational resources, training grants, train-the-trainer programs, assistance with developing regulatory oversight, and establishing guidelines for areas such as harmonization in reporting.

S4B3.3

THE EUROPEAN ANIMAL RESEARCH ASSOCIATION

K. Leech[1]
[1]*European Animal Research Association, London, United Kingdom*

Abstract
The European Animal Research Association (EARA) is a not-for-profit association with members in 24 European countries. EARA was established to better inform the public and political decision makers of the continued need and benefit of the humane use of animals in medical, veterinary, scientific and environmental research. EARA provides communications and advocacy support on behalf of public and private researchers.

EARA is recognised by the European Commission as an essential stakeholder in helping the European public understand the continued need for animal research, and the high regard that animal welfare plays within Directive 2010/63/EU. EARA is increasing its efforts to improve public understanding and acceptance of the use of animal models, by encouraging greater communications to the public by research institutions. EARA has inspired and promoted the adoption of National Transparency Agreements in Spain, Portugal, Belgium, France, Germany, and the Netherlands.

We work with FELASA member associations with specialist advice to guide their communications on animal research. We provide them with the necessary tools to develop and implement, at their own pace, an improved communications strategy on animal research.

EARA is responding, on behalf of the biomedical sector, to the growing political demands within the European Union, often focusing on the European Parliament and Commission, that have called for a shift towards animal-free science in basic and applied research, and the adoption of a quickened 'phase-out strategy' of animals used for scientific purposes. We look forward to further collaboration with FELASA to make our case heard on this pressing matter.

S4B3.4

LABORATORY ANIMAL SCIENCE HARMONIZATION THROUGH COLLABORATION

S. Mischler[1]
[1]*Consultant, Morrisonville, United States*

Abstract
Since 2012, The Federation of European Laboratory Animal Science Associations (FELASA) and the American Association for Laboratory Animal Science (AALAS) have been working together to harmonize animal care and research recommendations for the Laboratory Animal Science (LAS) community. A Liaison Body comprised of individuals from each association was established to advance information exchange and to oversee the establishment of joint working groups. The working groups would be jointly charged and would explore and publish recommendations on important topics pertinent to the LAS community. This session will provide a brief overview of the structure and relationship between FELASA and AALAS and will summarize efforts of current and past working groups.

S4B3.5

FELASA WORKING GROUPS – COMMUNICATION BETWEEN AND WITH LAS COMMUNITY AND LEGISLATORS

M. Dorsch[1,2]
[1]*Institute for Laboratory Animal Science, Hannover MEdical School, Hannover, Germany*
[2]*FELASA Executive Committee, Bruessell, Belgium*

Abstract
The Federation of European Laboratory Animal Science Associations (FELASA) has released guidelines and recommendations on several laboratory animal science (LAS) disciplines for more than 20 years, aiming to enhance animal welfare by providing guidance on procedures involving animals used in research and education.

The guidelines and recommendations are produced by expert working groups that are nominated by FELASA member associations and established around LAS current issues and 3Rs.

New topics can arise from proposals raised by associations or individuals, but FELASA also revise recommendations in order to adapt them to new knowledge or challenges.

The target audience is all persons related to or involved with the production, housing and use of animals in the research and educational environment. FELASA working group publications also target responsible local authorities, to harmonize implementation and regulation of European legislation across nations.

As welfare of laboratory animal is not solely a European topic, FELASA and the American Association for Laboratory Animal Science (AALAS) joint working groups, with experts from both organisations, work together on selected topics to facilitate common improvements in LAS.

The talk will give a short overview on FELASA working groups, their importance and reputation

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S4B5.1

ASSESSMENT OF CULTURE OF CARE WITHIN LABORATORY ANIMAL SCIENCE USING A COMPREHENSIVE SURVEY TOOL

T. Bertelsen[1]
[1]*Novo Nordisk, Maaloev, Denmark*

Abstract
Every user-establishment has its unique Culture of Care which requires individual attention to address relevant challenges and issues. Approaches on how to work with and assess Culture of Care has recently been published (Bertelsen T., Øvlisen K.; 2021 and Robinson, S., 2019).

This presentation describes a comprehensive survey tool that provides a means to describe what the Culture of Care in a user establishment looks like. The survey tool is one of the elements that can contribute to the overall picture of the culture in the user establishment. It addresses one of three relevant elements of making Culture of Care functional and effective – the culture; the other two being the desired outcomes and the structures that support and connect these two elements. The Culture of Care can be assessed in terms of 'what does it look like'. The outcomes – in terms of 'what does it achieve' – can be measured by using Key Performance Indicators (KPIs) to assess its functionality and efficiency. The supporting structures are the different tools that the AWB identify and deploy to transform culture into achievements.

The survey tool offers a multilevel and comprehensive view of different subcultures, presenting details on mindset and behaviour of the employees and the different relations within the culture, thus enabling the initiation of improvement projects if required. The tool addresses essential elements of a co-operative culture in terms of what we think, what we do and how we work together.

S4B5.2

SAME ANIMAL CARE CULTURE ACROSS DIFFERENT HUMAN CULTURES THROUGH AAALAC INTERNATIONAL ACCREDITATION

J. Guillén[1], D.D.-L. Denais-Lalieve[2], M. Góngora[3], D. Chai Chivatsi[4], A. Assiri[5] and M. Gettayacamin[6]
[1]*AAALAC International, Pamplona, Spain*
[2]*IRSN, Paris, France*
[3]*Pontificia Universidad Javeriana, Bogotá, Colombia*
[4]*Institute of Primate Research, National Museums of Kenya, Nairobi, Kenya*
[5]*King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia*
[6]*AAALAC International, Bangkok, Thailand*

Abstract
Legislation (or the lack of it) in general, and specifically for the protection of animals used in research arises from each country/region societal culture and resources. Whereas in most Western countries' strict legal frameworks on animal care and use have been established that facilitate research institutions the way to a culture of care, institutions in other countries, due to lack or poor legislation have to develop the culture of care in their animal care and use programs based on their own commitment and international communicated examples. In this session, several approaches from different areas of the world to develop strong and internationally recognized animal care programs thanks to the efforts to achieve international recognition through AAALAC accreditation will be presented. In addition, the perspective of some of those who promote culture of care standards and evaluate the quality of animal programs internationally will be described, along with the importance of performance standards for the evaluation in different cultural and legal frameworks.

S4B5.3

CULTURE OF CARE: TRANSPARENCY INITIATIVES IN GERMANY PART I – WHERE ARE WE NOW?

R. Stilling[1], F. Ferrara[2] and S. Bischoff[3]
[1]*Tierversuche Verstehen (Informationsinitiative der deutschen Wissenschaftsgemeinschaft, Münster, Germany*
[2]*ConScienceTrain, Berlin, Germany*
[3]*Universitätsklinikum Jena, Jena, Germany*

Abstract
Public discussion about animal testing has been highly polarised for many years. This has led to a stage of non-communication and subsequently loss of scientific literacy in the general public and a lack of trust in researchers. Providing first-hand information and engaging in dialogue is one of the key elements to gain trust and understanding. Also, through positive feedback, increased openness and transparency will amplify animal welfare, research quality and staff wellbeing in the sense of a lived and responsible culture of care.

Culture change is a process and is characterised by exchange and mutual learning. In Germany, we have seen an increasing movement towards more transparency and communication in animal research in the last six years. Nevertheless, Germany may still be lagging behind to other European countries. This is why various initiatives have emerged from the German scientific community in the recent past. In 2016 "Tierversuche verstehen" was launched. This initiative provides up-to-date factual information as for example the comprehensive and visually appealing source brochure "Kompass Tierversuche", which was first published in 2021. Also, in 2021 a German transparency agreement was initiated. The agreement follows similar activities through Europe and gaining >70 signatories has already led to substantial, visible change. The signatories of these agreements commit to engaging in dialogue with the public as for example by informative websites for the public, or special events that promote dialogue. These changes and opening up to the public are key elements of a responsible culture of care.

S4B5.4

CULTURE OF CARE: TRANSPARENCY INITIATIVES IN GERMANY PART II – BEST PRACTICES AND EXPERIENCES

S. Bischoff[1], R. Stilling[2] and F. Ferrara[3]
[1]*Universitätsklinikum Jena, Jena, Germany*
[2]*Tierversuche Verstehen (Informationsinitiative der deutschen Wissenschaftsgemeinschaft, Münster, Germany*
[3]*ConScienceTrain, Berlin, Germany*

Abstract
Public discussion about animal testing has been highly polarised for many years. Gain of knowledge or new therapies seem to fall from the sky and there are tireless calls for a ban on animal experiments. This situation shows that there is a lack of acceptance and trust by the public. Also, low appreciation and persistent criticism of animal research can be stressful for people working in this field. Through

positive feedback, increased openness and transparency will amplify animal welfare, research quality and staff wellbeing in the sense of a lived and responsible culture of care.

Culture change is a process and is characterised by exchange and mutual learning. The "Initiative Transparente Tierversuche" in Germany is a strong commitment to the public. Yet, changing behaviour towards transparency and honest communication brings opportunities, but also induces concerns and direct changes in the daily life of institutions and staff. For public dialogue, organisations need internal actors as well as appropriate tools, which requires special support of staff in this transition process, such as through communication training. In a transparent communication process, all employees should be involved and different channels for dialogue should be used. Special events, such as the annual "long night of science", enable dialogue on housing of research animals, on current research results, or on the practised open-minded error culture through the use of transparency databases such as CIRS-LAS.de. Best practices and experiences of different organisations should be shared within the scientific community in the sense of a culture of care.

S4B6.1

TRANSFORMING CULTURE: CULTURE OF CARE IN ANIMAL RESEARCH

K. Ameli[1] and **S. Krämer**[1]
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Abstract
Introduction and aim: "Culture of Care" is understood as an appropriate behavior and attitude towards all animals and employees. All levels of an institution are committed by personal responsibility and a proactive attitude. The desideratum becomes particularly clear in the analysis of all levels related to a differentiated meaning of a Culture of Care in animal research.
Materials and methods: Following on from the differentiated derivation of the historical anchoring and reception in the concept of a Culture of Care, the project focuses on analyzing the characteristics of a Culture of Care in Germany. By using qualitative social research, the management level, the science level, the monitoring level and the care level were analyzed. Three interviews were conducted per level.
Results: Results show that individual knowledge of the concept of a Culture of Care derives from the decisions of an actor in the level and from the given legal and organizational structures. Subsequently, Culture of Care is understood as a complex mosaic of different categories: Organizational level, personality, science, and animal welfare are main categories. These categories are underpinned by subcategories such as 3R, ethical concerns, education, or agency.
Conclusion: Results indicated that a "simple commitment" is not enough to implement sustainable changes in the culture of animal science. A Culture of Care can only be implemented if all levels involved break down old structures and rules and interact with each other. As a result, Culture (of care) is a basis for all research concerning animals.

S4B6.2

THE ROLE OF LEADERSHIP IN CREATING A CULTURE OF CARE

C. Back[1]
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Abstract
A culture of care is a mindset that permeates an organization and affects the way people relate to each other and to their work. It is a way of being where people – both employees and customers – feel valued. They feel listened to, they have the knowledge, trust, and tools to do a good job, and they are fairly rewarded for their efforts. Establishing a culture of care is especially important where animals are involved as their handling and care is often a direct reflection of the standard of care the people in the organization experience.

It is well-known that the quality of leadership within a workplace shapes an organization more than any other single factor. To create a culture of care comes from the actions of a good leader which include leading by example, giving direction, being genuinely interested, inspiring people to be their best, giving timely and appropriate feedback, and achieving consistently good results. In this presentation, learn more about the role of leadership in creating a culture of care.

S4B6.3

CONNECTING PARTIES FOR A RESPONSIBLE STANCE TOWARDS ANIMALS

M. Janssens[1]
[1]*Utrecht University, Utrecht, Netherlands*

Abstract
Organisations should take the interests of these animals into account as a topic of Corporate Responsibility. Communication is one of the means to make this happen. Organisations doing animal research and working on a Culture of Care can learn from a study that was done in the food industry. It argues that a manager responsible for animal welfare can strengthen the company's ethical position towards animals in two ways using communication. The first way is to connect directly with stakeholders within and outside the company. The second way is to facilitate, as a moderator, communicative connections between these stakeholders in which the manager is not involved per se. Establishing these connections in the form of personal meetings further fosters a responsible attitude, because in that way insight, trust and collaboration are gained and sustained. The speaker presents a model outlining all communicative exchanges and channels found in the qualitative study that are used to effectuate a responsible stance towards animals, and offers practical advice derived from the model.

S4B6.4

CULTURE AND COLLABORATION BETWEEN THE CLINICIAN-SCIENTIST AND VETERINARY SPECIALIST: A VITAL INTERPROFESSIONAL PARTNERSHIP

R. Ober[1], J. Ho[1], M. Kemp[2], T. Keeney-Bonthrone[1], K. Chtraklin[1], L. Forman[1], S. Levin[1], G. Geist[1] and H. Alam[1]
[1]*Northwestern University, Chicago, IL, United States*
[2]*University of Michigan, Ann Arbor, MI, United States*

Abstract
Teamwork and culture have been increasingly recognized as essential components to improving healthcare. Organizational culture has not been well studied or applied to the translational science environment. Given the stakeholders and complexity of work necessary to execute quality animal research, it is only natural that creating a strong, high-performing team between medical doctors, scientists, and veterinarians would improve productivity. We use our institutional experience to demonstrate recommendations and practical steps to establishing working-relationships between clinician scientists and veterinary staff from each perspective.

We recommend optimizing collaboration through understanding roles and responsibilities, early and clear communication, continued reassessments of goals and concerns, and creation of a culture of safety and accountability. Establishment of common goals promotes early integration of labs in to existing infrastructure and promotes humane and ethical scientific inquiry. Clinician scientists can use the veterinarian expertise in regulatory aspects and clinical knowledge of animals to improve their efficiency and productivity. Additionally, veterinarians are able to provide research support that evolves with the investigator and the project ensuring animal welfare and enabling high-yield scientific inquiry.

Collaboration can result in mutual benefits in learning and career development. Veterinarians can immerse themselves in clinician scientists' ongoing projects and develop a greater understanding of the projects while expanding their clinical skill. Overall, the positive collaborative culture we have instated promotes animal welfare and allows for high-yield and impactful translational research.

S4B6.5

IMPROVING CULTURE OF CARE THROUGH AN EFFICIENT AND AGILE ANIMAL WELFARE BODY ORGANIZATION

K.P. Dhondt[1] and Animal Welfare Body – Charles River RMS France
[1]*Charles River Laboratories – RMS France – Veterinary Professional Services Dpt., Saint-Germain-Nuelles, France*

Abstract
The Animal Welfare Body (AWB) is a key component of the Culture of Care of an organization. Despite the regulatory framework that gives it legitimacy, it can be challenging to identify a mode of operation that allows this structure to play an active and effective role in the transformation of the institution.

We propose here an efficient and agile organizational model that elicits a real collaborative shift to action in favor of animal welfare.

Our AWB is organized in 3 layers that sustains its continuity, its reactivity and its renewal. The first layer consists of the regular Animal Welfare team composed of 4 people including 2 veterinarians. It is the foundation of the structure which promotes its continuity and leadership and sets the working groups' goals.

The second layer consists of the leaders of the working groups. They are selected from regular AWB members, based on a motivation interview. Together with the core team, they form a select committee capable of meeting in less than 48 hours to make quick decisions.

The third layer is composed of staff members representing each department in the company. They are selected on the proposal of their managers for a maximum period of 3 years, and the option for a second term. They commit to participating in at least one working group, completing two animal welfare audits per year, and attending quarterly meetings.

Overall, this organization, has been demonstrated to improve "One Welfare" for both animals and technicians and set an easy-to-use operational model.

S4C1.1

CONGENTO REMOTE LAS TRAINING – MAKING ENDS MEET WITH A SIMPLE, LOW BUDGET STRATEGY

D. Bonaparte[1], A.C. Borges[2], S. Leocádio[2], I. Moreira[3], L. Carvalho[3] and A.I. Santos[4]
[1]*Champalimaud Foundation, Lisboa, Portugal*
[2]*Instituto Gulbenkian de Ciência, Oeiras, Portugal*
[3]*Instituto de Medicina Molecular João Lobo Antunes, Lisboa, Portugal*
[4]*NOVA Medical School, NOVA University Lisbon, Lisboa, Portugal*

Abstract
In the pre-pandemic world, the CONGENTO Education and Training Working Group (E&TWG) engaged in putting together a low cost, high quality and – a novelty at the time – fully remote dynamic theory course for the care and use of research animals.

The concept was very simple and accessible: in-house lecturers, everyday technology, and a free sharing platform. The Course was then complemented by a paid online exam platform – the only cost in the full project.

The Course is structured in modules according to the EU Common Education and Training Framework, and tackles functions A, B, C and D for rats, mice and zebrafish, with small customisations (e.g. Module 23 is standard). These modules can be taken independently and cumulatively, according to individual needs.

Then came COVID, and remote training has gone a long way. Still, we have a flexible and "always on" system that ensures theoretical training at virtually no costs. So far, over 200 students have completed the course with very good feedback.

Future steps in this project will be expanding available resources to cover new Modules and new species and making the Course available outside the Consortium.

The CONGENTO E&T WG had previously updated and harmonised LAS practical training in the four institutions. With the theory course, full training is harmonised within the Consortium, facilitating the inter-institutional flow of researchers.

CONGENTO is a Portuguese Consortium composed by four biomedical research institutions in the Lisbon area, aimed at synergising technology development for different animal models.

S4C1.2

HOW EDIT AND MANAGE AN INTERACTIVE LAS TEXT-BOOK OF 3,000 PAGES ON E-FORMAT

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Abstract
A virtual interactive textbook in Spanish has been coedited by SECAL and the University of Alcalá on a e-learning platform format after four years of works. We will explain the process for the edition and the advantages of the e-learning platform format for virtual training of people worldwide.

The book covers the Modular Training and Learning Outcomes from the European Education and Training Framework for all EU Functions.

Dr J.M. Zúñiga & Dr J.M. Orellana directed also the edition in 2008 of the first printed text-book in Spanish, three times updated in CD, USB and a downloadable format of which more than 10,000 copies have been used in training courses.

The book includes:

- 64 chapters.
- 138 authors (73 women and 66 men).
- 2 Editors-in-chief, 3 Deputy Editors and 4 coordinators of section.
- 2,000 pages of text and 1,000 pages of complementary documents.
- Over 500 complementary resources (open access scientific articles, videos, pictures, etc.)
- Over 1,000 words of glossary and 900 literature references.

The advantages of this virtual book:

- Implement the European Education and Training Framework for organizers of training courses recognized by the competent authorities.
- Very low rate (around 20 euros) for worldwide training courses, because it is sponsored by the University and SECAL.
- Translatable to other languages by other stakeholders.
- Encouraging the EU standards in the emergent Laboratory Animal Sciences countries.
- Steadily updatable.
- Available from internet worldwide.

Link to two examples of chapters (Spanish and English):

- http://www.elearningreel.com/descargas2021/UAH/UGR/E.08/E.08.04/curso_Identificacion_y_nomenclatura_de_signos_clinicos_en_raton_Tratamiento_de_algunos_de_ellos_20210909/
- http://www.elearningreel.com/descargas2021/UAH/UGR/E.01/E.01.05/curso_Types_of_models_depending_on_their_microbiological_condition_20210720/

S4C1.3

"IMPROVE YOUR SKILLS" – THE INNOVATIVE 3R-SKILLS LAB OF THE 3R-CENTRE GIESSEN

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Abstract
Skills Labs are becoming increasingly important in veterinary education to allow students to gain practical skills without the need for a patient, which may suffer from inexperienced examiners. The ICAR3R- 3R Centre of Giessen now established a 3R-Skills Lab "Improve your Skills" for future researchers but also for those already actively involved in animal research. The main goal of "Improve your skills" is raise awareness for the 3Rs and to promote the willingness to critically rethink the use of animal models.

Knowledge and skills are taught through work at stations. This enhanced the usage of digital media in didactic concepts towards future-proof learning. At the stations teaching videos, simulators and real equipment from laboratory animal husbandry offer an authentic inside in laboratory animal science and a contemporary teaching to support the learning of theoretical content and practical skills. This results in a balanced amount of haptic, visual, and acoustic components to appeal to and inspire every type of learner.

All the 3Rs are addressed. By this, replacement-methods, measures to reduce the numbers of animals used for scientific purposes as well as refinement methods are outlined, whereby the individual animal and its ability to suffer is always the major focus.

Today, the Skills Lab makes an enormous contribution to the reduction of laboratory animals and the refinement of methods used in experiments. In the future, it raises questions about the general use of animals for scientific purposes in order to contribute to the long-term goal of elimination of animal experiments.

S4C1.4

OPEN ACCESS TRAINING RESOURCES: E-LEARNING MODULE ON SEARCHING FOR NON-ANIMAL ALTERNATIVES

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[7]*Syrcle, Radboud University Medical Center, Nijmegen, Netherlands*
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Abstract
In the context of responsible research and regulations, searching for available (non-animal) alternative approaches is a necessary but challenging task, especially when no straightforward searching standards exist. Further education in this area could help all preclinical research stakeholders to better apprehend Replacement and to facilitate its implementation in practice and education.

For this purpose, an e-learning module was developed as a guide to "identify alternative Replacement methods". It is freely available on the Education & Training Platform for Laboratory Animal Science platform (ETPLAS) as module EU-52 (https://etplas.eu/learn/eu-52/). The module provides knowledge and necessary practical skills on conducting extensive searches to identify (non-animal) alternative methods and approaches. It is divided into four parts:

1. Introduction to Replacement
2. Developing research questions for searching Replacement alternatives
3. Designing a search strategy and searching appropriate sources
4. Documenting the searches and their results

Upon completion, users have all the basic skills to choose proper search methods (e.g. extensive search in databases, grey literature or by contacting experts) and know how to conduct and report their search in a thorough, transparent and reproducible manner. Moreover, the module provides many examples, interactive exercises and extensive further reading materials to address diverse purposes (e.g., research, regulation, education) and various audiences. Finally, this module can also help users appraise searches and their completeness better, for instance, in the context of a project application. As the Three Rs are a legal obligation according to the EU Directive 2010/63EU, this e-learning module is considered essential in laboratory animal science education.

S4C1.5

VIRTUAL REALITY AND NEW MEDIA IN THE MASTER PROGRAM FOR LABORATORY ANIMAL SCIENCE (MLAS)

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Abstract
With the implementation of the EU Directive 2010/63 on the protection of laboratory animals, the principle of the 3R was for the first time incorporated into the animal welfare law. Therefore, the impartment of knowledge on 3Rs and alternatives to animal experiments have to be part of the qualification concept of personnel training, performing experimental procedures and evaluating animal experiments.

In 2015, the RWTH Aachen University started a FELASA accredited post-graduate master program in Laboratory Animal Science (MLAS) and qualifies students as "Laboratory Animal Science Specialists". The blended learning concept incorporates e-learning, complemented with attendance blocks for practical skills training and includes a master thesis in the 4th semester. This concept contains modular designed visualization of knowledge integrated in the MLAS curriculum and are made available on an online learning platform.

The digital learning concept was successfully combined with Virtual Reality (VR) components. For this purpose, procedures or work environments were recorded in 360° videos and applied as a VR teaching/learning module. As a pilot-project, the induction of a standard rat anesthesia including all essential procedures and working environments was presented to students in VR to prepare them for the real practical exercises with the potential to refine, reduce or replace the skill training on animals. With the implementation of VR teaching modules in the teaching concept in the MLAS program the 3Rs were advanced. The high acceptance of this innovative training format is encouraging to develop further alternative teaching media in the field of laboratory animal science.

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S4C1.6

3R'S ADVANCED SIMULATION IN SURGICAL AND MEDICAL TRAINING IN IMAGE-GUIDED MINIMALLY INVASIVE PROCEDURES

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Abstract
The use of image-guided procedures (IGPs) has increased tremendously over the past two decades and increasing numbers of practitioners have adopted these techniques in their clinical practices, including radiologists, surgeons and endoscopists. The visual information obtained during IGPs is 2-dimensional and many times available with latency, consequently a complete new set of skills is required to be able to master these techniques.

A growing interest in efficient ways to improve learning coexist with the lack of high-fidelity models and trainers in the fields of minimally invasive surgery, interventional radiology, and therapeutic endoscopy.

Certain animal models have been developed and used to satisfy the abovementioned needs. The swine has been validated and accepted by the scientific community as a realistic model to enhance training. However, the rapidly evolving legal framework regarding animal welfare has become priority, demanding improvements in the reduction, refinement, and replacement of animals (3Rs).

The Institute of Image-Guided Surgery (IHU Strasbourg) is committed to foster and enhance education if the field of minimally invasive and image guided procedures, therefore developed, and validated a wide variety of models. The IHU's portfolio includes virtual, synthetic, ex-vivo, hybrid and in-vivo models, ***reducing*** considerably the number of animals employed, most of the times ***replacing*** them with phantoms, dummies, and hybrid models, as well as ***refining*** and highly optimizing the use of in-vivo models.

The presentation will focus on innovative *ex-vivo* models implemented in endoscopy medical training at the IHU-Strasbourg.

S4C2.1

A VOLUNTARY EU EDUCATION AND TRAINING FRAMEWORK IN SUPPORT OF HARMONISATION

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Abstract
Harmonisation of education and training (E&T) requirements can only be pursued on a voluntary basis in the EU with the main competence resting with the Member States. For harmonisation to succeed, the benefits of mutual acceptance of claims relating to training and competence should be based on jointly agreed quality criteria, which have to be recognised by all involved. The EU E&T Framework has set the basis for this work, which is now being actively followed up and co-ordinated by ETPLAS (Education and Training Platform for Laboratory Animal Science), bringing together all key players – training providers, training accreditors and Member State authorities.

A number of activities are taking place to support high quality, accessible and affordable training for all. We will explore how we can work together to build sufficient structures to allow reliable claims of competence following training and assessment provided by others.

S4C2.2

ASSURING COMPETENCE: PROCESS, CONSISTENCY AND TRANSPARENCY IN ASSESSMENT

L. Whitfield[1]
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Abstract
Operator competence is essential to safeguard animal welfare and to ensure the reproducibility and good quality of *in vivo* science. But what does competence mean and how do we know when someone has achieved it? Do we all agree on the standard?

Adapting validated frameworks from the healthcare setting, we are starting to develop and implement quantitative assessment instruments, such as DOPS (Directly Observed Practical Skills) assessments, to harmonise and improve the assessment process for practical tasks and thus to raise standards for the care and humane use of animals. This presentation will explore the process of assessment to ensure transparency, fairness, and consistency, and highlight the importance of training your assessors.

S4C2.3

PROMOTING CONSISTENCY IN SEVERITY CLASSIFICATION TRAINING ACROSS TIME AND SPACE

D. Bonaparte[1,2], A. Criado[1], A.-D. Degryse[1], D. Anderson[1], D. Denais-Lalieve[1,3], L. D'Angelo[1,4] and FELASA Severity Workshops – Core Trainers Group
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Abstract
Ensuring competence and consistency is a major objective of the FELASA Workshops on Severity Classification and Reporting. A working group of Core Trainers provides training programmes to gather a network of independent trainers, who are then

empowered to organize and deliver FELASA Severity Workshops in several languages across Europe.

Conscious that the broader the network of trainers, the greater the risk of introducing undesired variability, the Core Trainers implemented a strategy to minimize bias and maintain consistency. This strategy includes several mechanisms to help ensuring that the "Severity Workshops" do not drift away from the original format and contents by becoming "personalised" by individuals as they organise workshops in their own countries or establishments. Such mechanisms will also assist in the introduction of updates and new models, and in tailoring the workshops to specific target audiences without losing consistency and focus.

In 2020, the FELASA Severity Workshops were adapted to meet the demand for remote delivery. This allowed us to continue to disseminate severity classification best practices despite travelling and gathering restrictions. The consistency mechanisms, together with the remote capability, allowed us to expand also beyond the European borders.

In this session, we will review the strategy and mechanisms used by the Core Trainers to maintain harmonisation and consistency across time and space.

S4C2.4

COMPETENCE IN LABORATORY ANIMAL SCIENCE: TIPS AND TRAPS FOR MUTUAL RECOGNITION

R. Frias[1]
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Abstract
Adequate education, training, competence and maintenance of competence in laboratory animal science are all prerequisites to work with animals used in scientific procedures. A key aim of the EU framework on education and training was to harmonize the standards for such requirements to facilitate mutual recognition and free movement of personnel and scientific exchange. This presentation will provide an overview of common situations regarding mutual recognition and will highlight barriers and some potential solutions.

S4C2.5

ETPLAS FOR THE BENEFIT OF FREE MOVEMENT OF RESEARCHERS AND MUTUAL QUALITY STANDARDS ACROSS EUROPE

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Abstract
The Education and Training Platform for Laboratory Animal Science, ETPLAS, was set up to aid harmonisation and mutual acceptance of training on laboratory animal science across the European Union. Today, ETPLAS offers several open access tools for both animal care staff, competent authorities, and training providers. The toolbox will continue to increase in the coming years. Specifically, the European Parliament (EP) funded pilot-project allowed ETPLAS to develop further guidance for producing Learning Outcomes (LO) for Core and Function A specific modules; the creation of a question database for their assessments; and the expansion of the e-platform for the hosting of e-Modules and development of intuitive search functions. A second EP funded action-project is well underway developing a Continuous Professional Developemnt (CPD) framework and an exam service that will be made available to all LAS training providers. It is important that all involved engage in the activities of ETPLAS to continue develop further quality standards to make mutual acceptance of Education and Training in LAS a reality across Europe.

S4C4.1

FELASA ACCREDITATION: ENSURING QUALITY EDUCATION AND TRAINING IN LABORATORY ANIMAL SCIENCE.

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Abstract
The well-being of animals used for scientific purposes and the validity of research results depend, amongst others, on the professional competence of all personnel involved. For this reason, any person involved in animal research needs to be adequately educated, competent and continuously trained (Directive 2010/63/EU). The Federation of European Laboratory Animal Science Associations (FELASA) has long been involved in fostering high quality training in Laboratory Animal Science (LAS) by providing recommendations on the establishment of LAS courses and since 2006, ensuring course quality by accrediting LAS courses. The accreditation process involves a review of the course set up, its target audience, annual reporting as well as regular course audits.

The FELASA accreditation scheme is in line with Directive 2010/63 and is fitting with the modular education and training framework recommended by an expert working group (EGW) (3). One central aspect of the accreditation is to facilitate that the suggested learning outcomes (LOs) for the different modules are being met. While the approach to reach the LOs can differ, this review process supports harmonization between LAS courses and their mutual recognition.

Against this background, the FELASA accreditation helps course organisers to ensure their training programs fit with the Directive and the EWG framework.

S4C4.2

GO, GET (Y)OUR LAS COURSE ACCREDITED!

A. Teubner[1]
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Abstract
In the Netherlands, successful completion of a Laboratory Animal Science course is one of the requirements (besides a Master in a respective scientific field) to receive a license to conduct animal research. The courses minimum content is described in the Dierproeven Besluit 2014 and is in accordance with App. 5 of the EU 2010/63. Dutch universities and research institutions have very international student and research staff. In order to provide high level education in LAS courses and to streamline the knowledge and skills of persons performing experiments with animals, course organizers in the NL thrive for a common content management and meet on a regular basis to improve and harmonize their courses, based on most current LAS knowledge. Accreditation of the Dutch courses by FELASA is an agreed and approved vision for most institutions to get to this goal, and to provide mutually accepted records with respect to national, but also to European and international harmonization. An overview will be given on experiences during the accreditation process from the viewpoint of the course organizers at Maastricht University, the appreciation of the accreditation by the participants and some conclusions drawn by Dutch course organizers from the development and specialization of curricular education in the Life Sciences.

S4C4.3

CLASSICAL VERSUS ONLINE EXAMINATIONS: PROS AND CONS

N. Linklater[1], M. Berdoy[2], M. Castelhano-Carlos[3], T. De La Cueva Bueno[4], I. Dontas[5], M. Gyger[6], M. Sjöquist[7], J. Steidle[8] and C. Van Ginneken[9]
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Abstract
The assessment of knowledge and skills is an integral part of teaching and training programs, be it university, vocational, CPD or other. The form of assessment ranges from binary answers to multiple choice questions, open text answers, assays, oral examinations, or demonstration of practical skills. The common denominator is to ensure that an intended study goal has been achieved at a "minimum level" by the student. This mimimum level can be set as a "pass/fail" or a set pass mark (50% or other).

In recent years, online exams (live or remote) have become more common. The form of online assessments can be the same as classic paper-based or oral exams. In addition, they offer the opportunity to be used as study aids, such as in interactive quizzes or as learning paths through study material (e. g. unlocking study content) etc. Exams can take place remote and/or on site, either simultaneously for many students or at the students' home computer at their leisure. A point of discussion in respect to "remote" exams is to ensure that the person sitting in front of the screen (1) is the student in question and (2) doesn't cheat. Other issues of online exams are to ensure technical availability and "fail safe" backups such as in the case of lost network connections.

This talk will explore different opportunities, benefits and drawbacks of online exams and give some examples to illustrate the different options.

S4C4.4

SKILL TRAINING AND ASSESSMENT IN LABORATORY ANIMAL SCIENCE COURSES

C. van Ginneken[1], M. Berdoy[2], T. De La Cueva Bueno[3], I. Dontas[4], M. Gyger[5], M. João Castelhano-Carlos[6], N. Linklater[7], M. Sjöquist[8] and J. Steidle[9]
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[9]*FELASA Education & Training, Universität Mainz, Germany*

Abstract
The EU directive 2010/63 introduced classifications of personnel working with laboratory animals and set the requirements for technical skills for those who will perform procedures on specific species. The skill training is often embedded in a species-specific Laboratory Animal Sciences course where alongside acquiring the skill, the training intends to further foster the humane and welfare conform treatment of laboratory animals.

A multi-tiered approach to address such skill training and its assessment is highly recommended. As a first step, simulations offer a safe and ethical alternative to the use of cadavers and live animals. In some instances, national regulations may prevent the use of live animals as a final step to be part of a training program. In those cases, training on the job may be implemented, requiring a slightly different approach.

In medical and veterinary curricula, skill training and their assessment is well known. In these curricula the assessments of the skills use Objective Structured Clinical Examinations (e.g.

PEPAS). Such examinations can be implemented to test the technical skills (e.g. handling, restraint, minor procedures) in a laboratory animal course setting and could even be part of a training on the job scheme. Some platforms share DOPS (direct observable procedural skills) (eg. www.lasa.co.uk/dops) that serve the same purpose as OSCEs. During the presentation different examples on how skill training is carried out in courses and on the job are discussed as the use of simulators, OSCE's and DOPS.

S4C5.1

NEW INTERDISCIPLINARY AND CO-CREATIVE EDUCATION LEADS TO ACTION LEARNING FOR BOTH TEACHERS AND STUDENTS

M. Ritskes-Hoitinga[1,2] and I. Visseren-Hamakers[3]
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[2]*Aarhus University/Clinical Medicine AUGUST, Aarhus, Denmark*
[3]*Radboud University/Nijmegen School of Management, Nijmegen, Netherlands*

Abstract
Increasing evidence demonstrates low translatability of animal studies to humans. Even though many new approach methods have been validated, this does not imply that they become implemented in regulations and practices. Why that does not happen, is an interdisciplinary research question where social sciences need to come in. Therefore, an interdisciplinary honours lab at the Radboud University was organised by two professors with backgrounds in laboratory animal science and transformational governance. The goal of the honours lab was to study how the transition to animal-free medical science can be accelerated through interdisciplinary research. Students from different backgrounds could apply for participation. Ten students enrolled and cooperated with the teachers during a period of about 6 months to study what multilevel factors are involved in transitions and how this could be accelerated in the case of moving towards animal-free medical science. The students had to design large parts of the teaching program themselves, after an initial introduction into the two specialty subjects of the teachers. The teachers provided guidance and support during the rest of the course. External presenters were invited for lectures, focus group meetings were organised and a questionnaire was sent out to all faculties at the Radboud University. The students wrote an impressive report discussing the barriers, leverages and opportunities for the multiple levels involved in this ongoing transition, and five focus areas were identified. This interdisciplinary collaborative teaching is considered a great way forward for both teachers and students, leading to a new generation with interdisciplinary skills.

S4C5.2

EVOLVING EDUCATION TO MEET CURRENT AND FUTURE NEEDS

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Abstract
Background to session: IAT Education (https://iateducation.co.uk/) Level 2 and 3 programmes deliver the knowledge to ensure that the EU Directive requirements on having suitable qualified animal care staff is met. L2 provides the entry levels for animal care staff to work unsupervised, with L3 building on that knowledge/skill base. These can be delivered both online and in the classroom, whilst maintaining the integrity of the Learning Outcomes.

Changes were in two key areas, the first of which was delivery, which moved from the classroom to being wholly online, with tutors delivering sessions virtually and by providing more online material. This move to a blended style of teaching meant students could complete online work within a time frame.

The second area was around assessment of students needing to complete an End Point Assessment, (EPA) for which there are both practical and theoretical elements to the EPA.

Pre-Covid, an assessor would go to the student's place of work, watch them perform given tasks, question them around the ways and background knowledge of what they were doing followed by a more in-depth "professional" discussion to ascertain the student's broader comprehension of the subject and experience.

With the advent of better platforms such as ACE360, Moodle, SharePoint, Zoom and Teams, EPAs were carried out very successfully using remote access. Unforeseen benefits also became apparent. For example, recording the task and interview allowed assessors to revisit the student's answers during the post assessment discussion.

S4C5.3

BUILDING UP LABORATORY ANIMAL TRAINING CAPABILITIES WITH INTERNATIONAL COMMUNITIES

J. L. Tremoleda[1] and G.I. Fernández Rivas Plata[2]
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[2]*Universitat de Barcelona, Barcelona, Spain*

Abstract
Openness and communication **remain** at the core of our profession, not only associated to regulatory and social accountability, but importantly, to promote the welfare of laboratory animals and support their replacement. Training and professional capacitation are crucial to continue developing expertise and caring attitudes, with most training programs been guided by national or international Training Frameworks (e.g. ETPLAS, ICLAS). These frameworks promote harmonization and mutual recognition across laboratory animal communities, but their global implementation remains very variable. This is particularly critical for low and middle-income countries where resources may be limited and

importantly, governance strategies may be lacking to support such educational initiatives.

As part of an international project to promote sustainable development and capacitation in preclinical research and animal welfare, we have developed an online platform for "Planning preclinical animal studies in trauma research" (C4TS-QMUL https://vimeo.com/640531016), as part of a larger resource for clinical research methodology. This project, initially set up in collaboration with Thai clinicians, will be globally promoted. Furthermore, we have undertaken a pilot training experience on animal research integrity and culture of care with Peruvian communities to support further capacitation on animal welfare and global health. These experiences highlighted the importance to harmonize the learning approaches across multi-cultural communities, with varied resources and professional needs. Also, the importance of recognizing the interconnection between people, animals, plants, and their shared environment in the culture of care concept and teaching approaches. We will discuss the positive outcomes and challenges from these experiences.

S4C5.4

MULTIMODAL APPROACHES FOR THE IMPLEMENTATION OF THE 3R PRINCIPLES IN EDUCATION AND TRAINING

L. Zieglowski[1], L. Ernst[1], S. Deutsch[1], D. Fink[1], C. Bleilevens[1], M. Lemos[1], R. Tolba[1] and J. Steitz[1]
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Abstract
In 2018, 166,437 animals were used for training purposes in the EU demonstrating the need of alternatives to reduce animal numbers in education and training. At the RWTH Aachen University FELASA accredited courses are offered to more than 100 participants/year, based on a blended learning concept with a step-by-step approach using various methods and training modalities to ensure theoretical and practical competence. However, due to varying professional backgrounds of participants, it is challenging to meet individual requirements in depth of teaching sufficient skills to achieve optimal preparation of the participants for the hands-on training with the animals (refinement), and replacement of animal usage whenever possible. Therefore, a multimodal approach was implemented consisting of: 1st script-based theoretical lessons, 2nd instructional videos or virtual reality (VR) demonstrations, 3rd training in dead, 4th in anaesthetized and 5th in conscious animals.

Steps were evaluated and acceptance and efficacy of training concepts were assessed regarding teaching media and models used. Results showed that, scripts (87%) and videos (58%) are still preferred modalities. Interactive video formats received great acceptance (>80%) and for learning practical skills, the combination of instructional video and practical demonstration received the highest acceptance (100%). Over 90% assessed that VR contribute to the implementation of the 3Rs and should be used more for educational purposes in the future.

This multimodal approach facilitates a better awareness in dealing with laboratory animals and contributes to a less stressful and more secure interaction with animals in the sense of the 3Rs.

S4C5.5

TEN YEARS SUCCESSFUL EDUCATION ON LABORATORY ANIMAL SCIENCE

V. Küller[1] and **J. Schenkel**[1]
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Abstract
Courses on LAS are a prerequisite for animal experimentation. Evaluations and improvements of course contents are crucial for a successful education. Here we report our experiences of a FELASA Cat.B/EU-function A/C/D accredited course over ten years with 1600 students in 18 lecture blocks with 22 contributions each and 80 practical courses. The systematic evaluation was answered very frequently.

The students evaluated all individual lectures, all practicals, and special questions, e.g. the use of dummies. We observed a general satisfaction but also indications for improvements, resulting in an English-speaking course (practicals also in French and Greek), changes of the itineraries (if possible), or updates of the contents. The evaluations were also helpful to respond better to specific needs.

The compulsory test also helps to understand the learning progress. 400 questions were categorised to cover all learning outcomes. Analysing the success rate of the question categories was helping to identify fields difficult for the students.

107 students answered after years a retrospective questionnaire, showing the sustainability of the course.

In parallel, a seminar was offered for 15 years to 180 undergraduate students of Biology. The evaluations showed a high learning success in a quite new field for these students. The retrospective questionnaire responded by 53 students showed also a high sustainability.

Taken together, training of students at an early state of their study and a intensive introduction in LAS before starting the practical work is a successful and sustainable strategy to sensitize the students and to improve animal experimentation.

S4C5.6

COMPLIANCE AND TRAINING- CYCLE OF IMPROVEMENT

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Abstract
The presenter will examine the relationship between compliance, training, and continuing education. Poor training can lead to compliance issues while specific training can be an important part of compliance corrective actions and a preventative plan. The presenter will discuss how people learn and provide different strategies for training and continuing education to address compliance issues. Some of types of training discussed will include a course for laboratory managers, laboratory staff meeting presentations, as well as live and online options.

S4D1

OPENNESS ON ANIMAL RESEARCH: HOW NATIONAL TRANSPARENCY AGREEMENTS ARE TRANSFORMING CONVERSATION WITH THE PUBLIC

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[4]*Understanding Animal Research, London, United Kingdom*
[5]*Tierversuche Verstehen, Göttingen, Germany*
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[7]*EARA, London, United Kingdom*
[8]*VIB – KU Leuven Centre for Brain & Disease Research, Leuven, Belgium*

Abstract
Transparency and openness in the public debate on animal research is increasing in many European countries. Since the 2014 launch of the UK Concordat on Openness on Animal Research, the scientific community in Spain, Portugal, Belgium, France, Germany, and the Netherlands have joined forces in national transparency agreements that seek to improve communication with the public about animal research.

Through these commitments, institutions pledge to take a proactive approach in explaining when, how and why they use animals in research, agreeing to provide information to the general public and the media about the conditions under which animal research is carried out. They pledge to develop initiatives that generate greater public knowledge and commit to reporting on progress annually. All signatories should also have a recognisable position statement on their institution's website, describing their policy on the use of animals. Before the session, representatives from the agreements in each country will be sent a questionnaire asking about their experiences when establishing and running the agreements. The answers will be used to guide a panel discussion at the event. Panel members will explain what the drivers were towards this approach; provide guidance for those attending on how these agreements can be created and maintained. The event will conclude with questions taken from the floor. The European Animal Research Association, which is coordinating this event, will provide free materials at the end of the session for individuals and institutions who wish to help establish such agreements in their own countries.

S4D2.1

PREPARE FOR FISH RESEARCH

A. Smith[1] and C. Stevens[2]
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[2]*RSPCA, Horsham, United Kingdom*

Abstract
Fish research poses an extra set of challenges to those used to planning experiments on the traditional laboratory animal species. Not only are there practical and welfare issues when using animals that live in an aquatic environment, but there are far too few specific guidelines for the large range of fish species that are now in use. There is an acute need for access to those resources that do exist, especially the most recent of these. In addition, as in all preclinical *in vivo* research, scientists must be encouraged to collaborate with the animal care staff and facility where they will be working, from the earliest possible opportunity, to ensure that their plans are both feasible and optimal for the animals' welfare.

The PREPARE guidelines (https://norecopa.no/PREPARE) have now been available since 2017, and the PREPARE checklist is currently available in 25 languages, with several more European languages in the pipeline. Norecopa has maintained webpages for fish researchers for several years, but a need was seen to integrate these fish resources into PREPARE, to make PREPARE more attractive for fish researchers.

In collaboration with the RSPCA's Animals in Science Department (who provided funding and resources), Norecopa has added sections, specifically for fish researchers, to the PREPARE website for all the topics on the checklist.

The PREPARE guidelines are designed to be used on a voluntary basis by scientists who wish to evaluate all the issues which might affect the validity, reproducibility and translatability of their research.

S4D2.2

HEALTH MONITORING FOR FISH IN RESEARCH: RECOMMENDATIONS FROM THE FELASA-AALAS WORKING GROUP

E. Leguay[1], N. Pereira[2,3,4,5], C. Collymore[6], S. Farmer[7], K. Murray[8], **J.-P. Mocho**[9] and FELASA-AALAS Working Group
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[3]*Nova Medical School CEDOC, Lisboa, Portugal*
[4]*ISPA, Instituto Universitario, Lisboa, Portugal*
[5]*Oceanario de Lisboa, Lisboa, Portugal*
[6]*Veterinary Care and Services, Charles River Laboratories, Senneville, QC, Canada*
[7]*University of Alabama at Birmingham, Birmingham (AL), United States*
[8]*Zebrafish International Resource Center, Eugene (OR), United States*
[9]*Joint Production System Ltd, Potters Bar, United Kingdom*

Abstract
FELASA and AALAS established a joint working group to develop recommendations for monitoring and reporting of laboratory fish diseases, thus mitigating risk when exchanging fish for research. First, the joint working group focused on the establishment of health status in laboratory colonies and provided guidance for the definition of an epidemiological unit, management and risk assessment of fish diseases, and performance monitoring. Indeed, fish body condition, mortality, and morbidity can be monitored, recorded, and compared to identify trends. To define further fish health and microbiological status, the working group proposed

a routine screening pattern and defined frequency, assays, as well as the number of fish and environmental samples. It is recommended that pathogens are screened for according to their potential impact on research, health of fish and personnel, and likelihood of introduction and spread. Facilities can then share and compare their screening data, husbandry, and biosecurity program, in order to assess the risks and conditions for the exchange of fish. If the import is approved, fish should be received in quarantine and tested. When possible, only surface sanitized eggs are introduced into the main system. Barriers to isolate quarantine and different epidemiological units are pillars to the biosecurity program. Multi-species facilities are particularly exposed to the risk of cross-contamination between units and species. This influences the selection of microbes to monitor. To illustrate challenges linked with health status, facility size and need to accommodate different fish models, the working group described scenarios and practical solutions for import risk mitigation.

S4D2.3

ADVANCED REPORTING MODULE FOR AQUATIC ANIMALS IN ZEBRABASE

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Abstract
Thanks to the numerous experimental advantages and rapidly evolving new techniques, small fish species are constantly gaining popularity in many research areas. With more than 1000 laboratories using zebrafish as a model organism and many more using other small fish species, the question of proper tracking and reporting of the animals used in research is becoming more critical than before. There are certain aspects that make fish tracking more challenging and complex compared to rodents. The main difference is that groups of animals must be tracked as opposed to the individuals, which are typically the basic trackable unit in rodents. The aquatic facility manager may face the challenge of tracking tens of thousands of animals from the moment of fertilization until their death, which can be a very laborious task. Moreover, from onset of protected developmental stage, all experimental procedures have to be recorded in detail and summarized in periodical reports.

Zebrabase (zebrabase.org) is a non-profit project aiming at small fish species and other aquatic animals housed in tanks. It is a dedicated and scalable database solution that allows to track animal groups and their rearrangements and is capable of storing the breeding history as well as creating animal usage reports. Early this year, a brand-new Reporting module has been implemented in Zebrabase that allows users to track all the experimental procedures, including severity assessment. The Reporting module is tailored specifically to animals tracked in groups and provides an easy-to-use tool for every researcher or aquatic facility manager.

S4D2.4

FELASA WORKING GROUP REPORT: PAIN MANAGEMENT IN ZEBRAFISH

L. Sneddon[1], P. Schroeder[2], A. Roque[3], K. Finger-Baier[4], A. Fleming[5], S. Tinman[6] and B. Collet[7]
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[2]*University of Oxford, Oxford, United Kingdom*
[3]*IRTA- SCR, Sant Carles de la Ràpita, Spain*
[4]*Max Planck Institute of Neurobiology, Planegg, Germany*
[5]*University of Cambridge, Cambridge, United Kingdom*
[6]*Bar-Ilan University, Ramat Gan, Israel*
[7]*Université Paris-Saclay, Jouy-en-Josas, France*

Abstract
Empirical evidence suggests fishes meet the criteria for experiencing pain beyond a reasonable doubt and zebrafish are being increasingly used in studies of pain and nociception. Zebrafish are adopted across a wide range of experimental fields and their use is growing particularly, in biomedical studies, where they replace traditional rodent models. In many laboratory procedures, zebrafish are subject to involve tissue damage and this may give rise to pain. Therefore, this FELASA Working Group reviewed the evidence for pain in zebrafish, the indicators used to assess pain and the impact of a range of drugs with pain-relieving properties. We report that there are a number of behavioural indicators that can be used to determine pain including reduced activity, space use and distance travelled. Pain-relieving drugs prevent these responses, and we highlight the dose and administration route. To minimise or avoid pain, a number of refinements are suggested for common laboratory procedures. For example, skin swabbing could replace fin clipping where part of the tail fin is removed for genomic screening. Finally, practical suggestions are made for the management and alleviation of pain in laboratory zebrafish including recommendations for analgesia. Pain management is an important refinement in experimental animal use and so our report has the potential to improve zebrafish welfare during and after invasive procedures in laboratories across the globe.

S4D2.5

ENRICHMENT FOR LABORATORY ZEBRAFISH – SHARING AND IMPLEMENTING GOOD PRACTICE

C. Stevens[1]
[1]*RSPCA, Horsham, United Kingdom*

Abstract
The term 'environmental enrichment' refers to modifications which are made to the environment of captive animals with the aim of improving animal welfare. Enrichment is accepted as an essential requirement for meeting the behavioural needs and improving the welfare of many laboratory animal species, but in general, provision for zebrafish is minimal. One reason for this lack of provision is a perception that there is a lack of evidence that enrichment has welfare benefits for this species, or that zebrafish do not 'need' enrichment. Concerns are also sometimes

raised around the practical challenges of providing enrichments in a laboratory setting, or that they may impact on the science being undertaken. However, there is a growing body of evidence suggesting that various forms of enrichment are preferred by zebrafish over a barren tank, and that enrichment or increased environmental complexity can improve zebrafish welfare by reducing stress and anxiety. In this talk, I will give an overview of the evidence in the existing literature on the effects that enrichment can have on zebrafish behaviour, physiology and welfare, before discussing the ways in which the RSPCA has communicated and shared good practice for enrichment for zebrafish.

S4D2.6

CAPTURE AND TRANSPORT OF LIVE CEPHALOPODS: RECOMMENDATIONS FOR SCIENTIFIC PURPOSES-OUTCOMES FROM WG FELASA

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[9]Stazione Zoologica Anton Dohrn, Department of Biology and Evolution of Marine Organisms, Naples, Italy

Abstract

Since 2013 research using cephalopod molluscs, from hatchlings to adults, is regulated within the Directive 2010/63/EU. Given the existing bottlenecks and considering issues about welfare of these animals in case of captive breeding, scientific research employing these invertebrates relies on capture of animals from the wild. Furthermore, experimental needs may require live cephalopods to be shared and transported from location of origin and between different research facilities across countries and Continents.

Despite the regulations currently put in place by Europe and other independent organizations, experimental-based recommendations specifically addressing capture and transport of animals belonging to this taxon are still missing.

Here we will present the outcomes of a FELASA Working Group specifically focussed on identifying possible recommendations for species-specific requirements and training of all the persons involved in the supply chain, i.e. collectors and transporters, in order to spare animals avoidable pain, suffering, distress or lasting harm during capture and transport for scientific purposes.

We reviewed the legislations, codes and regulations currently in force together with the literature available on the matter and produced a series of crucial outcomes: ***i.*** a set of species-specific recommendations for capture and transport of live cephalopods (*Nautilus*, cuttlefish, sepiolid, squid, octopus) to be used in scientific procedures; ***ii.*** standardized approaches, based on scientific evidence, to objectively assess the impact of these processes on animals' health and welfare; ***iii.*** a training program for fishermen and transporters to attain the necessary competence as required by Article 23 of Directive 2010/63/EU.

S4D3.1

COMMUNICATION STRATEGIES TO PROMOTE DEVELOPMENT AND IMPLEMENTATION OF LABORATORY ANIMAL REGULATIONS

H.-M. Voipio[1]

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Abstract

Throughout the world, including Europe, research with animals is conducted in nations that have no laws or regulations governing such work. These nations lack formal requirements for ethical oversight for research animal work, scientific proposal scrutiny, husbandry and housing standards, personnel training, source and health of animals, use of adequate anesthesia and analgesia, record keeping and reporting. A considered and fairly enforced set of regulations promotes better science and animal welfare. The mission of the International Council for Laboratory Animal Science (ICLAS) is advancing human and animal health by promoting ethical care and use of animals in research worldwide. ICLAS has developed a new program to assist in promoting development and implementation of laboratory animal oversight legislation and the culture of care for nations that lack such regulation.

The program includes an interactive seminar and further information and support based on the need in each case. The seminar will provide a background on international regulations and norms, education and training, and accreditation of facilities and work. Importance of advanced laboratory animal knowledge for achieving high-quality science is highlighted.

The program aims to bring together stakeholders who need to be part of the discussion, to communicate and to understand the mutual benefits of laboratory animal oversight legislation. It provides a persuasive communication framework for scientists, association leaders, and members of government to propose, enact, and implement legislation governing laboratory animal oversight in nations where no such regulations exist.

S4D3.2

WALKING THE TIGHTROPE: HOW TO BALANCE DIVERGING EXPECTATIONS FROM SCIENCE, POLITICS AND THE PUBLIC

J. Biederlack[1], I. Retter[1] and S. Hippenstiel[1]

[1]Charité – Universitätsmedizin Berlin, Berlin, Germany

Abstract
During the last years, many 3R centres have been set up all around Europe. They face a general communicational challenge, ranging from unrealistic expectations from politics to restraints of experimental scientists. For this reason, Charité 3^R as the 3R centre of Charité – Universitätsmedizin Berlin has defined communication as one of its three pillars. Here, we discuss the chances and challenges of 3R communication. While our first target group is the scientific community, we also developed specific measures to actively communicate to politicians and inform the public.

Although the scientific community firmly supports the 3R principle, some scientists are reserved on establishing a 3R centre, fearing that the aim is to hamper animal experiments and thereby restricting the freedom of research. The general expectation of political stakeholders is the countable reduction of the number of animal experiments. In accordance, they would like to know, which "replacement methods" were established that avoid the further use of animals. However, the diversity of academic research in contrast to well-defined validation procedures in the regulatory sector makes it difficult to meet these demands. The chance of media requests is the opportunity to communicate the 3R topic with high visibility to the public, including politics. However, the content of the story is in the responsibility of the journalist, and his/her first interest is a good story – not necessarily a realistic view on scientific work. We try to balance all these chances and challenges by a communication strategy based on transparency and honest communication into all directions.

S4D3.3

IT IS TIME TO TALK

B. Ledermann[1] and I. Desbaillets[1]
[1]*Swiss Laboratory Animal Science Association, Muenchenstein, Switzerland*

Abstract
Animal research and the welfare of animals within animal research are of increasing public and political concern. The suffering of the animals is the main issue for politicians as well as for the society in western countries. The European parliament has recently adopted a resolution for plans and actions to accelerate a transition to innovation without the use of animals in research, regulatory testing, and education (667 Members in favor – 4 against.)

In Switzerland the political system even allows to influence the Swiss legislation not only through the election of the members of the National Council and Council of States but also through the submission of so-called referenda or initiatives. These can be initiated either on a cantonal or, as popular initiative, on a federal level.

The strong trend towards vegetarianism and veganism for several years has triggered a popular initiative in Switzerland, called "Tierversuchsverbotsinitiative" that requests changes in the legislation for a total ban of animal and human research. Furthermore, the initiators request the ban for importation and trade of products that have been developed with the support of animal research. This prohibition would have far-reaching consequences as the supply of new medication would no longer be possible.

Therefore, the SGV among other Swiss organizations has initiated various activities for a transparent and proactive discourse of our scientists with the public. These activities as well as the outcome on the vote for the total ban of animal and human research initiative are being presented.

S4D3.4

A TRANSDISCIPLINARY TOOL FOR COMMUNICATING INTEGRITY AND ANIMAL EXPERIMENTATION TO HIGH SCHOOL STUDENTS

R. Santos[1], I. Lopes[1], P. Gomes[1], J. Borlido Santos[1] and **I.A.S. Olsson**[1]
[1]*i3S, University of Porto, Porto, Portugal*

Abstract
Ethically challenging topics can be useful triggers for public interest in research. When challenged with developing tools to teach integrity to high school students in the context of the H2020 project INTEGRITY, we decided to couple this to the wider topic of animal experimentation, which is already a sought-after topic in the school outreach program at i3S, Portugal. We have developed a toolkit to be used in science classes for 16–18 year-old students, by teachers or by scientists/science communicators in school visits. A set of slides and videos are used to introduce the topics of animal experimentation and research integrity. We start with providing an overview of animal use in biomedical research, including both science and ethics. Students get to ask questions and engage in a discussion which typically is so lively it needs to be interrupted to move to the next topic. Research integrity is presented using two animal research examples: William Summerlin's painted mice masking a failed transplantation study and the CAMARADES work showing how (lack of) blinding impacts scientists' evaluation of research outcome. The second part consists in group discussions of integrity dilemma cases, situated in a high school context. The temptation to manipulate results to gain recognition and the possibility to unconsciously bias results are also present in the student dilemmas. A final classroom discussion wraps up the 90-min activity. We will present the toolkit and preliminary results from pilot testing it in Portuguese schools.

S4G1.1

CULTURE OF CARE – SETTING THE SCENE

S. Louhimies[1]
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Abstract
Directive 2010/63/EU gives animal welfare considerations a high priority in animal care and use practices in Europe. This legal framework is an agreement between society and the research community on how animals can be used in research and testing. A solid culture of care is a cornerstone of this agreement,

implemented through the work of all involved in the use and care of animals throughout the establishment, requiring strong leadership from the management. Concerns over the culture of care can and will threaten this trust. In contrast, all benefit from a good culture of care – animals, science, organisation and its members, and society.

Culture of care is also a central theme covered by the various guidance documents developed together by Member State authorities, user community and key stakeholders. Competence is fundamental for an individual to actively contribute to a good culture of care. Several open access tools have been developed to help build a solid competence base across the EU. Finally, it is important that culture of care extends from animals to those working with animals – to care for the carer builds resilience to compassion fatigue and a strong basis for a continued compassionate attitude towards animals trusted in one's care.

S4G1.3

CREATING SPACES AND RESOURCES TO RECOGNIZE AND SUPPORT THE EMOTIONAL LABOUR OF ANIMAL TECHNOLOGISTS.

B. Greenhough[1] and **J.L. Tremoleda**[2]
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[2]*Queen Mary, University of London, London, United Kingdom*

Abstract
Many of those who work with laboratory animals are driven by a deep personal attachment to animals and science and committed to providing the best welfare and care for laboratory animals in order to support the best quality science. It is this empathy and caring attitude that generally drives those seeking employment working with laboratory animals. Many learn, and will continue to learn, to become attuned to and affected by the animals in their care. Work by social scientists and professionals looking at the workplace cultures of animal research has drawn attention to this 'emotional labour' performed by animal technicians, and the impacts this can have on their wellbeing. Such expectations are challenging, especially in a context where technologists are also expected to perform procedures on, and euthanise, the animals in their care, placing them at risk of emotional harm and compassion fatigue.

An introductory talk will reflect on the challenges on preclinical research, and how directly impacts on staff. Staff can feel emotionally dissonant and poorly engaged with their workplace, a situation exacerbated for many by recent challenges imposed by the ongoing COVID-19 pandemic. This will be followed by a short review of recent social science research which highlights the emotional labour performed by animal technologists. This second talk will include suggestions of resources, tools and tactics that can help technologists communicate how they feel and its impact on their work, thereby offering a starting point for beginning to share and address the burden of emotional labour.

S4G2.1

STAY OUT OF MY TERRITORY – UNDERSTANDING AND MITIGATING MALE MOUSE AGGRESSION.

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[4]*Astrazeneca, Gaithersburg, United States*
[5]*Astrazeneca, Boston, United States*

Abstract
Group housing is very important for social animals. However, it can also give rise to aggression, (particularly within the laboratory environment) which is one of the most serious welfare concerns in mouse husbandry. Severe fighting can lead to pain, injury, and death.

Historically male mice have been treated the same as female mice when handling and during husbandry procedures. Understanding the triggers of aggression has led to us implementing a specific male mouse housing and handling regime.

Sex bias is a major issue in the pre-clinical setting, we cannot simply not use male mice in studies. Additionally male mice are required for certain models e.g. prostate cancer models. When using male mice often additional mice have to be included to mitigate the potential loss of mice due to fighting and keep the study statistically relevant.

We formed a global working group to identify the triggers of aggression e.g. behaviours seen prior to fighting occurring and have identified strategies to mitigate these triggers. We have also identified the signs of a harmonious cage, how to identify when aggression is occurring and when/how to intervene.

Understanding what triggers aggression and the more subtle signs of aggression has allowed us to take action before animals need to be euthanised. Utilising these new regimes has greatly reduced overt aggression and ensured more harmonious social interactions. This has led to a reduction in the number of animals that needed to be separated from 31% to less than 1% in nude mice.

S4G2.2

MICE CAN ALSO BE IN ZEN

M. Kiersgaard[1], M. Petersen[1] and H. Nordahl Hansen[1]
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Abstract
Body weight is an important output in experimental animal work, both scientifically and as an animal welfare assessment. When weighing mice, we have previously used "weighing boxes" for the animals. The mice could not easily escape the box, however, the mice often seemed somewhat distressed in the box and tried to jump out, sometimes with success. When switching from tail

handling to cup and tunnel handling, we found it very difficult to use the weighing boxes. We observed that the mice seemed calmer with the new handling methods, maybe the weighing boxes weren't necessary anymore?

Perhaps the cold and slick surface of the scale is uncomfortable for the mice, could we offer a soft, non-slippery and warm surface?

We had some spare yoga mats, maybe we could use these for the mice?

The yoga mats were cut, they were cleaned with ethanol and we tried weighing mice directly on the yoga mat on the scale, with no box or other fencing around the scale. The mouse could easily run off the scale if it wanted to. But it didn't! The mice keep calmly on the yoga mat, being weighed, and voluntarily enters the tunnel or palm of hand, afterwards. The yoga mats can be washed and wiped with ethanol when necessary, but the mice urinate a lot less on the mat, than they did before. Everybody, both mice and animal caretakers, are very happy with this change, which is so easy and yet makes a huge difference.

S4G2.3

UNDERSTANDING COMMUNICATION OF MICE: IS THERE A VALUE FOR ANIMAL WELFARE ISSUES?

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[2]*University of Kiel, Kiel, Germany*

Abstract
Humans and mice differ quite strongly in their communication means. The hearing range of mice is not identical to humans. Mice communicate within the human hearing range and out in a world beyond our perception in the ultrasonic spectrum (above 20 kHz–110 kHz).

Several studies show that this ultrasonic vocalization (USV) in mice is important for the exchange of social information. Mice communicate and transfer information in short syllables or longer calls consisting of several syllables in the ultrasonic range.

It is very important to be aware of the senses, which the research animal of interest is using, in order not to involuntary influence the behavior and in the end animal welfare.

We will describe the fascinating world of ultrasonic vocalization and communication in mice. How could the recording and analysis of USV from mice be used to monitor mice with minimal human interference? This might be useful in order to develop more non-invasive methods for evaluating animal welfare.

We try to understand the usage of the vocalization and the possible alteration because of human influences. In the end we will also show the potentials of this method as also the drawbacks and limits of this approach.

S4G3.2

FEMALE COMPANIONSHIP TO END SOCIAL ISOLATION OF MALE MICE

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[3]*Central Laboratory Animal Research Facility, Utrecht University, Utrecht, Netherlands*

Abstract
Prolonged social isolation is used as a solution to prevent aggression between males used for breeding, as well as within experiments (Zidar 2019). Due to the use of individually ventilated cages, no visual, auditory, olfactory, and tactile contact can be maintained, which may be considered as a violation to the European Directive (3.3a), to be classified as severe suffering (section III,3k). Ample evidence for negative welfare and effect on behavior and physiology is described in several reviews (Schipper 2018).

Social housing of males with a sterile female buddy might be a constructive approach (Florijn 2019), provided that the females do not experience too much discomfort as a consequence for this would counterbalance the benefit. Therefore the sterilization process should be minimally invasive and the females should not be the victim of aggression or repetitive sexual approaches. To investigate this, we chemically sterilized C57Bl/6 females with repeated Lucrin suspension injections (s.c.), or a small single Suprelorin implant followed by socialization with socially isolated males. We monitored their fertility and their social behavior during activity at dawn, midnight, and dusk for 10 weeks. The couples showed normal social interaction and, females sterilized with Lucrin and Suprelorin did not experience excessive sexual harassment or aggression. Depo-Provera injection sc. is under current investigation.

We conclude that preventing social isolation of males using chemically sterilized female companions is promising.

S4G3.3

IMPROVING GROUP SIZE PLANNING OF BREEDINGS OF GENE-MODIFIED ANIMALS

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Abstract
Vertebrate animal models are an important tool for biomedical researchers, even more since genome editing allows the rapid generation of mutant strains and complex genotypes. In this light, efficient experiment planning of the matings to avoid supernumerary offspring becomes critical. To obtain the desired cohort sizes for the wanted genotypes, one needs to account for the effective genotype frequencies in the offspring, the fertility rate of the respective mouse strain and the variation in litter size. Naive expectation values often do not conform to the actual breeding outcome in practice, with small breeding setups being affected the most. Therefore, breeding processes are frequently plagued with delays, inflationary use of animals and cohorts with strongly varying ages.

Here we optimize the calculation of the number of the matings needed for having predefined success guarantees. Primarily for small breeding setups, this approach is advantageous compared to the conventional techniques, as it allows researchers to reduce animal use without compromising the confidence to obtain the desired breeding outcome. Although less critical, we also observe an improvement in animal use for large breeding setups. Additionally, we verify our method by accessing the empirical distributions of the litters for various mouse strains.

For practical application, we developed an R package and Shiny Web application (https://www.ltk.uzh.ch/en/Breeding.html). These tools should facilitate the accurate calculation of the breeding outcomes, thereby optimizing animal use and making breeding experiments time- and cost-efficient.

S4G3.4

A NECROPSY PROTOCOL FOR NEWBORN MICE

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Abstract
The mouse remains the most frequently used species in biomedical research, representing more than 50% of all animals used worldwide. Consequently, breeding efficiency is highly impactful to the 3Rs.

Rates of neonatal mortality can be as high as 39% in some facilities and represent a welfare and economical concern. However, causes of neonatal death remain poorly understood and most pups found dead do not undergo post-mortem analysis, partly due to a lack of proper guidelines. We have therefore developed a protocol for post-mortem analysis of C57BL/6J pups aged between 0 and 4 days old.

The protocol consists of both external and internal inspections, focusing on identifying viability indicators. These include: major malformations which have the potential to impact suckling (e.g. cleft palate and ankyloglossia); the presence of traumatic lesions (bruises and bite wounds); the presence of foetal membranes and condition of the umbilicus. We also propose a novel set of criteria for the identification of stillbirths consisting of evaluation of lungs for evidence of breathing (morphology and float test), stomach contents for evidence of swallowing, and the colouration of prescapular brown adipose tissue (essential for non-shivering thermogenesis). Finally, all major internal organs are inspected for abnormalities or internal lesions.

Routine application of this protocol following the discovery of dead mouse pups will allow the collection of valuable information that might otherwise be lost, and contribute to understanding the causes of neonatal mortality.

S4G4.1

HOW COMMUNICATION THROUGH A CULTURE OF CARE HAS OPENED OUR HIGH CONTAINMENT DOORS

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Abstract
The Pirbright Institute is a world leading centre of excellence in research and surveillance of virus diseases of farm animals and viruses that spread from animals to humans. This research would not be possible without the proportionate use of animals which are integral in the development of new viral disease control methods such as veterinary vaccines and diagnostics.

Given the nature of the Institute's research, there is a requirement to house animals in high containment facilities designed to protect the environment from the pathogens being used within. There are more controls surrounding the access to these facilities compared to low containment units and, as a result, it was historically challenging to promote a culture of openness. In 2014 The Pirbright Institute became a signatory to the Concordat on Openness on Animal Research; a set of commitments for UK-based life science associations to enhance their animal research communications. Since then, the Institute has received a 'Leader in Openness' award and more recently an 'Internal engagement activities' award.

This presentation will describe the different strategies the Institute has developed over the past several years to promote openness both internally and externally. One particularly successful solution has been the use of photographic and video material to facilitate "access" into the animal facilities and examples of this will be given. Overall, these approaches have transformed the communication of the Institute's research in addition to its culture of care through networking and empowerment of animal technicians.

S4G4.2

USING A REFINEMENT WIKI TO ENHANCE COMMUNICATION

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Abstract
Small practical details are often the key to more humane and reproducible animal studies. These details are typically tacit knowledge that is not implemented as standards. Animal care staff are key players in these discussions, but their contribution is not always appreciated. In addition, they may not have the time or training to write papers that would ensure that these refinements become known to scientists. Several informal online discussion forums have been established to discuss best practice, but many of these lack easily searchable archives.

To bridge the gap between scientific papers and informal discussion forums, we have launched a Refinement Wiki (https://wiki.norecopa.no). We foresee a number of uses:

1. Rapid dissemination of refinement techniques where resources or interest in writing fullscale scientific papers are unavailable
2. As a hub where those investigating the effects of a potential refinement strategy in a multi-lab study can identify collaborators
3. Creation of pages encouraging colleagues to share experiences or develop new strategies to solve a problem

The contents of the Wiki are in general not curated, so its quality is determined by registered *bona fide* members of the research animal community. No one else can add, delete, or comment upon material.

The Wiki is an integral part of Norecopa's website: https://norecopa.no. In addition, the Wiki has its own search engine.

We hope that this Wiki will help to accelerate the introduction of new refinement methods. Those interested in contributing to the Wiki (anonymously if preferred) may contact Adrian Smith (adrian.smith@norecopa.no).

S4G4.3

COMMUNICATION WITH THE FUTURE: LABORATORY ANIMAL SCIENCE IN 2042

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Abstract
If we could communicate with colleagues in the laboratory animal science (LAS) field in 2042, what would be our questions to them, and what would be their answers?

The objective of this talk is to exercise and discuss the trends in laboratory animal science for the next 20 years. Predicting the future is an important exercise for all areas of science. To assess the trends for the next 20 years, it is necessary to understand our science today. This talk raises several questions that have no right answers yet. Understanding the trends in our field may let us be prepared for this future, which for some areas is coming fast.

The first and most important question: are we still going to use animals in 2042? Is LAS prepared for the next pandemic? What animal models will be used? Will open cages be allowed in 2042? Will cage space be larger? There will be bedding, cage change, disposable cages, IVC racks, real-time environmental parameters for all cages? How much robotics will we have? What animal models will we use in the future? Will zebrafish replace rats and mice? How many mice models will we have? How standardized will be animal experiments? How SPF will be the animals? Will specific microbiome-free animals be standard? Will training, IACUC reviews, translation, reproducibility be important issues?

We cannot predict the future, but we can review the past, discuss the present and understand the trends we have ahead for the next 20 years of LAS.

S4G4.4

CONCLUSIONS FROM THE FELASA-EFAT WORKING GROUP

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Abstract
Competent, confident, and caring animal caretakers, technicians and technologists are essential for good animal welfare, high quality science and a secure Culture of Care. However, the level and quality of education, training and continuing professional development (CPD) of this category of staff varies considerably between European countries. Current career pathways are neither entirely aligned with EU Directive 2010/63/EU and the learning outcomes for EU function C in the adjacent Education and Training Framework, nor do they reflect the diversity of national educational pathways in Europe. This impairs harmonisation of education within Europe, making it difficult to structure clear career pathways and necessary CPD activities for caretakers and technicians.

FELASA and EFAT established a joint working group with the tasks of scrutinising educational and CPD programmes and career pathways for laboratory animal caretakers and technicians throughout Europe, and making recommendations for the

harmonisation of education and career pathways for this category of staff. The recommendations are intended to help establish new, or improve existing, education, training and CPD activities.

The working group surveyed educators and other relevant persons around Europe, which confirmed the suspected diversity between countries. We developed a five-step career staircase, with levels C0-C4 based on learning outcomes for function C according to the Education and Training Framework. This provides clear details for consistent basic and continuing education and training, as well as the competencies required for each level. These levels are suitable for creating and adapting education, training and CPD activities for animal caretakers and technicians throughout Europe.

S5A1.1

DATA COMMUNICATION THROUGH DIGITAL CAGES: PHENOTYPING SPONTANEOUS LOCOMOTOR ACTIVITY IN INBRED AND OUTBRED MOUSE STRAINS

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Abstract
Mouse strains differ markedly in all behaviours. We undertook this study to disentangle diurnal activity and feature key aspects of three non-genetically altered mouse strains widely used in research, C57BL/6NCrl (inbred), BALB/cAnNCrl (inbred) and CRL:CD1(ICR) (outbred). With this aim, we conducted a longitudinal analysis of the spontaneous locomotor activity of the mice during a 24-h period for 2 months, in two different periods of the year to reduce the seasonality effect. Mice (males and females) were group-housed in Digital Ventilated Cages (Tecniplast), mimicking standard housing conditions in research settings, and avoiding the potential bias provided in terms of locomotor activity by single housing. The recorded locomotor activity was analysed by relying on different and commonly used circadian metrics (i.e., day and night activity, diurnal activity, responses to lights-on and lights-off phases, acrophase and activity onset and regularity disruption index) to capture key behavioural responses for each strain. Our results demonstrate significant differences in the circadian activity of the three selected strains, when comparing inbred versus outbred as well as inbred strains. Conversely, males and females of the same strain displayed similar motor phenotypes; significant differences were recorded only for C57BL/6NCrl and CRL:CD1(ICR) females, which displayed higher average locomotor activity from prepuberty to adulthood. All strain-specific differences were further confirmed by an unsupervised machine learning approach. Altogether, our data corroborate the concept that each strain behaves under characteristic patterns, which needs to be taken into consideration in the study design to ensure experimental reproducibility and comply with essential animal welfare principles.

S5A1.2

AN IMPEDANCE-BASED AUTOMATED HOME-CAGE SYSTEM DISPLAYS ACTIVITY CHANGES IN AN DSS-INDUCED ACUTE COLITIS MODEL

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Abstract
In order to improve the welfare of laboratory animals and the quality of research results, severity assessment of experiments is ethically and legally required. However, there is still a lack of adequate methods. This study aimed to assess the severity of dextran sulfate sodium (DSS) colitis induction in mice by contactless monitoring of home-cage activity. Furthermore, activity patterns of mice during routine husbandry were monitored to analyse the impact of handling methods.

For acute colitis induction, female C57BL/6J mice were exposed to 0%, 1.5% or 2.5% DSS on five consecutive days. Besides daily clinical scoring, weighing and fecal occult blood testing (FOB), activity was monitored 24/7 using an impedance-based home-cage system (Digital Ventilated Cage, DVC®). On day 14 intestines were collected for histology to confirm graded colitis.

Compared to control mice, DSS-treated mice displayed increased clinical colitis and histology scores, as well as positive FOBs. Activity and body weight were significantly reduced due to a higher dosage of DSS. Furthermore, no significant differences between the two handling methods were detected. A binary classifier enabled classification into two severity levels based on activity and body weight. This revealed that not only DSS-treatment but also handling had an impact on the animals.

The automated home-cage system detected decreases in activity in correlation with higher DSS concentrations as well as changes in activity patterns due to handling procedures. Contactless monitoring in a home-cage represents an improvement due to objective observation and the avoidance of more invasive methods.
Funding: DFG-FOR2591

S5A1.3

AUTOMATIC ASSESSMENT OF SOCIALLY RELEVANT BEHAVIOUR IN A CNS INJURY MOUSE MODEL: BENEFITS AND CHALLENGES

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Abstract
The behavioural patterns of grouped housed laboratory animals can provide insight into their welfare in an experimental setting. Home Cage Automatic Tracking (HCA) systems permit the analysis of consistent social and cognitive information, contrasting with the 'snap-shot' of stimulated and biased conduct observed in classical tests, whereby animals are isolated from their group and exposed to unfamiliar environments. These minimally invasive systems can improve our understanding of animal communication and subsequently, their needs to ensure their welfare.

Mice (CD1-male) in this study sustained a moderate controlled cortical injury (CCI), whilst naïve individuals were used as controls. Employing Actual Analytics' ActualHCA, video and automated metrics of locomotor activity and body temperature were acquired through 24 h/day recordings for 3 days/week for 5 weeks post-injury. Analysis of behavioural patterns in week 3 reveals rearing to be the most prominent activity in CCI mice. Maintenance behaviours, such as grooming or burrowing, were frequently observed in this group, possibly associated to body temperature regulation, with automated data showing pronounced fluctuations in the condition. Locomotor measurements showed that both injured and naïve mice exhibit higher nocturnal activity in the first week, with a steady progressive decline, eventually resulting in a diurnal shift.

Ongoing analysis for a craniotomy model will follow to corroborate relevance of these findings to CNS injury. This study shows the value of minimally invasive approaches to analyse progressive modifications in transitions and temperature to qualify social interactions between mice, thereby helping to provide evidence-based guidance to better support their care and welfare.

S5A1.4

EXPLORING THE VALUE GAINED BY MONITORING ANIMAL ACTIVITY DURING CALCIPOTRIOL INDUCED ATOPIC DERMATITIS STUDIES

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Abstract
Atopic Dermatitis (AtD) is a chronic inflammatory skin condition which results in dry itchy skin in adults and children. Dermatological features exhibited by AtD such as skin thickening, inflammation and itch can be reproduced in mice using calcipotriol, a vitamin D3 analogue (MC903).

Sixteen male C57BL/6J mice were split into two groups and randomly assigned to treatment group A or B. Under brief General Anaesthesia (bGA) of (up to 5 minutes), a small area of the upper back was shaved, 48 hours post shaving the remaining fur was removed using depilatory cream under bGA. Following a 3-day rest period to allow the skin to recover, mice were briefly anaesthetised and 25μl of ethanol (Group A) or Calcipotriol (Group B) was administered topically to their shaved backs once daily for 10 consecutive days. Mice were housed in Digital Ventialted Cage system throughout the study to investigate any differences in activity. Mice were euthanised on Day 11 and various tissue samples taken. Data demonstrated a reduction in activity across both treatment groups at the start of the study, and this reduction in activity was greater in the group of mice treated with Calcipotriol. These results indicate that activity during the light and dark phase is impacted by a short period of GA and further impacted as a response to the Calcipotriol treatment. All animal studies were ethically reviewed and carried out in accordance with Animals (Scientific Procedures) Act 1986 and the GSK Policy on the Care, Welfare and Treatment of Animals.

S5A1.5

STUDYING PHYSICAL EXERCISE EFFECT ON MOTOR SKILLS OF THE CMVMJD135 MACHADO-JOSEPH DISEASE MOUSE MODEL

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Abstract
Machado–Joseph Disease (MJD) is the most common autosomal dominant ataxia worldwide, a neurodegenerative disorder caused by a CAG repeat expansion within the Ataxin-3 gene. The DVC® (Digital Ventilated Cage), is a home-cage rack monitoring system capable of continuously registering spontaneous animal activity in the home cage 24/7. We evaluated the influence of physical exercise as a therapeutic strategy to improve established motor dysfunction in a mouse model of MJD, the CMVMJD135, using the non-intrusive DVC® data, combined with motor behavioural analysis. Four groups of mice were established: Wild Type (WT); Transgenic (TG); Wild Type with Running Wheel (WTRW); Transgenic with Running Wheel (TGRW).

Preliminary analysis of the overall animals' activity, as registered by the DVC® during the night period showed, as expected, that TG mice had significant less activity when compared to their WT-littermates. Interestingly, TGRW mice where more active than TG mice. The overall results of the motor behaviour tests showed a tendency for the TGRW mice to present a better performance when compared to TG mice. These results suggest that the DVC® system is able to detect the phenotype of the MJD mice without the experimenter interference, and the presence of running wheels in the cages seem to improve CMVMJD135 motor phenotype. We aim to continue with further and more extensive characterization of physical exercise effects in this mouse model, taking advantage of the unbiased automated data collection contributing for an improved welfare.

S5A2.1

GENETIC AND HEALTH QUALITY CARE FOR MOUSE AND RAT BREEDERS

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Abstract
ICLAS Laboratory Animal Quality Network (LAQN) has been providing standards and recommendations on the maintenance of genetic and health guidelines for mouse and rat animal users since its start in 2006. LAQN has developed two programs: Performing Evaluation Program (PEP) for diagnostic laboratories, and GenReference program, which is open to all institutions worldwide. In both cases, ICLAS provides high quality samples, sera and microbiology samples in PEP and DNA from the most common mice strains in Gen Reference.

Until today, PEP has been running for 15 years, distributing yearly 20 different samples to more than 30 participating laboratories worldwide. We will present an analysis of how the program contributes to maintaining quality assessment in diagnostic laboratories.

On the other hand, the Gen Reference program started more recently with the contribution of the most important commercial breeders who donated DNA from their most common mouse strains. ICLAS has also been promoting that a good genetic quality program in every research institution that breeds mice and rats for research use must include an inhouse genetic monitoring program. The purpose of GenReference is to provide DNA from pure defined mouse strains as reference standards to detect potential genetic contamination in their facility. This program is open to any institution that breeds mice. Examples of how to use the program will be presented.

S5A2.2

USE OF SENTINEL-FREE AGITATED SOILED BEDDING AS A MEANS TO DETECT RODENT PATHOGENS

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Abstract
Reduction of animal numbers in research is a cornerstone of the 3R's principles and can be applied to today's animal health monitoring programs. Regular monitoring of rodent colonies for infectious agents is critical to maintain research colony health status and prevent inadvertent experimental variability. Over the past decade, PCR testing of dust from the return air systems of open airflow IVC rack systems has provided an alternative or adjunct approach to rodent health monitoring. However, this method is only applicable to IVC systems that do not filter the return air at the cage level. Our experimental data demonstrate that a variety of commercially available media agitated with composite soiled bedding from rodents can be used as an adjunct to, or possible replacement for, soiled bedding sentinels for detection of murine pathogens and can be applied to any rodent caging system. The target audience includes veterinarians, facility managers, and technical personnel who manage health monitoring programs.

S5A2.3

STANDARDIZATION OF A SENTINEL-FREE BEDDING DUST COLLECTION PROCEDURE FOR RODENT PATHOGEN PCR DETECTION

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Abstract
The majority of commonly excluded rodent pathogens go undetected in soiled bedding sentinels (SBS). Alternative PCR-based methods demonstrating equal or greater sensitivity to SBS have been developed which also reduce or replace the use of sentinel rodents. A recently proposed method for SBS-free PCR pathogen detection is to sample soiled bedding dust representing rack animals by shaking bedding with a dust collection filter or by swabbing the bedding holding container bottom. Our investigation sought to evaluate different dust collection media and sampling schedules to optimize pathogen detection. Three cages of 3 pet shop and 2 naïve mouse contacts provided weekly soiled bedding that was mixed and diluted to ~17% with bedding from naïve mice. Six filter types and 2 swab types in triplicate were exposed to bedding mix by shaking within or swabbing the bottom of the holding container respectively. Sampling schedules for filters varied from monthly to weekly exposure to bedding as well as monthly-pooled filters versus a single filter used throughout the 3-month period. Swabs of bedding containers were collected weekly and pooled by replicate. The number of positive PCR pathogen detection events (PDE) varied with media type, exposure schedules, and media pooling. Total PDE summation across replicates for each filter and swab types ranged from 20–76 PDE. The most sensitive exposure schedule incorporated weekly bedding dust collection and exposure using either one filter continuously used through the 3-month period (76 PDE), separate monthly filters pooled (72 PDE), or weekly swabbing with an adhesive swab (68 PDE).

S5A2.4

TOWARDS NON-INVASIVE HEALTH MONITORING OF LABORATORY MOUSE COLONIES WITH LUCIA-PATRIOT SENTINELS

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Abstract
Objectives: To refine health monitoring of laboratory mouse colonies we devised a novel transgenic sentinel mouse model LUCIA-PATRIOT secreting luciferase upon stimulation of interferon gamma (IFN- γ) promoter. In the present work we aimed to validate this mouse model as a real-time, non-invasive biosensor.
Methods: LUCIA-PATRIOT mice were generated by pronuclear injection of linear DNA encoding a synthetic luciferase gene under a minimal IFN-g promoter. The specificity of transgene expression and mobilization was assessed in vitro using transgenic splenocytes exposed to various T and B cell mitogens. The level of luciferase activity in lymphoid and nonlymphoid tissues was also examined ex vivo using tissue lysates from antigen-immunized LUCIA-PATRIOT mice. Finally, in vivo experiment was carried out on a group of 5 LUCIA-PATRIOT mice transferred from an IVC animal containment to a conventional facility. Levels of luciferase in the urine were determined twice a day for 14 days.
Results: In vitro treatment of splenocytes from LUCIA-PATRIOT mice with T cell mitogens, (concanavalin A, phorbol myristate acetate, anti-CD3e antibody) but not B cell mitogen (LPS) led to 2–3 fold increase in the secreted luciferase levels after 24 hrs of cell culture. Also, tissue lysates from lymphoid organs of immunized LUCIA-PATRIOT mice revealed over tenfold difference in luciferase levels over nonlymphoid tissues. LUCIA-PATRIOT mice exposed to pathogens in conventional animal facilities induced a rapid and statistically significant increase in luciferase levels in urine.
Conclusion: The conducted studies showed the usefulness of LUCIA-PATRIOT mice for examining the exposure of laboratory rodents to environmental pathogens.

S5A2.5

MURINE CHAPPARVOVIRUS DNA AND ANTIBODY DETECTION IN SOILED-BEDDING SENTINEL MICE IS DOSE DEPENDENT

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Abstract
Murine chapparvovirus (MuCPV) produces kidney disease and mortality in immunodeficient mice and histologic kidney lesions in immunocompetent mice. To investigate detection of MuCPV in soiled bedding sentinels (SBS), chronically infected immunodeficient CD-1 nude (nuCD-1) mice or immunocompetent CD-1 mice were used to generate two infectious bedding sources. MuCPV genome copies in the feces and urine of nuCD-1 mice were 2–3 logs higher than CD-1 mice at study initiation. A 1:4 mix of MuCPV source bedding and naive (MuCPV-negative) CD-1 bedding respectively was transferred weekly to 12 naïve CD-1 SBS mice divided in 3 cages for each bedding source. Feces and urine for PCR and blood for serology were collected weekly. For SBS mice representing infected nuCD-1 mice, MuCPV DNA was first detected in feces at week 1 and urine at weeks 7–12 post-exposure, and both remained positive throughout the 22-week study. MuCPV antibodies were detected at 15–16 weeks post-exposure. DNA was not consistently detected in the feces of SBS mice receiving bedding from infected CD-1 mice until week 13 and 18 in two cages, which coincided with the first urine-positive mouse in each cage. Antibodies were detected in one cage at week 22. Higher titers of MuCPV in nuCD-1 bedding hastened MuCPV detection in SBS mice compared to CD-1 bedding. PCR screening of SBS feces representing immunodeficient mice is adequate for a 3-month monitoring period, but SBS representing immunocompetent mice should be maintained 6 months before PCR testing. Delayed detection of antibodies underscores the challenge of routine serological testing.

S5C1

LABORATORY ANIMAL SURGERY – CAN WE DO BETTER?

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Abstract
Surgery is an integral part of many animal experiments. It is commonly accepted that always the most refined surgical model and method have to be chosen in order to maximise scientific value and reproducibility as well as to minimise harms to animals. However, for experimental surgeons no consistent training or certification standards are applied throughout Europe and networking opportunities for exchanging refined techniques or developments are rare.

Additionally – although it is clear that all species have to be valued equally and aseptic technique is essential to success in surgery – it seems to be a significant gap in surgical standards applied for large animal and rodent surgery. More communication is needed to better promote exchange of knowledge and expertise within the surgical research community, to define standards and to develop guidelines for good surgical practice and training, to train experimental surgeons in a standardized and certified manner and to offer networks for exchange of standards and guidelines but also developments and refinements.

This session presents an overview on current practices and available guidelines for experimental surgeons, how living animals could be replaced during surgical training and how surgery and perioperative support is used to refine experimental studies – thus improving reproducibility but also animal wellbeing. Additionally, the European Academy of Laboratory Animal Surgery (EALAS) will be introduced, which aims to fill the currently existing gap by promoting high standards of practice and the application of the 3Rs within preclinical surgery, as well as fostering exchange of knowledge between experimental surgeons.

S5C1.1

TRAINING OF RODENT SURGEONS – CURRENT PRACTICE AND AVAILABLE GUIDELINES

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Abstract

Surgery is an integral part of many experimental studies in rodents. Optimal care, state-of-the-art protocols and minimal invasive and aseptic surgical technique are prerequisites to achieve surgical success and best possible animal welfare outcomes. Good surgical practice cannot only improve the animal's post-operative recovery, but also the outcome of a study and the validity of its results.

As stated in the EU directive 2010/63/EU the welfare of experimental animals is highly dependent on the quality and professional competence of the personnel supervising and performing procedures. Staff should be adequately educated, trained and competent and additionally be supervised until they have obtained and demonstrated the requisite competence.

Veterinary as well as human surgeons undergo a continuous systematic training for several years as well as examination to become a certified surgeon. However, no standards are defined for the training of experimental and especially rodent surgeons as well as there is no list of competencies or a certification procedure available in Europe.

Our aim was to find out how rodent surgeons are trained, and which guidelines and training resources are available for them. Therefore, we conducted online surveys with researchers performing rodent surgery via our extended network or through learned societies and information portals. Additionally, we conducted a systematic review to identify, critically evaluate and compare current guidelines describing good surgical practice for experimental rodent surgery. The results demonstrate that further efforts have to be made on developing best practice standards and implementing them into training offers for experimental rodent surgery.

S5C1.2

FROM TRAINEE TO TRAINER: LESSONS LEARNED THROUGH IMPLEMENTATION OF A DUAL-CATHETER MODEL IN MICE

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Abstract

Surgery in rodents is challenging, and specialized skills, training and experience are required to establish a reliable and reproducible surgical model. In addition to mastering the individual steps of the procedure, knowledge on anatomy and physiology, and a broad understanding of good surgical practice, including asepsis, reduction of trauma, hemostasis, anesthesia, analgesia, and selection of tools and materials is crucial for success. Yet, in preclinical metabolic research, the priority is typically the downstream application of the surgical model while the surgical procedure, being considered a tool required to enable the study, receives less attention. Consequently, proper surgical training is often replaced by a chain of peer training where inexperienced staff learn a surgical procedure from other lab members, who were also once trained by other lab members. This learning strategy is prone to propagation of procedural mistakes and faulty assumptions leading to unnecessary animal suffering, poor surgical outcomes, and, ultimately, unreliable research data.

We know this, because that is how we started ten years ago, when we set out to establish a dual-catheter infusion/sampling model for glucose clamp studies in mice. Here we will present our work on refinement of this model and demonstrate how improved animal welfare and substantial reductions in animal usage numbers can be achieved through training, optimization, and meticulous attention to detail. By consistently using this approach, we have expanded our surgical capabilities to the point of establishing a surgical training program for staff and students and providing surgical services for our in vivo research groups.

S5C1.3

REFINEMENTS IN PERIOPERATIVE SUPPORT FOR MICE AND RATS

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Abstract

Continuous refinements of surgical techniques are expected, as part of the 3Rs, to maintain the highest possible standards of care when working with animals. Perioperative planning is crucial to ensure the best possible outcome for animals and for personnel involved in research activities. When evaluating surgical refinements for laboratory rodent species, a variety of welfare and safety aspects should be considered for the benefit of the animals and for experimental outcomes. The focus of this presentation will be on assessments of skin preparation techniques, comparing traditional and novel scrub agents used for rodent surgery.

In addition, the critical need for thermal support of rodents during surgical procedures will be reviewed, including a discussion of novel heat sources and housing elements. While institutions may differ in what regulatory oversight bodies and internal processes contribute to their rodent surgery programs, the goal of this talk is to provide practical insights into the care and support of rodent surgical models involved in biomedical discovery.

S5C1.4

TRANSLATIONAL LARGE ANIMAL MODELS FOR CARDIOVASCULAR APPLICATIONS

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Abstract
There is a consensus that as a large, omnivorous, diurnal animal, the farm pig closely resembles humans in many features of its size, anatomy, physiology, immunology, and even lifestyle. Thus, providing good basis for modeling cardiac disease and testing novel therapies. However, it is often the attending veterinarian who needs to address the porcine-human differences and to ameliorate the short-comings. Exemplary, suitable dimensions of porcine heart and/or large vessels are project specific. Yet the correlation with body weight is not linear in farm pigs, as a recent computer tomography study shows. Pigs of 90–100 kg were shown to be most appropriate for investigating human-grade devices as cardiac dimensions in this weight-class closely resemble those of adult patients. Further, clinical-grade echocardiography equipment can be routinely used for procedural guidance of cardiac procedures in pigs, admittedly with some adaptations of the technique, as recently demonstrated by creation of minimaly-invasive aortic regurgitation model. Similarly, after adjusting for the different heart orientation in pigs than in humans, fluoroscopy produces the images most clinicians are familiar with. For navigationally challenging procedures, such as catheter-based mitral valve interventions, porcine animal model could be humanized by relatively simple surgical intervention, such as creating a 'neo vena-cava'. Finally, such model and technique adaptations can provide invaluable practical experience for medical doctors, when novel therapies finally find their way to clinic. Hence, for creating valuable scientific data and learning experience, the impact of veterinarians proficient in translational animal models could and should not be understated.

S5C1.5

SURGICAL TRAINING USING A COMBINATION OF SIMULATION AND ANAESTHETIZED PIGS

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Abstract
The use of animals for surgical training not only improves surgical skills, but also influences confidence levels of trainees in the operating room positively. Even though relatively few animals are used for surgical training, and the level of harms to the animals is categorized as a terminal procedure, the lowest harm level on the scale terminal-mild-moderate-severe for the use of animals in scientific procedures, the opinion on the use of animals in education and training in the general public has a negative tendency. Simulation training contributes significantly to a reduction in the number of animals necessary for surgical training, although it currently is not possible to replace the use of animals in this field completely. A typical training pathway for surgical residents at Odense University Hospital consists of one day of basic theoretical course, which is blended with hands-on exercises. Hereafter, the individual residents practice skills on a laparoscopic simulator, with the aim to pass the course's compulsory exercises. First when the mandatory exercises have been passed, training is continued on an anaesthetized pig. With the current simulation programs training on anaesthetized animals is still essential, as simulation does not provide accurate tactile feedback of handling tissues, and the prevention of bleeding and hemostasis is not realistic using current computer programs. However, developments in simulation training may further reduce the necessary numbers and eventually replace animals for surgical training.

S5C1.6

EALAS – FOSTERING HIGH STANDARDS IN PRECLINICAL SURGERY

D. Bouard[1]
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Abstract
The creation of EALAS was initiated a little over a year ago, in many ways inspired by the US *Academy of Surgical Research* (ASR). For over 40 years, ASR has remained active in promoting the highest surgical standards, mostly through meetings and certification programs. In 2020, a survey was created to explore the potential interest of building a similar entity in Europe. Approximately 50 key actors across various laboratory animal surgery fields were asked by the founder's group to respond to a survey exploring the potential interest in building such an academy. Ninety-five percent of the respondents expressed considerable interest in

the initiative, leading to the creation of the first council and elected executive committee to oversee the work of the new EALAS.

During this final presentation, EALAS President Dr. Delphine Bouard will summarize and expand upon the session's key messages. She will explain how EALAS creation will help spreading these messages all over Europe. EALAS's Missions and Values will also be outlined, detailing current and futures actions, as well as broader objectives for the new year and beyond.

S5C2.1

AN OVERVIEW OF THREE RS EDUCATION INITIATIVES TARGETING SCHOOLS, UNIVERSITIES AND EARLY-CAREER PROFESSIONALS

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Abstract
Benefitting from funding made available under a European Parliament Pilot Project (2018–2020), and a European Parliament Preparatory Action (2021–2023), the European Commission (Directorate General for Environment and EURL ECVAM at the JRC) has launched projects aimed at strengthening the Three Rs education and training in the field. Emphasis has been placed on the roll-out of Three Rs teaching at primary and secondary schools, working with educators in integrating the Three Rs further into programs at university level and providing quality training modules for professionals on aspects of Directive 2010/63/EU on the protection of animals used for scientific purposes.

S5C2.2

INTRODUCING THE THREE RS INTO PRIMARY AND SECONDARY SCHOOLS

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Abstract
Schools are the place to teach future changemakers problem-solving skills, introducing them to current issues and make them think of better solutions. Challenging the use of animals in research is key nowadays and an excellent topic to promote ethics and critical thinking in education.

The JRC project, coordinated by European Schoolnet on the Three Rs in education, is helping build learning activities and introduce the principles of Replacement, Reduction and Refinement of animal experiments. Students are offered not only lessons introducing the topic, but also have an opportunity to raise their awareness of the ethical basis to the European Union's Three Rs policy, they learn about animal testing in science and new technologies helping to reduce and/or replace the use of animals. Moreover, students are offered opportunities to develop critical thinking, to research different methods and innovation opportunities as well as to learn about careers and jobs in the Three Rs.

The Project targets also teachers, who have various opportunities to learn about the Three Rs, to develop their own educational materials as well as to use the materials, developed by their peers. The project fosters exchange of information, knowledge, and best practices between teachers, providing tools for education and training related to the Three Rs.

During the presentation, participants will learn more about the Project educational activities and their results achieved so far and the nearest plans.

S5C2.3

ADVANCING THREE RS UPTAKE IN UNIVERSITY EDUCATION THROUGH A EUROPEAN NETWORK

L. Gribaldo[1]
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Abstract
Education and training are fundamental to driving progress in the development and uptake of the 3Rs (replacement, reduction, refinement), and it is necessary to find common European strategies to involve experts, university professors and students sensitive to this topic. Developing and implementing a curriculum framework can be a complex process, requiring high-level support from the government, ministries of education and education planners. Therefore, a bottom-up approach could be complementary since it involves working with educators in universities, and ultimately envisage ways to bring the Three Rs into their lessons using different learning scenarios designed to suit a variety of different learning contexts. A group of key specialists in teaching 3Rs, invited at the JRC to discuss about future needs and ways to improve, recommended investing in the continuous professional development of teachers and lecturers. This could facilitate widespread inclusion of Three Rs content on the curriculum through engaging the teachers themselves in the process. In order to expand the number of teachers, "train-the-trainer" approaches and support by sharing content and materials for education are considered most helpful. A network of educators, within each MS, who could share ideas and resources for 3Rs, would be beneficial. The proposed work will be instrumental to produce, deliver and disseminate properly a set of tools for education harmonised across Europe. In terms of providing resources for educators, a repository would be a good support, where teachers/educators could go to search for and download ready-made resources, delivered directly or tailored to suit the particular audience.

S5C2.4

OPEN ACCESS TRAINING RESOURCES: E-LEARNING MODULE ON THE DEVELOPMENT OF ALTERNATIVE METHODS AND APPROACHES

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[3]*Ecorys, Birmingham, United Kingdom*
[4]*Syrcle, Radboudumc, Nijmegen, Netherlands*

Abstract
An e-learning module on "Developing *In Vitro* Methods and Approaches for Scientific and Regulatory Use" has been developed and implemented within the Education & Training Platform for Laboratory Animal Science platform (ETPLAS) as module EU-60 (https://etplas.eu/learn/eu-60).

The module provides guidance to method developers and other parties interested in improving the speed and efficiency with which new *in vitro* methods and approaches are developed, tested, optimised and implemented for regulatory uses. The module is divided in four parts as follows:

1. The context and needs for reliable and relevant *in vitro* methods and approaches;
2. Method development and implementation based on Good *In Vitro* Method Practices (GIVIMP)
3. Information requirements to demonstrate the scientific validity of a new method or approach;
4. A knowledge assessment based on case study exercises to check the knowledge gained and progress made by users.

Upon completion of this module, users should be able to determine where and how new methods or approaches can replace and/or reduce existing regulatory animal requirements and fill existing legislative gaps leading to more scientifically relevant and reliable information. The module contents highlight the critical aspects to take into consideration when designing and optimising new approach methods to ensure their reliability, relevance, and fit-for-purpose. Finally, they provide an overview of the different steps and target groups involved in the process of test method development, optimisation and, if applicable, in the validation of new methods and the pathways to regulatory acceptance.

S5D1

THE CHALLENGES AND OPPORTUNITIES TO IMPROVE PUBLIC UNDERSTANDING OF THE USE OF NHPS IN RESEARCH

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[4]*CNRS, Lyon, France*

Abstract
Non-human primates (NHPs) account for less than 0.05% of all animals used in research in Europe. Yet monkeys are the closest species to humans, biologically, anatomically, and physiologically. This means research with monkeys can give us more human-relevant compared perhaps with the information obtained from other animals.

Equally, because of their physiological similarity to humans, the use of monkeys is strongly contested by those opposed to the use of animals in research. Activist campaigns to immediately end the use of NHPs have found growing support with some Members of the European Parliament. In 2022, the European Commission is mandated to carry out a Feasibility Study on NHPs use.

These pressures on the use of monkeys in Europe comes at a time of a global shortage. Since early 2020, China has banned the export of all wild animals, including those purpose-bred for biomedical research. China is the primary global source of monkeys for biomedical research. This ban has had a significant impact on the supply of NHPs around the world.

The European scientific community needs to make a stronger and more compelling public case for the continued use of monkeys in scientific research. The aim of this session will be to discuss how we can encourage and practice better communications about the use of monkeys. It will bring together researchers and communicators to help develop such a public case. The session will be of interest to all of those interested in improving communications on animal research.

S5D3.1

KEEPING THE RIGHT SIDE OF THE LAW

S. Louhimies[1], D. Anderson[2] and K. Ryder[3]
[1]*European Commission, Brussels, Belgium*
[2]*PMS, Monifieth, United Kingdom*
[3]*Department of Health, Belfast, United Kingdom*

Abstract
The Animal user community and authorities alike have struggled during recent years to ensure a coherent approach to how genetically altered animals (GAA) should be handled under Directive 2010/63/EU. This has resulted in unclear and, at times, contradictory advice, differing practices across Europe and non-harmonised reporting, rendering the quality of data at EU level questionable.

To resolve this, Member States experts and key stakeholders, have developed a comprehensive GAA guidance, gathering, in one document, all aspects of GAA creation, maintenance and use that are necessary to ensure compliance with the Directive. The guidance document was endorsed by Member State National Contact Points in November 2021, and it has just recently been published. The introductory presentation will layout its content and highlight areas of specific difficulty. We will discuss common misconceptions and grey areas and demonstrate how these are addressed in the guidance.

S5D3.2

THE THREE RS IN THE CREATION AND MAINTENANCE OF GENETICALLY ALTERED ANIMALS (GAAS)

D. Anderson[1], S. Louhimies[2] and K. Ryder[3]
[1]*PMS, Monifieth, United Kingdom*
[2]*European Commission, Brussels, Belgium*
[3]*Department of Health, Belfast, United Kingdom*

Abstract
This talk will cover the key considerations on how the Three Rs should be taken into account at different stages of GA creation and maintenance.

The Three Rs should be considered at all stages from project inception, through the application and evaluation process, throughout the project and at the end of the project.

Effective application of the Three R principles throughout a project can result in significant welfare improvements and reduction in animal numbers.

Issues which require consideration include, for example, the methods of creation of new GA lines, evaluation of new lines, including welfare assessment, tissue sampling for genetic characterisation, and breeding strategies for established lines to minimise harms to the animals and to manage surplus.

S5D3.3

DRAFTING AND EVALUATING CONCISE PROJECT APPLICATIONS FOR CREATION/MAINTENANCE OF GENETICALLY ALTERED ANIMALS

K. Ryder[1], S. Louhimes[2] and D. Anderson[3]
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[2]*European Commission, Brussels, Belgium*
[3]*Pentlands Management Systems, Dundee, United Kingdom*

Abstract
There are elements required by the Directive which need to be included within a project application submitted for authorisation. Sufficient information also needs to be included to allow a harm benefit analysis to be done, covering the entire programme of work. A non-technical project summary is needed. We will discuss the sections of the new EU GAA Guidance and show how it can be used to facilitate being concise but providing all necessary information, thereby fulfilling requirements to provide all that is necessary to allow evaluators to perform their role.

The talk will also discuss the requirements for project evaluation, breaking it down the into sub-elements. It will demonstrate the types of information required in this field to allow a project evaluator to seek assurance that appropriate measures are in place to promote compliance with the Directive, including the application of Three Rs.

The expectation is that following the sessions, participants will be more confident using the new GAA Guidance document and applying it when writing or evaluating projects involving the creation and/or maintenance of GA animals and will be able to ensure that all legal requirements of project applications are complied with.

S5E1.1

BIOLOGICAL MATERIALS TESTING – AN OFTEN UNDER-COMMUNICATED COMPONENT OF AN ANIMAL RESOURCES BIOSECURITY PROGRAM

M. Hart[1], M. Crim[1], S. Hansen[1] and R. Livingston[1]
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Abstract
Transplanted cells and tissues engrafted in immunocompromised rodents provide a valuable preclinical model system for studying a wide variety of human diseases and evaluating responses to new therapeutics. Development of these models utilize various human- or animal- derived biological materials such as patient-derived xenografts (PDX), human blood or other tissues, and cell line-derived xenografts (CDX). Unfortunately, the scientific literature has widely documented that these research reagents can become contaminated with infectious agents or cells from another species or cell type. Potential adverse outcomes of using contaminated or misidentified biological materials include contagious disease outbreaks, risk of exposure of laboratory and vivarium personnel to human infectious agents, and the generation of unusable data if the biological material is misidentified or contaminated with other cells. This presentation overviews the impact of contaminated biological materials on the reproducibility crisis in preclinical research, outlines screening methods that may be instituted to mitigate these risks, and outlines communication goals for veterinarians when communicating these risks to principal investigators and staff. The target audience includes laboratory animal veterinarians, facility managers, principal investigators and animal welfare policy and compliance personnel.

S5E1.2

MIRIAD: MULTIPLEX IMMUNOASSAY FOR RODENTS INFECTIOUS AND ANIMAL DISEASES

R. Malbec[1]
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Abstract
Health monitoring of laboratory rodents is essential to prevent zoonoses – mandatory in some legislations – and to participate in the welfare of the animals. A poor sanitary status may also cause experimental biases, impact the reproduction of the experiments, and increase the number of animals used in a way that is not compatible with the 3Rs.

Several agents – generally pathogenic – are regularly controlled according to FELASA recommendations. We have developed MIRIAD, a multiplexed ELISA serological assay, for the sanitary monitoring of rodents according to the 3Rs principle.

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The multiplex ELISA assay is easy to implement and to perform without heavy investments, as it requires standard skills and equipment, already present in most pet shops and analysis centers. This test aims to improve flexibility and reactivity for rodent health monitoring and can represent an alternative to outsourcing the analysis. In addition, the multiplexed format allows the simultaneous detection of different pathogen-targeting antibodies per analysis. This approach is made possible by the miniaturization of a probe array at the bottom of the wells of a 96-well microplate. Parallelization allows for increased throughput with minimal staffing, and reduced costs and sample consumption to limit the need for animal sacrifice. By increasing the frequency of testing and reducing the time required to obtain results at competitive costs, the MIRIAD assay can contribute to the early detection and management of FELASA-recommended serological agents.

S5E1.3

CHLAMYDIA MURIDARUM: A PATHOBIONT HIDING IN PLAIN SIGHT.

N.S. Lipman[1], N. Mishkin[1], R. Ricart[1], K. Henderson[2] and S. Carrasco[1]
[1]*Memorial Sloan Kettering Cancer Ctr & Weill Cornell Medicine, New York, United States*
[2]*Charles River Laboratories, Wilmington, United States*

Abstract
Converging findings led to the recent detection of *Chlamydia muridarum* (Cm) in two genetically engineered mouse colonies. The bacterium was found in association with multifocal chronic pneumonia by immunohistochemistry and/or genus-specific PCR. Its discovery was startling as the bacterium had not been identified in the laboratory mouse since the 1940s, when it was isolated from mice used to study influenza. Cm was suspected to be a virus and thus called the "mouse pneumonitis virus". It was subsequently identified as a *C. trachomatis* mouse pneumonitis biovar (MoPn), and most recently as Cm following whole genome sequencing. While Cm has been studied extensively in the mouse as a model of sexually transmitted *C. trachomatis* urogenital infection of humans, surprisingly little is known about its natural biology in its murine host. Following our development of a species-specific PCR that can identify Cm in feces antemortem, as well as analysis of murine fecal metagenomic NGS libraries, Cm has been identified in multiple academic US biomedical research colonies and is presumed moderately to highly prevalent across the globe. As Cm is known to cause persistent infections and stimulate both the innate and acquired immune systems, its presence may pose a significant confounding variable in research studies. This presentation will review the rediscovery of Cm, its considerable prevalence, as well as characterization of natural infection of immunocompetent and immunocompromised mouse strains.

S5E1.4

CLINICAL CASE AND PATHOLOGY QUIZ BOWL

C. Brayton[1], C. Besch-Williford[2], C. Franklin[3], B. Gentry[3] and M. Hart[2]
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[2]*Idexx, Columbia, Missouri, United States*
[3]*University of Missouri, Columbia, Missouri, United States*

Abstract
The pathology quiz bowl at AALAS' national meeting has provided entertainment and education for more than two decades. This session will consist of an informal review of the clinical presentations and pathology of laboratory animals as an image-based quiz, followed by review of the cases/answers. Topics will include infectious and non-infectious conditions and selected phenotypic characteristics of important animal models. The images will be educational and challenging to laboratory animal specialists at all levels of expertise. The target audience is laboratory animal veterinarians, trainees, technicians, pathologists, and scientists. Participants will learn gross and histologic pathology of laboratory animals.

Bring a traditional writing instrument (pen/pencil). An answer sheet will be provided. Presenters: C Besch Williford, C Brayton, C Franklin, B Gentry, M Hart

Logistics permitting – there will be prizes!

One (1) 40 minute session or (2) 20 minute sessions is recommended to

1. Give the quiz
2. Discuss the answers
3. Determine winners

W2B1.1

UNDERSTANDING AND VALUING THE ROLES OF DIFFERENT PEOPLE WITHIN AN ESTABLISHMENT: WORKSHOP I, PART1

T. Bertelsen[1]
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Abstract
This is the first of two workshops on "How to facilitate a good Culture of Care in laboratory animal establishments", which will address four different aspects of Communication and the Culture of Care. This section, "Understanding and valuing the roles of different people within an establishment", will be followed by a session on considering emotional loading in people with different roles. The second workshop will address the topics of communicating effectively with others, and processes for raising concerns.

Both workshops aim to facilitate a good Culture of Care in laboratory animal establishments, by focusing on communications and interactions between individuals having different roles, e.g. scientists, designated veterinarians, animal technologists, management and regulators. Effective communication between these staff is recognized as especially important with respect to

improving animal care and welfare, empowering care staff and veterinarians, and identifying and addressing any concerns within an establishment so these can be acted on and resolved.

Part 1 will include a discussion on: "Understanding and valuing the roles of different people within an establishment", addressing the following topics:

- What do you wish other people knew about your role – what would you like to say to those with different roles?
- What makes you feel valued and appreciated?
- How can you make others feel valued and appreciated?
- Would you like anything to change at your establishment, and if so what?

This part will conclude with a plenary summary of the discussions: – what suggestions can you take away? Is there anything you will do differently?

W2B1.2

COMMUNICATING EFFECTIVELY WITH OTHERS IN DIFFERENT ROLES

P. Hawkins[1]
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Abstract
The *European Commission Working Document on Animal Welfare Bodies and National Committees* emphasises that effective two-way communication between scientists and animal technologists and care staff is a vital component of a good Culture of Care.

This includes open and constructive communication throughout the establishment on animal welfare, care and use issues and how these relate to good science. Animal technologists, care staff and veterinarians should be empowered, respected, and listened to, with their roles and work supported throughout the establishment. All voices and concerns must be heard and dealt with positively, and good interactions and communication between researchers and animal care staff should be encouraged.

The Working Document explains how all of the above can be facilitated by encouraging the development of formal and informal communication channels between researchers and care and technical staff for mutual benefit with respect to science and animal welfare.

This discussion session will provide some examples of activities set up by International Culture of Care Network members to help create these channels and achieve good communications between people with different roles. Participants will be able to share experiences and identify new ideas and approaches to implement at their own establishments.

W2B1.3

CONSIDERING EMOTIONAL LOADING IN PEOPLE WITH DIFFERENT ROLES

J. Parks[1]
[1]*University of Southampton, Southampton, United Kingdom*

Abstract
Part 2 of the first workshop "How to facilitate a good Culture of Care in laboratory animal establishments', will look at emotional loading of people in different roles. The workshop will consider what emotional loading is, and how it affects people such as scientists, animal technologists, veterinarians, Animal Welfare Body members, facility management and regulators.

Personnel can be emotionally loaded or overloaded in many occupations, but the field of laboratory animal technology and science presents additional and unique pressures. The *European Commission Working Document on Animal Welfare Bodies and National Committees* highlights that to foster an appropriate culture of care, "appropriate behaviour and attitude towards animal research from all key personnel is of key importance" and that attitude is partly based on "an individual's positive and proactive mindset". Achieving this depends on roles and work being properly supported. To effectively support people in different roles, emotional loading needs to be recognised and addressed within an establishment. Individuals need to understand what emotional loading is, the different types and causes of emotional loading and identify it in themselves and colleagues. Managers and colleagues need to understand when an individual is emotionally overloaded to help them cope. Workshop participants will think of examples and different types of emotional loading and of times when they or others may struggle in their role. Communication about emotional loading and ways of facilitating good clear communication around the subject is very much part of the culture of care.

W2B1.4

RAISING CONCERNS – CULTURE OF CARE WORKSHOP

K. Ryder[1]
[1]*Department of Health, Belfast, United Kingdom*

Abstract
This is part 4 of two workshops "How to facilitate a good Culture of Care in laboratory animal establishments", addressing four aspects of Communication and the Culture of Care: 1. understanding the roles of people within an establishment, 2. emotional loading in different roles, 3. communicating effectively and 4. raising concerns.

We hope that everyone acts with a culture of care at all times. However, there has been evidence in the public domain e.g. from exposés, which demonstrate practices which we would prefer not to see in some cases of those working with animals. These cases do not just relate to handling animals or performing procedures but cross the entire breadth of the Directive requirements. We should all be alert to other activities, in particular those with which we are not comfortable, or which we know represent poor practice, and be prepared to discuss them, in the hope and expectation of understanding why they are occurring and shaping behaviours towards best practices.

This workshop session will discuss some cases which may indicate a poor culture of care, and explore with participants a variety of communication options and processes which may be available for raising concerns. It will identify appropriate persons that you can talk to about concerns. Processes and systems will be considered to notify and then follow up to determine if the issue

has been resolved. It will explore strengths and weaknesses of some options and build confidence in developing or refining robust strategies for constructive challenge.

W2C2

SKILLS FOR COMMUNICATION & LEARNING IN THE WORKPLACE: DEVELOPING YOUR PRACTICAL SKILLS & MORE

L. Whitfield[1], R. Serlin[2], A. Costa[3], A. Holmberg[4] and A. Kerton[5]
[1]*OWL Vets Ltd, Bedford, United Kingdom*
[2]*Royal Veterinary College, Potters Bar, United Kingdom*
[3]*i3S, Porto, Portugal*
[4]*Karolinska Institute, Solna, Sweden*
[5]*Learning Curve Developments Ltd, London, United Kingdom*

Abstract
The workplace creates opportunities for colleagues to develop new understandings and skills within an authentic setting. This workshop will provide overviews of some of these and assist delegates to gain skills for themselves through active participation.

Sessions comprise:

* **Communication skills for you:** "In whatever context we work, clear and concise communication is essential. Enhancing our communication skills not only ensures that our message is understood clearly by our partner, of particular importance during training and assessment, but also to promote our own well-being."

* **Active learning and development through e-learning resources:** "Adults learn through active participation in their learning, supported by feedback, gaining skills at the time that they're needed. This presentation will explore some of the options available for learning and development through e-learning resources."

* **Dialogue and transparency in workplace training and assessment**: "Animal technicians are highly skilled and essential to the humane use of animals in research, so it makes perfect sense to involve them in training and assessing practical tasks. By using a framework such as Directly Observed Practical Skills (DOPS), technicians can gain new skills and confidence in assessment."

Practical session: you will participate actively to try out newly-acquired communication and assessment skills in small groups, using simulators, toys and role play, which you can apply to some common workplace learning challenges.

This session is suitable for anyone with an interest in training and assessment of competence in the in-vivo workplace; this workshop is especially intended for professional development of animal technicians.

W2C3

COMMUNICATING GOOD EXPERIMENTAL DESIGN: AN INTERACTIVE WORKSHOP IN TWO PARTS

D. Fry[1], T. Steckler[2], C. Sorzano[3], N. Franco[4], M. Berdoy[5] and M. Forni[6]
[1]*University of Manchester, Manchester, United Kingdom*
[2]*Janssen Pharmaceutica, Beerse, Belgium*
[3]*University Carlos III, Madrid, Spain*
[4]*i3S, Porto, Portugal*
[5]*University of Oxford, Oxford, United Kingdom*
[6]*University of Bologna, Bologna, Italy*

Abstract
Concerns about the quality and conduct of animal-based studies persist, and a FELASA working group has been looking at how the teaching of experimental design might be improved to help researchers appreciate the common problems and gain confidence in use of varied designs. The objective of the workshop is to promote discussion on the knowledge and skill set needed to achieve basic competence in design of animal experiments, on harmonization across the LAS community, and on how education in experimental design can equip participants with these skills. It will be about experimental design not statistics, help with learning more about the topic and how to teach it, and use a format the working group are exploring in which the ideas presented in brief initial talks are taken further in group discussion and synthesised in a following plenary. Comments from the participants should help the working group's development of a Training the Trainers workshop.

In part 1 an overview of common problems in experimental design and the conduct of experiments, and introduction to the issues in experimental design that need addressing, will lead to group discussions on 'How do you randomize in your experiments?' and 'Deciding on the experimental unit', and a general discussion. In part 2 presentation of two approaches to conveying the idea of blocking, with illustrations of various randomised block designs, will be followed by group discussions on 'Picking a good design' and 'Commenting on how an experiment is conducted', with a final general discussion.

W2C4

WIDENING PARTICIPATION: EDUCATION AS A DIALOGUE BETWEEN STUDENT AND TUTOR IN A VIRTUAL WORLD

L. Whitfield[1], I. Garrod[2], D. Lewis[3], I. Dontas[4] and A. Kerton[2]
[1]*OWL Vets Ltd, Bedford, United Kingdom*
[2]*Learning Curve Developments Ltd, London, United Kingdom*
[3]*University of Leeds, Leeds, United Kingdom*
[4]*National & Kapodistrian University of Athens, Athens, Greece*

Abstract
"I hear, I forget. I see, I remember. ***I do, I understand****"* Confucius 500BC

OK, so we all had to move our teaching and learning online last year. What now? Can't wait to get back to didactic teaching in the classroom?

No! Don't just go back to the old ways! Let's stop and think about the opportunities available to us now that will enhance the learning experience, be more inclusive, and modernise our approach to education.

Online learning is here to stay and whether your course is delivered virtually, or in person, the pedagogical principles are the same: that adults learn as they need to, and when given ownership and responsibility for their own learning. We learn best through a blended, focussed approach, with support from tutors and opportunity to reflect.

Presenting the same 'classroom' material online is not the solution but by taking advantage of all the possibilities that a Virtual Learning Environment can offer, we are able to help our students to learn in a much more effective and dynamic way.

Using active learning ourselves, the activities in this conference session will enable you to experience this learner-centred method of education. We'll share practical ideas to help you engage and support students in their learning journey, improve communication, and encompass theory, group work, practicals, and assessments.

Come along and find out how using digital resources supports our diverse range of students, is less resource-intensive – and what's more it's FUN!

W2D6

EURL ECVAM BIOMEDICAL REVIEWS FOR SPECIFIC DISEASE AREAS

L. Gribaldo[1]
[1]*JRC-EC, Ispra, Italy*

Abstract
Nowadays, a relevant percentage of drug programmes fail to progress due to a lack of efficacy or unexplained toxicity. There are several factors underpinning this failure, and the use of animals to model human diseases is coming under scrutiny. Therefore, EURL ECVAM launched a series of studies on available and emerging non-animal models in seven areas: respiratory diseases, neurodegenerative disorders, breast cancer, immune-oncology, autoimmunity, cardiovascular diseases, and immunogenicity of advanced medicinal products. The selection is based on disease incidence and prevalence, and amount of animal procedures conducted. The reviews describe both well-established approaches and the ones under development, collecting *in vitro* and *in silico* techniques, or *ex vivo* methods. Researchers will use the knowledge base to identify models useful to tackle their specific questions. Educators could provide the latest information on the state-of-the-art to their students while funding bodies can consider trends, and target areas for investment. Furthermore, the knowledge base will be of use to Competent Authorities, to support the process of project evaluation.

W2D6.1

THE RELEVANCE OF ANIMAL MODELS AND ALTERNATIVES FOR HUMAN RISK ASSESSMENT FOR PHARMACEUTICALS

R. Mader[1], M. Bobst[1], K. Chen[2], A.M. Giusti[3], S. Kustermann[1], M. Odin[1] and R. Villenave[1]
[1]*F. Hoffmann-La Roche Ltd., Basel, Switzerland*
[2]*Roche R&D Center (China) Ltd., Shanghai, China*
[3]*Roche Glycart AG, Schlieren, Switzerland*

Abstract
The relevance of animal models for human risk assessment cannot be generalized and depends on several factors. Novel therapeutic approaches often lack such models and for appropriate safety evaluation, more human-relevant ways to assess safety are required. Animal studies are often of limited use in these cases, if at all. On the other hand, the predictive value of animal models for human safety is still very good for many drugs in development. Replacing them entirely or only partially in these circumstances is and will be hard to achieve in the foreseeable future. In terms of the application of 3Rs, Roche and other pharma companies are pushing the boundaries to replace, reduce and refine animal studies in the frame of regulatory safety assessments wherever possible. This presentation will provide a review of what would be required from alternative models to fully or partially replace animal studies for human risk assessment, as well as a case example where this can already be achieved today and one that exemplifies the challenges ahead.

W2D6.3

COMPUTATIONAL MODELLING AS A PRACTICAL EXAMPLE OF BRIDGING BETWEEN DISCIPLINES

E. Passini[1] and B. Rodriguez[1]
[1]*Department of Computer Science, University of Oxford, Oxford, United Kingdom*

Abstract
The role of computer modelling and simulations in medicine and biology has been growing over the years, and *in silico* methodologies now constitute a powerful tool to complement experimental and clinical investigations.

Within our group, we develop multiscale models of human cardiac electro-mechanics, from the sub-cellular to the whole-organ level. Our computer models are biophysically-detailed, i.e. they incorporate the state-of-the-art knowledge of the biological processes occurring in human cardiac cells and tissue, and they are constructed and validated using experimental and clinical data. They can also be personalised based on patients' data, thus allowing for patient-specific simulations of the electro-mechanical activity of the heart. We routinely use these models to investigate specific cardiac conditions and find ways to improve diagnosis and therapies for patients.

An example of application is drug safety and efficacy testing, where most of the experiments are still performed using animal

models, and the translation of the results to humans is not always accurate, due to inter-species differences. We can incorporate the effect of selected drugs in the models and identify potential drug-induced risks for the heart, such as arrhythmias. We can also test multiple treatment options, and suggest the drug most suitable to improve a cardiac condition, e.g. heart failure, to be then tested experimentally.

The strength of this research relies on its multidisciplinary nature, and it is a good example of how it is possible to combine very different expertise (engineering, computer science, medicine, biology, pharmacology, etc.) for a common goal.

W2D9

FILMING AND TAKING PICTURES WITH YOUR SMARTPHONE

R. Scrase[1], H. Hobson[1] and B. Williams[1]
[1]*Understanding Animal Research, London, United Kingdom*

Abstract
Good images and new videos that highlight the realities of our research are essential if we are to communicate effectively and transparently with lay audiences. In these days of social media and video communication, real images that tell a story are more important than ever. As communicating online becomes the most efficient way to tell stories, it's important to make your content stand out. With a focus on video content, we will show you how to create and edit videos using your smartphone and how they can fit with your online strategy.

This workshop will provide participants with an overview of the importance of visuals storytelling on social media, as a means of supporting transparency and communication. As well as considering what and how to communicate, it will include practical content on filming short clips with tips and techniques to improve your videos. We will include information about smartphone settings plus free and cheap applications for android and apple phones, as well as suggestions for video editing software for PC and Apple computers.

W3A1.1

DIGITAL HOME-CAGE: CURRENT OPPORTUNITIES AND CHALLENGES

F. Scorrano[1]
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Abstract
Recent advancement in digital cage technology enables a non-invasive and continuous assessment of animal behaviour and activity in their home. This provides an opportunity to discover more relevant digital biomarkers and to evaluate their potential benefit on drug discovery, animal welfare assessment and the 3Rs. At the same time, introducing a new technology in a complex environment, such as the biopharmaceutical industry, comes with challenges and resistance that can slow down the process of implementation. In this lecture, we will present different digital cage platforms available on the market, their advantages and limitations, examples of scientific results achieved, impact on animal wellbeing and recommendations to be considered before the investment and to facilitate the adoption.

W3A1.2

IMPROVED ANIMAL WELFARE AND SCIENTIFIC VALIDITY IN HOME CAGE-BASED AUTOMATED PHENOTYPING OF MICE

O. Stiedl[1]
[1]*Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

Abstract
Several stressors, e.g. cage transfer, handling, novelty and coercion, impact on the performance of mice in classic behavior tests used for behavioral phenotyping. Consequently, these stressors affect the interpretation of results with regard to emotional and cognitive function of mice. These limitations are often combined with short test duration and interpretational ambiguity of used outcome measures. Therefore, a refined passive avoidance system was developed to automatically control fear learning and analyze fear memory in mice. This approach optimally exploits existing knowledge in combination with novel technology.

Several mouse strains, substrains and experimental conditions were tested and substantial performance differences were identified. Overall, the behavior experiments were improved by (1) exploiting experimental conditions in which the experiments come to the animals (and not vice versa), (2) deliberate decision of mice if and when to participate in the experiment, (3) prolonged long test duration, and (4) use of outcome measures without interpretational ambiguity. High arousal impaired contextual fear memory consistent with the concept of the Yerkes-Dodson law. Furthermore, we found increased rather than decreased inter-individual variation in genetically identical mice.

In conclusion, innovative, animal-centered approaches on long time scales with deliberate choice and translational measures serve as important animal welfare refinement. At the same time these approaches improve the quality and translational validity of behavioral phenotyping. We arrived at partly opposing conclusions as compared to studies with classic tests including own previous investigations. Thus, a revision of the 'gold standard(s)' in behavioral neuroscience in necessary.

W3A1.3

IMPROVING BIOMEDICAL RESEARCH BY AUTOMATED MONITORING OF ANIMAL BEHAVIOUR IN THE HOME-CAGE

V. Voikar[1]
[1]*University of Helsinki, Helsinki, Finland*

Abstract
Novel and emerging technologies allow 24/7 collection of behavioral data in undisturbed mice, the most widely used species in biomedical research. These recently developed technologies minimize the impact of unspecific stressors, such as human interaction and testing in novel arenas, which are known to influence data collection and animal welfare. It is now possible to assess a more naturalistic behavioral profile in familiar environment, such as the animals' home-cage. In addition to promoting welfare, it can improve research in a wide spectrum of research fields ranging from psychology and neuroscience to translational psychiatry and neurology and may further provide valuable insights into other types of pathologies and genetic alterations. However, addressing the complex problem of monitoring the full 24-hour behavioral repertoire of a rodent still presents many challenges, with each technology having its strengths and limitations. This presentation is focusing on recent developments in the field of home-cage monitoring of laboratory mice and provides a perspective for future applications, emphasizing communication and collaboration between all stakeholders (COST Action 20135, https://www.cost.eu/actions/CA20135/).

W3C2

THE ART OF RODENT ANESTHESIA 101 – MADE EASY

P. Sharp[1]
[1]*University of California – Merced, Merced, United States*

Abstract
Anesthesia-related procedures in rodent research are from minor, i.e. implantation, injection of cells, imaging, to major, i.e. laparotomy, thoracotomy, orthopedic, procedures. Rodent anesthesia is challenging because of multiple species-specific factors i.e., animals' size, high metabolic rate, different experimental manipulations etc. Because rodent anesthesia is a common procedure, to provide safer anesthesia, anesthetists should be familiar with different anesthetic monitoring techniques and their interpretation. Although gas anesthesia is commonly used and typically encouraged when possible, injectable anesthesia is another option when gas anesthesia cannot be provided. Regardless of using gas or injectable anesthesia, anesthetic monitoring is vital to reducing morbidity and mortality. Because rodent anaesthesia monitoring equipment and techniques can be different from larger animals, understanding the equipment, techniques, and interpreting these parameters are key in making anesthesia safer. This workshop will discuss both gas and injectable anesthesia, monitoring, and offer some troubleshooting complication techniques. This basic and effective anesthesia for rodents workshop is suited for researchers, veterinary technicians, and ethic committee members.

W4B4

CARE-FULL STORIES? INTRODUCING A NEW 'CULTURE OF CARE' TRAINING RESOURCE

B. Greenhough[1], T. Jordi[2] and A. Kerton[3]
[1]*University of Oxford, Oxford, United Kingdom*
[2]*Queen Mary, University of London, London, United Kingdom*
[3]*The Learning Curve (Development) Ltd, Ware, United Kingdom*

Abstract
Description: This workshop will allow participants to try out a new training resource being developed by members of the Animal Research Nexus in collaboration with stakeholders in animal research. The training resource uses a series of fictional prompts (story scripts), which participants read out during the session. The scripts are designed to encourage those involved to see a particular scenario from multiple perspectives. Each script is accompanied by a series of discussion points which are aimed at getting participants to share their own stories, and to use these as a resource for reflecting on their institution's culture of care. Following a short introductory talk (20 minutes), there will then be an opportunity to participate in one of three breakout sessions where we will try-out the resource with workshop participants.

Target Audience: This workshop would be of interest to animal technicians, Named Persons, Unit managers, veterinarians, research scientists and those involved in training animal research staff, as well as anyone with a broader interest in promoting continuing professional development around the 'culture of care'.

Minimum number of participants: 10

Maximum number of participants: 40

Technical requirements: 1 room with presentation facility for introductory talk; 2 additional rooms for breakout sessions and/or a room large enough to allow people to break-out into smaller groups.

Potential conflicts with other sessions: Beth Greenhough is assisting with Interdisciplinary dialogues around animal research and care [SES-FELASA-2022-00121]. We may also be running a session for the technician's day on the 14th June.

W4B7

TECHNICIANS' CARE AND COMPASSION WORKSHOP

B. Williams[1], K. Davies[2] and P. Hawkins[3]
[1]*Understanding Animal Research, London, United Kingdom*
[2]*KD Consulting, Cardiff, United Kingdom*
[3]*RSPCA, Horsham, United Kingdom*

Abstract
This workshop will use the 'Dimensions of Care' model to show the skills and qualities associated with caring, and how they connect with welfare and open communication. It will extend the concept of care-as-welfare, to caring for one another and actively developing and championing the Culture of Care, including the aspects of animal technicians and care staff asserting themselves and expecting the respect to which they are entitled.

Taking a hands-on approach to the emotive side of care, the session will focus on attentiveness and compassion, as key aspects of care-work. We will discuss the support animal technicians and care staff are entitled to expect: that they are 'respected and listened to and their roles and work, supported throughout the establishment' (EC Working Document on AWBs and National Committees). In specific support of 'attentiveness' we will look at how scientists can and should value their contribution to supporting care, and the key role that technicians play in their facilities.

Considering the compassionate-aspect of care, which connects to emotional labour, compassion satisfaction, burnout, and traumatic stress, we will use scenario-based discussions to consider a range of tools and strategies to support caring. Participants will be encouraged to share their experiences and listen to others, thinking about which approaches that will be effective in their own work.

W4C3

COME BREED WITH US! THE INTERACTIVE COLONY MANAGEMENT WORKSHOP FOR VIRTUAL GA MOUSE COLONIES

S. Wells[1] and M. Stewart[1]
[1]*Mary Lyon Centre at MRC Harwell, Oxon, United Kingdom*

Abstract
One of the most important interactions in animal facilities is the ongoing communication needed between colony managers and scientific research groups. Research involving genetically altered colonies does not last a few days but extends into months and years. Experienced colony managers are a source of breeding and welfare knowledge. They are required to identify early warning signs when breeding is not going to plan or there are inconsistencies in the results and numbers. Importantly, colony managers are the controllers of numbers and are tasked with delivering the correct number of animals for experiments.

A key factor in communication between colony managers and researchers is how the facts of the current status of the colony are presented. In this workshop we will focus on correct GA terminology and data-driven assessment of breeding performance, both of which will increase the confidence of those involved in communicating with expectant researchers. This workshop will help participants navigate their way through the highs and lows of managing colonies of genetically altered mice, using defined language recognised in genetic research. Importantly, it will furnish attendees with descriptive terminology and breeding advice to feedback to their scientific colleagues.

From founders, to breeding experimental cohorts, we will challenge the workshop participants to make decisions at each stage and communicate these with their reasoning. This will lead to different outcomes, and therefore new challenges to discuss and overcome. By exploring different paths during round-table discussions with tutors, optimum breeding strategies will be established, and correct terminology embedded in conversations.

W4C6.1

ETPLAS RESOURCES AIMED AT FACILITATING HARMONISATION OF LAS EDUCATION IN EUROPE

A.-D. Degryse[1], J.B. Prins[2] and N. Franco[3]
[1]*ETPLAS, Barcelona, Spain*
[2]*Director of the Biological Research Facility The Francis Crick Institute, London, United Kingdom*
[3]*Institute for Molecular and Cell Biology, Porto, Portugal*

Abstract
In 2018, the European Commission awarded a grant to ETPLAS, the Education and Training Platform for Laboratory Animal Science, to develop Learning outcomes and assessment tools for LAS education and training in line with the EU Education and Training Framework guidance. Five Working Groups (WGs) were created with the respective objectives to develop **guidance** for producing **assessment criteria** of Learning Outcomes (LOs); set-up a **database of assessment criteria** for core modules and Function A specific modules; establish a **question database** for theoretical core and Function A specific modules; establish a **database of assessment of common practical tasks** (DOPS) for Function A persons, and to establish the required **IT infrastructure** on the ETPLAS platform www.etplas.eu where moreover, other e-modules developed under the same grant are hosted. All the deliverables of the Grant, made available through the web-portal www.etplas.eu and its functionalities will be presented.

One of the additional great new development on our website is that the portal now allows for an online searchable DB of courses with filters on various items s.a. Modules, certification or accreditation status, etc.

We do hope that Course Organisers throughout the EU will appreciate this portal and publicise their trainings, and that National Competent Authorities (NCA's) feel free to check the website for certified courses; see and scrutinize these quality courses, and grant approval.

Thus the Grant will have succeeded in providing a supplementary ticket for personnel with Function x to move to other EU-countries by ensuring the use of harmonised Education and Training criteria.

W4C6.2

PUTTING THE "E" INTO "LEARNING": EFFECTIVE, EASY-ACCESS EDUCATION WITH 2010/63/EU FUNCTIONS E-LEARNING MODULES

N. Henrique Franco[1]
[1]*University of Porto, Laboratory Animal Science, Porto, Portugal*

Abstract
The European Commission (EC) has supported several initiatives to harmonize the interpretation and implementation of the 2010/63/EU Directive, such as the development of e-learning modules for education and training (E&T) on Directive 2010/63/EU Functions. These included modules from the E&T Framework

Guidance Document – namely "Design of Procedures and Projects" (EU-10 + 11) and "Project evaluation" (EU-25) – as well as new ones: "Severity assessment framework" (EU-12), "Searching for (existing) non-animal alternatives" (EU-52) and "Developing in vitro methods and approaches for scientific and regulatory use" (EU-60). These e-learning modules are freely available on the Education and Training Platform for Laboratory Animal Science (ETPLAS) website (www.etplas.eu), which in one year after launch reached more than 1200 registered users.

This talk will present an overview of the e-learning modules already available, and new ones being developed by a European consortium of experts designated by the EC from a recent call for tenders (ENV/2021/OP/0011). These will include Core modules such as EU-2, EU-3.1, and EU-5 (the latter two for mouse, rat, zebrafish, and farm animals), along with such others as "Level-2 Ethics, Animal Welfare and the Three Rs" (EU-9), "Designated Veterinarian" (EU-24), "Inspectors" (EU-26), and a new module for "Competence Assessors". These will also be freely available on the ETPLAS website, cover all learning outcomes described in the E&T Framework, and offer a multimedia-rich, interactive learning experience. A reflection group comprising LAS experts, laboratory animal veterinarians, and National Contact Points will evaluate and provide feedback on the new modules, which will be tested in blended-learning LAS courses.

W4C6.3

EDUCATION AND TRAINING TOOLS FOR THE IMPLEMENTATION OF THE DIRECTIVE AND THE THREE RS

S. Louhimies[1] and M. Holloway[2]
[1]*European Commission, Brussels, Belgium*
[2]*European Commission, Ispra, Italy*

Abstract
European Parliament special funding allowed the European Commission to establish a number of projects aimed at improving awareness, uptake and implementation of the Three Rs and non-animal alternatives in the EU. These projects covered a wide range of activities with a specific focus on developing open access educational and training tools and resources for a variety of target audiences ranging from secondary school to early career scientists, from training providers and trainees to competence assessors.

Modern technologies play an increasingly important part in today's educational delivery. The tools developed will use interactive learning techniques, for example those used in some of the open access eModules. These can be accessed through a central user-friendly platform hosted by ETPLAS (Education and Training Platform for Laboratory Animal Science). The same platform will also host specific tools for course and competence assessors. Finally, the participants will be able to explore what virtual reality has to offer when introducing tomorrow's scientists to the *in vitro* world.

W5B1

HOW TO UNDERSTAND AND ASSESS CULTURE OF CARE WITHIN ACADEMIA AND PHARMACEUTICAL SETTINGS

H. Emery[1] and T. Bertelsen[2]
[1]*University of Leicester, Leicester, United Kingdom*
[2]*Novo Nordisk A/S, Maaloev, Denmark*

Abstract
Culture of Care forms part of the regulatory requirements under Animals (Scientific Procedures) Act 1986 (ASPA) and has been under discussion for some time in animal research facilities in the UK. This session will provide an understanding around what could be learnt from health care organisations Culture of Care and the translation into institutional practices. A definitive description of ten institutional practices that influence organisations to be compliant has been identified. The support that Named Persons working under ASPA require from their organisation, identifies how they can demonstrate effective working and the promotion of Culture of Care. A theoretical training framework for all stakeholders supports them to understand their own responsibilities, contributing towards compliance and supporting the organisational vision and mission statement. Introducing two additional 'R's, Responsibility and Respect provides a significant link between the animal and all stakeholders, thus, identifying the organisational behaviour expected. The session will combine academia and pharmaceutical settings and identify a novel survey tool aimed to support a more comprehensive evaluation of the effectiveness of the Culture of Care within an organisation. In conjunction with standard key performance indicators on outcomes in terms of animal welfare and the 3Rs, this approach will include a multilevel and comprehensive view of different subcultures, presenting details on mind-set and behaviour of the staff to support other employees. Feedback on pilot tests in an industry setting will be discussed, to support the importance of addressing the cooperative work culture in terms of how we work together.

W5B2

COMMUNICATE BETTER

P.S. Verhave[1], M.R.E. Janssens[2], A. Petrie[3], R. J. van der Sluis[1], A. Ramkisoening[1], P.L.P. van Loo[2] and I.A.C.W. Tiebosch[2]
[1]*LUMC and Leiden University, Leiden, Netherlands*
[2]*Utrecht University, Utrecht, Netherlands*
[3]*University of Aberdeen, Aberdeen, United Kingdom*

Abstract
We would like to invite you to a session on how to communicate better. The aim of this workshop is to improve the power of your message within your organization. Clear communication is essential for any team to work successfully and efficiently together. Communication comes in many forms: face to face, poster, presentation, movie, photo-board, newsletter, form, policy document, e-mail message, short story, internal announcement, a 3Rs approach or a best practice example. After this workshop your message will be heard.

Dr. Monique Janssens, an expert in communication will provide a short general introduction and Dr. Anja Petrie will share experiences from a named information officer. Then the workshop will quickly move to your need: a piece of better communication to take home.

To design your message, it will be broken up in small pieces. You will determine your audience, your purpose, your key message, the communication channel, and the tone of your message. All together this will result in a piece of work to use directly when you are back at your institute. You will receive personal feedback by a team of experts by experience. You are invited to bring background information for your message and your laptop, although an old-fashioned pen and paper will be available as well. This workshop will be hosted by Dr. ir. Nelleke Verhave.

W5C2.1

IMPROVING RESEARCH REPORTING: WORKSHOP INTRODUCTION AND INSTRUCTIONS

C. Brayton[1], C. Pekow[2] and O. Souilem[3]
[1]*Johns Hopkins University, Baltimore, United States*
[2]*VA Puget Sound Health Care System, Seattle, WA, United States*
[3]*National School of Veterinary Medicine, Sidi Thabet, Tunisia*

Abstract
This workshop will focus on description of animals, relevant husbandry, environmental, and experimental conditions, in methods sections of research publications. The ARRIVE guidelines, ILAR and NIH guidance for reporting will be introduced. Excerpted methods sections of three peer reviewed publications will be presented. Participants will be teamed into groups of 4–6 to read and discuss the excerpted methods sections.

W5C2.2

IMPROVING RESEARCH REPORTING: GROUP WORK

C. Brayton[1], C. Pekow[2] and O. Souilem[3]
[1]*Johns Hopkins University, Baltimore, United States*
[2]*VA Puget Sound Health Care System, Seattle, WA, United States*
[3]*National School of Veterinary Medicine, Sidi Thabet, Tunisia*

Abstract
Teams of ∼4-6 participants will assess (peer review) excerpted animal and procedure portions of one of 3 published methods sections.

- Is the description adequate to understand what was done, and reproduce it?
- Does it align with ARRIVE guidelines regarding description of animals, relevant husbandry and environmental conditions, and experimental procedures?
- List suggestions to improve model selection, and description of animals, relevant environmental and study conditions, OR rewrite the methods section.

W5C2.3

IMPROVING RESEARCH REPORTING: PRESENTATIONS AND CONCLUSIONS

C. Brayton[1], C. Pekow[2] and O. Souilem[3]
[1]*Johns Hopkins University, Baltimore, United States*
[2]*VA Puget Sound Health Care System, Seattle, WA, United States*
[3]*National School of Veterinary Medicine, Sidi Thabet, Tunisia*

Abstract
Each team will present their critiques, suggestions, rewrites, and justifications, for up to 5 minutes per example.

Final conclusions with take home points and resources will be presented.

W5D2

INBRED, OUTBRED AND WELL-BRED

S. Wells[1] and **M. Stewart**[1]
[1]*Mary Lyon Centre at MRC Harwell, Oxon, United Kingdom*

Abstract
In this interactive session, we will take the audience on a journey from the start of mice being used in genetic research, through to the new technologies being used today, and some best practices in how to support genetic research.

The session will be divided into 3 parts:

1. *Introduction to genetic research:* All knowledge needs context, and we hope to capture your interest by describing some of the key experiments and personalities involved in the discovery of DNA and how it codes for the diverse proteins in living organisms. We will then discuss the establishment of the mouse as a model for genetic research, including the generation of inbred and outbred strains.
2. *Genetic Alterations in the mouse*: This session will describe the basic types of genetic alteration, with an emphasis on how to maintain a colony of mice carrying them. This will include demonstrations on planning breeding experiments, welfare assessment, simple Mendelian crosses and the interpretation of genotyping results.
3. *It's all about numbers*: In the final part of the session, we will describe ways to calculate the number of matings required for a given colony or experiment, ways of reducing numbers but maintaining genetic integrity, and an easy method for assessing viability.

Each part will be accompanied by an interactive quiz, questions, and problems to solve!

W5D4.1

PUBLIC (AND FRIENDS AND FAMILY) ENGAGEMENT WITH ANIMAL RESEARCH

A. Williams[1] and **J. Meredith**[1]
[1]*Understanding Animal Research, London, United Kingdom*

Abstract
Need to present your research to public audiences, but worried you won't be able to field questions about your animal work? Maybe you are concerned about talking to your family or friends about working with animals.

When it comes to communicating our research, sometimes those closest to home can be hardest to reach. Using animals in science is a polorising issue which involves complex ethics, and it can be difficult to know how and when to approach the subject with people you know. This interactive workshop will give you the skills and confidence to talk about animal work with non-scientific audiences in both formal and informal settings. It is an introduction to the area, and ideal for those looking for an overview of methods for approaching controversial topics, or who will take part in face-to-face workshops. The session will look at how our views about animal research differ, and the ways they are the same, how to prepare for disagreement and conflict and chances to work on answering the more difficult questions about your work.

W5D5

HOW TO PROMOTE PUBLIC AWARENESS ABOUT ANIMAL RESEARCH USING SOCIAL MEDIA

A. Barros[1], B. Jones[1], G. Petrellis[2] and M. Havermans[3]
[1]*European Animal Research Association, London, United Kingdom*
[2]*University of Liege, Liege, Belgium*
[3]*University Medical Centre Freiburg, Freiburg, Germany*

Abstract
Social media is an essential way to inform, educate and unify audiences in support of the biomedical field through providing accurate and evidence-based information about the importance of the humane use of animals in biomedical research. As popularity social media platforms increases, it is important that institutions take advantage of these in order to keep effectively communicating their animal research with new audiences.

As a pan European advocacy organisation, EARA has 18 Twitter accounts across Europe. These accounts allow EARA to provide information in native languages, and also help us gain a better understanding of the research that is ongoing in that country. During the EARA-led Be Open about Animal Research Day (#BOARD21), over 1000 institutions supported a global social media campaign designed to celebrate openness about animal research, with activity on Twitter, Instagram, YouTube, LinkedIn and Facebook.

EARA will use this workshop to provide an introduction to attendees on how to take advantage of social media to improve openness and transparency about their work. This will be an interactive session where attendees will be encouraged to work on their key messages and learn tips on how to effectively communicate this over different platforms. The workshop will feature talks from two of EARA's Twitter ambassadors; Georgios Petrellis, University of Liege, Belgium and Monique Havermans, University Medical Centre Freiburg, Germany, who will share their experiences of communicating on social media and being part of #BOARD21.

PA01

PAINTING AS A MEANS OF PROMOTING POSITIVE HUMAN-PRIMATE INTERACTIONS

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Abstract
Non-human primates (NHPs) are highly social and intelligent animals and ensuring a psychological and physical well-being in captivity is a high priority. Additional enrichment measures need therefore to be implemented to keep the animals mentally stimulated. However, they tend to lose interest in toys or items such as wooden gnawing blocks over time.

We have in one of our primate facilities implemented a novel enrichment: animals that want to participate are being occasionally offered paint and canvas. While some animals are not interested – or would only participate in exchange for a food reward – some animals willingly come to the front of the cages to engage in the activity.

Are the animals enjoying the painting activity or rather the attention and interaction with their caretakers? Answering this question would require further studies but what we can state clearly is that the animals voluntarily and actively engage in the practice, which is promoting a strong, positive relationship between the caretaker and the nonhuman primates. The activity is monitored to ensure human and animal safety.

These relationships can also promote coping skills and help mitigate stress reactivity. Primates are more likely to sit calmly in the front of their cage when they trust their caretakers. This relaxed response to the presence of humans facilitate daily observations and health checks as well as research procedures. High quality and conscientious animal care is good for the animals, good for the science, and good for public perception of research facilities.

PA02

VALIDATION OF REPRODUCIBILITY AFTER E.COLI NISSLE INFECTION IN INTESTINAL ORGANOIDS

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Abstract
Stem cell-derived organoids have become an alternative in cell culture for studying various scientific issues that were investigated through animal experiments or conventional cell lines. After their initial hype, concerns regarding their standardization have been raised. In this study, we aim to examine some standardization procedures for murine colonic epithelial organoids, which we use as a replacement method for research on inflammatory bowel disease (IBD). We investigated various factors that might challenge the design and outcome of experiments using these organoids: i) we measured the effect of antibiotics/antimycotics; ii) we analyze the impact of technical, interexperimental and biologic replicates and iii) we conducted infection experiments using freshly isolated and cryopreserved/thawed organoids.

For all research questions, the gene expression levels of tight junction markers, proliferation marker, and proinflammatory cytokine were measured. Organoids were infected using the probiotic *Escherichia coli* Nissle 1917.

I) We found no differences between organoids cultivated with and without ZellShield®; II) Interexperimental differences were found to be the greatest challenge for reproducibility and iii) we determined that cryopreservation influenced the experimental outcome during early passages. Formerly cryopreserved colonoids exhibited a premature appearance and a higher proinflammatory response to bacterial stimulation.

Therefore, we recommend analyzing the growth characteristics and reliability of cryopreserved organoids before to their use in experiments together with conducting several independent experiments under standardized conditions. Taken together, our findings demonstrate that organoid culture, if standardized, might further improve our understanding of the role of epithelial cells in IBD development.

PA03

LEARN FROM THE HOARD – FISHENDS/ FISHENDS-DIG REFINEMENT OF ENDPOINTS IN FISH STUDIES

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Abstract
The EU directive 2010/63 explicitly state that death as an endpoint shall be avoided. "Alternative to death" reflects a very narrow definition of humane endpoints and it has been questioned if all earlier endpoints can be really considered "humane". Other therefore propose a broader definition of humane endpoint as a **concept for continuous refinement** of animal studies.

The objective of the FISHends/FISHends-DIG project is to improve humane endpoints and score sheets for fish studies. Selected endpoints should be relevant for the study and should not suffer from being false positive or false negative predictors. Humane endpoints and scoresheets are a part of study design based on current knowledge of pathogenesis, disease mechanism and impact of procedures on animals. Analysis of large datasets by machine learning from earlier studies is another way to gain knowledge about early indicators of expected severity, morbidity, or death.

FISHends/FISHends-DIG have reviewed the Fishwell scale for farm-fish regarding suitability for defining humane endpoints in fish studies. The Fishwell-based software, eMar, was used for standardized welfare assessment. eMar offer researchers customization of electronic score sheets to implement relevant endpoint parameters. To improve fish welfare, the eMar version 1 also included an option for the researchers to implement simple endpoint decision-/handling/action support, on a per parameter basis.

The eMar system allow for recording, storing, reporting, analysis, learning, and improving based on big datasets, and is thereby a powerful tool for refinement of fish studies. The FISHends/ FISHends-DIG group thanks norecopa for economic project support.

PA04

A SUPER ENRICHED CAGE FOR RATS AND STAFF

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Abstract
Background: Standard type 4 cages used to house laboratory rats do not support the need to express species-specific behavior (climbing, rearing, digging, gnawing and exploring) and social interaction can be limited by the small areas of the cages. Rats prefer social interaction and larger groups increases overall physiological welfare, when compared to smaller groups. Using larger cages is often linked to ergonomic challenges as the weight increases and ease of handling decreases. We saw the need to develop and test a caging system with the space for the animals to express species specific behavior while supporting good ergonomic conditions.
Methods: A prototype for a super enriched rat cage with a floor area of 2000 cm^2 equipped with hammocks, tubes, ladders, and other enrichment objects with multiple functions (gnawing, playing and use of three-dimensional space) was tested. The rack contained four cages, and these were interconnectable in pairs of two. The cage bottoms were light weight (1 kg) and the only thing needed to be handled when changing the cages.
Results: The rats were obviously less aggressive, more active, and contact-seeking towards the animal care takers in these cages. Besides this they used a dedicated area as a toilet, easing the cleaning of the cages.
Conclusion: The large interconnectable cages increased the possibility for social interaction between the animals and the results observed was increased contact-seeking behavior towards the animal care takers. Further studies are warranted to collect data on the behavior of the rats in these cages.

PA05

BEHAVIORAL TESTS ASSESSING ANXIETY- AND DEPRESSION-LIKE BEHAVIOR IN MICE AND THE MEMORY EFFECT

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Abstract
Behavioral tests have been routinely in use in neuroscience for decades to evaluate different behaviors in rodents. Standard practice for assessing anxiety- and depression- like behavior recommends single trials to avoid the possibility of habituation to the apparatus, memory effect and loss of outcome data sensitivity. Multiple trials can lead to unwanted familiarization of rodents with the test environment and reduce neophobic responses during testing. In our experiment, we used adult C57BL/6J mice to determine the effect of repetition of the open field test (OFT), the elevated plus maze (EPM) and the forced swim test (FST) on different behavioral measurements. Behavioral tests were repeated every 4 weeks for 3 months under the same conditions. OFT repetitions led to a significantly decreased activity in both males and females. Their moving speed and distance made dropped significantly in the following trials compared to the first trial. In contrary, a significant reduction of floating time and increased swimming time in both sexes were monitored by repeating FST. Interestingly, sex-related differences in repeating EPM have been revealed. Female mice spent significantly less time in open arms in the second trial compared to the first trial. However, the measurements in further trials were similar to the first trial. No effect of EPM repetition on behavioral measurements has been found in males. Repeating behavioral tests led to a decreased exploratory behavior, decreased depression-like behavior, and sex-dependent changes in anxiety-like behavior. OFT, EPM and FST should thus be conducted as single trials to avoid memorization biases.

PA06

SETTING-UP A MULTIMODAL AND INTEGRATED SENSORY PLATFORM TO ANALYZE MOUSE MODELS IN AGING RESEARCH

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Abstract
In the near future, the percentage of elderly populations is expected to increase worldwide, due to augmented life expectancy. In this scenario, Age Related Sensory Decline (ARSD) is supposed to become a large social and economic burden for the health-care system. Therefore, research focused to provide new insights concerning ARSD is mandatory. To date, the laboratory mouse is the most common and predictive model for the study of aging. The ambitious aim of our work is the set-up of an *in-vivo* integrated multimodal platform to unravel the genetics of sensory decay and social interaction. We combine sensory test and behavioural evaluation with clinical, histopathological, and molecular analyses. Specifically, from the functional standpoint we first selected auditory brainstem response and distortion product otoacoustic emission to analyze hearing; optical coherence tomography and electroretinography for sight; odor discrimination for smell; two-bottle preference test for taste; tactile perception threshold and response to thermal stimuli for touch; exposure to physical and social stimuli for social interaction. Then we correlated the resulting dataset to any occurring morphological changes revealed by Micro-CT analysis of the whole brain, along with gene and protein expression analyzed respectively via RT-qPCR and

immunohistochemistry. We aim to provide, for the first time, a full and exhaustive dataset which stems from the contemporary, multimodal analysis of the five senses in two of the most common inbred (C57BL6/N) and outbred (CD1) mouse strains, in both sexes and at different ages. Future refinements of sensory platform may be a real asset for translational studies.

PA07

EVALUATION OF METAMIZOLE AND BUPRENORPHINE AS POST-LAPAROTOMY ANALGESIC AGENTS IN RATS

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Abstract
Metamizole is a non-steroidal anti-inflammatory drug of the pyrozolone family and has anti-spasmodic properties. It is widely used in veterinary medicine to relieve somatic, visceral and post-surgical pain. Its use on laboratory rodents remains controversial. Buprenorphine is an opioid drug widely used in animal research. However, opioids are known to inhibit intestinal transit which represents an adverse effect following visceral surgery. In this study, we aimed to evaluate metamizole and buprenorphine analgesic properties in rats following exploratory laparotomy, alone or in combination.

The study was designed as a double-blinded randomized study following ARRIVE guidelines. Four groups of 12 animals with balanced sex-ratio were treated with buprenorphine only (0.05 mg/kg TID), metamizole low dose (250 mg/kg SID), metamizole high dose (500 mg/kg SID) or a combination of metamizole low dose and buprenorphine. First treatment was done 1h before surgery and continued for 2 days post-surgery. Analgesic properties were evaluated using several parameters: weight, resumption of digestive transit, diet and water consumption, grimace scale, clinical score, nesting score and burrowing activity.

Our results suggest that all treatments provided substantial pain relief. Combination or high dose of metamizole did not prove superior efficiency. The group "Metamizole low dose" was the fastest to recover a functional intestinal transit and to gain weight. Clinical and behavioral scores were similar between groups although only females treated with buprenorphine showed a significantly higher nesting score.

Metamizole (250 mg/kg SID) could represent an alternative to buprenorphine (0.05 mg/kg TID) for treatment of moderate visceral pain following surgery.

PA08

TAIL-BITING BEHAVIOUR IN BALB/C FEMALE MICE: NESTING MATERIAL AND SPACE CONSIDERATIONS

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Abstract
The BALB/cAnNCrl mice are an inbred strain widely used in research. The mice are housed in our open-top cage barrier room in groups of 24 from 3 – 8 weeks old. The cage is a 1292 N with a floor area of 980 cm^2 and height of 12 cm. The care and accommodation of animals conforms to the standards required by the UK (A(SP)A 1986) Code of Practice. Each cage is provided with wood chip bedding, 2 cardboard tunnels, 2 flat-topped shelters and tissue paper. The mice are fed a SDS mouse breeding and maintenance diet, and chlorinated water is provided in a bottle. Tail-biting has been reported as an aggressive behaviour in the female BALB/c mouse. The behaviour has an impact on the health and welfare of the animal and creates animal wastage as moderately affected animals are humanely killed. The behaviour is typically observed from 6 weeks of age, which is also the age associated with the onset of puberty. The presence of tissue paper did not appear to reduce tail-biting, although it seemed to delay the onset of the behaviour. Space considerations may be important: a 25% decrease in the number of animals per cage did not appear to reduce the behaviour but a 50% decrease appeared to reduce the behaviour.

PA09

ASSESSMENT OF WELLBEING AND PAIN IN A *CITROBACTER RODENTIUM* INFECTION MOUSE MODEL

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Abstract
The reviewing of animal welfare in laboratory animal science is essential for prospectively judging the health and condition of animals in experiments. Therefore, several methods had been established in the past. One of these methods is the live mouse grimace scale (lMGS) which was former used to show pain and suffering after e.g. surgical interventions and sepsis. Anyway, it hasn't been evaluated in infection experiments yet.

The aim of this study was the assessment of **physical pain and wellbeing** in mice during *Citrobacter rodentium* (*C. rod.*) infection, which is a model organism used for gastrointestinal pathogen infection. Therefore, weight observation, the lMGS, consisting of orbital tightening, nose bulge, cheek bulge, ear position and whisker change and a clinical score (CS), consisting of different parameters such as behavioral changes, weight, and outer appearance, was observed in female C57BL/6J mice.

C. rod. was applied orally and the mice were sacrificed around 10 days after the infection, to score the severity of inflammation using histopathological assessment, MRI and CFU of *C. rod*.

The mice lost weight after *C. rod.* Infection. We can hardly see any changes in CS, except due to the weight loss, which is an included parameter. The lMGS has not shown any changes after the infection.

We can conclude that the weight observation and additional the CS is a moderate method to score the wellbeing in *C. rod.* Infection.

PA10

DEVELOPMENT OF A CAMELID GRIMACE SCALE TO RECOGNIZE PAIN IN LLAMAS AND ALPACAS

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Abstract
The EU Directive 2010/63 states that all procedures undertaken on laboratory animals are to be classified into categories according to their severity.

It has been demonstrated that changes in facial expression provide a reliable and rapid means of assessing pain and could therefore be used as part of a clinical assessment. Twelve grimace scales for nine species to standardize evaluation of facial expressions have been developed (mice, rats, rabbits, horses, piglets, sheep/lamb, ferrets, cats and donkeys).

As llamas and alpacas are now more frequently used as laboratory animals, and in addition become increasingly popular companion animals, there is a growing need to understand more about their behavior related to their overall well-being.

Llamas and alpacas may endure hardship without the display of feelings and complaints. Like any prey species, they may suppress the exhibition of obvious signs of pain in the presence of possible predators. Well-trained and experienced observers can determine pain in camelids by their body language and behavior.

Based on the existing Facial Action Units (FAU) for other species and our own experience, the following FAU are chosen to set up a 'Grimace Scale' for camelids: flared nostrils, pursed lips, drooping eyelids, laid back ears and elevated tension in facial muscles.

This grimace scale may be a valuable and practical method for rapid evaluation of pain status in camelids to implement humane endpoints or provide analgesia thereby meeting legislation requirements.

Furthermore, it can be implemented in practice by veterinarians and owners as an effective on farm early warning system.

PA11

E-CAGE: INSTRUMENTATION FOR REMOTE MEASUREMENT AND MANAGEMENT OF LABORATORY ANIMAL WELFARE

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Abstract
In Neuroscience, behavioural studies require optimal monitoring of the animals' welfare to avoid any bias due to altered physiological and/or cognitive state. This is especially true when performing learning/memory tasks, which sometimes require restrictions on access to food or water to motivate the animals (Rowland, 2007).

Here, we introduce a cage instrumentation specially developed to continuously monitor and manage water intake, to measure environmental conditions (temperature, hygrometry...), and to visualize live images of the animals. The water consumption of each animal is recorded through the detection of licks on drinking pipettes and the identification of the animals' RFid chips. These data are useful when monitoring animals' well-being (Chapinal et al. 2007) and essential to determine whether animals can withstand a possible restriction. A customized interface allows to set periods of access to water for a progressive restriction. Water consumption and environmental variables are accessible to researchers, regardless of their location, via a secure website interface. Video data streams allow the experimenters to check the general condition and mobility of the animals. In the event of a problem such as abnormal elevation of room temperature, this instrumentation generates automatic alerts. The system is scalable and can be complemented by other sensors/measurements, including weight monitoring or global activity measurement (actimetry).

Without replacing the regulatory requirements and recommendations in force (Mähler et al. 2014), especially the daily presence of experimenters/zootechnicians, remote observations allow the animals well-being to be checked at any time and relevant data to be collected for behavioural studies.

PA12

A CLINICAL CASE OF IMPERFORATE VAGINA IN A CRL:CD1 (ICR) MOUSE

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Abstract
Perineal swelling was observed in a female Crl:CD1(ICR) mouse, 48h after arrival at a new facility. This prompted the investigation into the development and causes of perineal swelling.

The vagina of the mouse is closed at birth. Opening occurs around the age of 24–28 days with the onset of sexual maturity. Dietary phyto-oestrogens may modulate the onset. The most common developmental defect of the vagina is a dorso-ventral septum, a result of the defect of fusion of Müllerian duct, also known as double vagina. The other is imperforate vagina. Both are apparently inherited as a complex recessive trait.

The development of an imperforate vagina is due to the persistence of vaginal septum (failure to dissolve) that leads to marked distention and atony of the vagina, cervix, and uterus causing perineal swelling. Uterine horns become distended, thin walled, and translucent, and contain mucus.

Double vagina is relatively easy to diagnose with careful examination of the distal portions of the vagina, whilst imperforate vagina may remain undiagnosed until the observation of characteristic perineal swelling. This can resemble the appearance of scrotal sacs. The age at the time of submission reported in literature ranged from 27 to 258 days with a mean of 100 days.

PA13

DIETARY MANIPULATIONS CAUSE SEX-DEPENDENT METABOLIC AND BEHAVIOURAL CHANGES IN MICE

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Abstract
A typical western society diet is energy-dense and affects physical and mental health. Obesity, depression, and anxiety are the most prevalent co-occurring global health problems. The link between them seems to be bidirectional. Healthy eating patterns may treat or prevent such medical conditions, yet much remains to be clarified.

In our study, the effect of Western diet (WD) and possible therapeutic effect of restricted-caloric diet (RCD) on metabolism and behaviour of adult C57BL/6J mice of both sexes were investigated. WD and control group of mice were fed with WD and standard diet, respectively, *ad libitum* for 3 months. RCD group was fed with WD for 2 months, followed by 1 week of RCD and 5 weeks of standard diet. The metabolic syndrome parameters were checked monthly and the elevated plus maze, the forced swim test, and the open field test were performed four times, once a month.

WD caused a progressive development of metabolic changes, which were mostly significant in male mice, and reversible by RCD. A progression of anxiety-like behaviour was observed in WD mice, which was successfully reversed by RCD in female mice. No significant diet effect in depressive-like behaviour was found. Interestingly, sex-related differences in locomotion activity have been observed in WD mice; leaner females were more active than obese males.

WD provoked metabolic and behavioural changes that were to some extent reversible by reduced caloric intake. Females were less prone to dietary manipulations, suggesting the beneficial role of oestrogens in the control of energy balance.

PA14

SOCIALIZING THE DIET INDUCED OBESE RAT – NO MORE GRUMPY OLD RATS

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Abstract
The diet induced obese rat is a well-established model. We use male Sprague-Dawley rats and raise them on high fat diet. They were housed for a prolonged time, with human contact at cage change, once or twice per week. With this limited human contact, rats were not interested in interacting with handlers at the time of the study. Basically, we had a lot of "grumpy old rats" in our cages.

We wanted calmer animals to work with, and started out a socializing plan, which is easy and effective.

An important part of the plan is that we are working with the animals. The rats choose to interact with us, and thereby we end up with calm animals.

The plan is very simple and easy, but time must be dedicated to it.

The rats must be handled two or three times per week, the handling is systematic, and the handling is not forced upon the animal:

Lift the rat from the cage in a cupping manner.

Be close to the cage, so the rat can enter the cage if it prefers this over the socializing.

Pet the rat gently, 5–10 times.

Lift the torso of the rat.

Let the rat enter the cage at its own free will and pace.

After two to three weeks, the rats are comfortable around people and express curious and interested behaviour instead of fear and aggression.

The socializing also improves the bonding between the caretaker and the animal and as such gives more job satisfaction.

PA15

MODULATION OF NOCICEPTION BY NORADRENALINE AND SEROTONIN RECEPTOR SYSTEMS IN SPEKE'S HINGE-BACK TORTOISE

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Abstract
Background: Studying nociceptive systems in non-mammalian species is important to understand the development and structure of pain mechanisms. Noradrenergic and serotonergic monoaminergic pathways modulate pain related behavior in most animals studied. Neuroanatomical studies have demonstrated the presence of the pathways in several species of the order testudines. However, there is limited knowledge on nociception in testudines, which poses a challenge for pain management in these animals, particularly in the tortoise.

Objective: The purpose of this study was to evaluate the involvement of noradrenaline and serotonin on nociception in the Speke's hinge-back tortoise.
Methods: Formalin and capsaicin nociceptive tests were used for the study. Noradrenergic and serotonergic agonists (clonidine and yohimbine hydrochloride) as well as their respective selective reuptake inhibitors (nortriptyline and desipramine hydrochloride) were administered thirty minutes before the start of the nociceptive tests. The time spent in nocifensive behavior and associated observable effects during the tests were recorded.
Results: Clonidine and yohimbine hydrochloride inhibited pain-related behavior in the formalin test with no effect on sensorimotor performance of the animals. Nortriptyline and desipramine hydrochloride inhibited pain-related behavior in both formalin and capsaicin tests. Higher doses of the drugs caused excessive salivation and drowsiness in the animals.
Conclusions: Noradrenaline and serotonin are key modulators of nociception in the Speke's hinge-back tortoise. Noradrenaline and serotonin agonists have few side effects compared to selective reuptake inhibitors of the neurotransmitters. Drugs targeting the noradrenergic and serotonergic pathways could present a good option of analgesics for the Speke's hinge-back tortoise.

PA16

A COMPARISON OF WELFARE INDICATORS OF GROUP HOUSED RATS IN SEMI-NATURALISTIC AND STANDARD CAGES.

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Abstract
Most laboratory housing restrict rodents from performing their species-specific behaviors due to the nature of their environments. Space has been reported as the major limiting factor for designing housing systems without considering natural environmental needs of the animals. Such environments compromise the welfare of these animals. We compared the home cage behavior, growth parameters and fecal glucocorticoid metabolite concentrations as welfare indicators of rats group housed in cages enriched with semi natural environments and standard cages. Sprague – Dawley rats (n = 24) were allocated to either semi-naturalistic cages (n = 4 per cage) or standard cages (n = 4 per cage). Home cage behavior, growth parameters and fecal glucocorticoid metabolite concentrations were sampled every week over a six-week observation period. The results revealed that housing of rats in semi natural environments increased levels of indicators of good welfare exploration, movement and feeding behavior, body weights, weight gains and the relative weights of the thymus gland, and decreased levels of indicators of poor welfare such as stationary behavior, fecal glucocorticoid metabolite concentrations and the relative weight of adrenal glands. Thus, enriching rat with semi natural environments appeared to promote their species-specific behavior; changes that can ultimately result in good welfare. These findings add to mounting evidence that standard laboratory cages interfere with important natural behaviors, which is likely to compromise rat welfare, and provides further scientific support for recommendations that current minimum standards be raised.

PA17

BEHAVIORAL MANIFESTATIONS IN RODENT MODELS OF AUTISM SPECTRUM DISORDER: A SYSTEMATIC REVIEW AND META-ANALYSES

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Abstract
One of the crucial tools in studying brain molecular mechanisms and drug discovery is the usage of animal models. Understanding how consistently each behavior can be potentially studied in a given model can help to expand ASD research further. By conducting a systematic review and meta-analysis of the evidence available in the literature, we hope to indicate which rodent models are most widely used or more suited for research in this area, enabling the assertion of models or compilation of models that present specific behavioral manifestations of ASD. In order to collect the most reliable information from original studies, a systematic review was conducted. Pubmed, Scopus, and Web of Science databases were searched. Following the searches, the duplicates were removed, and the records were screened independently by two reviewers. Studies should include one of six genetic models (Ube3a, Pten, Nlgn3, Shank3, Mecp2, and Fmr1) and behavioral testing. Studies are meta-analyzed using the R environment package metafor. After duplicates were removed, 24,983 records remained to be screened. The number of studies included in the qualitative synthesis is 531. Preliminary results show that *Fmr1* is the most widely used genetic model of Autism in rodents with 248 studies. The FMR1 (fragile X mental retardation 1) human gene, which codes for the fragile X mental retardation protein, may play a role in the development of synapses. Summarizing this kind of evidence has many benefits from experimental to ethical perspectives. Keywords: validity, validation, animal-to-human translation.

PA18

THE EFFECT OF CLICKER TRAINING ON THE ACUTE PHYSIOLOGICAL STRESS RESPONSE IN C57BL/6J MICE

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Abstract
The objective of this study is to investigate the effect of clicker training and laboratory procedures on the acute physiological stress response caused by injection stress and short periods of restraint stress in female C57BL/6J mice. Using indices of stress

such as elevated levels of corticosterone and immune parameters. Experimental procedures such as blood sampling, injections, or restraint cause stress to the animals. Acute stress decreases blood leukocyte subpopulations. Even responses within the normal adaptive range could influence experimental outcomes. Previous research determined an impact of gentle handling on the well-being of laboratory mice. Our aim is to develop a clicker training protocol to prepare the animals to laboratory routines to minimize acute stress.

PA19

REPRODUCTIVE AND NUTRITIONAL PARAMETERS IN POLYGENIC MOUSE MODELS OF OBESITY AND LEANNESS

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Abstract
The objective of this study was to examine the effects of diets that differed in fat content in unique polygenic Lean and Fat mice generated by divergent selection on adiposity for over 60 generations differing in body fat by more than five-fold. In comparison with outbred lines and wild mice, most inbred lines have affected reproduction. Our results showed that the reproductive parameters of Fat and Lean mice were even worse. For example, they averaged four pups per litter or less with other reproductive parameters also being at the lower end. In our digestibility experiment, the Lean line showed better utilisation of some nutrients than the Fat line on standard chow diet containing 4% fat. When mice were fed isocaloric purified diets with high fat content (58% kcal as fat, HFD) or low fat (11% kcal as fat LFD) these had no significant impact on protein utilisation in both lines, but the Fat mice accrued significantly more ($p < 0.05$) body mass on HFD as compared to LFD. In contrast, the Lean mice gained similar body mass on both diets. This suggests increased sensitivity of Fat line to HFD-induced obesity and resistance to HFD in the Lean line. Future searching for metabolic and genetic factors underlying these results may at least in part explain the large phenotypic differences between the two lines. This may also help explain how extremes of fatness and leanness can negatively affect reproductive and nutritional traits also in the complex mechanisms of human obesity and leanness.

PA20

USING MICE SOCIAL BEHAVIOUR TO ASSESS PATHOGEN TRANSMISSION DYNAMICS

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Abstract
Despite the importance of animal transmission models in the study of pathogens, only a few studies have addressed direct contact transmitted pathogens. In this study, an experimental housing system has been developed that allows only direct nose-to-nose contact between mice (Patent pending, ES-2883337-A1). We used this invention to study the transmission dynamics of nosocomial bacteria. One central animal was allowed to interact with five other mice during a period of time. It was essential that the mice demonstrated their normal exploratory behaviours and be willing to introduce their noses into the hole to touch the other mice. When the two animals had their noses in the hole, it was considered a contact.

Based on the social behaviour of mice, in the first trial a male mouse (C57Bl6/J, 42–49 days) was selected as the donor and five female mice (C57Bl6/J, 42–49 days) as receptors. The experiment consisted of three transmission periods (TP) of 48h each. Before each TP, the oestrus of the females was synchronized using male urine. The number of contacts was quantified in each TP using video tracking software.

The bacteria were only transmitted in the first TP. In the subsequent TPs, the number of contacts decreased gradually. T The reduction in contacts was caused by the male mouse losing interest in the females with each TP. This highlights the significance of considering an animal's behaviour when designing an experiment. Further studies are necessary, but this invention has already demonstrated its value in transmission models.

PA21

MICE WELFARE ASSESSMENT AFTER HETEROLOGOUS RED BLOOD CELL TRANSFUSION

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Abstract
The effective assessment of laboratory mouse welfare is a fundamental legal and moral requirement as it is critical part of both maintaining and improving the welfare of the most widely used laboratory animal globally. Although many different welfare indicators are routinely used to assess mouse welfare, the validity, reliability, and practicability of many of these measures remains unclear.

Traditional system has been created by combining criteria frequently used to assess pain or discomfort in laboratory.

Materials and methods: Sixty-two healthy male C57BL/6J 8–12 weeks old were assigned in two groups (control and transfused). All mice participated in experiments that involved blood transfusion by intravenous injection in the tail vein, blood sampling via the facial vein was performed one day before, 30 min and

24 h post-infusion. Traditional welfare scoring system based on behavioral, clinical, and procedure-specific criteria was used to evaluate animal welfare and behavioral changes due to stress caused from the experiment. The evaluation occurred in three time-points, the first was the day before the initiation of the experiment and the two remaining 1 hour after the termination of the experimental procedure. The observation occurs from distance, after cage opening and during handling. Each criterion was marked as absent (0), mildly present or doubtful (1) or present (2). All mice received a mark out of 50.
Results: Statistically significant difference was detected in certain behavior resulting in significant increase in the welfare score of the transfused animals.

PA22

HOMECAGE TESTING DEVICE TO EVALUATE COGNITIVE LEARNING IN A GROUP OF RELATED COMMON MARMOSETS.

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Abstract
In the wild, common marmosets generally live in family groups with a breeding pair and their offspring, who will become helpers after their growth. However, this social structure cannot always be preserved in a laboratory environment. One of the objectives of our project is therefore to study the relationship between the social organization of a group and individual performance in a learning task. In this study, the performance of 5 related female marmosets was evaluated. A freely accessible device mounted on the homecage of the animals allowed cognitive tests to be performed without separating individuals from their social group. Each animal was identified by a chip placed on a collar, the detection of which triggered the task with a personalized difficulty level. Three pairs of visual stimuli were presented on a touchscreen in a pseudo-random order. In each pair, the animals had to determine by trial-and-error the rewarded stimulus. Once acquired, the contingency was reversed and the time to acquire the new association was measured. The hierarchical organization of the group was determined based on observations of access to resources (food, resting area, testing device). Daily performance (correct trials, errors, omissions, distribution) was measured for each animal. Without food or water restriction, animals performed an average of 278 trials/day ([0-1192]). We found high heterogeneity in inter-session and inter-individual number of trials, as well as in the performance on the task. Ultimately, this approach will allow us to evaluate the influence of group composition on performance in different cognitive tasks.

PA23

HEALTH MONITORING IN AN AAALAC ACCREDITED ANIMAL FACILITY IN THE SENSE OF THE 3RS

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Abstract
The aim of health monitoring is to detect bacterial, viral and/or parasitic infectious agents. The microbiological quality of experimental animals can critically influence animal welfare and the validity and reproducibility of research data. Until now, this has been done by "sentinel" animals, which are specially kept in the animal room and examined quarterly according to FELASA guidelines. 3 of 4 quarterly examinations were performed by sampling the animals (blood, swabs, faeces) and examined by serology, PCR or ELISA and at the 4th examination after 12 months they were subjected to necropsy with subsequent serological, microbiological, and parasitological examinations. For IVC systems there is the possibility to perform health monitoring examinations via specially developed filter cards (interceptor cards). In the sense of the 3R – reduce, replace, refine the change of the examination method to the Interceptor cards is intended (reduce). The Interceptor cards collect particles that arrive with the exhaust air on the pre-filter of the blower unit of the IVC system and which are subsequently evaluated. Studies have been conducted to determine if the interceptor filter cards will save the use of sentinel animals in the future and thus can be used as an alternative for health monitoring. In the sense of "reduce", the use of sentinel animals could be completely eliminated.

PA24

EFFECTS OF ANTI-INFLAMMATORY DRUGS ON INDUCED CHRONIC INFLAMMATION IN THE NAKED MOLE RAT

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Abstract
Naked mole rats (NMRs) have gained attention of many researchers because of its unique adaptive features that have evolved over time to exploit the adverse subterranean environments where they live. They have a unique nociceptive system unlike that of other mammals, but very little has been reported on their response to chronic inflammation and chronic pain. Evaluation of efficacy of anti-inflammatory drugs to manage Complete Freund's adjuvant (CFA) induced chronic inflammation has been met with little success and this prompted the need for more sensitive parameters. In this study, the effects of dexamethasone and meloxicam on locomotion after induction of chronic inflammation on the right hind limb was investigated. Different doses of dexamethasone and

meloxicam were administered and nocifensive behaviours were evaluated. Mobility, stance and joint rigidity of CFA treated NMRs in comparison to the control group was significantly different. While the injected paw was swollen, the NMRs would still ambulate with it while barely lifted off the ground and there was no significant difference in the time periods through which this was observed. The amount of time spent licking injected limb was significantly different after dexamethasone (1 and 3mg/kg) or meloxicam (5mg/kg) treatment. There was a significant difference in the distance covered between animals with inflammation and the control animals, but no effect was observed between treated and non-treated animals. This study suggests that time spent licking the inflamed limb could be a sensitive parameter in evaluating efficacy of anti-inflammatory drugs on chronic inflammation in the NMR.

PA25

USE OF POST-OPERATIVE NIGHTTIME BEHAVIOUR TO ASSESS THE EFFICACY OF ANALGESIC PROTOCOLS IN RESEARCH MACAQUES

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Abstract
Sleep is essential for good health and surgical recovery, and quantifying behaviour during this period can provide insight into the efficacy of perioperative care. This study aimed to (1) compare night-time behaviour of healthy cynomolgus macaques (*Macaca fascicularis*) in 2 types of housing and (2) assess the occurrence of post-operative breakthrough pain. Study animals consisted of pen-housed macaques ($n = 21$) that were video recorded during the 12h dark period and cage-housed macaques ($n = 43$) that were video recorded before and after surgery for the equivalent duration. One observer blinded to time and animal conducted behavioural analyses of cage-housed macaques (224h) and another observer for pen-housed macaques (77h), both using an established sampling strategy (15min/h) and detailed ethogram. Housing comparison demonstrated that pen-housed primates are more active and perform less social behaviours in the first hour of the night period, but overall, cage-housed primates are more active throughout the night. To compare pre- and post-surgical night-time behaviours a linear mixed model/pairwise comparison was used and demonstrated that the proportion of time spent inactive prior to surgery (0.88 ± 0.07) was higher than after surgery (0.67 ± 0.10) with significant differences during hours 1, 3, 4, 9, and 12 ($p < 0.05$) of the night-time period. The proportion of pain-associated behaviors was higher post-surgery (0.03 ± 0.09) compared to baseline (0.01 ± 0.01) with a significant difference during the last hour of the night-time period ($p < 0.05$). This suggests that sleep behaviour could be a useful tool to evaluate analgesic efficacy following surgery in research primates.

PA26

METABOLIC RATE DURING SIMULATED DISPERSAL IN STRICTLY SUBTERRANEAN RODENT, THE GIANT MOLE-RAT (*FUKOMYS MECHOWII*)

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Abstract
In social species dispersal is very energy demanding period of life. Individual has to cope with higher energy costs while searching for food or new territory. Especially subterranean rodents have to deal with loss of cooperative digging of tunnels and loss of social thermoregulation as a consequence of leaving natal group. Overall 12 *F. mechowii* were involved in laboratory study of simulated dispersal movement in connection to energetic costs for individual living alone. Resting metabolic rate (RMR), digging metabolic rate (DMR) was measured and daily energy expenditure (DEE) using DLW technique was used to calculate energetic costs of individuals living alone in temperature within the thermoneutral zone (TNZ) for this species (30°C) and lower temperature (20°C). Chosen individuals were measured while living in the family and then after at least 4 weeks in separation. Results showed no significant differences in RMR and DMR whereas DEE measured revealed significant increase of metabolism in separated individuals and in lower temperature the increase was even higher. Such results suggests that change of metabolism of individual living alone is not at basal level, digging is also not more demanding but increase of metabolism is mainly result of behavioral response to life in separation and coping with unaided thermoregulation.

PA27

IMPLANTATION OF A RAT VASCULAR ACCESS BUTTONS IN GÖTTINGEN MINIPIGS

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Abstract
Infusion and serial blood sampling are often important technical aspects of an experimental design. There are few superficial vessels in the minipig, and frequent access can be challenging. Although Göttingen Minipigs have a convenient size for handling, restraint and venepuncture can be stressful and can affect blood parameters; catheterization is often the best option. Various methods of catheterization are described, all have their benefits but also limitations. A Rat Vascular Access Button™ (VAB) offers another option for refinement in the sense of the 3R's in a study with intended vascular access. The VAB's are placed percutaneously allowing pain free access to the vascular system for dosing and sampling. The system allows up to four catheters to be connected; this option is useful when both sampling and dosing is required. The aim was to test whether a VAB can be implanted

in Göttingen Minipigs, has useful patency times and allows stress-free blood sampling or dosing.

In the proof-of-concept phase, different catheter types and placements were investigated. Based on these results, the pilot study was conducted using a 2-channel button with both catheters placed in the external jugular vein. The results of the pilot study were very encouraging. By tweaking surgery procedures and post-operative care, initial incidents of infection around, and rejection of the button could be eliminated. So far, we have successfully implanted close to 300 Minipigs with buttons. Together with the manufacturer we also created a version the button that allows implantation in larger Minipigs with thicker skin.

PA28

MULTIMODAL SEVERITY ASSESSMENT IN LABORATORY SHEEP AFTER SURGERY

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Abstract

Large animals, such as sheep, are frequently used in orthopaedic translational research studies. However, methods for adequate severity assessment are rather rare regrading large animal models. Therefore, in the present study, different methods were evaluated to assess the welfare of sheep after surgical interventions.

Telemetric devices were implanted subcutaneously into four German black-headed mutton ewes (4–5 years, 77–115kg) following two weeks of habituation. After four weeks of recovery, the sheep underwent tendon ablation of the left *M. infraspinatus* at the greater tuberosity of the proximal humerus. Besides telemetric measurements (heart rate (HR), HR variability, temperature, activity), video recording for Sheep Grimace Scale (SGS), saliva sampling for cortisol measurement and clinical scoring were performed to assess the postsurgical pain after both surgeries.

Compared to baseline the SGS was significantly elevated after tendon ablation within the first two days post-surgery and only tended to increase directly after transmitter implantation. Furthermore, clinical score, cortisol values and HR were slightly increased whereas activity was decreased in individual sheep after both surgeries, especially within the first 24 hours post-surgery.

In summary, SGS and telemetry-derived data revealed post-operative pain. Therefore, these methods, especially the SGS, have the potential to improve individual pain recognition and post-operative management in sheep, consequently contributing to refinement.

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PB01

WHAT MONITORING OF REHOMED ANIMALS CAN TELL ABOUT THE SHORTCOMINGS OF REGULATORY HOUSING CONDITIONS

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Abstract

Reports are showing the effectiveness, as well as the relevance, of placing animals previously used for scientific purposes, as encouraged by Directive 2010/63/EU. The satisfaction, almost unanimous, of owners of newly adopted animals is supporting this observation.

However, these programmes should not hide a number of essential issues. Despite the tremendous effort made in recent years to make the environment of laboratory animals more complex, most of these animals suffer from deprivation syndromes, to a greater or lesser extent. These pathologies are generally well tolerated by the adopters, who adapt themselves to the particular behaviour of their animals. Nevertheless, this shows animals have still difficulties to deal with new environments, and it highlights the underlying pathologies linked to life in laboratory settings. These observations, confirmed by our experience in long-term clinical follow-ups of adopted animals (mainly dogs, cats, primates but also other species), should make us understand there is potential for improvement in housing conditions, as standards specified in regulatory texts remain set as minimum standards.

Regarding captive wildlife, the enthusiasm for a return to a more natural habitat than enclosures or cages may lead to think that everything is possible with this approach. However, recent examples have shown that animals are sometimes suffering from initiatives which are born from good intentions but are insufficiently prepared and coordinated.

Clinical experiences, especially dogs, primates and captive fauna will be presented.

PB02

COMMUNICATION WITH SCIENTISTS AND TIMED-MATING RODENT MANAGEMENT CAN HELP REDUCE SURPLUS ANIMALS: OUR EXPERIENCE

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Abstract

An accurate conception-timing of rodents is a prerequisite for studies using embryos and newborns. The most frequently used method to establish timed pregnancies is overnight mating, where female(s) are placed to male and the presence of vaginal plugs are monitored in the morning. The method is not reliable and generates surplus animals. Surplus laboratory rodents in animal facilities represent an important ethical dilemma and unnecessary costs.

In 2006, we thus started with a new approach based on females' behaviour and willingness to mate. A single female was introduced to a male (proven breeder) for a few minutes, and their behaviour was carefully observed. Our approach has been found reliable and cost-effective. However, at the same time, we established communication with the scientists. Communication has been accepted as beneficial for both, the scientists, and the facility personnel. The scientists got more information about the animal characteristics and confounding factors, while the personnel got more information from scientists to conduct their tasks more efficiently. In agreement with scientists breeding management based on the pre-ordering of animals was set up in 2016. The timed-mating approach used for the newborn studies and breeding of rats reduced costs and surplus animals. In 2018, we established an online platform with all breeding data to enable scientists' direct insight into the agreed daily updated data and even better communication with personnel. Our experience shows that communication between scientists and personnel can improve daily work and result in the reduction of surplus animals, particularly in a small facility.

PB03

CONSIDERATIONS OF REFINEMENT IN THE SWINE FACILITY OF CERIMED

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Abstract

Refinement is an essential regulatory requirement in animal experimentation in order to respect the needs and welfare of the animals. The enrichment of the environment can represent a significant challenge to implement depending on the species, especially for large animals.

At CERIMED (European Center of Research on Medical Imaging), we have been confronted with the difficulty of finding feasible, reliable solutions adapted to the configuration of the facilities.

We tried different floor coverings (slatted floor, carpet, straw, wood fibers...), the use of various toys (basketballs, bite toys...), hanging ropes, bite chains... After visiting other pig facilities in France to exchange ideas and under the guidance of the veterinary inspector of the DDPP, CERIMED has finally found viable solutions to provide animals with an environment adapted to their needs and welfare.

PB04

THE IMPACT OF MIRRORS IN ENHANCING ANIMAL WELFARE OF SINGLE HOUSED RABBITS

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Abstract

The main goal of environmental enrichment is to improve animal welfare providing sensory and motor stimulation by using equipment and resources that facilitate the expression of specific behaviours and promote psychological welfare. Enrichment impacts animal welfare by encouraging physical exercise, manipulative activities and cognitive challenges based on species-specific behavioral phenotypes.

Social enrichment in species that are naturally gregarious is essential. Wild rabbits spend most of their time in groups as well as in close contact, revealing a complex social activity. Unfortunately, experimental procedures, specific research goals or aggressive behavior could force researchers to house rabbits singly.

It has been extensively reported that single housing can compromise animal welfare encouraging the development of abnormal and stereotypic behaviours also in rabbits.

Mirrors are considered beneficial to the welfare of single housed horses and heifers, but they appear mildly aversive in laboratory mice.

However, the results of interesting studies in rabbits suggested that the use of mirrors could be a successful tool to improve welfare in laboratory rabbit.

We, therefore, investigated the effect of the introduction of a mirror in the cages of pregnant females housed singly. The effects were studied considering an ethogram recorded and analyzed by two different operators to reduce subjective biases.

Our results may be helpful in evaluating the feasibility of mirror use in laboratory facilities particularly for researchers working with rabbits in experimental settings requiring a single housing condition.

PB05

AN ALTERNATIVE DECONTAMINATION PROCEDURE OF SHIPPING CONTAINERS FOR INTRODUCING ANIMALS IN AN ANIMAL FACILITY

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Abstract
Animal facilities should consider a proper procedure for unpacking incoming animals in order to reduce the number of unknown and potentially pathogenic microorganisms or vectors from entering the unit.

Most of animal facility operators spray shipping containers with disinfectants in a designated unpacking room. This practice offers decontamination of the container surfaces considered acceptable. Nevertheless, it potentially exposes animals to chemical substances impairing their welfare and increasing the distress. In addition, being a manual procedure, consistency and repeatability of results is arguable.

We investigated the feasibility of using a multi-purpose and high efficiency low-temperature decontamination chamber providing a decontamination cycle by ultraviolet light (UV) for shipping containers of incoming animals.

We conducted the study selecting randomly some animal transport boxes for different species to be sampled before and after the new proposed and the standard sanitation procedure. The selected boxes were cardboard standard shipping filter crates for animals containing adult rabbits, mice, rats, or guinea pigs of different gender.

The effectiveness of decontamination using a microbiological parameter checked on 5 different boxes was assessed, evaluating colony forming units (CFU) on Rodac plates pre and post disinfection. Our goal was the reduction of the CFU according to a standard acceptance criterion.

Our findings indicate the system to be a reliable decontamination method of transport boxes, stress-free, well accepted by animals and easy to perform by operators.

PB06

THE FRENCH NETWORK OF ANIMAL WELFARE BODIES (RN-SBEA): ACTIONS AND PROJECTS

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Abstract
The French Network of Animal Welfare Bodies (RN-SBEA) has been set up in 2019, following a symposium organized in 2017 by AFSTAL and GIRCOR about ethics and animal welfare in research. This symposium, as well as a survey made at the same time, showed the need to create a national network for Animal Welfare Bodies (AWB).

This network aims to allow the sharing of experiences, references resources and good practices for those who participate. The coordinating body of the network is made up of 6 members, all members of an AWB and coming from different backgrounds.

More than 370 AWBs are already members.

Upon its creation, the network set itself various objectives with the main mission of providing service to AWBs through the development of a toolbox where everyone can choose those that suit them best.

Among actions already made, we could cite a full survey made on needs and expectations of AWBs in France (it also helped the RN-SBEA to prioritize its actions), a shared website with the French Ethics Committee in Animal Research Network, regular Newsletters and practical sheets, organization of 2 annual meetings (online in 2020 and in real in 2021), presentations of the RN-SBEA at various meetings.

The current main project of the RN-SBEA is currently to write and publish a "Guide" that could help AWBs to be effective, especially in regards of the regulatory defined missions. The RN-SBEA would like also to take over the AFSTAL team in charge of AWB workshops.

PB07

ETHICAL CONCERNS OF ANIMAL USE IN RESEARCH – LAWS, RECOMMENDATIONS AND CULTURE OF CARE

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Abstract
The use of animals for scientific purposes is regulated by legislation and guided by recommendations, while caring about their welfare and lifetime experience in the terminology "culture of care" has developed to encompass, in addition to animals, the staff's welfare, establishment structures and scientific quality.

Animal use in biomedical research involves the evaluation of safety and efficacy of potential therapies, which may include drugs, devices or methods, initially in laboratory animals prior to their application in humans, as well as in education and training to acquire knowledge and skills. This use is accompanied by obligations, set in international and/or national laws, which researchers must adhere to and ensure the ethical treatment of the animals throughout their use. Additionally, the extensive development of Laboratory Animal Science has produced a wide range of recommendations for multiple aspects of their use aiming to ensure their ethical use and preserve their welfare, which are continuously updated according to new scientific evidence. Even so, ethical concerns can arise during the project design, application, evaluation, during the on-going study and euthanasia. Indicative examples will be presented as dilemmas to solve, focused on harm/benefit assessment of their welfare and application of the 3Rs.

Laws and scientific recommendations provide the backbone of the ethical use of animals in biomedical research. Conveying a culture of care for their ethical use and commitment to improving their welfare involves caring about each individual animal in every step by all those within an establishment, as well as caring about the staff's welfare.

PB08

ARE SWEETMEATS SUITABLE FOR VOLUNTARY ORAL DRUG ADMINISTRATION IN RATS?

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Abstract
Oral drug administration is very common in *in vivo* protocols. Voluntary intake promotes mice' welfare but is poorly studied in rats. We aimed to evaluate rats' preference for condensed milk (CM) or strawberry jam (SJ), and its suitability as an easily accessible vehicle for voluntary drug intake.

Male Wistar Han rats (already ascribed to another project – REUSE) were randomly allocated to CM ($n=10$) or SJ ($n=10$) group. Each sweetmeat was presented in a syringe (maximum of 5min.) for 4 consecutive days. On day1, rats that did not voluntarily lick the syringe were restrained to taste the sweetmeat. The time to lick the syringe (TLS) and the time to ingest the sweetmeat (TIS) were registered. After, 10/20 rats were randomly ascribed to CM for 3 days and then, metoclopramide or paracetamol were mixed in CM and the TLS and TIS were registered.

At day1, more rats voluntarily ingested CM (9/10) than SJ (4/10). TLS was always lower for CM than SJ. For rats that voluntarily licked the syringe, TIS decreased along the 4 days of training only with CM, although no differences were found between sweetmeats in each day. The presence of metoclopramide or paracetamol did not alter TLS for CM, but TIS was higher for CM+paracetamol than for CM alone.

Rats voluntarily ingest CM better than SJ and CM allows voluntary oral administration of metoclopramide and paracetamol. Future studies will focus on diseased rats.
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PB09

CONTACTLESS MONITORING METHODS IN LARGE ANIMAL SPECIES – A CASE STUDY IN PIGS

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Abstract
Introduction: Severity assessment of animal experiments and their refinement are in the focus also of academic research. Before refinement approaches can be taken, potential stressors, pain, and suffering in the model must be detected, identified, and classified. In order to obtain objective and non-observer-dependent information, measurement activities should not influence animals directly and be easily accessible. This case study aims to investigate special monitoring methods of physiological parameters such as the implantation of telemetry transponders and 24/7 monitoring through near-infrared (NIR)- observation and the analysis of fecal cortisol metabolites (FCMs) as measure of stress.
Methods: Six female German landrace pigs were observed for 7 days. A telemetric device (EMKA easyTEL+L) was surgically implanted in the left femoral artery and ECG electrodes were placed subcutaneous at the lateral chest wall 2 weeks before starting the measurements including: heart rate (HR), mean art. blood pressure (BP) and body core temperature (T). NIR observation was performed 24/7 using Mobotics Camera systems. FCMs were analyzed in a period of up to 48 h after ACTH stimulation to simulate a defined stressor and identify delay times of FCM peaks.
Results: Telemetric analysis showed stable results in HR, BP and T and possibility to analyze physiological data in a contactless manner. NIR observation displayed, breathing activity, body-surface temperature and visualized feces and urine excretion. The results of FCM measurements showed that the occurrence of stressors could be identified. Approximately 24–28 h after exposure to a stressor, the peak increase of FCMs concentrations was detected.

PB10

CONNECTING THE VIRTUAL MOUSE HOUSE TO THE REAL WORLD

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Abstract
"Refinement" in the virtual mouse house leads to a large "Reducement" of animal numbers in the real mouse house.

As the management of a mouse breeding via a digital database leads to a loss in relationship to the living being, a personal training to the single mouse user needs to be established.

Training has to be conducted in the software used, in the basics of mouse breeding and husbandry and in legal conditions and in Mendel's laws. Furthermore, the topic of ethics has to be dealt with in particular.

The ongoing COV-19 pandemic has made it evident that users must be trained directly and continuously in the databases to be able to actively participate in breeding planning and implementation.

Possibilities for reducing the number of animals are rapid genotyping and documentation, keeping a young breeding stock to be able to start further breedings at any time if necessary and more timed matings activities and fewer permanent breeding cages.

Further advantages of these timed matings are the same date of birth of the experimental animals, continuous marking of the animals, easier grouping after weaning and thus increased reproducibility of animal experiments.

Furthermore, it is necessary for the animal house staff to know about the "users' plans". This exchange of knowledge takes place

through project presentations on a small scale. Open points can thus be solved quickly.

In any case, good communication in both directions leads to effective breeding of experimental animals and therefore to a smaller number of produced animals.

PB11

HOW DO LABORATORY ANIMAL RESEARCHERS AND PROFESSIONALS PERCEIVE WELFARE? AN EXPLORATORY STUDY

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Abstract

Koreans have paid greater attention to the ethics of animal experimentation since the amendment of the Animal Protection Act and enactment of the Laboratory Animal Act in 2008. Since then, IACUC has been more common, and the number of laboratory animal professionals such as laboratory animal technician and DKCLAM has been increasing.

To establish ethical guidelines for the use of model animals in research, this researcher investigated 1) the welfare of laboratory animals; 2) the welfare of laboratory animal professionals; and 3) institutional and national support for ethics in animal experimentation. A web-based survey was conducted with researchers experimenting with model animals and professionals working at animal experimental facilities using a 5-point Likert scale.

Most respondents (97.3%) were aware of the 3R principle, and nearly 98 percent of participants who knew the 3Rs made an effort to apply the principle in their experiments. Approximately 86 percent of respondents also answered that they knew about environmental enrichment, corresponding to Refinement of the 3Rs. More than 93 percent of participants responded that they strived to implement environmental enrichment in animal experimentation.

Those who were well aware of the 3Rs perceived a higher sense of work accomplishment and job stress than those who were less aware of the 3Rs. Over three-fourths of participants also responded that they experience compassion fatigue.

Respondents considered human resources to be the most necessary national support to enhance the ethics of animal experimentation, followed by funding and promotion to improve researchers' awareness. Practical implications are discussed.

PB12

ETHICAL MANAGEMENT OF CRISIS

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Abstract

Crises such as the COVID19 pandemic may happen again in the future. To anticipate this scenario, it should be integrated in the Disaster Plan. Recommendations for dealing with the crisis in a specific animal care and use disaster plan should take into consideration all the possible crisis scenarios. Therefore, it is recommended to establish an Animal Welfare Crisis Management (AWCM) Team. The team should include representatives of the Animal Ethics Committee and Animal Welfare Body, the attending veterinarian, the facility manager, and other functions if needed, e. g. study directors (PIs), Medical Doctor, Quality Assurance (SQO). The role of the AWCM team is to balance the disruptive situation, the operational adjustments, project priorities with ethical criteria. The role of the AWCM team is to balance the disruptive situation, the operational adjustments, project priorities with ethical criteria. The multidisciplinary composition of the team under the leadership of the chair of the AEC offers a good place for collegial informed decisions about animal welfare and ethics.

PB13

IMPLEMENTING CUP AND TUNNEL HANDLING IN A (LARGE) PHARMACEUTICAL RODENT FACILITY

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Abstract
The standard way of catching and handling mice has for decades been by grasping the animal by the tail, because this was considered the only effective and safe way of handling mice.

In 2010 the first article on cup and tunnel handling was published (Hurst et al., 2010). This and articles since then demonstrated that catching, lifting and handling mice by either cup or tunnel handling is less stressful and creates more trust for the mice.

Already in 2015, we began to look into tunnel and cup handling, however, without the correct instruction in these methods, we had to put it aside.

In late 2017 a decision was taken at management level, that cup and tunnel handling should be implemented, beginning in 2018.

Emphasis on the following:

- Employees had to change their way of thinking and their way of acting.
- The employees had to be educated in both the theory and the practical aspect of the new methods before the implementation.
- Time had to be dedicated to training and evaluating.
- Tunnels had to be in place in each cage.

With a dedicated plan and intensive follow-up, a full implementation has been reached, as well as a mind-set change amongst the animal caretakers.

Tunnel and cup handling of mice can be applied in any animal facility. However, training of personnel and management endorsement is essential and necessary, and if tunnel handling is desired, tunnels must be provided. Other than this, it is neither costly, more time consuming nor difficult to do.

PB14

NEW METHOD TO CONTROL LABORATORY ANIMAL HEALTH AND CARE

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Abstract
In the research on animal protection carried out by the Department of Laboratory Animal Science and Animal Welfare, my aim was to make assessment of animal abuse and the well-being of animals measurable for those, too, who are non-professionals in this field. I made an online reporting interface to make the procedure of reporting animal abuse and wrong animal husbandry easier. It is essential because judging an animal's well-being requires professional knowledge and practical experience, but there cannot be an expert always on the scene. This is the same in case of the housing conditions of laboratory animals, so we would like to help the workers of animal houses – who don't have specialized qualification on each breed – keep the laboratory animals in the right way, prevent the animals from diseases resulting from inappropriate housing, and support the healthy, stress-free life for them. Furthermore, the use of the list could facilitate daily work, as the workers can easily monitor the animals, and nothing escapes their attention. We would like to achieve this new big idea as my PhD work to make a new method – a check-list – that could raise the living standards of animals; thus it could be a significant step forward to be introduced in daily life. With the help of this list the 3Rs rule can be applied even more successfully and the results of the experiments are expected to improve in direct proportion to the appropriate state of the health of the animals.

PB15

REFINING KETAMINE ANESTHESIA IN C57BL/6 MICE

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Abstract
A generally used protocol for ketamine/xylazine anaesthesia in mice consists of 100mg/kg ketamine and 10 mg/kg xylazine for intraperitoneal (IP) injection. It is our experience that this protocol does not provide satisfactory results as many of the mice needs to be supplemented to achieve surgical anaesthesia. Moreover, IP injections are associated with pain, peritoneal irritation, and the risk of perforation of abdominal organs. Subcutaneous (SC) injection removes the risk of peritoneal irritation and perforation of abdominal organs, as well as lowering levels of pain and stress caused by fixation. This study presents the results of a refined method for ketamine anesthesia in mice. Five male C57Bl/6Rj mice were injected IP with ketamine and xylazine (KX-IP), five males were injected SC (KX-SC) and five males were injected SC with KX and midazolam (KXM-SC). To examine the effect of oxygen on peripheral oxygen saturation and heart rate, a follow-up study was performed, including SC dosing only, using both males and females. The results showed that all animals (five) injected with KXM-SC, two out of five with KX-SC and none with KX-IP achieved surgical anaesthesia within 10 minutes. In the follow-up study, six males and five females (out of eight) with KX-SC and all animals (eight) with KXM-SC achieved surgical anaesthesia within 10 minutes. Moreover, providing oxygen had a positive effect on peripheral oxygen saturation and heart rate. It was concluded that refined anaesthesia with KXM-SC is possible, but that oxygen must be supplied for optimal results.

PB16

COMMUNICATION IN ANIMAL RESEARCH – IMPORTANCE OF PERSONALITY TYPE AND ETHICAL VIEWPOINTS OF ANIMAL EXPERIMENTATION

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Abstract
Trustworthy, reliable, and competent communication is extremely important when working with laboratory animals and performing animal experiments while having expertise in the field. It also depends on personality type and views of people's duties toward animals, and affects the care, safety and welfare of animals and employees in the workplace. Personality is a relatively consistent and unique set of mental, behavioral, and physical characteristics that distinguish individuals from one another. Personality assessment is a well-researched scientific field in which number of theories have been developed to interpret different personality types. The Myers-Briggs Model (MBTI) is the most widely used self-assessment instrument in the world. The aim of this study was to investigate the Myers-Briggs model (MBTI) types and ethics of animal experimentation distribution in students of the Veterinary faculty, University of Ljubljana, in comparison with students of the Faculty of Criminal Justice and Security, University of Maribor. This social study profile is well-studied profile, known as the ombudsmen profile, for which care and safety play an important role in work and is not natural sciences profile. Overall, veterinary students were diverse in their MBTI types and preferences and had hybrid viewpoints regarding animal experimentation. Introversion, Sensing, Thinking and Judging were the predominant preferences, and among the viewpoints, the utilitarian viewpoint was the most prevalent. The results obtained differed in some respects from those of social studies students, who also exhibited similar treats. This study highlights the importance of personality traits for better communication and work in animal research.

PB17

ACUTE ASPIRATION PNEUMONIA IN COMMON MARMOSET (*CALLITHRIX JACCHUS*) WITH MARMOSET DUODENAL DILATION SYNDROME

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Abstract
Marmoset duodenal dilation syndrome (MDDS) was first reported by the Central Institute for Experimental Animals (CIEA), Japan. The main characteristics of this syndrome are as follows: 1. A dilated, fluid- and gas-filled descending duodenum; 2. Clinical signs of repetitive vomiting, chronic bloating, and exhaustion; 3. Two to 10 years of age at onset; 4. No gender difference in prevalence; 5. Unknown exact aetiology; and 6. Poor prognosis. An eight-year-old female common marmoset suffered from weight loss for over a month. To diagnose the cause of weight loss, we anesthetized the marmoset using isoflurane for CBC and blood chemistry analysis. She exhibited tachypnea after anaesthesia. The alveolar and interstitial lung pattern on the entire lung and a dilated, gas-filled stomach and duodenum were observed on plain radiography. We diagnosed MDDS and aspiration pneumonia after post-anaesthesia vomiting secondary to MDDS. This marmoset died with pink frothy sputum two hours after radiography even though oxygen therapy, antibiotics and steroid treatment were applied. A dilated, gas- and fluid-filled stomach and descending duodenum and an adhesion between the duodenum and ascending colon were observed during necropsy. Together with the histopathology results, this marmoset had acute aspiration pneumonia induced by post-anaesthesia vomiting secondary to MDDS. If MDDS is suspected due to clinical symptoms such as weight loss, bloating, or vomiting, careful anaesthesia and management strategy for vomiting will be important to prevent aspiration pneumonia.

PB18

THE KKAY MODEL FOR DIABETIC NEPHROPATHY: CHALLENGES AND SOLUTIONS IN THE ANIMAL HANDLING.

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Abstract
High blood glucose levels causes changes in the kidney vasculature and the glomeruli resulting in serious complications including diabetic nephropathy. Furthermore, people with uncontrolled diabetes are at risk to develop wounds due to impaired sensing and poor wound repair.

TNO Metabolic Health Research developed a KKAy-mouse-based diabetic nephropathy model, to identify interventions to prevent, or inhibit development of these life-threatening effects. Adult KKAy mice develop spontaneous hyperglycemia. This, combined with a unilateral nephrectomy and feeding with a high-fat diet (HFD) with, or without the vasoconstrictor nomega-nitro-L-arginine (LNNA) gives additional development of hyperlipidemia and hypertension.

Initially, the model was hampered by a large dropout of animals due to stress, fighting, scratching, and skin problems. As diabetes is associated with slow wound healing, this resulted in open wounds which was the main reason to apply the humane endpoints. The animal technicians have therefore explored several opportunities to optimize the model. These included optimization in housing, analgesia, wound management, and stress reduction. Furthermore, the novel technique of transdermal GFR monitoring by non-invasive, transdermal measurement of the excretion of sinistrin-FITC was introduced in this research model. These combinations of several, small, improvements resulted in refinement of these experiments such that the occurrence of severe discomfort was limited.

This diabetic nephropathy KKAy model resulted in a GFR decrease of nearly 50% in 20 weeks, representing the disease phase in which most patients have to start with treatment, thus offering the translational potential to identify novel treatments.

PB19

CORRELATION OF HEALTH NOTIFICATIONS, GENETICAL STATUS, TEMPERATURE AND HUMIDITY IN TWO RODENT FACILITIES

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Abstract
In addition to genetic status, environmental factors in laboratory animal facilities such as temperature, relative humidity, noise, microbiological status is important for the health of laboratory animals. Health problems of laboratory animals may lead not only to pain, suffering and distress but also influence the quality of scientific data. In order to collect systematic data allowing researchers to react and resolve animals' health issues, we have developed a real-time notification method for recording clinical observations of individual experimental animals, which caretakers can input into the ELLI record-keeping system, accompanied by a picture or video. A browser-based interface system sends alerts using a three-tier scale (+, 120 hours; ++, 72 hours; +++, 24 hours) by email and/or SMS. We retrospectively collected data regarding health notifications from two rodent facilities from 2019 and 2020. We have also correlated the clinical observations with temperature and relative humidity in animal rooms. The percentage of animal health notifications for rodents was approximately 1.5%, coat and skin conditions (wounds, bites, and scratches) being the most common health issues. Less common health notifications concerned behaviour, procedure-specific indicators, and other abnormalities (weight loss, bleeding and abnormal secretions, eye and teeth malformations). Most health notifications concerned genetically modified (GM) animals indicating that GM status had stronger correlation with health problems than temperature or relative humidity. Our data shows that health notification system incorporated into the record keeping system in an animal facility provides valuable information allowing us to improve animal welfare.

PB20

THIRD PARTY ASSESSMENTS: INTRODUCING A NEW STANDARD TO IMPROVE ANIMAL WELFARE

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Abstract
Understanding the procedures governing animal welfare for research when working with external third parties is critical prior to engagement. Currently, there is no industry-wide accepted external assessment available that address the needs of pharmaceutical companies. The result is numerous individual pre-assessments being conducted, which places a burden on all parties and increases the cost associated with research.

Working with industry partners, including a wide range of top-30 biopharmas and global contract research organizations (CROs), we have developed an independent pre-assessment program specifically designed to meet the needs of the pharmaceutical industry. Our solution reduces the number of assessments that are being conducted, decreasing delays in the drug discovery/development process without compromising compliance standards. It also enables smaller research organisations, who may not be able to implement a pre-assessment program, to improve their due diligence on third parties whilst reducing costs for all involved.

We would like to share more information on this program with you, which is now used by multiple major pharmaceutical companies related to their animal welfare due diligence strategy, to increase awareness and support the continuous improvement of animal welfare standards globally.

PB21

IMPACT OF OPTIMIZED HOUSING AND MODERNIZED ULTRASOUND TECHNIQUES ON FETAL GROWTH CURVES IN MACAQUES

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Abstract
In 1988, fetal growth curves for rhesus (*Macaca mulatta*) and cynomolgus macaques (*Macaca fascicularis*) were established by ultrasound. However, laboratory animal housing standards changed drastically over time. Nowadays, in the Biomedical Primate Research Centre, the macaques are housed in naturalistic groups in large and complex cages comprising both indoor and outdoor enclosures(280m^2). Inhouse data show that the physique of adult macaques is altered over time. Also, the image quality and resolution of ultrasound has improved.

Our hypothesis is that these alterations, both housing and imaging quality, have an impact on the fetal growth curves.

During routine physical examinations a single transabdominal ultrasound of 23 pregnant rhesus (range 4–19y, 6.0–12.4kg) and 11 cynomolgus (range 4–19y, 3.6–5.3kg) macaques was obtained using the Siemens ACUSON Juniper. The gestational sac was measured during the embryonic and early fetal periods while the dimensions of the head were collected throughout the later fetal period to predict the gestational age and possible day of birth.

The average difference between the actual and predicted day of birth was 5.0 days. No differences in prediction were determined between rhesus and cynomolgus macaques (5.3 vs 4.6 days), the sex of the fetus (4.3 vs 2.8 days) or the weight of the mother ($R = 0.04$). However, data revealed a small difference in the mother being multiparous or uniparous (3.3 vs 8.3 days).

These results show that despite the optimized housing and ultrasound techniques, the predictive values established in 1988 are still valid concerning the fetal growth curves in rhesus and cynomolgus macaques.

PB22

INTERZEBTEC: A NOVEL TECHNICAL APPROACH TO THE ENVIRONMENTAL MICROBIOLOGICAL MONITORING OF ZEBRAFISH

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Abstract
The approach to microbiological monitoring of aquatic species used in research has seen in recent years the development of methods that are often complementary to each other and aimed at identifying the classic pathogens of these species and of microorganisms responsible for sub-clinical conditions.

The use of colony animals as pre-filtration sentinels has represented and still represents the logical tool for the identification of species specific pathogens.

To these have been added the so-called environmental investigations, thanks above all, to the introduction of PCR in microbiological screening panels. The collection of the biofilm and debris deposited in different sections of the recirculating aquaculture systems has allowed to highlight a broader microbiological picture that better characterizes the hygienic state of both animals and the equipment in which they are kept.

Microbiological monitoring has seen an increased interest in environmental monitoring versus animal monitoring. This shift in interest is partly due to ethical reasons and to reasons linked to the greater sensitivity of environmental investigation systems through PCR vs sentinels or colony animals.

The characteristics of the unique and newly introduced device reflect precise specifications that can be summarized as follows: ability to make biofilm and debris available to the laboratory for PCR investigations but also standard microbiology in suitable quantities; ease of use; reliability and sensitivity of results.

The technical aspects related to the InterZebTEC and the rationale that led to its realization will be described, as well as a series of results obtained during the development and field test phase.

PB23

ZEBRAFISH SPERM CRYOPRESERVATION: AN ESSENTIAL PRACTICE FOR A CRO SPECIALIZED IN ZEBRAFISH SERVICES

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Abstract
Zebrafish cryopreservation programs have been implemented in a variety of internationally recognized academic institutions in the last decade. The purpose of cryopreservation is to store sperm samples endlessly by slowing the cell's metabolism with ultralow temperatures. Hence, they may remain in a state of suspended cellular metabolism indefinitely and can be thawed as needed. In the case of laboratory animal models such as zebrafish, this leads to numerous advantages in terms of animal colonies management, time and cost savings, and reproducibility of studies. Here, we present an overview of the improvements achieved by a biotech contract research organization like Biobide after the implementation of a cryopreservation program. It is known that there are a number of factors that may affect post-thaw success rates, such as the quality of eggs and the concentration of sperm samples.

We found that previous conditioning of males and females is key to producing at least a 10% fertilization rate. At Biobide, we are currently working to improve this process, focussing especially on the enhancement of spawns, and increasing speed during the procedure allowing us to get a minimum of 20% efficiency with wild-type zebrafish, and a maximum of 42% and 40% with some transgenic and mutant lines respectively.

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PB24

CREATING AN EMOTIONALLY ENGAGED CULTURE TO ADDRESS COMPASSION STRESS AND BUILD RESILIENCY

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Abstract
There is increased recognition of compassion stress and compassion fatigue as occupational hazards affecting the mental health and well-being of those working in biomedical research. People working with research animals can experience normal feelings ranging from sadness, grief, or a sense of loss that they may be unable to articulate. Left unaddressed, caregivers and others working with research animals may become desensitized and numb, impacting their ability to care for the animals. In 2018 we conducted a pre- and post-workshop survey with >700 employees attending an internal multi-day compassion fatigue workshop. Based on the survey results and available literature we developed and implemented a corporate program to raises awareness of compassion fatigue with management and employees, its impact on our work, and positive supports for building resiliency. The program is supported by a network of Resiliency Building Ambassadors (RBAs) across multiple sites and geographies that are trained in empathetic listening for peer support. The RBAs share tools for building resiliency and personal wellness, support adoption and rehoming efforts, strengthen communication between research and animal care personnel during studies, develop tributes to the research animals, and collaborate with other groups on site in wellness programs. The program includes flexibility for sites to ensure culturally appropriate tools and materials are available across sites. There is further training for supervisors, managers, human resources representatives and veterinarians focused on building an emotionally engaged cultures at their facilities.

PB25

UTILITY OF ENVIRONMENTAL ENRICHMENT IN NATURALLY AGED MICE BREEDING

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Abstract
Our facility has kept many naturally aged mice used in gerontology and geriatric research. Social stress (e.g., fighting, barbering, etc.) and chronic stress-related inflammation resulted in an increased risk for age-related diseases. On the other hand, changes in the characteristics of the environment (e.g., enrichment, size of the cage, etc.) have been shown to have a significant effect on animal welfare. In this study, we have evaluated the anti-stress effects of three different types of cage enrichment. Three different types of enrichment: Trapeze, small squares of non-woven fibers (Happi-mat) and cardboard Tunnel (10 male and female mice per enrichment group, C57BL/6NCrSlc (B6N), C57BL/6J (B6J)) were tested. Mice without environmental enrichment were used as a control group. Physiological (body weight and temperature, food/water consumption and survival rates), behavioral (rotarod tests), and biochemical (urinary corticosterone (CORT)) were performed from 3 months-old (MO) to 18 MO every three months.

B6N male Happi-mat and Tunnel body weight were relatively higher than control groups. Rotarod test results showed that motor coordination in enrichment groups was not lowered than control in both strains. The occurrence of hair loss tended to be higher in the experimental groups in both strains, but dermatitis and other skin disorder incidences were lower than in control groups. Results showed that enrichment reduced abnormal behaviors, incidence of skin problems, and stress levels in young mice. The survival rates were higher in enrichment groups than control groups. In the future we will continue to investigate different types and methods of environmental enrichment in mice.

PB26

COMPASSION FATIGUE AND COPING MECHANISMS IN UK AND EU RESEARCH ANIMAL PROFESSIONALS

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Abstract
Research animal professionals (RAP) face several stressors that can lead to compassion fatigue (CF). Despite evidence of CF in RAP, few studies have investigated CF and effective workplace programs in this population. The goal of this study was to better understand CF in RAP in the UK and EU, both in the general population (GP) and within a specific contract research organization (CRO). We surveyed prevalence, personal and work-related factors, coping mechanisms, and work-support programs for CF. Independent χ^2-tests compared personal and work-related factors and feelings of CF. There were 302 participants from the UK and EU, with most participants from France (n = 138) and Germany (n = 54). Over half of the participants (52%) reported experiencing feelings of CF at some time in their career. Work-related factors that contributed to feelings of CF were insufficient staffing, lack of resources, and negative workplace relationships. Talking to someone and engaging in physical activity were top coping mechanisms. There were no major differences between GP and CRO, suggesting similar experiences across institutions. Fewer than 10% of participants indicated that their place of employment had CF support programs and even less indicated that these programs were helpful. Only 16% indicated that they had received resiliency building or self-care training at work. To address issues associated with CF, research animal institutions in the UK and EU should work to develop effective workplace compassion fatigue and resiliency building programs and communicate about program availability

and their importance for supporting mental well-being to their employees.

PB27

VERSATILE E-SCORE SHEET TABLE FOR SEVERITY EVALUATION WITH FREE AND OPEN ACCESS

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Abstract
We show a generic observational score sheet with examples for the follow-up and evaluation of the severity, on electronic spread sheet format adaptable to most kind of experiment and animal species, both individual and in groups.

It is based on the conjunction of previous works from Morton & Griffiths, the FELASA Working Groups for clinical signs and the evaluation of the severity and the BVAAWF/FRAME/RSPCA/UFAW WG for welfare assessment.

It will be open and free available on the Ethics Committee on the Research and Animal Experimentation website of the University of Alcalá in Spanish and English version, where it has been used for several years and it is included also on the SECAL/ University of Alcalá's interactive text-book for training courses.

The main advantage is that the user can adapt the table, deleting or adding lines and columns or adding multiple pages, depending on the circumstances, the individual or the group of animals and the type of experiment.

It is understandable and easy-to-use to novel researchers although should be previously designed and overviewed by experienced people for scoring correctly the expected clinical signs.

It includes several sections as it follows:

- Project and researcher data.
- List of procedures on animals.
- Schedule (day and hour) of procedures on animals. Diary or shorter intervals.
- Comprehensive list of clinical signs.
- On-distance and on-handling observations.
- Specific expected clinical signs for the experiment.
- Automatic sum of clinical signs scoring.
- List of actions to carry out depending on the limits of severity applied.
- Unexpected findings.

PB28

COMMUNICATION IN ANIMAL FACILITIES – ANIMAL WELFARE, TRANSPARENCY, CULTURE OF CARE

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Abstract
"A mouse's house may ruin experiments" was Reardon's headline in Nature in 2016. Has awareness of the roll animal facilities play in the reproducibility crisis increased since then?

Many scientists are insufficiently informed about the processes in animal facilities. Too little interest on the one hand, too little transparency on the other. A significant contribution towards improving the reproducibility crisis can be made by more open communication and by jointly developing quality standards.

We advocate the compilation of a "checklist" through which the quality of animal facilities can be monitored:

Is animal welfare always the focus? Is the facility externally certified? Is the mission statement, quality management, organigram and so on clearly laid out? How good is the personnel key, how qualified are the personnel? Are the animal caretakers, designated veterinarians and animal welfare officers specialists in laboratory animal science? Are they independent and unbiased? How intensive and open is the communication between the animal facility, the scientists, the animal welfare board, the home institution and the authorities?

Are the animals treated responsibly and empathetically? Are all the operational proceedings recorded in SOPs? Are warning systems in place to guarantee an effective and immediate reaction to unforeseen incidents?

How is compliance with the regulations controlled and guaranteed? Is criticism accepted and processed accordingly, is wrongdoing reported and those reporting them effectively protected from reprisal?

The animal facility can only make a positive contribution towards the reproducibility crisis if all involved communicate openly with a common will for continual improvement!

PB29

IMPLEMENTATION OF NON-AVERSIVE HANDLING IN MICE IN AN ABSL3 FACILITY

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Abstract
Hurst & West (2010) showed that handling mice by the tail increases their anxiety and avoidance of the human hand and proposed the use non-aversive handling methods (NAHM) instead. In the past years, we have been working on the implementation of these handling techniques in our centre. For this purpose, we took the following actions: 1) to assess whether the tunnel handling method worked in practice, we replicated the original protocol, adding a pharmacokinetic study; 2) to assess whether it was practical to implement this method in the centre, we first did a test in one room, placing tunnels in all cages and performing cage changes with them; 3) we conducted a theoretical-practical course to facilitate staff learning to use the new methods; 4) we carried out a survey to gather the experiences and opinions of staff involved in handling mice.

We were able to replicate the original protocol and confirmed an increase in voluntary interaction with the hand in mice handled with tunnels compared to those tail-handled; a difference that was significant after the PK study. Workload (time) when carrying out cage changes did not increase with the use of tunnels. We now also use the tunnels for the reception of the mice on arrival to get them used to this handling from the first day. Training in NAHM was positively valued by the staff, who reported using NHAM more than before the training (100%) and also reported an improvement in the responses of mice to handling (60%).

PB30

REFINEMENT OF CO_2 EUTHANASIA IN MICE

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Abstract
The American Veterinary Medical Association recommendation for CO_2 euthanasia in mice is to use a gas flow rate of 30–70% of the chamber volume per minute (AVMA 2020). These recommendations are higher than those in the EU (Hawkins et al 2016). Thus, we carried out a comparative study to evaluate these recommendations and their possible application in our centre.

For this study, mice of different strains used in studies in our centre were euthanised with different flow rates of CO_2 (30, 50 and 70%) and in two different chambers: colour (red vs white), volume (1.6L vs 3.5L) and presence vs absence of a perforated platform placed over the air outlet. During euthanasia we recorded time to recumbency, time to cessation of respiratory movements, and general behaviour.

There was a significant decrease in mean times to recumbency and respiratory arrest using 70% CO_2 flow when compared to 30%. BALB/c mice showed the highest times to recumbency and respiratory arrest and CD1 the lowest; C57BL/6J mice were intermediate.

No significant differences in behaviour were observed with different flows, although in CD1 and BALB/c mice jumping was observed in the white chamber, with an increasing frequency the lower the flow rate. Jumping stopped by adding a perforated platform to the white chamber (16% incidence vs 0%). Thus, the platform may allow a better flow of the CO_2 and a more homogeneous fill of the chamber.

In conclusion, for CO_2 euthanasia in mice we recommend avoiding low flow rates and using a perforated platform.

PB31

ENHANCED PERIOPERATIVE RESPIRATORY MANAGEMENT OF SHEEP UNDERGOING EXPERIMENTAL SURGERY

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Abstract
This study aims to describe the effects of an enhanced perioperative respiratory management of sheep undergoing cranioplasty. Seven sheep were anesthetized with midazolam, buprenorphine, propofol and sevoflurane. After orotracheal intubation sheep were mechanically ventilated in a volume-controlled mode (tidal volume = 10-12 ml/kg). After the stabilization of the anaesthetic plane a vital capacity recruitment manoeuvre (vcRM, 40 cmH_2O for 20 seconds) was performed followed by 5 cmH_2O of PEEP.

Respiratory and cardiovascular functions were continuously monitored during anaesthesia. At the end of surgery sheep were recovered and room-air SpO_2 was monitored at extubation and after 5 (T5), 15 (T15), 30, 45 and 60 (T60) minutes. Postoperative respiratory support (PRS) consisted of high flow nasal cannula (HFNC, FiO_2 of 0.3 at a flow of 2.5 ml/kg/min) and cases unresponsive to HFNC ($SpO_2 < 90\%$ at T15), 5–10 cmH2O of continuous positive airway pressure (CPAP) was administered with a helmet. After, the vcARM, dynamic compliance increased (0.69 ± 0.16 ml/cmH2O/Kg *Vs* 1.13 ± 0.14 ml/cmH2O/Kg; $P = 0.001$) and plateau airway pressure decreased (18.71 ± 1.49 cmH2O *Vs* 16.57 ± 1.2 cmH2O; $P = 0.02$). Pulse-oximetry at T5 revealed a median (IQR) value of 84% (79 – 88.5). PRS determined a significative improvement of SpO2 at T30 (91% (90.5–95) $P = 0.018$), with restoration of normoxemia at T60 (95% (94–96.5), $P = 0.018$). In 2 cases CPAP was required. Intraoperative alveolar recruitment strategy and PRS with HFNC and CPAP are useful to improve oxygenation in sheep undergoing cranioplasty.

PB32

REASSESSMENT OF THE MOUSE ESTROUS CYCLE BY SENSITIVE MEASUREMENTS OF CIRCULATING ESTRADIOL AND PROGESTERONE

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Abstract
Aim: To develop a smart hormone implant, we measured normal estradiol and progesterone levels throughout the mouse oestrous cycle.
Methods: Sixty mice of strains C57BL/6 and BALB/c aged 14 to 17 weeks were monitored by vaginal lavage for 2–3 weeks. Animals were euthanized and organs processed for histology. Vaginal cytology was compared with uterine mass and volume, endometrial depth, and ovarian cycle. Estradiol and progesterone were measured in plasma using mouse-specific and sensitive ELISA kits and liquid chromatography-tandem mass spectrometry (LC-MS/MS), with lower limits of quantification of 10 pg/mL and 5 pg/mL for progesterone and estradiol, respectively.
Results: We found that up to 20% of cytologic smears may be atypical. Estimated uterine volume is a better predictor of cycle stage than mass. Progesterone levels ranged from 0.2–27 ng/ml and correlated well between ELISA and LC-MS/MS. Interestingly, only 50% of the animals showed the expected progesterone peaks in the presumed proestrus phase. Estradiol levels were low (range 5–30 pg/ml), and greater variation was observed between concentrations determined by ELISA and LC-MS/MS.
Conclusions: We speculate that the cycle does not respond equally to the photoperiod in all animals and that progesterone levels may have increased after the onset of the dark phase. Estradiol concentrations fluctuate during the mouse estrous cycle. More sensitive ELISA and LC-MS/MS methods are still needed to accurately determine the estradiol cycle from a mouse-safe amount of blood sample. In addition, other animal models may be more suitable for the development of cyclic release implants.

PB33

NHP REFINEMENT: BEHAVIORAL MANAGEMENT PROGRAMSCOMBINING TRAINING AND DESIGN FOR LABORATORY ANIMALS MENTAL WELL-BEING

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Abstract
In laboratory animal facilities, it is nowadays not only important to protect the physical health of laboratory animals, but also to ensure mental well-being is an important component of the Animal Care and Use Program (ACU).

Behavioral Management (BM) of laboratory animals plays an important role in ACU programs and promotes the "Culture of Care" concept in institutions. The concept of Behavioral Management is based on the detailed knowledge of the behavioral repertoire of each animal (or closely related species) in its natural habitat.

BM combines several refinement categories:

- Animal Training
- Environmental enrichment
- Behavioral monitoring of laboratory animals including their assessment (Behavioral Assessment)
- Group housing (Social Housing)
- Animal housing design (Facility Design)

A combination of the individual categories establishes a holistic concept of refinement, which optimizes animal welfare more effectively and comprehensively than each area applied individually.

This presentation introduces the individual refinement categories of a BM program for non-human primate husbandries in context of the development and innovations of the last years. Small changes in animal husbandry have a big impact on the welfare of the animals.

Examples are used to illustrate the individual interlinked categories and the advantages of a holistic concept for planning BM programs.

PB34

FAMILIARIZING MICE WITH TONOMETRIC INTRAOCULAR PRESSURE MEASUREMENTS

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Abstract
Non-invasive tonometric intraocular pressure (IOP) measurements are used for diagnosing diseases causing ocular hypertension, such as glaucoma. For developing novel treatments against such diseases, rodent preclinical *in vivo* research provides the best tools.

For the IOP measurements, rodents are often either restrained or anaesthetized, neither of which is optimal from the perspective of animal welfare, nor from the validity of the IOP results. Medical anaesthesia increases IOP in rodents. Elevated stress levels increase IOP via increased blood pressure in pigs, humans, and non-human primates, but the connection has not been studied in rodents.

Preliminary data collected on DBA/2J GPNMB+ mice ($n = 30$), measured at 10 different time points, showed that after the fourth time point, there was a clear change in the distribution of the measured IOP values, including reduction in the total range (from 10.5 to 4.3 mmHg), the interquartile range (from 3.6 to 1.8), and the standard deviation (2.7 to 1.1) of the measured IOP values. After the reduction, the values remained constant, suggesting that the acute stress response to a novel situation may increase the IOP in mice in the first measurement time points.

Familiarizing the mice with the tonometric measurement can improe the validity of vIOP results for two reasons: 1. Familiarized mouse will stay in place without periocular skin tension caused by the restraining, making the measurement easier and more reliable. 2. Familiarized mouse will not have an acute stress response to the measurement, and thus the temporary increase of IOP is avoided.

PB35

A CULTURE OF CARE FOR HUMAN WELLBEING: THE IMPORTANCE OF CROSS-POLLINATION ACROSS ANIMAL-RELATED FIELDS

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Abstract
Animal care professionals across different disciplines such as laboratories, shelters, zoos, aquariums, sanctuaries, and farms experience a wide range of occupational stressors (sorrows) as well as satisfactions (joys). Sorrows may include extended workloads, dysfunctional teams, limited time and budgets, grief, loss, and euthanasia; joys may be supporting good animal wellbeing, the connection with the animals, species conservation, connecting to the public, animal, and environmental protection, contributing to other goals such as research and education. While differences between the professions exist, there are also large overlaps grounded in common humanity. The knowledge that we are not alone, that life is all about relationships and connections and that we can find support and strength in each other unites us. The cross-pollination of stories across disciplines and fields, as well learning and contributing different proven strategies and methods is what we can all benefit from, both the animals and the people in these professions. Creating healthy workspaces, attention to psychological wellbeing, benefits of gratitude and mindfulness, addressing bullying and toxicity, and systemic causes of stress and burnout are equally as important as holding space for people to grief, have rituals, and time to feel connected. What all people need most is to feel loved (Baer, 2011), today a deep and true culture of care is about love in the workplace.

PB36

UPPER AIRWAY MANAGEMENT STRATEGIES DURING INJECTABLE ANESTHESIA IN NEW ZEALAND WHITE RABBITS: PRELIMINARY RESULTS

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Abstract
The study objectives were to assess the need of oxygen supplementation and compare 3 upper airway management methods in New Zealand White Rabbits anesthetized for surgical models of bone or cartilage healing. Thirty-eight four-month-old rabbits (3.1–3.9kg) were randomly allocated to received 100% oxygen via a face mask (FM, $n = 12$), a supraglottic device (SD, $n = 13$) or a non-cuffed endotracheal tube (ET, $n = 13$) during subcutaneously delivered anesthesia with medetomidine (0.25mg/kg), buprenorphine (0.05mg/kg) and ketamine (20mg/kg). Arterial blood was sampled for gas analysis after anaesthesia induction on room air, 10 and 20 minutes after airway management and oxygen supplementation implementation and during recovery after medetomidine reversal, extubation and return on room air. Data were tested for normality, analyzed with a Student's t test and an ANOVA for repeated measures. Results are expressed in mean± SD ($p < 0{,}05$). There was no difference between groups on the development of hypoxemia and hypoventilation after anaesthesia induction ($PaO_2 = 45.5 \pm 6.4$, 47.6 ± 7.4, 44.5 ± 7.8 mmHg, $PaCO_2 = 61.0 \pm 4.5$, 58.0 ± 5.4, 61.7 ± 5.3 mmHg for FM, SD and ET, respectively). Oxygenation improved and hypoventilation increased with oxygen supplementation independently of the airway management methods (PaO_2(10 min) $= 310.0 \pm 49.0$, 342.1 ± 58.8, 287.3 ± 48.2 mmHg, $PaCO_2$(10 min) $= 82.0 \pm 15.9$, 75.8 ± 10.4, 79.0 ± 9.0 mmHg for FM, SD and ET, respectively). All variables were stable over time. Oxygenation in recovery on room air was within normal limits. The study confirmed the need for oxygen during anaesthesia. The three airway management methods were found equivalent with regards to oxygenation and hypoventilation.

PB37

THE CHALLENGE OF LONG DURATION ANAESTHESIA FOR ZEBRAFISH LARVAE

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Abstract
The advantages of using zebrafish (*Danio rerio*) larvae in research are undeniable. Its transparency allows researchers to follow organs development, and to use probes that can be tracked by imaging through time. Anaesthesia provides an accurate *in vivo* observation by inducing larvae immobility and reducing stress. However, ensuring immobility and survival of animals during several hours of anaesthesia may be challenging. Thus, this work aimed to study the clinical parameters and stress levels induced by different anaesthetic protocols applied for 15h in zebrafish larvae, measuring cortisol levels, and thigmotaxis behaviour.

Six-day postfertilization AB zebrafish were randomly distributed to ($n = 25$): 80mg/l MS222, 2mg/l etomidate (Eto), 5/50mg/l propofol+lidocaine (P/L), 60/60mg/l MS222+isoflurane (MS222/ISO),

30mg/l clove oil (CO), and control group. Time for anaesthesia induction and recovery and heart rate were measured. 26h after recovery, thigmotaxis was recorded. Cortisol levels were assessed 15min or 3h after the beginning or the end of anaesthesia, respectively (n = 6–8 pools of 6 larvae); a naïve group was added. The latency to induce anaesthesia was similar, but P/L took more time to recover and had lower heart rate than the other groups ($p < 0.0001$), except CO. Eto was the quickest to recover ($p < 0.001$), except compared to MS222/ISO group. Cortisol levels were similar between groups at the 15min time-point, but CO showed higher cortisol at 3h compared with the naïve group ($p = 0.01$). Resuming, P/L and Eto induced the deepest and the lightest anaesthesia, respectively, but only CO interfered with cortisol levels after recovery with no further implications on behaviour.

PB38

POSITIVE IMPACT ON THE LABORATORY MICE WELFARE BY ESTABLISHING A PERMANENT CAGE-CHANGING DAY

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Abstract
Our study confirmed that mice are aware of the day of changing and are prepared for that previously, so if we establish a permanent day at week, we could reduce its negative, stressful effect on the scientific results.

Four groups of 10 cages each of mice were studied: Both males and females of CD1 and C57BL/6 strains, with a similar number of mice per cage. The assays were performed with the same commercial bedding and environmental conditions.

Two cycles of cage changes were studied: once a week and once every two weeks. Cage changes were carried out always on the same day of the week and mice were previously trained to be aware of the cage change period assigned.

The watering bottle, feed, animals and cages were weighted daily to calculate the water and feed consumption and production of excrements (faeces and urine) compared to the day of cage change.

All groups showed a pronounced increase in production of excrements during the 24 hours after cage change, which continued during the second day in some groups of animals. On the other hand, water consumption increased significantly in all groups the previous 24 hours before cage change and in the previous 48 hours in some of them.

Although the cage changes influence the animal welfare and the reproducibility of the experiments, they should be performed. Our conclusion could minimize that effect by establishing a permanent day for changing and even increasing that interval.

PB39

LONG-TERM EFFECTS OF FOUR COMMERCIAL BEDDINGS IN THE LUNGS OF AGED MICE

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Abstract
The study compared the effects of four commercial beddings on the lungs of aged mice as relevant direct environmental factor on animal welfare and no previous long-term exposition studies were found in bibliography. It was authorized by the competent authority (PROEX 219/18).

Sixteen groups of fifteen mice were studied – four groups for each bedding- up to 6, 12, 18 and 24 months. All animals were housed on the same bedding since weaning. Four commercial beddings were used (corncob, cellulose pellets and two of poplar). Mice were euthanized and it was carried out the histopathological study of lungs to identify and quantify eight types of lesions.

Overall, few lesions were found in all animals and few of them were severe. Most of findings were on 6 months aged animals, although the most severe appeared in the 24 months aged group of mice. The most common pathologies were edema, alveolar congestion and pulmonary collapse and, once again, the largest amount appeared in the 6 months aged groups.

Comparing the four bedding materials, corncob and one of the poplars showed the lowest rate of lesions, especially for 12 and 18 months aged groups, followed by the cellulose pellets and finally the other poplar bedding, which showed a similar number of pathologies in the four aged groups.

The study concluded that the four commercial bedding do not causes severe pathologies in the lungs, however 6 months aged animals should be close observed when our investigation is related to respiratory system.

PB40

PROVISION OF ANIMAL FACILITIES TO EXPRESS NATURAL BEHAVIOR.

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Abstract
In 2020, the company invested in a new animal facility to house cattle with a conventional status. Until then, only ABSL3 building existed for this Species while this biocontainment is the most demanding. Whereas not all *in vivo* studies in ruminants require to use high containment facilities. The building of this cattle housing addressed the optimization of animal welfare by:

1. Providing animals with an optimal substrate, natural feed, and suitable enrichment.

2. Housing cattle in a building which enables them to express their natural behavior as much as possible with free access to an outdoor pasture
3. Reducing stress due to acclimatization and matching with the highest standards of Animal Health in livestock
4. Reducing the number of animals used by providing housing areas that allowed animals to be reused.

Since its opening, the building has an occupancy rate close to 100% and the positive effect on animals is noticeable. Especially, the attending to the animals by the caretakers is made easier with animals that are less stressed and thanks to a building specifically designed for this species.

The pasture is currently growing and will be available for animals during spring/summer 2022. Trees will also be planted directly to a size that creates a natural shadow for animals. By then, we 'll be able to evaluate this facility at its full potential.

PB41

THE NEW METHODOLOGY: THE 6 CS IN THE CULTURE OF CARE (COC)

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Abstract
A new methodology based on the concept of the 6 Cs is presented within the framework of an effective CoC. The execution of this method is than a research center, part of the need to be able to guarantee that the CoC is present in the continuous improvement of the care of the welfare of the animals, the emotional well-being of the staff, the scientific quality, and the transparency in the animal experimentation.

The first C, for Commitment, gives visibility to responsibility and transparency in the management of CoC. The second C is for proactive Communication, which must be established at all levels of the center. The Animal Welfare Bodies (AWBs) are responsible for implementing these communication channels. The third C, for Competence, covers the area of training personnel and their abilities in the performance of their duties with the utmost integrity. The fourth C, for Compliance, is associated with all the regulations and recommendations that exist in the field of scientific experimentation, the key to the use, handling, and care of animals. In the fifth C, for Care, we must focus on the emotional well-being of the staff who care for them. The responsibility of care is derived through compassion, affection, and respect. Finally, the sixth C, for Conduct, is the attitude that the personnel who work with animals should be, based on empathy, responsibility, and professionalism.

PB42

STATISTICS VERSUS ANIMAL WELFARE: VALIDATION OF THE EXPERIMENTAL UNIT IN THE FOCUS OF 3R.

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Abstract
To justify animal experiments, all methods require State-of-the-Art techniques. Statistics belong to often 'unloved' methods but reduce subjects by biometrical predictions, statistical analyses, and, surprisingly, by correct identification, i.e. the experimental unit (EU).

Per definition, the EU is the number of subjects that can be treated differently within the experiment. Consequently, a correct implementation of EUs increases animal numbers when 'treatment' applies to housing conditions, because the cage, independent of the number of animals, is the EU. Thus, either ignore sociability and single-house **or** to test one single cage-representative, thereby producing several 'surplus' animals **or** testing all animals of a cage (but using only the mean of the cage) would be a solution.

To analyze these 4 optional conditions (single-housed, 'cage-representative', 'cage mean' or all individual within cage), we analyzed male and female C57BL/6NRj mice concerning animal welfare behavior and physiology, thereby regarding, activity, anxiety, nociception, sensomotorics, exploration and corticosterone. Hierarchy was weekly assessed to correlate behavior with rank.

Several significant, but not striking effects of condition could be observed. Coefficient of Variation was not influenced by condition but dependent on the parameter assessed. Hierarchical ranks were rather stable within the groups and did not correlate with the behavioral phenotype.

Concluding, application of the EU as either 'mean' or 'representative' of the cage does not differ from individual analyses of mice within a cage. Therefore, animals' social needs can be honored over statistical needs resulting in higher animal welfare and more respect for the individual life of a mouse.

PB43

EFFECT GNAWING WOOD ON DISEASE INDUCTION IN A MOUSE MODEL FOR DIET-INDUCED NON-ALCOHOLIC STEATOHEPATITIS

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Abstract
Non-alcoholic steatohepatitis (NASH) is the most prevalent form of chronic liver disease worldwide. Mouse models which rely on diet-induced development of NASH are used in the preclinical drug development phase for novel therapeutics. Gnawing wood sticks

commonly serve as cage enrichment in mouse studies but can potentially affect intestinal uptake and/or result in faecal excretion of dietary components following binding or attachment to wood fibres. In the current study we investigated if gnawing wood cage enrichment could affect the dietary induction of NASH in mice.

APOE*3Leiden.CETP mice, a translational animal model that displays histopathological characteristics of NASH in the context of obesity, insulin resistance and hyperlipidemia were used. To induce NASH, mice were fed a high fat and cholesterol (HFC) diet for 25 weeks (HFC control group) with (n = 15) or without (n = 15) addition of gnawing wood as cage enrichment. The effects on body weight, food intake, plasma parameters and NASH histopathology were assessed.

Addition of gnawing wood led to a similar obese body weight in the mice, nor did it affect food intake. Blood glucose were similar between both groups and in both groups hypercholesterolemia and hypertriglyceridemia were induced by the diet to a similar extent. Liver weights were similar between both groups and histopathological evaluation revealed that macrovesicular steatosis, microvesicular steatosis, hepatic inflammation and hepatic fibrosis were all similarly induced as well.

Addition of gnawing wood did not affect the induction of NASH and fibrosis in HFC fed APOE*3Leiden.CETP mice and can safely be used as cage enrichment.

PB44

HOW TO BREED *MONODELPHIS DOMESTICA*: THE PROTOTYPE LABORATORY MARSUPIAL FOR RESEARCH ON EARLY LIFE-STAGES

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Abstract

The selection of the appropriate species of laboratory animals is among the scientist's major concerns. The grey short-tailed opossum *Monodelphis domestica* is the only marsupial species that has been produced successfully in captivity and provides an interesting model because of the birth of neonatal pups after a short gestation that enables manipulation of young at an immature (embryonic-like) stage of development.

Despite its unique biological features, which make *M. domestica* an ideal model in basic and biomedical research, the reports about its husbandry are limited. The researcher must consider the specificities of the species related to its normal behavior and welfare and must act in accordance with the 3Rs.

Here we present an overview of the colony management practices, health monitoring procedures and reproductive performance of this species. During a 24 years period (1998-today), basic care and welfare, breeding techniques and embryo manipulation were standardized resulting in a stable and long-term colony of animals bred under standard conditions and housed in conventional cages.

The biological features of the colony were analysed in terms of pregnancy duration, number of offspring/mating, percentage of deaths/mating and body-weight and -size of neonatal opossums (P3-P18).

The use of this animal model represents a unique opportunity to achieve and study both embryonic and neonatal developmental stages without a need of invasive/lethal intrauterine surgery of pregnant females (like necessary for other mammalian laboratory animals, such as rodents) in according with the rule of Reduction which minimize the number of animals needed to answer a scientific question.

PC01

STATISTICAL CONSIDERATIONS FOR THE BREEDING OF ZEBRAFISH AND THEIR USE IN EXPERIMENTS

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Abstract

High expectations exist to justify all animal research and it must be guided by the principles of the 3Rs. There are also robust guidelines to follow within reporting (for example, PREPARE and ARRIVE). Statistical considerations are implicit in many aspects of these. Zebrafish are an important model globally with unique qualities that should be understood for optimal data acquisition. This popular and versatile fish requires statistical knowledge for stock management, health screening, to generate robust experimental data and to analyse it appropriately. Scientific validity of experimental results depends on the minimisation of bias in data by choosing and applying methods carefully.

We have been developing statistical reference material for zebrafish researchers and technicians, covering not only sample size and analysis for experiments, but also maintaining healthy stock. There is already a wealth of statistical textbooks out there, but none of these are specific to zebrafish research. There is also a general lack of guidance on how to justify numbers of fish used for breeding and health screens. Whilst relatively few fish used for experimental purposes may be at a life stage where they are protected by law, all of those used for breeding and health screens will be. Therefore, robust probabilistic justification in these areas was considered a valuable addition to our work.

This presentation will give a taste of the topics we have addressed, and the way information and example problems are presented to guide zebrafish experts in areas of statistical application they may be unfamiliar with.

PC02

ADAPTING TRAINING STRUCTURE DURING THE COVID-19 PANDEMIC: THE EXPERIENCE OF FONDAZIONE GUIDO BERNARDINI

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Abstract
The Fondazione Guido Bernardini (FGB) is a non-profit organization, founded in 2009, focused on continuing education and training of professionals involved in the care and use of laboratory animals. FGB provides a wide range of training activities and scientific events, including different face-to-face courses. Three main features characterize the courses: the constant revision and update of the topics; the time dedicated to extensive discussion; the limited number of participants in order to foster the interaction both between the participants and with the speakers.

Over the past two years, the COVID-19 pandemic has seriously affected, and even hampered, many activities, including teaching and training. In this context, new online training programs were developed to keep up the offer of high-quality and safe training. The new programs have the added value to be more affordable from logistic and economic point of view, both for the participants and the speakers. During the last two years, the authors were able to organize, through an online platform, 10 courses on different topics with more than 150 attendees from 30 countries. Very positive comments were received from the participants.

In conclusion, the solutions adopted allowed to keep offering a safe way to continue learning, even during a global pandemic. The use of online education helped FGB to expand, not only its training portfolio, but also its network of international experts. This approach, however, showed some limitations, due to poor social interactions, and represents a tool not to replace but to complement the face-to-face courses.

PC03

BEST PRACTICE IN ANIMAL WELFARE EDUCATION FOR ROCHE APPRENTICES

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Abstract
It is important for us to address animal welfare and practical application of the 3Rs already to our apprentices during their internal apprenticeship training program. For this we designed a dedicated training for the apprentices, where they learn how to handle the laboratory animals in a quiet and stress-free environment. During these courses theoretical classes, as well as hands-on training, are provided to the apprentices to impart the necessary skills and knowledge for conducting animal experiments in a responsible and state-of-the art manner.

The practical courses take place in small groups of apprentices or one-on-one tutoring. Due to the close and intensive supervision, the initial uncertainty of the first contact with the laboratory animals shall be reduced to a minimum.

To further minimize stress and burden, we have incorporated several refinement aspects into the training:

Tunnel handling is preferred whenever possible, to reduce aversion, anxiety, and stress.

Besides, rat tickling is applied to rats. The method increases well-being of the animals and handlers by positive interaction.

For a more comfortable oral application to the animals, we use flexible plastic gavage tubes. By using plastic tubes, traumas are reduced, and the animals are less stressed.

Furthermore, we designed a Statistics-Module where they learn fundamental statistical thinking and a critical mindset to help them to plan experiments that meet essential standards of reproducibility and scientific validity.

PC04

EUROPEAN UNION AND ALGERIA: STATISTICS ON THE USE OF ANIMALS FOR SCIENTIFIC PURPOSES

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Abstract
This study provides an overview of the status of the care and use of animals for scientific purposes in Algeria compared to the European Union (EU) statistics in 2015–2017. Animals used for educational and scientific purposes in Algerian Institutions, were mainly mice, 84% and rats, 14%. The EU statistics shows that the most used species of laboratory animals were mice, 61%, fish, 13%, rats, 12% and birds, 6% that together represented 92% of the total number of animals used. With regard to the most used species of laboratory animals, namely mice and rats, Algeria is similar to the EU. In Algeria, the wild-captured rodents used in research were in particular Sand Rat, Gerbillus and Meriones. They account for 18% of all rodent species in this study which is considerably higher than that reported by EU (1%). Our retrospective study showed that the majority of animals were used for education, with quality control and therapeutic production being the next two large areas where animals were used in Algeria. Indeed, educational purposes accounted for 41% of animals which was much higher than reported for EU states. Basic research was the minor area for which animals were used, with less than 5% compared to 45% in the EU in 2017. The present study demonstrates that animals are commonly used for educational purposes in Algerian institutions. Our findings highlight also the need to establish policies and guidelines regarding the use of animals for educational and scientific purposes in Algeria and perhaps elsewhere in Africa.

PC05

EUROPEAN ACADEMY OF LABORATORY ANIMAL SURGERY (EALAS)

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Abstract
Surgery is an integral part of many animal experiments, and the most refined surgical model and operating method should always be chosen in order to maximise scientific value, reproducibility and to minimise harms to animals. Aseptic technique is essential to success in surgery and all species should be valued equally. Since rodents represent the majority of experimental animals, their needs must be addressed as a priority.

However, for experimental surgeons no consistent training or certification standards are applied throughout Europe. Additionally, there seems to be a clear need to increase communication in order to better promote exchange of knowledge and expertise within the surgical research community, to define standards and to develop guidelines for good surgical practice and training as well as to train experimental surgeons in a standardized and certified manner.

EALAS is a recently founded association of professionals with an interest, experience and expertise in non-clinical surgery. EALAS' aim is to a) promote high standards of surgical and aseptic practice, anaesthesia, peri-operative care, education & training across all species and disciplines, b) foster exchange and build a European network of experimental surgeons, c) assess and certify surgical competence; upholding standards of practice.

EALAS' mission is to contribute to, and draw upon, cross-disciplinary expertise for the betterment of surgical, peri-operative and pedagogical practices in the experimental setting by offering a platform open to all those involved in biomedical research within Europe as well as promoting understanding, expertise and the 3Rs to the surgical research community.

PC06

FULFILL 3R IN PRACTICAL COURSES WITH MICE, AND THE CHERRY ON THE CAKE: 5R

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Abstract
Animal experiments have long been practiced in several cursus (biology, pharmacy, medicine, etc.). Altogether, it concerns hundreds of students and therefore thousands of mice each year. However, teachers are required to decrease the number of animals and whatever the case to fulfil the 3R recommendations. We have designed and experimented a new way of teaching and achieved to reach the pedagogical requirements and to satisfy the 3R.

Students are familiarized with mice manipulation during a single 3h session and thereafter they work on videos and analyze all the same parameters as those collected in real experimentation.

Replacement is ensured by previously videotaped animal behavior that can be analyzed on computers. Reduction has been drastically applied from 500 mice to 60 (88%). Refinement has been reached by focusing on behavior studying, by asking the students to manipulate the mice as often as possible, to visit and check them in the facility, to bring them enrichment objects and varied food. The cherry on the cake is that all students are now all compelled to follow a specific certified training (Felasa A, "Applicateur de procedures") before touching any animal, making them more responsable: 4R is fulfilled. Even better, given that students have taken care of the animals, are more sensitized by animal welfare, they become more prone to adopt them. In any case, animals are replaced in animal sanctuaries with the help of associations, satisfying the 5R.

PC07

3RS IMPORTANCE IN PRACTICAL TEACHING: STUDY OF CARDIORESPIRATORY PHYSIOLOGY WITH A NON-INVASIVE TELEMETRIC JACKET

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Abstract
A 3R approach is essential when thinking of maintaining practical experimental education on laboratory animals at University, especially for integrative physiology teaching.

This work gives an example of this approach with a study aiming at evaluating the implementation of a practical experiment on physiological adaptation to controlled exercise, using a cardiorespiratory connected jacket for small mammals and a treadmill.

Two male Wistar rats (360 gr, 14/16 weeks, reused from a previous study) were accustomed to the jacket and the treadmill. Twelve students from a professional "physiology and pharmacology" bachelor degree were divided in pairs. For two weeks, each pair was daily asked to equip the animals with the jacket and carry out a standardized exercise protocol. They finally answered a questionnaire to assess their experience as experimenter.

Although only two animals were used during the sessions, all the students got the opportunity to equip and study freely moving animals. The telemetric jacket allowed them to record the expected increases of heart and respiratory rate at the different imposed running speeds. In the questionnaires, the severity of the procedure was evaluated to light (average mark of 1.25 ± 0.09(SD)/5 (0-light, 5-severe)) which indicated a very good acceptance and perception by the students.

To conclude, the study of cardiorespiratory physiology using non-invasive monitoring jacket allowed to reduce the number of

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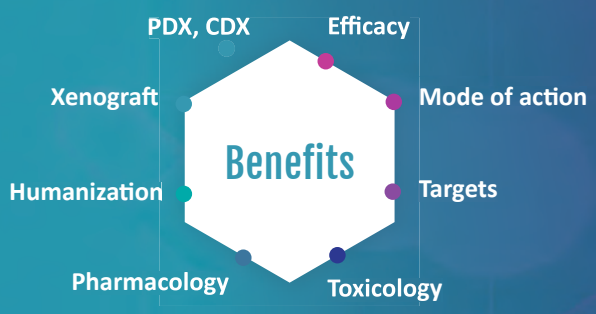

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animals used and refine the practical work procedure. This approach could be replicated on a larger scale (more students) or to study different physiological conditions during university courses.

PC08

REFINING THE IMPLEMENTATION OF SURGICAL PROTOCOLS: BENEFITS OF NON-INVASIVE CARDIORESPIRATORY MONITORING IN RAT

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Abstract
Laboratory animal experimental procedures, including surgical interventions, may induce unwanted and uncontrolled physiological constant alterations. Therefore, these procedures should be evaluated and validated before the beginning of a study to ensure qualitative results and minimize the impact on animal welfare.

In this study, an external monitoring jacket has been used to monitor heart rate (HR) and respiratory rate (RespR) during a procedure involving carotid arteries catheterization in anesthetized (2%/2.5% isoflurane) male Wistar rats (10 weeks, 355 gr). The procedure induced variations of HR and RespR were compared between five animals submitted to the initial protocol (Group1) and five animals that underwent the refined protocol (Group2).

The stimulation of the vagus nerve during surgery induced an average increase of +12% in HR and +20% in RespR in Group1. Given that observation, the initial protocol was amended with atropine injection (250 μL/kg, IM), ergonomic improvement of the experimental setup and an increase of inter-gesture recovery times. The manipulator also used the monitoring to adjust its surgical gestures in real time. The operated changes allowed to attenuate these effects of -83% for HR and -63% for RespR in Group2.

The use of non-invasive monitoring induced little overhead of the study while being helpful to fine-tune the protocol before to move to a larger experimental group. This illustrates how such real time non-invasive cardiorespiratory function monitoring may be an opportunity to easily improve the follow-up of small laboratory animals during surgery and to validate the experimental gestures before starting the actual protocol.

PC09

HANDLING OF MTB-INFECTED MICE IN BSL3 MOLECULAR IMAGING LABORATORY FOR IN VIVO PET/CT IMAGING

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Abstract
A PET/CT for imaging tuberculosis-infected mice has been implemented recently in our BSL3 molecular imaging laboratory. PET/CT imaging could serially monitor response to tuberculosis treatments using non-invasive biomarkers, accelerating anti-TB drug development, and facilitating progression to clinical studies. Being a non-invasive technique, it allows the whole study to be carried out on the same mouse without the need to sacrifice it, reducing the number of animals. The most widely used radiotracer to see the distribution towards tuberculous lesions is ^{18}FDG.

^{18}FDG is administered in mice by experienced staff through the venous route inside the Class III biosafety cabinet since the mice are infected with *M. tuberculosis*. These mice are allocated in a cage placed in a leaded container to facilitate the distribution of the tracer. Subsequently, the mouse is sedated with isoflurane and then placed on the stretcher-receptacle inside a methacrylate cylinder. This device keeps the body temperature of the mouse in optimal conditions. The sedated mouse is transferred to the PET-CT equipment, proceeding to the capture of the images in approximately 30 minutes. After imaging acquisition, the mouse is returned to the biosafety cabinet inside the leaded until its radioactivity decays.

PET/CT imaging of mice infected with tuberculosis is a non-invasive technique that requires an extra effort to handle the mice under BSL3 conditions and to maintain the welfare of the mice during the imaging process. PET/CT allows us to apply two of the 3Rs principles: Reduction and Refinement.

PC10

THE ROMANIAN STUDENT PERCEPTION ABOUT ANIMAL EXPERIMENTATION

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Abstract
Since the experimentation on animals is a sensitive subject throughout the world, we have been interested in the young people's perception concerning the use of animals in experimentation, especially considering the fact that such surveys have not been made in Romania so far. The survey was addressed to pupils in the last high school classes, with various educational profiles, and to young students, generally from the biomedical faculties.

The purpose of the survey is to find out the projection in future of the general trend on perception, knowledge, and attitude regarding experimentation on animals. Thus, we were able to find out what the level of knowledge was and what the sources of information were, when it comes to the use of animals in experimentation, but above all, the current and future perception or attitude concerning animal experimentation. Young people/pupils in high schools are less interested in the subject and less informed than students from universities, and their general attitude is to disagree with experimentation on animals. On the other hand, we have noticed the increasing in receptivity among young students from universities, where, the acquired information from the curriculum raises the level of knowledge concerning the role of experimentation and more than that, it increases the tolerance regarding the use of animals in experimentation. The results of our survey are generally similar to the others in the European Union countries and show a general tendency to reject the experimentation on animals.

PC11

EVALUATION OF A NEW TELEMETRY JACKET SYSTEM FOR RATS

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Abstract
Non-invasive telemetry systems are currently being developed and given their potential to refine pharmacological studies, we sought to test such a system (telemetry jackets) in our experimental set up.

Two studies were conducted. First, the activity levels, heart and respiratory rates were recorded across one nyctemera to establish how well physiological variations are detected. Secondly, the same parameters were recorded over 48hrs in rats surgically implanted with a classic transmitter. On recording days, the rats were treated with saline or 5 mg/kg of metoprolol to see how practical the jackets are in a standard pharmacology study context and how their performance compares with that of a standard surgically implanted transmitter.

The jackets detect significant variations in activity levels, heart and respiratory rates across the nyctemera, with values increasing during the dark phase (ANOVA analyses; Heart rate: $F = 22.33$, $p < 0.001$; Respiratory rate: $F = 8.77$, $p = 0.0033$; Activity levels: $F = 10.44$, $p = 0.0015$). Within 15 min of metoprolol injection, the heart rate decreases by approximately 80 beats per minute, and remains lower than in saline-injected rats for approximately 1.5 hrs (Mixed-effect analysis: Time x Treatment $F(46, 190) = 2.379$, $p < 0.0001$). In metoprolol-injected animals, the Pearson r correlation coefficient between the heart rates measured with the jackets and the implants is of 0.907.

Taken together, these results suggest the jackets 1) detect physiological variations in activity levels, heart, and respiratory rates 2) are compatible with standard experimental procedures and 3) perform similarly as implanted transmitters for heart rate detection.

PC12

ASSESSMENT OF RESEARCHER'S PRACTICAL SKILLS IN LABORATORY ANIMAL SCIENCES COURSES

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Abstract
The implementation of practical assessment strategies in laboratory animal science education during and after formal training has gained increased attention with the adoption of Directive 2010/63/EU and is a challenge for the LAS community. Training is one of the contexts in which it is relevant to assess practical skills.

LAS training courses are usually intense with demanding programs on different topics, combining classroom lectures and practical sessions with living animals. Later practical sessions in the program often build on earlier sessions, and the development of safe and correct animal handling technique is determinant for successful learning of procedures. The organization and delivery of training also needs to account for participants' different background and experience in laboratory animal handling: while for some the practical session represents the first contact, others are already familiarized.

Starting in 2020, in our FELASA-accredited course (Functions A, B, D) we have implemented an assessment strategy to evaluate handling proficiency during training, in order to promote a directed and oriented practical training and reduce the number of trainees per session. For this purpose, we use our own Global Rating Scales[1].

We will present our strategy used and explore its practical impact as viewed by both teachers and students. The aim is to discuss the benefits of assessment during training and which formats would be adequate in the context in order to promote learning and acquisition of handling skills.

PC13

IMPORTANCE OF LABORATORY ANIMAL SCIENCE TRAINING IN AN EDUCATION INSTITUTION

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Abstract
Laboratory Animal Science is a multidisciplinary approach that is still unknown to many students and researchers. Thus, courses and training programs on Laboratory Animal Science are essential for animal welfare, quality of research data, and teaching or testing programs for animals used in research and education. Therefore, our work aimed to prepare researchers for the appropriate use of animals in scientific experiments and to promote Laboratory Animal Science at the university. To this end, a course on ethics, proper housing, animal care, and biosecurity was conducted. Then, students had to present weekly seminars on species-specific management and yarning circle in order to deepen their knowledge of laboratory animal science. The species discussed in the seminars were lagomorphs, dogs, reptiles, and non-human primates. The results were trained researchers to use of animals in research project and education. In addition, a scientific paper and an e-book about animal care was developed by the students during training. In conclusion, the training course in animal care and ethics must be mandatory for all animal users at university and research centers because it is a valuable means of educating and raising awareness regarding animal welfare. In addition, the current survey emphasized that trained researcher may be responsible to spread information about animal care and standardization of scientific results as well the respect to the animals.

PC14

ITS TIME TO BUILD AN EDUCATION DATABASE FOR LABORATORY ANIMAL SCIENCE PROFESSIONALS AND PARAPROFESSIONALS

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Abstract
Competent and knowledgeable animal care staff are critical to quality research and implementation of the 3Rs. High standards of education and training of LASM personnel are essential in ensuring quality reproducible science. In addition to veterinarians, facility managers, animal technicians, veterinary technicians, and other paraprofessionals are arguably crucial for maintaining animal welfare standards. Creating educated and skilled professionals, promoting the professions' public identity, and developing opportunities and curricula to prepare students for these roles is a critical need. Developing a database of education and training opportunities is a step towards understanding what is available, where gaps exist, and how to access them. Data was collected utilising publicly available information from professional organisations. Additionally, education institutions with specific programs in LASM or veterinary technology were identified. Finally, the inclusion of LASM in the curricula was evaluated utilising data obtained from websites or available accreditation reports.

This research identified educational opportunities for veterinarians, veterinary technologists, and other LASM professionals. However, significant gaps in opportunities are present in many areas of the world, including Australia and New Zealand. The development and maintenance of education resources are essential to developing a professional pool proficient in relevant skills to ensure quality science and animal care worldwide. This data is available for the development of a database of LASM education. Further needs include recommendations for harmonisation, curricula development, and improvement in training standards to support outcomes for animals and science in essential biotechnology, biomedical, and agricultural research.

PC15

ARE AUSTRALIAN VETERINARY STUDENTS PREPARED TO WORK IN LABORATORY ANIMAL SCIENCE AND MEDICINE

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Abstract
Adequate numbers of work-ready veterinarians entering the workforce are needed to support animal welfare, the 3Rs and research in Australia. However, the Australian veterinary curricula do not include laboratory animal science and medicine (LASM). Understanding students' knowledge and intentions towards LASM is a first step to determining the curricula needs. We aimed to explore first and final year veterinary students' awareness and confidence in LASM and their views on animal use in society. A survey interrogated students' awareness, confidence, intent to pursue LASM, and opinions on animal use in society. Exploratory Factor Analysis was used to validate the survey. Data were not normally distributed. Therefore Mann-Whitney U test was used to compare groups. Results indicated that both first and final year veterinary students lacked awareness and confidence in their ability to apply their knowledge in LASM. Neither group expressed intent to pursue careers in LASM. However, both groups viewed animal use in production and pet keeping positively, had neutral views on animal use in research and were less accepting of animals in sport. Further, there were no significant differences in any factor between the groups. This research suggests that veterinary students acquire little knowledge of LASM under the current Australian veterinary curricula. Furthermore, the lack of awareness and confidence in LASM implies they are not day one ready in LASM at graduation. Further research is required to understand the education and training pathways needed to support the development.

PC16

THE 3RS DATABASE PROGRAMME: HUMANE ENDPOINTS WEBSITE AND THE INTERSPECIES DATABASE

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Abstract
The availability of databases with specific 3R information may save time within the process of compliance to the 3Rs implementation, as required according to Directive 2010/63/EU.

The 3Rs-Centre at Utrecht University has initiated the 3Rs Database Programme, which aims to provide up to date 3Rs information free of charge, thereby contributing to the implementation of the 3Rs in research. Among others, the programme currently offers the Interspecies Database and the Humane Endpoints website.

The **Interspecies Database** (*www.interspeciesinfo.com*) provides insight into physiological, anatomical, and biochemical parameters of different animal species and humans. With the database, researchers can design their experiments smarter with respect to the choice of an animal model. This could lead to a reduction in the number of experimental animals.

The **Humane Endpoints website** (*www.humane-endpoints.info*) provides information and training modules on how to recognize and apply humane endpoints in laboratory animals. This helps to prevent unnecessary pain and distress in the animals. Therefore, the website contributes to refinement. The website provides training modules, and an extensive e-learning module that are successfully used in several laboratory animal sciences courses worldwide. The website is available in the Dutch, English, French, Germain, Spanish, and Chinese language.

To guarantee a sustainable future for these websites and increase their usage, the 3Rs Database Programme is inviting partners who are willing to cooperate and support its activities.

For more information, visit *www.uu.nl/en/3Rsdatabases* or contact 3RsCentreULS@uu.nl.

PC17

SETTING UP VIRTUAL PRACTICAL WORKSHOPS IN REGULATORY EDUCATION/TRAINING COURSES FOR LABORATORY ANIMAL USERS

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Abstract
According to the European Directive 2010/63/EU, the virtual practical workshops are recommended and are a way to reduce the number of living animals. In order to apply the 3Rs principles for animals used for scientific purposes, we developed an approach to replace and refine ongoing training on mammals and birds with the objective "Never the first time on the animal". New virtual workshops have been introduced for education and training courses for personnel using animal for scientific purposes.

As part of these education and training courses, we have designed and evaluated six virtual practical workshops for each species-specific module.

Learning objectives were to apprehend basic technical gestures on inert models (without using live animals), to reproduce technical gestures with the most reproducible support possible and to be released from stress in the absence of animals.

The training program proposes four species-specific modules: rodent-rabbit, carnivore-pig, pig-bird and ruminant-equine.

Each module includes a 1.5 hour hands-on session. It consists of six virtual workshops of 10 minutes, in groups of three trainees and one supervisor.

This is a preliminary step before using live animals.

A satisfaction questionnaire was provided by the trainees on five criteria: the duration (time for each workshop), the means made available (hands-out, documents, videos, material, mannequin), content (practical quality), pedagogy of the and the right to their expectations.

Considering the results of feedback survey from trainees, we have modified some components to achieve our learning objectives and to better fit to trainees requests.

PC18

FEEDBACK FROM THE REHABILITATION OF TRAINING ANIMALS USED IN ONIRIS

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Abstract
A questionnaire containing 28 questions was submitted online to rabbits' owners in 2019 and 2020. The survey was distributed electronically to 37 owners of 38. A total of 37 returns were registered at the end of the survey.

Among the 37 adopters, women are in the majority with 84%. This result can be explained in part by the strong feminization of veterinary students over the past several years.

About the conditions of accommodation, the animals are either inside a dwelling 42% or outdoors 35% or mixed 23% when the dwelling allows as well as the weather conditions. After a time of acclimatization to his new home or on sunny days or during the holidays, access to the outdoors or even to an exclusive outdoor habitat 44% is possible.

The pet owners also spontaneously described to us the type of accommodation with the park 31% used preferentially in apartment, then the hutch 33% installed outside the dwelling, the cage 27% used in apartment and the shelter 6% used outside. The enclosure is also built for 12 rabbits that live outdoors. Other results will be presented during the meeting.

The process of rehabilitation of laboratory animals in Oniris Veterinary College has led to the adoption of nearly fifty rabbits over four years. These laboratory animals have become "new pets." The feedback has allowed us to ensure animal welfare, socialization, adaptation with their human environment and with other species of animals responding to their gregarious instincts.

PC19

'HOW WE'VE ALWAYS DONE IT': FACING DIFFICULTIES IN VIRTUAL LEARNING

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Abstract
Since March 2016, University College London Zebrafish Facility has offered the legally required modular course for using zebrafish. This was successful, with positive feedback, high summative assessment performance (SAP, i.e. exams), and business

growth. However, going into a once-in-a-generation pandemic, delivering training 'how we've always done it' was not possible. During lockdown, face-to-face training had to be quickly moulded into a virtual course. The transition was difficult, and it was detrimental to learners' performance, seen in the decline of SAP. During 2020, only 59.26% of learners passed the exam in the first instance, whilst in 2019, 85% passed. This indicates that face-to-face formats lead to better SAP and understanding of the material. This alarming change required a re-examination on virtual communication methods. First, the exam questions were evaluated using an item difficulty index; this determined that the virtual exams were an acceptable difficulty level. Thus, the delivery needed reformatting. This was achieved through improving formative assessments, including increased self-led study materials, more group-based activities, interactive coursebooks, and earlier access. These changes were implemented slowly over 2021, in which the SAP rose to 75.76%. As the course enters 2022, further changes will include thorough diagnostic assessments and more ipsative assessments. Covid has forced people to think more horizontally and change 'how we've always done it'. It is clear that communication is not static but dynamic. Just as we strive to constantly improve the use of research animals, we must apply that same ambition to how we communicate in training.

PC20

DEVELOPMENT AND DOMESTICATON OF AN INTERNAL LINEAGE OF BLACK RATS FOR LABORATORIES STUDIES

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Abstract
Wild rodent populations are carriers of zoonotic pathogens and cause economic losses. It is therefore essential to control their populations. This management involves sanitary, architectural measures and chemical control.

Although it can also cause damage, the black rat (Rattus rattus) has been little studied. Its management is done as that of brown rat, while its biology is little known, and its behavior and food preferences are different from those of brown rats. This lack of knowledge is essentially due to the fact that there are currently no laboratory lines of black rats.

Here we report the creation, adaptation to animal facility conditions, and socialization of a line of black rats from our colony maintained for many years in outdoor terrariums in a semi-wild state. As soon as they were introduced in quarantine, a gradual habituation to humans was achieved, but animals were at this stage difficult to handle due to their behavior and agility.

The most docile animals were selected as founder of the internal lineage and were crossed with each other. From the third generation, the animals showed behavior adapted to laboratory conditions and were easy to handle, while minimizing their stress. They were curious and were no longer afraid of the manipulator. During the establishment of this lineage, parameters relating to reproduction were monitored. While further studies will be needed to continue to refine their housing conditions, this lineage may already be useful for future research.

PC21

POSTER FOR GUIDANCE ON ASEPTIC TECHNIQUE DURING RODENT SURGERY

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Abstract
Surgery is an integral part of many experimental rodent studies. Minimal invasive and aseptic surgical technique are prerequisites to achieve surgical success and best possible animal welfare outcomes. Good surgical practice cannot only improve the animal's post-operative recovery, but also the outcome and validity of a study. However, it is challenging to implement the diverse aspects of good surgical practice. Additionally, further considerations must be taken into account such as batch surgeries, the use of genetically modified or immunocompromised animals, the specific (micro)surgical equipment and instruments due to the animals' small size, as well as an often limited number of surgical assistants.

It is generally accepted that aseptic technique used during surgery minimizes the contamination with microorganisms and thus prevents postoperative wound infection. Although it is known that rodents can develop (subclinical) wound infections and septicemia (as they are used as infection models), there seems to be a lack of implementation of good surgical practice during experimental rodent surgery – possibly due to a lack of adequate training of researchers performing rodent surgery. Therefore, we started to create posters for our surgical area, presenting the key principles of good surgical practice and aseptic technique as a step-by-step picture story, visualizing the necessary steps with keyword explanations. The poster shown at the FELASA 2022 meeting is displaying the preparation of the surgeon (washing, gowning, gloving), the surgical site and the handling of instruments and other consumables before, during and after surgery – more are planned to follow, covering other topics.

PC22

SYSTEMATIC REVIEW ON GUIDELINES FOR GOOD SURGICAL PRACTICE IN EXPERIMENTAL RODENT SURGERY

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Abstract
Surgery is an integral part of many experimental animal studies in rodents. Optimal care, state-of-the-art protocols and minimally invasive and aseptic surgical technique are prerequisites to achieve surgical success and best possible animal welfare

outcomes. Good surgical practice can not only improve the animal's post-operative recovery, but also improve the robustness of a study's outcome. However, there seems to be a lack of implementation of good surgical practice during experimental rodent surgery. The aim of this systematic review is to identify, critically evaluate and compare the currently recommended guidelines for good surgical practice in experimental rodent surgery. PubMed, Embase and Web of Science were searched to identify guidelines published in peer-reviewed journals. To identify grey literature and unpublished guidelines, we performed a Google search for published guidelines and searched laboratory animal sciences books for relevant book chapters. Based on the extracted data, a descriptive synthesis of the bibliographical details, guideline development and endorsement, and the prevalence of (themes of) individual recommendations was performed, including subgroup analysis of the guidance per continent/per country and differences between peer reviewed versus non-peer reviewed guidance.

The results of this study shall be used for future efforts on developing best practice standards and implementing them into training offers for experimental rodent surgery.

PC23

SURVEY ON CURRENT TRAINING PRACTICES OF RODENT SURGEONS

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Abstract
Surgery is an integral part of many experimental studies in rodents. Optimal care, state-of-the-art protocols and minimally invasive and aseptic surgical techniques are prerequisites to achieve surgical success as well as best possible animal welfare. Good surgical practice cannot only improve the animal's post-operative recovery, but also the outcome of a study and the validity of its results. However, no standards are clearly defined for the training of rodent surgeons.

As stated in the EU directive 2010/63/EU the welfare of experimental animals is highly dependent on the quality and professional competence of the personnel supervising and performing the procedures. Staff should be adequately educated, trained, and additionally be supervised until they have obtained and demonstrated the requisite competence. Veterinary as well as human surgeons undergo a continuous, systematic training for several years with examination before becoming certified surgeons. For experimental- and rodent surgery specifically, there is no list of competencies or a certification procedure available in Europe.

We evaluated the current training practice by conducting online surveys sent out in March and September 2020, either via our extended network or through related organizations and information portals. The survey's 31 questions aimed to gather detailed information about demographics, workplace, working habits in surgical procedures but also the participant's perception and opinion on selected topics. The results indicate that further efforts must be made on developing easily comprehensible and accessible best practice standards while also implementing them into physical training offerings for experimental rodent surgeons.

PC24

INNOVATIVE ANIMAL-FREE TRAINING TO STEREOTAXIC NEUROSURGERY

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[6]*Ecole de Chirurgie de Lyon, Lyon, France*

Abstract
Stereotaxic neurosurgery is used in a wide variety of studies to explore brain circuits and functions. However, to date this demanding technique is not taught as a subject per se, but rather passed on behind closed doors in laboratories, resulting in various practices and success rates. Therefore, there is a need to harmonize practices and enhance neuroscientists' abilities to explore the brain in a valuable and reproducible way.

Here we introduce animal-free training on stereotaxic neurosurgery that complies with the 3Rs principle. Trainees first complete an online course on basic surgical concepts such as aseptic techniques, anaesthesia and pain management, per-operative animal care, incisions and sutures (Vogt et al, 2011) and then follow theoretically and practice modules with a teacher/trainee ratio of 1:3.

The course covers the theoretical background of stereotaxic surgery and focuses on techniques and surgical approaches to optimize spatial precision, while minimizing the risks of irreversible harm to the animal. The essentials of anatomy and functional organization of the brain are reminded, and the course emphasizes hands-on exercises to acquire ease and precision in the manipulation of stereotaxic instruments and surgical implantations. Instead of animals, realistic high-resolution simulation devices are used for practice and immediate evaluation of a complete procedure and are made available for trainees to maintain their skills once back to their laboratory.

Really designed with the 3Rs' principle in mind, this course should contribute to promote more reproducible and compassionate approaches in animal research in Neuroscience.

PC25

EDUCATION IN THE LABORATORY ANIMAL SCIENCE IN ONCOLOGY; EXPERIENCE IN CENTER OF MOLECULAR IMMUNOLOGY

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Abstract
Over the past three decades, the increasing understanding of cancer has fuelled the generation of diverse biomodels and the handling and manipulation is more specialized. However, the undergraduate programs have deficiencies in the Animal Science. Based in the preclinical evaluation for more than twenty years, the CIM has established the algorithm to guarantee the

training of researchers through of Tour of the animal facility, mini or extensive courses, practical classes, and seminaries. This paper provides an overview of how we assure the education of the students, collaborators, researchers, and technicians in the Laboratory Animal Science in Oncology.

PC26

TOWARD THE DEVELOPMENT OF A 3D SIMULATOR FOR TRAINING THE MOUSE *IN UTERO* ELECTROPORATION

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Abstract
The *in utero* electroporation (IUE) requires high-level training in the microinjection through the mouse uterine wall and into the specific areas in the embryo's brain. Currently, IUE training is performed in live mice, given that there are no artificial models for simulations. Thus, this study aimed to develop a 3D printed simulator that was anatomically realistic to train the IUE in mice. To this, an embryo model containing lateral ventricle and coupled to a uterus model were created following the next steps: (1) computed tomography-imaging, (2) 3D-Models segmentation, (3) 3D-Models refinement, (4) molds creation for casting the actual model, (5) 3D-molds printing, and (6) casting the molds with a mix of soft silicones to ensure uterus and embryo hardness and consistency. Preliminary results showed that the simulator assembly successfully recreated the IUE, and the compression test indicated no difference in the elastic modulus ($P > 0.05$). Around 90% of users approved the simulator suitableness as an introduction for the IUE, while 70% considered the simulator helpful for practicing the steps of the IUE. Experts' users tended to be more pessimistic about using the simulator to replace the IUE completely. Despite current technological limitations in model design and the low number of users surveyed, the presented 3D simulator enabled a realistic experience for introduction to the IUE and is a tangible alternative for mice reduction and replacement in neurosurgical approaches. Research in the refinement of the simulator is ongoing at our lab and is a promising alternative for the 3R principle implementation.

PC27

ONE SIZE DOES NOT FIT ALL – BETTER ANIMAL WELFARE BY DESIGNING BETTER SCORE SHEETS

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Abstract
The EU Directive 2010/63 on the protection of animals used for scientific purposes demand monitoring and documentation of specific details of an animal experiment including animal welfare related aspects as well as the assessment of the severity of the procedures the animals underwent. Despite the legal requirement for assessing the actual burden of the animals, the score sheet is an essential tool for an objective evaluation of the burden in animal experimentation and – if properly designed and used – helps fulfilling the 3Rs principle. A score sheet must be adapted to the species of interest and specifics of the animal experiment. This enables objective evaluations of the experimental animal leading to an adequate intervention.

However, we found in a literature review that many publications do not include score sheets that fulfil these quality requirements. We identified critical aspects that must be integrated in a score sheet.

In this poster, we suggest an eight-step procedure to establish a well-designed score sheet for any type of animal experiment.

PC28

THE GENERAL PUBLIC'S OPINION ABOUT LABORATORY DOGS – A HUNGARIAN SURVEY

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Abstract
In our research we tried to assess the general awareness and opinion of people about experiments and examinations in dogs in the laboratory in the form of an online questionnaire. We asked the respondents 26 questions, with which we tried to examine people's opinions and emotional involvement. The response was voluntary and anonymous. Out of the 510 responses received, 509–507 responses per question could be evaluated.

Our hypothesis that humans see the world of animal experimentation darker than it seems to be confirmed. Our respondents found the protection of the rights of experimental animals important (98.4%), while 21.8% thought that there was no veterinary supervision in an experiment using dogs, and 23.6% thought that their caregivers (animal caretakers) could abuse laboratory dogs. Nearly three-quarters of respondents (64.5%) did not know what

kind of person could perform an experiment on dogs, and 18.9% thought it was irrelevant that the animals in the experiment were healthy. Our hypothesis was that respondents show a more negative attitude if the subject of the experiment is not a mouse but a dog. Drug testing in mice was considered unethical by 53.8% and testing in dogs was considered unethical by 72.2%.

In general, people are not fully aware of the legal framework for an animal experiment, not everyone knows what is mandatory for the dogs in an experiment, and that most experiments on dogs are designed to protect human health.

PC29

CHALLENGES IN THE TEACHING OF LABORATORY ANIMAL SCIENCE AND THE NEED TO IMPROVE OPENNESS.

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Abstract
It is a serious problem worldwide that the general public is not informed about animal experiments in professional forums, but instead form their opinions from social media or from emotional articles of animal/environmental protection organisations. As a result, there are many misconceptions circulating among the public, which greatly increases the rejection of animal experimentation. According to our research, people don't know what is considered animal experimentation, which species are used, and they also greatly overestimate the amount of suffering and pain involved. They don't know that it is governed by rules, let alone how strict these rules are.

Unfortunately, the same phenomenon is also typical for veterinary students, which we experience whilst teaching Laboratory Animal Science. When students arrive, they don't understand why a veterinarian needs to learn about laboratory animals, and the attitude "I would never do such a job" is common. Animal experiments are often identified with animal cruelty; therefore attitudes are generally negative.

We are continously analysing the knowledge and attitudes of Hungarian and international students through questionnaires, and we are also investigating the knowledge of the Hungarian population and where they get their information.

In my presentation I would like to present our experiences and results in this field. Our goal is not only to educate vet students about experiments, but to develop and operate a platform where the general public can get information on animal testing from experts in an understandable format to improve the transparency and understanding of animal experimentation.

PC30

HOW DO TRAINEES EVALUATE REALTIME ONLINE AND LIVE LECTURES IN LABORATORY ANIMAL SCIENCE COURSE?

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Abstract
Background: COVID-19 had a severe impact on higher education and training, among others, with virtual delivery of knowledge replacing physical attendance when possible. The present study investigated potential differences in trainees' anonymous score evaluations of a FELASA accredited Laboratory Animal Science Course between two delivery methods.
Materials and methods: This Course, running for five years with on-site theory and practicals, changed theory delivery to realtime online the last two years, following COVID-19 health restrictions. The trainees' evaluations of each individual lecture of the recent two years were compared to the respective evaluations of the last two years of live classroom delivery. Each lecture and lecturer was evaluated for: interest of the topic, ability to hold attention and presentation clarity on a 5-level score.
Results: There was no statistically significant difference between method of knowledge delivery as far as interest of the topic and presentation clarity were concerned. However, statistically significant ($p = 0.043$) lower values were observed regarding the ability to hold attention for realtime online presentations overall.
Conclusions: Realtime online lecture presentations had no significant impact on interest of the topic and presentation clarity. The significant lower scoring of the ability to hold attention may potentially be attributed to 1) the need for engaging components within the lectures, and 2) trainees' preference to courses physically attended with the related lecturer-trainees and trainees-trainees live interactions. As the demanding days and hours of realtime online lectures were identical to the previous live classroom lectures, this finding was unlikely due to asynchronous preference delivery.

PC31

COMPETENCE ASSESSMENT METHODOLOGY DEVELOPMENT FOR LABORATORY RODENTS HANDLING IN CONGENTO, A PORTUGUESE RESEARCH INFRASTRUCTURE

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Abstract

In what concerns the use of laboratory animals, compliance with ethics, European Directive *2010/63 EU* and National Legislation is essential to promote high standards of good research (*pleonasm*) and animal welfare. People are required to be properly educated, trained, and supervised, and the acquired competence for specific techniques (*procedures*) must be assessed.

The methodology for training and competence assessment should be well-defined, reliable, and consistent among different assessors, facilities, and institutions, to ensure an appropriate application of learned techniques, minimizing animal suffering and promoting a good research outcome.

Based on the EU Common Education and Training Framework document, a CONGENTO Working Group was formed to define a thorough methodology of competence assessment for some of the most common laboratory mice and rats techniques, including injections, blood collection, identification methods and euthanasia.

CONGENTO is a Portuguese Research Infrastructure, part of the National Roadmap. It is composed by four research institutions (FC, IGC, iMM, and NMS) in the Lisbon area, that synergizes technology development across different animal models *(this is not clear)*.

A harmonized training programme had been previously established by CONGENTO, and now this Working Group has developed assessment tables with scored items covering different learning outcomes, guidelines and clear assessment criteria, comprising the evaluation of skills, attitude, knowledge, understanding and application of the 3Ŕs.

We believe this cooperative work will contribute to improve the competence of all those involved in the use and care of mice and rats for scientific purposes and will facilitate free movement of people between these four institutions, with equivalent standards of competence.

PC32

THE NHP-SPECIFIC FELASA COURSE: PRACTICAL TRAINING (IN TIMES OF SOCIAL DISTANCING)

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Abstract

The work with non-human primates (NHP) in research is challenging and personnel need a highly specialised and thorough education. To meet this challenge, the network of European primate centres (EUPRIM-Net) developed an NHP-specific Laboratory Animal Science course. Since 2017 the NHP-LAS course is accredited by the FELASA for Directive Functions A & B and offered twice a year by the German Primate Center (DPZ). To our knowledge this is to date the only FELASA accredited NHP-specific LAS course in Europe.

The course is comprised of an e-learning part and a part usually taking place on-site at the DPZ in Göttingen, Germany.

Since it is not permitted to use NHP for education purposes, participants learn amongst other practical contents: behaviour monitoring, sterile dressing, the principles of clicker training, and flushing of neuroscience head plants in a model.

With the primacy of social distancing during the pandemic, most of the practical training parts could be transferred to the online course; however, all practical work using training on models has come to a stop. We invite all course participants to visit us when the situation allows and use the DPZ skills lab. For more veterinarian practices the DPZ skills lab shall be integrated into the course programme as soon as the pandemic situation allows face-to-face meetings again.

Here we present what kind of practical training is still possible when moving a face-to-face course to an online platform.

PC33

INTERACTIONS AND READOUT BETWEEN MOUSE GUT MICROBIOME AND INFECTIONS BY USING 'ALTERED SCHAEDLER FLORA'

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Abstract

In recent years, the mouse microbiome and its analysis have increasingly become the focus of scientific attention. There is a vast number of studies dealing with analysis methods and significance of changes in different bacterial groups. It is also interesting to note that the microbiome also differs not only between animal housing facilities, but also within strains of the same housing area. Another fact is, that the gut microbiome also has an impact on some research aims as it is for long term studies, drug interactions, IBD mouse models, tumor models or infectious disease models (and many more). We assessed the composition of the mouse gut microbiome in an infectious disease model using a mouse corona virus (mouse hepatitis virus). Two different strains had been infected and analyzed. As there is a huge amount of data by analyzing the gut microbiome, we kept our focus on the 'altered schaedler flora'. The results show a significant increase in some special bacteria groups and there are also strain dependent differences. The idea is to learn more about the interactions between gut microbiome and infectious disease models by using 'altered schaedler flora'. It also shows that there are more parameters such as the gut microbiome which should be included in study designs. Using 'altered schaedler flora' could serve as a simpler tool for analysis and readout of the gut microbiome in the mouse.

PC34

A NEW FACILITY FOR THE SYSTEMATIC REVIEW AND META-ANALYSIS OF ANIMAL STUDIES

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Abstract

The recently established Facility for Systematic Review and Meta-Analysis of Animal Studies is the first institutionalized initiative in

Germany that aims to provide education and methodological support for conceptualising and conducting systematic reviews and meta-analyses of preclinical data. Our primary target is to raise awareness of the 6Rs (Replacement, Reduction and Refinement plus Robustness, Registration and Reporting). Appraisal of the 6Rs will help to strengthen internal validity of future experiments to increase the chances for successful translation to clinical applications. Supported by Charité, we are initially targeting all preclinical scientists at one of the biggest university clinics in Europe, creating a blueprint for other institutes to follow.

We offer education to scientists through introductory and in-depth workshops on systematic review and meta-analysis methodology, providing one-on-one support and initiating e-Learning material. Further, we provide a local helpdesk for the online Systematic Review Facility (SyRF) application, the only software that is designed to support systematic reviews and meta-analysis of animal studies.

Since our founding we have developed a guide to preclinical systematic reviews and meta-analysis as an online wiki with step-by-step instructions and a web-based tutorial on meta-analysis with the statistical language R. Our facility has given workshops to more than 150 scientists from several institutions and given individual support to 19 systematic review projects or teams. Moving forward, we plan to improve and extend our in-person and online educational materials and to scale our services over other university clinics and institutions.

PC35

SERUM BUPRENORPHINE, CORTICOSTERONE AND CLINICAL EFFICACY OF ORAL BUPRENORPHINE IN RATS UNDERGOING MAJOR SURGERY

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Abstract
Efficacious analgesia is a prerequisite for ethical use of rodent models. We assessed the effects of subcutaneous and oral protocols of buprenorphine dosing on serum corticosterone, serum buprenorphine and clinical parameters in male Wistar rats during myocardial infarct surgery. Buprenorphine was dosed subcutaneously (Bup-SC: at 1/2h before and 8, 16 and 24h after surgery) or orally (Bup-O1: 1h before surgery, Bup-O2: 1h before and 12h after surgery, or Bup-O24: 1h before and 24h after surgery). The aim of the study was to investigate the analgesic effects of different peroral regimens compared to standard subcutaneous dosing during and after surgical induction of myocardial infarct in general anaesthesia.

Serum corticosterone, body weight changes and food and water consumption was not significantly different in catheterised rats. Repeated SC administrations of buprenorphine result in variable serum concentrations. Oral dosing of buprenorphine provides significantly higher and more stable serum concentrations, at or above clinically effective concentrations (1 ng/ml), for 24h after surgery (Bup-O1) and 42h (Bup-O2). When evaluated in a clinical trial with rats dosed with oral buprenorphine at 1h before and 24h after MI surgery, relative body weight development, intake of food/water from day 1–2, and the relative body weight on days 2–5 remained significantly higher than in rats dosed by the SC route. Compared with analgesia by repeated SC dosing, a buprenorphine dose of 0.4 mg/kg by oral route at 1h before and 24h after major surgery result in clearly better clinical indicators and likely better animal welfare in male Wistar rats.

PC36

HANDLING OF RATS FOR BEGINNERS

R. Sanchez-Brandelik[1] and Veterinarian Referee to the Dean of the Faculty of Medicine
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Abstract
In accordance with EU Directive 2010/63 it is a prerequisite for working with animals for scientific purposes that the necessary expertise must be acquired before the project starts.

After introductory theory, practical training on the animal has to be done. The aim of this training should be the independent, responsible handling of the laboratory animal in accordance with animal welfare requirements. This introduction is typically held during a course, in which there is usually little time for practical training on rats.

Actually, it seems to be preferable to use well prehandled rats for this training with beginners to reduce stress for animals and persons.

But does it really make sense to train people on already well-handled rats? We think that it is important to show especially beginners how they can perform this handling task alone in the future on not-handled rats.

It is much more effective for both, rats and humans, if the start of their relationship is based on a respectful and friendly cooperation, lasting for the future as well.

We want to present our approach on how to comply this task within only three days and 10–15 minutes daily, in the sense of the 3Rs in a calm ambience and with the use of the "towel method".

Our criteria for assessing stress reduction are the decrease in escape behavior and vocalizations, the decline of urine and feces deposited, and positive feedback from the participants on the evaluation sheet.

PC37

A COMPANY INTERNAL 3R AWARD IMPROVES ANIMAL WELFARE AND STUDY OUTCOMES

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Abstract
While the implementation of the 3Rs is a priority topic on the regulatory level based on the Directive 2010/63/EU the integration of non-scientific personnel into this process is lacking. Although animal care takers and research technicians are key personnel working with the animals on a daily basis, they are rarely involved in the process of devising and implementing novel measures to improve on the 3Rs.

We therefore set out to create an environment in which the personnel dealing the most with the animals are specifically addressed to come up with their own ideas to improve on the 3Rs. To provide a clear incentive for active participation in improving on the 3Rs, in 2019 we implemented an annual company internal 3R award. We deliberately excluded personnel in management and study lead positions from this award, to ensure participation by personnel working directly with the animals.

The participation in this award process creates a high level of awareness regarding animal welfare and the 3Rs within the key animal personnel and throughout the company. Importantly, it acknowledges any efforts taken to improve on the 3Rs and underlines that animal welfare is a high priority topic within the company.

Since implementation of this award, we have seen improved animal welfare resulting in improved study outcomes. This simple and highly effective approach to include and sensitize all personnel in the process of pro-actively improving on the 3Rs can easily be adopted throughout academic institutions, CROs and the pharmaceutical industry.

PC38

SHARING BEST PRACTICES WHEN WORKING WITH GÖTTINGEN MINIPIGS

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Abstract
Ellegaard Göttingen Minipigs Academy facilitates courses, seminars and workshops targeted for employees, animal technicians, researchers, veterinarians etc., working within laboratory animal science on various topics concerning Göttingen Minipigs. In addition to our scheduled courses, we offer on-demand lectures and hands-on training tailored to your specific needs and interests. Training can be done at Ellegard's premises in our well-equipped seminar room, or in our animal and laboratory facilities. Training can also be held at a site of your choosing.

Through a continuous cooperation between you and us, we wish to share and disseminate best practice when working with Göttingen Minipigs. The overall objective of the Ellegaard Göttingen Minipigs Academy is to create a platform with opportunities for continued education and knowledge sharing on animal welfare, culture of care, new modalities, and techniques etc. and increase the knowledge and use of Göttingen Minipigs.

PC39

ANIDROP, AN INNOVATIVE 3R TOOL FOR ALL

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Abstract
First, animal use in research projects is done only when necessary and after validation by the local ethics committee and the Ministry.

Administrations and blood sampling are among the most common procedures used in animal research protocols. Thus, research actors must know the volumes to be respected when setting up their projects and protocols. The ethics committees in animal experimentation are very vigilant as to the respect of these good practices.

Moreover, these methods constitute the basic techniques taught in the animal experimentation teaching modules. However, a single teaching module cannot provide absolute knowledge, and this often requires further bibliographical research on the species used and the administration or sampling method envisaged. Only experienced handlers know the volumes to be respected for the species and the routes classically used. Several reference papers in the field were published and many research centers have developed their own recommendations.

Based on a large bibliographical study, I imagined and designed a compact tool (**Anidrop**) that could play the role of a reminder. It is a physical disk with 2 sides. The first side lists the good practice in administration for 14 of the most common species in animal experimentation. The different possible routes of administration and the associated recommended volumes are shown. The other side deals with blood volume that can be collected from the animal depending on the species. Anidrop is very intuitive, users just have to rotate the disc to the target species to get the information. This tool fits perfectly into the general principle of the 3Rs initiated by Burch and Russel.

PC40

MY ANIMAL RESEARCH: EXPERIMENTAL DESIGN, A PERSONALIZED, PRACTICE-BASED LEARNING TRACK FOR PHD STUDENTS

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Abstract
There is a growing concern about the quality of animal research. Many research findings within animal research are considered questionable due to poor methodology (Macleod et al., 2015). To combat this problem Utrecht University and University Medical Center Utrecht have joined forces to change the current research culture. For this, we developed an internationally oriented learning track for PhD students, using Educational Design Research (EDR) (Plomp, 2013). Based on the educational concepts of connectivism (Siemens, 2005), personalized learning and workplace-based learning, the learning track consists of several online and face-to-face learning activities (i.e., blended learning). It focusses on the competence of "designing procedures and projects" (Working document, 2014) and delivering an executable work protocol. Key components are a diagnostic assessment with personalized feedback, a pre-assessment, an online learning platform with a knowledge database and practice assignments, working sessions with experts, intervision and culture interventions, and personalized assessment. The pilot and first run demonstrate great potential in creating awareness of the importance of good experimental design, well-motivated choice of (animal) models, a good statistical plan and increases the knowledge and a critical view on the current culture. More importantly, the setup allows for direct implementation of the acquired knowledge. Further development is directed towards increasing the working sessions efficiency using detailed lesson plans and expanding the knowledge database. This will strengthen the effect on participants' overall quality of future animal experiments. Additionally, due to the assessment and certification, it establishes "designing procedures and projects" as a validated competence.

PC41

EVALUATING ZEBRAFISH GENOTYPING METHODS WITH CONSIDERATION OF THE 3R'S

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Abstract
Genotyping zebrafish has been essential since the development of transgenic technologies to identify mutant alleles. The most recent method, CRISPR technology, has provided the tools for creating a vast number of specific mutations within a gene(s) of interest for a wide variety of research. This has meant that the increased number of mutations, and the need for genotyping, has become more of an everyday part of aquarium management. As such, facilities have required to become adapted to streamlining this.

Fin clipping of adult zebrafish has become commonplace and is the standard genotyping method employed by many institutions. More recently, alternative genotyping methods have been explored to help refine procedures as part of continual 3Rs improvements for our fish. The options range from alternative adult genotyping e. g. swabbing instead of fin clipping, to a variety of embryo methods such as using the zebrafish embryo genotyper (ZEG) or embryo fin-clipping. Each method has its own advantages and considerations which will be presented.

Alternative genotyping options are continually emerging; however, many facilities are still using fin clipping. Is this due to habit and confidence in a trusted technique, or is this still the best method for genotyping? Only by sharing knowledge on genotyping progress will we enable the 3R's to develop, either from alternative genotyping options, or improvements (e.g. refinements) in existing methods. These developments to allow considerations of alternative methods to incorporate the 3R's going forward will be highlighted.

PC42

HIGHLY REALISTIC SWINE MODEL FOR TRAINING IN THERAPEUTIC ENDOSCOPIC ULTRASOUND

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Abstract
Applications of Therapeutic Endoscopic UltraSound (TEUS) are growing rapidly and becoming part of the standard clinical practice to treat patients with various abdominal conditions. However, TEUS interventions require skills from different domains, like the analysis of US images and the manipulation of flexible endoscopes, As a result, TEUS is technically challenging and known to have steep learning curves, requiring substantial amounts of training to achieve autonomy.

Up to date, only a handful of dedicated programs have been implemented, and simultaneously there is a growing interest in most efficient ways and methods to improve learning processes. Also, there is an increasing recognition that the simulation and laboratory practices are required for the acquisition, upscale, and refinement of the abovementioned skills. With these intentions, phantoms and *ex-vivo* models have been used to enhance learning, however they provide a very limited level of realism, and at the moment high fidelity simulators do not exist. Swine models have been already validated and accepted by the scientific community as a realistic model to enhance TEUS training.

Many techniques have been developed in pigs, combining surgical ligation, endoscopic clipping, radiofrequency ablation, among others. However, the evolving legal framework regarding animal protection and welfare has become priority, demanding improvements in the three Rs (reduction, refinement, and replacement).

In the Institute of Image-Guided Surgery (IHU Strasbourg), we developed and validated a swine model that brings to the next step the training of TEUS techniques, while improving the 3Rs.

PC43

REDERIVATON OF STREPTOCOCCUS – INFECTED RATS BY CAESAREAN SECTION AND CROSS FOSTERING - PRACTICAL ASPECTS.

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Abstract
Group B beta – haemolytic *Streptococci* (*Streptococcus agalactiae*, GBS) are gram-positive bacteria, generally considered as a commensal and occasional an opportunistic pathogen in rats. Many rat facility are colonized with no morbidity, but clinical signs can occurs and be lethal in young or immunosuppressed rats. Therefore, Streptococci are considered undesirable flora, especially in animal facilities where immunodeficient or immunocompromised animals are housed.

Streptococcus infection was detected by PCR method (IDEXX) in a group of rats at the Section of Comparative Medicine, University of Oslo, in April 2020. A rederivation procedure was conducted from April to June 2021.

The whole procedure was performed in accordance with the guidelines of Norecopa "Caesarean rederivation in the mouse" adopted to rats.

Three unique lines of rats were successfully rederived using our own protocol for generating Streptococcus – free rats. Developing this protocol required a close cooperation of many people and synchronization of activities. We conclude that rederivation of infected rats by Caesarean section and cross fostering is one way to obtain a Streptococcus – free colony.

PD01

COMMUNICATION AS KEY ELEMENT FOR CENTRALIZED PROFESSIONAL BREEDING OUTSOURCING ACTIVITIES

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Abstract
The number and variety of genetically modified animals used in biomedical research is continuously increasing. However, when dealing with genetic modifications of varying complexity, breeding activities require considerable amounts of resources, complemented with special expertise.

The outsourcing of breeding activities (for customized models) represents an attractive combination of harnessing the vast expertise of professional breeder Contract Research Organizations (CROs) corroborated with reducing the need for physical space, manpower, and other resources in-house.

However, certain challenges must be met to facilitate a smooth process for providing research groups with their required rodent lines despite added complexity of logistics and further stakeholders.

Establishing a person or team as the Single point of contact (SPOC) between the breeders and the users of rodent lines can be a strategy to overcome this bottleneck. This SPOC should combine: a good understanding of the field, a structured work approach and distinct communication skills, as such a role typically involves liaising with stakeholders and leaders from the large spectrum of the drug development process. The crucial points include workflows on establishing new lines in breeding, with clear roles and responsibilities for everyone involved, and adjusting mindsets towards early planning and providing detailed information.

Regular and planned exchange with both breeders and users is key, as is the definition and alignment on standards for legal and financial aspects, hygiene levels, de-risking strategies, and quality controls.

Efficient tools for appropriate documentation and for the data management of various projects should be tailored to the institution's specific needs.

PD02

REPORTING OF RISKS OF BIAS IN ANIMAL RESEARCH: AN AUTOMATED INSTITUTIONAL MONITORING DASHBOARD

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Abstract
For animal research to be ethical, the 3Rs (replacement, reduction, and refinement) do not suffice; biomedical research must also be scientifically valid and support translation to human benefit. Currently, there is widespread failure to translate the results of animal studies, despite reporting guidelines such as ARRIVE & PREPARE.

Currently, assessing the reporting of measures to reduce risks of bias is a time-consuming manual task. Novel automation tools have the potential to greatly reduce the human resources required to identify and assess animal literature. Here, we present a newly developed dashboard that automatically assesses risk of bias in all experimental research from Charité, Berlin. The aim of the dashboard is to monitor the reporting quality of animal research over time.

To build the dashboard we searched PubMed and Embase databases for biomedical publications with at least one Charité-affiliated author from 2015–2019. Of 27,656 total studies, 4,832 were identified as animal studies by a trained machine learning classifier. We were able to retrieve the full text of 3,376 studies and perform automated risk of bias assessment using a natural language processing tool identifying reporting of: randomisation, blinding, compliance with animal welfare regulations, conflict of interest statement.

The results will be used to initiate discussions with researchers, animal facilities and other stakeholders to identify areas for improving the quality of animal research, and monitor reporting of measures to reduce risks of bias over time. This dashboard serves

as a proof-of-concept demonstrating the use of automated tools to monitor large amounts of animal research.

PD03

VOLTAGE-GATED SODIUM CHANNELS $NA_V1.7$ AND $NA_V1.8$ INHIBITORS HAVE POTENTIAL TO INHIBIT COUGH IN GUINEA-PIGS

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Abstract
Cough in chronic respiratory diseases is a common symptom associated with significant comorbidities including visceral pain. Available antitussive therapy still has limited efficacy. Respiratory vagal nodose Aδ-fibres and jugular C-fibres are involved in regulation of cough. Among voltage-gated sodium channels $Na_V1.7$ like $Na_V1.8$ may present a promising therapeutic target for antitussive therapy. We recently showed that inhalation of $Na_V1.8$ blocker A-803467 caused about 50% inhibition of cough. In the present study, we focused on $Na_V1.7$ that is known to be essential for action potential conduction.

We aimed to evaluate the antitussive effect of $Na_V1.7$ blocker PF-05089771 administered systemically and topically in awake guinea pigs using capsaicin cough challenge.

We used a standard method for capsaicin-induced cough (25μM). Prior to the beginning of experiment guinea pigs were adapted to laboratory conditions. An experimental group was pre-treated with $Na_V1.7$ inhibitor by inhalation of aerosol (PF-05089771,100 μM) for 10 min followed by inhalation of capsaicin aerosol together with inhibitor for 5min. For comparison, the second experimental group was pre-treated with peroral administration of $Na_V1.7$ inhibitor (15mg/kg) 2.5 hours prior to capsaicin inhalation. No analgesic treatment was required, and no respiratory distress was observed.

Compared to vehicle, peroral or inhaled PF-05089771 administration caused about 50–60% inhibition of cough at the doses that did not alter respiratory rate. A similar response was observed in a study where $Na_V1.8$ inhibitor A-803467 was used.

Conclusion: The $Na_V1.7$ blocker PF-05089771 like $Na_V1.8$ blocker inhibits cough in a manner consistent with its electrophysiological effect on airway C-fibre nerve terminals.

PD04

PUBLIC CONFIDENCE, TRUST, AND EXPECTATIONS FOR THE OVERSIGHT OF INVERTEBRATES USED IN SCIENTIFIC RESEARCH

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Abstract
Ethical and regulatory oversight of research animals is focused on vertebrates and rarely includes invertebrates. Our aim was to describe differences in confidence, trust, and expectations for the oversight of scientists using animals in research. Participants were presented with one of four treatments using a 2 by 2 design; terrestrial (T) vs aquatic (A) and vertebrates (V) vs invertebrate (I). Canadian participants ($n = 959$) were asked, on 7-point scale, their confidence in oversight, trust in scientists and expectation of oversight for invertebrates. Participants' open-ended text reasoning for confidence and expectations of oversight were subjected to thematic analysis. Confidence in oversight was highest for TV (mean±SE; 4.5±0.08) and AV (4.4±0.08), less for TI (3.8±0.10), and least for AI (3.5±0.08), indicating the absence of oversight decreased public confidence. Four themes emerged to explain participant confidence, centered on: animal, human, oversight system, and science. Trust in scientists was similar for TV (4.3±0.07) and AV (4.2±0.07), but higher for TV compared to TI (4.1±0.07) and TV and AV compared to AI (4.0±0.06); absence of oversight decreased public trust in scientists. Participants believed invertebrates should receive some level of oversight but at 2/3 of that currently afforded to vertebrates. Four primary themes emerged to explain participant expectation: value of life, animal experience, participant centered, and oversight system centered. We conclude that a gap exists between current and public expectations for the oversight of invertebrates which may threaten the social license to conduct scientific research on these animals.

PD05

COMMUNICATION OF THE COMPETENT AUTHORITY IN ROMANIA ON ANIMAL EXPERIMENTATION

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Abstract
The competent authority for animals used on scientific purposes in Romania is the National Veterinary and Food Safety Authority (ANSVSA), its Animal Welfare Office with offices in the 42 counties. Communication in this area is aimed at the public, users, breeders, but also inspectors who authorize establishments and projects. Romania has fully transposed Directive 2010/63/EU by a law adopted by parliament in 2014 and 8 law enforcement orders. They are all posted on the ANSVSA website, in a special page dedicated to animals used for scientific purposes. Inspection

sheets, guides and report forms have been developed for local inspectors authorizing establishments and projects. All documents are posted on the website but have also been sent to authorized establishments for information. ANSVSA has translated and transmitted all related guidelines relating to Directive 2010/63/EU. The activity of the national committee is also highlighted on the ANSVSA website by publishing the minutes of the meetings and the elaborated guides. The communication to the public is marked by the publication and annual communication through press releases of the statistical reports and by the publication of the projects non-technical summaries. The list of authorized user establishments is also public. In addition to these, the national contact point sends any communication from European Commission to all those interested. We consider that taking into account the number of animals used (0.20% of animals used in the EU) and the number of animal experiments, the communication of the competent authority with stakeholders can be positively assessed.

PD06

DEVELOPMENT OF A SARS-COV2 (COVID19) MULTIPLEX FOR SEROLOGICAL SCREENING OF LAB ANIMAL COLONIES

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Abstract
A new high throughput COVID-Plex serology assay has been developed for detection of antibodies against SARS-CoV2 virus, more commonly known as COVID-19. Multiplex assay utilizes six-antigen coupled beads, two specific for detecting SARS-CoV2 antibodies and one antigen for each of the four human seasonal coronavirus strains (229E, NL63, HKU1 and OC43). Recombinant SARS-CoV2 proteins for the full-length spike and nucleoprotein (NP) and full length spike proteins for 229E, NL63, HKU1 and OC43 were coupled to Luminex magnetic beads. Samples were interpreted as COVID19 antibody positive if both SARS-CoV2 beads (spike and NP) were individually positive.

Sensitivity of the COVID-Plex assay was assessed by using 82 positive NHP and human sera with 79/82 scoring positive for COVID antibodies. Three negative samples were confirmed negative by a commercial COVID19 spike protein ELISA too. Specificity of the assay was assessed by screening pre-2019 human and macaque samples with 0/8 and 0/24 positive samples, respectively. Field trials were run at four different institutes with sera from macaque colonies (n = 715) with three false positive findings resulting in 99.6% assay specificity for NHP's. Specificity for several other species including rodents and rabbits was found to be 100% with 1146 sera tested. These studies confirm that COVID-Plex, a blood-based test is sensitive and specific for screening of COVID19 (SARS-CoV2) antibodies in common lab animals. Also, the COVID-Plex can be performed in a user friendly and high throughput format while screening for other infectious SPF agents using the same sample.

PD07

CONVERSATIONS WITH PATIENTS: AN IMPORTANT APPROACH TO SPREAD ANIMAL RESEARCH IN BIOMEDICINE TO SOCIETY

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Abstract
Animal experimentation has a negative view on society and taking actions to explain how it is conducted to improve human health is fundamental. Our animal facility is in the largest Hospital of the Southeast of Spain, linked to a Biomedical Research Institute. We started a pioneering approach by offering to patient associations visits to our installations and explaining how animal research helps to understand and find new treatments related to their diseases.

During these visits we also invited researchers and clinicians working on projects related to the interest of the patient associations. Both, animal house staff and researchers made them aware of the animal research performed at the facility in the disease they are interested on. We show them the process of knowledge generation and transference from the "bench to the bedside". We explain all the training and legal requirements of animal research in order to be authorized, as well as the strict protocols of animal welfare supervision during the development of the experimentation. We finally show them the medical advances achieved on their pathology of interest thanks to animal experimentation and we let them visit the zebrafish facility.

After more than one year, the clinicians have transmitted us the high satisfaction of these patients after the visits, that has also resulted in donations to support ongoing research projects. In conclusion, approaches to explain animal experimentation to patient societies as key stakeholders will have a positive impact on European policy makers regarding the importance of research with animals in biomedicine.

PD08

MEDICINE SAFETY IN BREASTFEEDING: COMMUNICATING ABOUT ANIMAL DATA IN A LARGE EUROPEAN RESEARCH CONSORTIUM

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Abstract
This presentation will focus on some of the challenges for communicating about animal data in large research consortia and project internal opportunities and threats to acceptance for animal data, and how these have been addressed in communications strategy for the Innovative Medicines Initiative ConcePTION (GA No 821520) project. Starting from the LERU note on good practice in communicating animal research in universities, we focus on transparency in external communications and how we can talk about animal data in relation to other results in a project. The Innovative Medicines Initiative 2 Joint Undertaking (IMI) is a European partnership for health. Although many projects funded by the IMI use animal data, the programme does not have guidelines for communicating about how animals are used in research. These consortia are often multidisciplinary in nature. The expertise in this area is with animal researchers who, in addition to communicating with the public, also need to educate scientists from other disciplines about the role animal data will play in their project, why replacement is not always the best option, how animal welfare is ensured, and how this research is carried out in a responsible way: Building the consortiums' capacity for transparency in external communications. The ConcePTION project has worked to build a foundation to allow transparent communication on animal data. This presentation will focus on and the role that animal data plays, the rationale behind the projects' communications strategy and plan and internal capacity building, and how this was put into practice.

PD09

PROBLEMS WITH THE REGULATION OF ANIMAL EXPERIMENTS IN EVERYDAY WORK. CASE STUDIES FROM HUNGARY

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Abstract
Animal experiments are very strictly regulated in the EU, including Hungary. Testing on a living animal should be allowed only if there is no objection to animal welfare, in particular with regard to Regulation 3R, and the harm caused to the animal is negligible in relation to the expected benefits. At the same time, what is stated in the legislation in everyday practical work is in many cases not feasible, so the authority does not give the permit and the experiment cannot be carried out legally. This can lead to the loss of scientific results or diagnostic work that is irreplaceable for human health and/or to protect human life. However, it should also be known that compliance with some statutory conditions is contrary to animal welfare. For example, some housing conditions are required that are not the most ideal for the species from an animal welfare point of view. This even applies to the performance of euthanasia, where if we follow the protocol prescribed by law, we will cause more suffering to the animal than with an older, traditional method. In our presentation, as the Dean of the Animal Welfare Committee of several experimental animal houses, I present cases where full assurance of animal welfare is not feasible under the conditions required by law. I will also mention the specific cases where very important experiments have been cancelled or protracted due to the non-fulfilment of a condition that is irrelevant for animal welfare but required by law.

PD10

TRANSITION FROM DATA ANARCHY TO PROFESSIONAL COLONY MANAGEMENT DATABASE SCENARIO: DATAFLOW AND COMMUNICATION STRATEGIES

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Abstract
When dealing with laboratory animals, the use of a colony management software is crucial for improving colony management, supporting ***R***efinement and ***R***eduction measures, facilitating invoicing, and keeping oversight.

Despite clear advantages in the mid-term, many research groups are reluctant to take the step of migrating from home-made, mostly Excel-based, solutions to a professional database tracking. Beyond the effort of moving away from the comfort zone of well-established habits, another reason is the amount of work involved in the migration process itself.

Here, we summarise the strategy used at the University of Bern to manage the migration to PyRAT® based on a three-phases approach: data collection, user training and data upload.

Management of the process relied on the use of a commercial cloud-based platform, *Monday.com*. Each research group was provided access to an individual so-called Member- and a Timeline-board.

The Member board allowed to track the training progression of each of the research group members, while the Timeline board was designed to track each single step of the migration process. Information exchange, responsibility assignments and collection of data were almost exclusively carried out through these tools, making it simple to keep the overview.

The reliability of the data collected was increased using sophisticated Excel tables. Self-developed Python programs were used to check the collected data for plausibility and to convert it into a form suitable for upload to PyRAT®.

IT tools, including digital platforms, can streamline data collection, review, and processing, while facilitating communication among stakeholders.

PD11

POST-RECEIPT CLIENT FEEDBACK: UNDERSTANDING, COMMUNICATING AND RESOLVING. CHARLES RIVER UK

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Abstract
This poster reviews the post-receipt client feedback procedure, which includes animal observations (which help us gather additional information about a strain), strain enquiries and complaints. The 'Contact Us' online form allows our clients to communicate with us to provide such feedback as well as to obtain scientific and technical information. The feedback is received by our Customer Services Department, who together with our Quality Assurance Lead work with the client to establish what it involves. The two most common reasons for post-receipt feedback concern the animals supplied or their health. Depending on the nature of the feedback, it is assigned to the most appropriate person, who investigates the matter raised and responds. Investigations may be straightforward or complex and some investigations may involve multiple departments and occasionally external bodies such as suppliers or other organisations. Other investigations may require a visit to a client's facility or a client visiting us. Responses usually require some sharing of technical information, for example about production procedures or strain characteristics and some responses have prompted the modification of our procedures. Information about post-receipt feedback, its investigation and resolutions are held in a dedicated database which is reviewed by the local management team on a monthly and annual basis, helping us to make decisions on the most efficient use of our resources to enhance our service to our clients and optimise our operations.

PD12

MRI TO IMPROVE ANIMAL RESEARCH

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Abstract
Our company is a young innovative company offering a Magnetic Resonance Imaging (MRI) service adapted to animals, for both veterinarians and the animal research in the pharmaceutical industry. On the veterinary side, our goal is to improve the diagnosis through accurate images and thus improve the care and welfare of animals. On the pharmaceutical side, we perform the imaging part of our sponsors' preclinical studies. MRI is a non-invasive and non-ionizing imaging technique that allows us to communicate directly with tissues while **R**eplacing invasive methods. This allows us to answer the "R" in **R**efinement.

In addition, this method allows us to **R**educe the number of animals used for scientific purposes by the longitudinal follow-up of these animals ("R" of **R**educe).

MRI thus allows us to obtain a rapid and precise level of communication through images without using invasive techniques.

The field of application of MRI is very broad: oncology, characterization of medical devices, osteoarticular themes, neurology, pathologies of the digestive system (IBD, NASH), etc.

It seems very relevant to us to communicate during the congress on this imaging technique that we adapt to animals from 0 to 150kg (adaptation of imaging sequences, coils, positioners) in order that it becomes systematic during the realization of our peers' in vivo preclinical studies.

PD13

ROLE OF REGULATORY CLEARANCES IN MAINTAINING RESEARCH ANIMALS IN COVID-19 CRISIS: INDIAN PERSPECTIVES

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Abstract
Maintenance and experimentation on research animals may vary primarily based on the regulatory requirements in each country. India has distinct regulatory requirements for breeding, care, and experimentation on small and large animals. Covid-19 crisis has largely affected each country's breeding, maintenance, and experimentation. This is mainly due to lockdown, which has imposed restrictions on the movement of human resources, materials, and animals. Except for the essential workforce and material, all other movements were halted. The major setback was the availability of a workforce to attend day-to-day activities in the vivarium. Relaxation in regulations on the movement of the workforce of the essential services staff helped us take care of the animals. With the relaxed rules on the movement of the workforce, hurdles in animal care were greatly removed. However, the approval process of animal experiments by the institutional ethics committees was initially hampered. To cope up with these requirements, the regulatory authority in India relaxed the norms of physical meetings and allowed us to meet virtually to approve the animals under new and ongoing animal study proposals. Restrictions on the movement of material affected the essential supply like animal feed, bedding etc. Relaxation in material movement by the regulatory authority gave the helping hands to ease the availability of animal feed, bedding, and other essential components. The role of regulatory authority for maintaining the research animals during the Covid-19 crisis in India will be discussed.

PD14

BETTER ANIMAL RESEARCH THROUGH OPEN SCIENCE

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Abstract
The promise of Open Science is that it will lead to more reliable, more efficient, and more relevant research. How do these ideals

relate to animal research? What is the added value of the Open Science approach in the context of animal research and what are the practical implications? Which steps should be taken to integrate Open Science in animal research?

Utrecht University and its Animal Welfare Body have developed a model that can be used as a checklist. It visually shows the Open Science aspects of animal experiments one by one, from first preparations to publishing. Using it will benefit research and society, including human and animal patients, and laboratory animals.

The checklist includes the following steps: Preparing with PREPARE guidelines, writing a clear Non-Technical Summary, writing protocols based on optimal experimental design, making a Data Management Plan, preregistering, engaging in conversation with journalist and the public, sharing surplus animals and tissues, sharing data, reporting according to ARRIVE guidelines, and publishing whatever the outcome (including neutral or negative results).

PD15

WE NEED TO TALK ABOUT FRAUDULENT ANIMAL STUDIES – LEARNINGS FROM A SYSTEMATIC REVIEW

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Abstract
With an ever-growing number of published animal studies to contend with, we are increasingly reliant on evidence synthesis methods, like systematic reviews, to make sense of them. Using meta-analysis methods, we can gather data from hundreds, or even thousands, of studies; we can answer research questions backed by millions of data points. These methods rely on a simple assumption, however: That the described experiments actually took place. When this is not the case, we face problems.

In a systematic review concerning a rat model of depression, we screened 1,006 published papers for inconsistencies in their images (photomicrographs, blots, gels, *etc.*). Even though many completely lacked images, 10% of the papers were found to be problematic. The issues ranged from inconsistencies that could be explained as honest mistakes made in preparing the report, to outright manipulations and fabrications. We suggest that the latter (at least) are indicative of fraudulent studies – studies that may never even have taken place.

Neither typical tools for assessing the validity (*e.g.*, risk of bias checklists), nor traditional heuristics (*e.g.*, number of citations), appear to flag these studies. To further dispel popular myths, these papers were also neither exclusively published in low-impact journals nor written by authors of any particular nationality. At current we cannot offer simple solutions. Rather, the problem begins with acknowledging that a problem exists, that it is larger than we have previously liked to admit, and that if left unchecked, it will pollute published literature, potentially derailing entire fields of research.

PD16

LACE1 DEFICIENCY ACCELERATES BROWNING OF INGUINAL WHITE ADIPOSE TISSUE IN MICE

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Abstract
Adipose tissue browning is essential for maintaining energy homeostasis against obesity. It is well known that lactation elevated 1 (LACE1) is mitochondrial integral membrane protein that functions to mediate mitochondrial protein homeostasis. Lace1 is known as expressed in heart, kidney, lactating breast of mouse. However, little is known about the function of Lace1 in beige fat. Here, we found that Lace1 is increased during beige adipogenesis and brown adipogenesis. Lace1 is also enrich in CL-316243 (CL) and cold induced beige fat compared to white fat. Then, we tried to induced iWAT browning by intraperitoneal injection of CL-316,243 into Lace1 null knock out mice. Surprisingly, Lace1 knockout (KO) mice had improved adipose tissue browning ability concomitant with increased energy expenditure. Deletion of Lace1 accelerates lactate influx and lactate induced browning in subcutaneous fat compared to control littermates. We reported that the reason of enhanced browning capacity in Lace1 KO is increased lactate efflux by phosphorylation of PDH in heart. Taken together, our study revealed the role of Lace1 in mediating browning capacity of subcutaneous fat through lactate release from heart.

PD17

COMPARING REPORTING QUALITY OF PRECLINICAL ANIMAL STUDIES IN 2009 VERSUS 2018 – A NATIONWIDE STUDY

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Abstract
Detailed reporting to safeguard study quality contributes to better translation and reproducibility of preclinical animal studies. In this nationwide study we investigated the reporting prevalence of methodologies and the information's level of detail. Publications from 2009 and 2018 with at least one affiliation to a Danish university were compared to study possible reporting progress.

A predefined protocol was devised, and a systematic search retrieved all relevant studies. Random sampling of 250 studies from 2009 and 2018 led to evaluation of 500 publications. To identify presence of measures known to impact study results, we applied a two-level scoring "yes/no". To analyze the reported information's level of detail, a three-level scoring was conducted.

Reporting prevalence remained low, only minor improvements were noted. Reporting of randomization increased from 24.0% in 2009 to 40.8% in 2018, blinded experiment conduct from 2.4% to 4.4%, blinded outcome assessment from 23.6% to 38.0%, and sample size statements from 3.2% to 14.0%. Details were lacking, e.g., reporting of the method of random allocation to groups being 1.2% in 2009 and 6.0% in 2018, reporting of sample size calculation was respectively 2.4% and 7.6%. Interestingly, conflict-of-interest statements increased from 37.6% to 90.4%.

Reporting of measures to safeguard study quality should be prioritized by all stakeholders. We suggest rigorous teaching in designing, planning, and reporting animal studies and journals should enforce ARRIVE guidelines. Teaching and conduct of systematic reviews could be a good starting point, as the evidence shows this increases motivation and behavior towards quality improvements in science.

PD18

FAKE NEWS IN SCIENCE AND ABOUT SCIENCE

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Abstract
Science is no exception when it comes to distinguishing between real (reliable) and fake (unreliable) news and the combination of the two. It is critical for science to be based on objective and real data. Fake news is created with the intent to mislead the reader and lacks credibility and authenticity. In science, fake news is extremely problematic because it lacks any scientific basis and is increasing due to the exponential increase in the number of manuscripts received by journals, which have difficulty finding reviewers due to time constraints and pressure of researchers to achieve large number of publications. It may also be related to the pursuit of contract research interests, which is common in the food and tobacco industries, and nowadays in the context of COVID-19 information. With the advent of Covid-19, rejection and doubt have arisen about scientifically derived data that people do not trust and prefer to follow online information that is not accurate, verifiable, and scientifically proven. Predatory journals that do not follow the basic rules of scientific publishing are on the rise offering unscientific and low-quality articles. Yet we tend to associate misinformation with fake news and think less about how data – even correct data can misinform. This, however, is where the reader's critical thinking skills and knowledge are needed. Therefore, it is now more important than ever that scientific information be truly objective and accessible to everyone. Importantly, also laboratory animal welfare depends on them and the number of animals in research.

PD19

COMPARING ANIMAL AND HUMAN SCIENTIFIC LITERATURE: IMPLICATIONS FOR AUTOMATISATION OF SYSTEMATIC REVIEWS

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Abstract
Systematic literature reviews (SRs) are labour-intensive, and screening of the literature is one of the most labour-intensive phases in the process. Several groups focus on automation of this process by implementing algorithms. However, most of these have been based on the abstracts of human studies.

There are several important differences between animal and human primary studies. For example, animal studies are in general more experimental and will compare multiple groups, while human studies are mostly randomised blinded clinical trials comparing a novel treatment with placebo or a gold standard. This may result in differences in the manner the studies are written up, which could affect automation.

As a first step in exploring if we should expect issues when implementing algorithms developed for human literature in reviews of animal studies, we compared text frequencies between abstracts from animal and human primary studies. Abstracts were derived from an ongoing SR on the nasal potential difference test for cystic fibrosis. In comparison, in human abstracts the terms "subjects" and "patients" are more frequently used, while in animal abstracts the words "mouse", "gene" and "cftr" are more prevalent.

Further analyses will include data from other SRs from different biomedical fields and should also address other aspects from natural language than word frequencies. The SRs to be included in these analyses have clearly defined inclusion criteria and cover several biomedical research fields, allowing for fair comparisons between texts on animal and human data. Results will be discussed in light of automation of SRs.

PD20

CORTICOSTERONE LEVELS IN MOUSE MODELS FOR INFLAMMATORY BOWEL DISEASE: A SYSTEMATISED SCOPING REVIEW

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Abstract
Inflammatory bowel disease (IBD) comprises Crohńs disease and ulcerative colitis; inflammatory diseases of the gastrointestinal tract which can also affect other organs such as skin and joints. While both predisposing genetic factors and environmental influences are involved, IBD pathology is far from fully understood, and animal experiments are being performed to increase our knowledge. Mice are a popular animal model species used in these experiments.

Corticosterone is one of the most-frequently measured stress hormones in mice. Concentrations of stress hormones can be measured as a surrogate outcome for animal welfare; while short-term increases in corticosterone concentrations normally reflect healthy responses to stressors, prolonged increases can reflect low welfare.

To get a first indication of the welfare status of mice used in IBD experiments, we performed a systematised scoping review. We used our previously developed database as a convenience sample and are extracting additional corticosterone data for all included IBD models and the corresponding control mice from the k = 59 included papers.

A frequentist (classical) random effects model meta-analysis of standardised mean differences will be performed to compare the corticosterone concentrations between different IBD mouse models. Time of measurement will be addressed as a potential source of heterogeneity. At the conference, we will present this meta-analysis combined with the risk of bias in the included publications. Results will be presented in light of the 3R principles.

PD21

THE NASAL POTENTIAL DIFFERENCE TEST FOR ASSESSING CYSTIC FIBROSIS DISEASE SEVERITY: A SYSTEMATIC REVIEW

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Abstract
Cystic fibrosis (CF) is a debilitating disease, which is caused by mutations in the cystic fibrosis transmembrane conductance regulator gene. Genetic animal models for CF are thought to have high construct validity (i.e. a high degree of resemblance in aetiology and pathophysiology between experimental animals and humans). However, contrary to CF patients, the phenotype in most mouse models shows little lung disease and severe intestinal disease.

The nasal potential difference (nPD) is regularly measured as a proxy of CF severity in CF patients and animal models. The nPD thus also has a seemingly high construct validity, but its variability and precision have been disputed.

We are currently performing a systematic review of the nPD test in CF animal models and patients, to quantitatively analyse the actual construct validity of the animal models and the nPD. More specifically, our review aims to answer the following research questions:

1. Is the nasal potential difference similarly affected in CF patients and animal models?
2. Is the nPD in human patients and animal models of CF similarly affected by various interventions?
3. Is the nPD in human patients and animal models of CF similarly affected by various changes in the experimental set-up?
4. Does the nPD detect CF-related abnormalities in model animals, which remain undetected with other methods (e.g. plethysmography)?

At the conference, we will present the results answering the first review question, based on a comparison of 53 animal,73 human and 4 combined papers, as well as preliminary findings on question 4.

PD22

OPTIMISING NASAL POTENTIAL DIFFERENCE TESTING IN MICE

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Abstract
Cystic fibrosis (CF) is a debilitating disease, which is caused by mutations in the CF Transmembrane conductance Regulator gene (CFTR). Several animal models for CF are available, with bioelectric abnormalities (i.e. potential differences over epithelial layers) similar to those observed in CF patients.

One technique that is frequently used to measure bioelectric abnormalities as a proxy of CF severity is the nasal potential difference (nPD). The nPD measurements are comparably performed in animal models and CF patients. They start with a baseline measurement, followed by perfusion with buffers that specifically change the ion flow through the CFTR channel when this channel functions properly.

While the nPD has a seemingly high construct validity, the outcomes are variable, and its precision has been disputed. To analyse the variability and precision of the nPD, we performed 5 repeated nPD tests in wildtype (C57Bl6/J, n = 32) and CF

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(F508del, n = 32) mice that received saline or no treatment. As part of a project on improving animal-to-human translation, we optimised the experimental design to close-to-ideal, incorporating e.g. standardised variation.

Optimising the experimental design hardly required extra time and effort compared to normal. Genotype affected the nPD (CF-mice showed a lower nPD response to low-chloride buffers), while saline treatment and sex did not. Early nPD outcomes did not predict mortality at later stages. Full analyses of repeated testing, cohort effects, survival, variation within subjects and possible interactions between variables will be presented at the conference.

PD23

MORE REALISTIC BUDGETING IN GRANT PROPOSALS WOULD BENEFIT RESEARCH QUALITY AND ANIMAL WELFARE

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Abstract
The reproducibility crisis, or replication crisis, in biomedical research is a staggering issue. Particularly when animals are used. Many factors have been mentioned as contributors to this resources wasting phenomenon. Points that need to be improved include standardization of adherence to the PREPARE and ARRIVE guidelines, preregistration and data sharing, and the system that rewards researchers.

Good research is defined as work that is reproducible, anywhere in the world. So that we can all trust and build on the results. This fundamental argument deserves extra weight when it concerns animal testing.

"Lack of money" is rarely mentioned in this discussion, but is the main reason why researchers cannot design studies as they would prefer: with good animal breeding facilities, optimal housing conditions (exceeding legal requirements), good statistical support, and effective support in implementation of the ARRIVE guidelines.

Often in grant budgets there is no realistic budgeting for animal studies, and animal studies are tucked away in a lump sum for all execution costs. Grants are meager anyway. As a result, researchers must cut back on aspects that sound animal studies with due consideration for animal welfare demand. Thus, the grant system is an important factor contributing to the reproducibility crisis and suboptimal care for welfare. We propose a system where grant proposals mention the costs for animal testing explicitly. This estimate should be made realistic through coordination with the animal facility, institute, or university. In doing so, these responsible entities also declare to be co-guarantors of the required budget.

PD24

REHOMING PROCEDURES FOR RESEARCH DOGS AND CATS AT VETERINARY SCHOOL ONIRIS IN FRANCE

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Abstract
The research animal rehoming program in the Cat and Dog facilities of NP3 Unit (Oniris, France) consists of selecting only research animals that have undergone **only** mild or moderate procedures. In order to ensure the success of their **rehoming or adoption** and to enable them to **cope with** their new environment, all Dogs and Cats follow a socialization program by animal caretakers, under the control of the Pet animal-welfare body (AWB) of NP3 Unit. Two adoption approaches are proposed in the Cat and Dog Adoption Program. The first, being the main is established in partnership with the GRAAL association; and the second, corresponds to an internal process involving, occasionally, individuals such as Oniris staff. Both **approaches** are the subject of a contract **that** must be signed before **any animal is** taken out. The **rehoming** involving the GRAAL association commits our institution to provide the individual record of each animal, including the traceability document (I-CAD), medical information, health (types and dates of vaccines, sterilization, etc.) and behavioral (socialization) and the types of studies in which the animal was included. For both placement procedures, the state of good health and the absence of risk relating to human health, the animal and environmental health of all animals proposed for rehoming are guaranteed by the AWB veterinarian by the establishment of a veterinary certificate. The specificity of our research animals and their screening for placement process, the main points described in the rehoming contract, the benefits and the constraints of our adoption program will be presented and discussed.

PD25

STAPHYLOCOCCUS AUREUS INFECTION INDUCES HYPOXIA IN INTESTINAL CELLS AND ALTERS OXYSTEROL/ CHOLESTEROL RATIO

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Abstract
In a recent study we showed that infections with *S. aureus* negatively impact the final steps in the lipid raft-associated trafficking and apical sorting of human sucrase-isomaltase, the major intestinal brush border α-glucosidase. In view of these findings, we extended our investigations to unravel the potential role of oxygen levels and subsequent sterol metabolism in regulating the lipid rafts-associated trafficking in Caco-2 cells and in stem cells-derived intestinal organoids in response to *S. aureus* infection.

The cellular composition of cholesterol and oxysterol was quantified using HPLC, which revealed a remarkable reduction in total cellular cholesterol in Caco-2 cells as well as in intestinal organoids. This reduction is in all likelihood elicited by intrinsic changes in the oxysterol pool, as assessed by the distinct variations in the levels of five different oxysterols, 22 (S) hydroxycholesterol, 7-ß-hydroxycholesterol, 25-hydroxy-cholesterol, 6,5-eboxy-cholesterol and 7-keto-cholesterol. Since altered sterol metabolism often stems from an intracellular oxidative stress reaction, intra- and extracellular oxygen levels were measured in infected Caco-2 cells and the organoids. For this purpose, three different approaches were used. In the first, the intracellular oxygen level was quantified by cell-penetrating nanoparticles. The second method employed sensor plates to measure extracellular oxygen in the media. Finally, the distribution of the ambient oxygen in organoid cultures was examined via sensor foils. All three methods revealed a significant intra- and extracellular reduction of oxygen in Caco-2 cells and intestinal organoids upon infection. Additionally, the persistence of *S. aureus* in Caco-2 cells and intestinal organoids could be also demonstrated.

PD26

IMPLEMENTATION OF ANIMAL CARE AND USE REGULATIONS IN COUNTRIES IN TRANSITION: GEORGIAN EXPERIENCE

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Abstract
The absence of national legislation regarding experimental animals in Georgia -like countries in transition- has a negative impact on the credibility of scientific research and involvement of local scientists in international projects that are guided by quite challenging international regulations. Thus, significant changes in the management of biomedical research involving animals, are demanded to answer these challenges.

In Georgia, the establishment and implementation of national standards for the care and use of animals harmonized with those of the international biomedical research community were considered as a first step to develop a National Policy on the care and use of experimental animals. Relevant state authorities were informed of the need to urgently sign and ratify the "European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes" and amend the relevant national legislative acts. Georgian Association for Laboratory Animal Science (GALAS), the only internationally recognized LAS association in South Caucasus, helps local scientists in solving arising challenges and provides state-of-the-art information on the regulations and ethical standards regarding animal research. In particular, GALAS assisted to establish Ethical Committees on Animal Research at leading biomedical institutions, including one Interinstitutional Animal Care and Use Committee that currently regulates all ABSL-2 and ABSL-3 studies in the country. Several workshops and training were held for the researchers and Committees' members. A set of mandatory regulations is now available on GALAS website for all interested parties. In addition, a draft amendment to the existing legislation is being created for submission to the government.

PD27

QUALITY MANAGEMENT: A GOOD TOOL TO MANAGE CRISIS THANKS A BETTER COMMUNICATION

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Abstract
The Inserm quality network's "Continuous improvement in animal housing facility" working group has repeatedly demonstrated the contributions of management through quality with regard to the organisation of animal facilities and the protection of animals used for scientific purposes.

In this study, we were interested in the organization and more precisely in the communication of several French rodent animal facilities in a crisis situation, and more particularly during the initial lockdown phase linked to the COVID-19 pandemic (March 2020 in France).

First, we synthesized several experience feedbacks based on semi-structured interviews and a survey conducted with several animal facility managers and their teams.

In a second part, using these different cases, we illustrate the benefits of using the Deming wheel (continuous improvement wheel) in imbalanced situations within the animal facilities housing that participated in the experience feedback.

To conclude, we illustrate the contributions and benefits of a quality approach applied in the animal housing facilities using rodent models for scientific purposes in the particular context of a crisis.

PD28

USING DYNAMIC WORK DESIGN TO CONNECT PEOPLE WORKING IN LABORATORY ANIMAL RESEARCH

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Abstract
The pandemic has offered many challenges and opportunities as work moved from the outside office into the home office for research animal professionals, managers, and others. Staying connected with colleagues, ensuring timely completion of projects, and keeping workflow efficient while not overwhelming people offered the opportunity to implement the principles of Dynamic Work Design (DWD). DWD is a management tool that identifies units of work and how they flow through a system or process with the goal to improve workflows, reduce redundancy of effort, and improve communication. People need to know why they are doing something and that they are making progress while navigating their fast-paced work environment. The principles of DWD can be applied in the vivarium, lab, or other group within your facility that works in-person or remotely. Our group works remotely across multiple regions and time zones, with multiple groups to support the humane care and use of animals. Assuring that projects are completed efficiently, workload is appropriate, there is flexibility when priorities change, and communications are timely and productive is challenging. Our group utilized DWD to review internal workflow of animal welfare-related training, identify goals, review processes, and develop a visual model of our projects that is maintained in real-time, is accessible virtually by the team, and provides flexibility for those unexpected priorities that always arise. Implementing DWD has increased efficiency of meetings, provided clear direction and feedback on projects, allowed for more agile workflows, and the ability to quantify productivity over time.

PD29

ARE SPF GUINEA PIGS THE BEST MODEL FOR EXPERIMENTS IN RESPIRATORY PHYSIOLOGY?

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Abstract
Background: Recommendations of international associations for laboratory animal science emphasize that valid results in experimental conditions can be obtained only using quality laboratory animals. Specific pathogen-free (SPF) is a term used to describe laboratory animals of higher quality without specific group of pathogens, which worsen their overall health and survival in long-term experiments.
Methods: Dose-response curves were constructed for Dunkin-Hartley guinea pigs (8 males, 8 females; for both SPF and conventional animals) to doubling concentrations of citric acid (0.05M to 1.6M) and capsaicin (6.25μM to 200μM) in whole-body plethysmograph with simultaneous recording of sound and airflow trace for offline analysis. The measurements were performed four times in one-week intervals.
Results: In conventional animals the cough threshold occurred at concentration 0.2M in males and 0.1M in females for citric acid and 6.25μM for both males and females for capsaicin challenge. In SPF animals, the threshold for both males and females was 0.4M for citric acid and 6.25μM for males and 25μM for females in capsaicin challenge.
Conclusion: Cough response in all groups remained stable; however in SPF animals it was significantly lower or absent. Databases did not provide any explanation for our results and to our best knowledge such comparison between SPF and conventional animals has not been done. The role of microbiome is questioned and should be addressed in SPF animals for research in respiratory physiology. This fact must be considered during comparison of results in-between laboratories.
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PD30

COMMUNICATION IN MANAGING INTELLECTUAL PROPERTY AND MOUSE EXPORTATION

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Abstract
Exportation of mice internationally occurs frequently. Currently, there is no formal international agreement or mode of communication between institutions to facilitate mice transfer.

Material Transfer Acts (MTA's) and Intellectual Property Rights (IPRs) promote essential creativity, innovation, and collaboration by sharing technology.

- A formal agreement for the exchange of MTA's or IPR's between institutions for the exportation and importation of mice does not exist between the US and the EU.
- Key members in technology transfer include RESEARCHERS, LABORATORY ANIMAL VETERINARIANS, and ANIMAL CARE TEAM MEMBERS and LEGAL REPRESENTATIVES (required for US).
- An informal framework is dependent on a network of strong COMMUNICATION and TRUST between KEY members.
- A major difference between the US and the EU is that EU RESEARCHERS often have the authority to sign an MTA/IPR.
- This document agrees to any terms relating to animal care, specified by the exporting institution, and must include IACUC approval and compliance with all applicable regulations/laws. These animal care terms become legal terms of the MTA.
- The recipient must also acknowledge that the provider has a proprietary interest and that it cannot be used for any commercial purposes.

- Rightsholders need access to effective ways of protecting their rights internationally and need a solid and predictable legal framework for communication.

A more formal network between countries could be mutually beneficial, identifying key contact personnel and the mechanism(s) for an MTA or IPR. This would greatly streamline the process to facilitate essential scientific advancement using unique mouse models.

PD31

3R RANKER: AN ARTIFICIAL INTELLIGENCE BASED ALGORITHM TO IDENTIFY REPLACEMENT ALTERNATIVES

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Abstract
Background: The use of the 3R principle is mandatory according to the EU Directive2010/63/EU. A major challenge is to find valid and accurate information on the possibilities for the 3Rs in general, and in Replacement in particular. To facilitate identifying animal alternatives, we developed a machine learning based algorithm to enabling rapid and effective searches of Replacement related papers from the scientific literature.
Methods: (1) Creating a machine-learning algorithm (3R ranker) based on sets of known positive (about 3R) and negative (not about 3R) papers, curated by 3R experts. (2) Applying the 3R ranker to the entire MEDLINE database. (3) Validation of the 3R ranker output based on specificity and recall.
Results: The algorithm was trained on a set of 300 papers related to 3R alternatives in skin research and cosmetic testing and 300 papers on general skin research. The accuracy of the final model was 0.93, showing that the model obtained a high recall and a high precision. Application of the model to a set of papers from neuroscience yielded an accuracy of ~0.7, indicating that the model can be used for multiple disciplines, but that topic specific optimisation is needed.
Conclusions: Automated, high throughput literature mining combined with artificial intelligence-based classification can help in identifying the 3R methods fast and effectively. With this tool, non-animal methods can be more easily identified, and animals may be replaced by selected research programs, in selected projects involving the use of animals, and in individual experiments and procedures.

PD32

DAILY CARE OF MICE INSIDE ISOLATORS IN A BSL3 FACILITY

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Abstract
In our centre, we focus on the discovery of new treatments against tuberculosis (TB), which causes 1.5 million deaths per year. It is caused by *Mycobacterium Tuberculosis*, an airborne pathogen classified as biological agent risk group 3.

To carry out *in vivo* tests under safe conditions, we have a system that involves four flexible foil isolators permanently connected. These isolators are capable of independently maintaining a negative pressure differential of 30 Pascals and an airflow of 20 air changes/hour. The system is composed of an isolator for housing small rodents, another for experimental techniques, and two smaller ones for sample processing. Animal studies, aimed at testing the efficacy of new drugs, are carried out inside the isolators. Some of these studies take months and involve long periods of daily animal care inside the isolators. Dirty and contaminated materials generated must be processed effectively to ensure the protection of workers and the community. Entry and exit of materials must be done through specific ports; the exit port connects directly to a waste bag that must be heat-sealed and autoclaved.

Working with infected animals in isolators means a greater effort in human and economic resources, given the cost of the equipment and its maintenance, and the greater time required to perform daily tasks for animal care. Additionally, ergonomics for the worker are not optimal, so work schedules need to be reduced. In contrast, isolators offer greater biological safety due to the physical barrier between the contaminated material and the worker.

PD33

BUILDING A 3R-NETWORK AND INCREASING OUTREACH: A CASE REPORT

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Abstract
Especially during the COVID 19 pandemic, it became clear that an appropriate online presence is of great importance for the communication of content.

As a comparatively young 3R organization, whose previous communication channel had consisted mainly of face-to-face events such as workshops and conferences, we were confronted to look for new ways of communication during the pandemic to spread 3R relevant content. The solution was to establish an online presence as efficiently as possible and to create a network to reach the 3R community.

Methods used to build a proper online presence included an expansion of the website, hosting a monthly online seminar series with experts from the different areas of the 3Rs, using social media to create tailored content for the respective target groups, and word of mouth from members at their respective institutes. Besides the effort which went into the online presence, direct networking requests were sent out to other 3R organizations and initiatives, as they all follow the same purpose to spread 3R relevant content.

This poster will on the one hand explain the experiences made, as well as show positive and negative aspects of the pursued strategy based on generated web analytics data.

On the other hand, we will outline a short practical guideline on how young organizations can build an online network or improve their existing online communication.

PD34

MICRODIALYSIS OF ADRENALINE AND CORTICOSTEROIDS IN ANIMALS AND HUMANS: A SYSTEMATIC REVIEW

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Abstract
The presence of adrenaline and corticosteroids indicates elevated stress of the organism. Whether this can be taken as a surrogate outcome for welfare is under debate. While short-term increases in these hormones are a normal response to stressors, prolonged increases can reflect a reduced state of welfare. To analyze the external validity of stress hormone measurements, we screened a total of 801 studies for a systematic review, with 158 studies meeting the inclusion criteria: adrenaline, corticosterone or cortisol as substance measured, microdialysis as the technique used to measure and it must have been done in-vivo. We included all animals, also humans.

Our systematic review compares both the experimental design and the observed hormone concentrations of adrenaline (total $n = 957$), corticosterone (total $n = 1548$) and cortisol (total $n = 353$) between animal ($k = 120$) and human ($k = 38$) studies. Only 4 of the included papers addressed animal welfare to some extent, 2 of which specifically mentioned the 3Rs and severity assessment. Further results will be presented at the conference.

A stress hormone can be released and measured systemically and locally. When systemic hormone levels are measured in the blood, urine or feces, the amount can represent a stress response to handling, environment, hunger, etc., but may also be affected by the collection procedure. The local hormone level, when repeatedly measured in the extracellular space by in vivo microdialysis, can provide better insight to local and systemic stress responses. In vivo microdialysis thus has significant and unique advantages over other methods in ascertaining stress hormone levels.

PD35

FOR BETTER COMMUNICATION – ONE SECRETARIAT FOR BOTH 3R-CENTER, NATIONAL COMMITTEE AND ANIMAL EXPERIMENTATION COUNCIL

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Abstract
In Denmark, the secretariat for The Animal Experimentation Council, The Danish 3R-Center and the The National Committee for the Protection of Animals used for Scientific Purposes are represented by one united secretariat and therefore serve in a joint communication effort. Each of the organizations contribute with tasks to one joint secretariat, which is considered as project management for all three organizations.

One of the most important aspects for the secretariat is to prepare and execute all communication related assignments on behalf of the organizations. In Denmark, this includes a wide variety of events, written material and statements.

Both The National Committee and The Danish 3R-Center have active websites with updates and novelty information within the 3Rs, and The Danish 3R-Center has a yearly international symposium, which strives to gather the academic environment and disseminate new research. In addition, several seminars, conferences, annual reports, recommendations, and statements are each year a part of the overall dissemination and communication.

A joint secretariat ensures a high level of involvement and distribution of knowledge in all aspects concerning The Animal Experimentation Council, The Danish 3R-Center and the National Committee, within the Ministry of Food, Agriculture and Fisheries in Denmark.

PD36

HEALTH MONITORING IN FARM PIGS USED FOR RESEARCH PURPOSES – A PRACTICAL EXAMPLE

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Abstract
In 2020 the new FELASA recommendations for health monitoring of pigs used for research were published. Many animals origin from production farms and may carry a complex mixture of pathogens. At our research facility, several experiments focus on cardiovascular and pulmonary physiology, thus these organ systems are of importance when designing a health monitoring strategy. Following infection of our supplier's herd with porcine circovirus 2 (PCV-2) we initiated a health status evaluation of a new supplier based on FELASA recommendations and pathogens prevalent in Denmark.

Twenty pigs were enrolled in the study and placed in a designated area of the stable facility. Clinical scores and diagnostic samples were collected at day 1, 12 and upon termination (day 26–49) to investigate initial health and potential infections attained at the research farm. Pathogens examined were: actinobacillus pleuropneumoniae, mycoplasma hyopnemoniae, influenza, PCV-2, porcine reproductive and respiratory syndrome virus, bordetella bronchiseptica, pasteurella multocida toxin A.

Analyses day 1 were negative, except for bordetella bronchiseptica (17/20). Analyses day 12 tested via antibody assays were negative. At termination 9/19 pigs tested positive for PCV-2.

In conclusion, the pigs were PCV-2-infected at our facility. A thorough sanitation process in combination with vaccination and monitoring was instituted to ensure eradication of the infection. The publication of health monitoring work in farm pigs is scarce, but in our belief, it is paramount to publish this work to enable a discussion between peers managing pigs for research purposes.

PD37

TRANSITION OF FARM PIGS TO RESEARCH PIGS USING A CHECKLIST – A REFINEMENT INITIATIVE

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Abstract
Refining animal studies has gained traction. Several initiatives may limit stress, indirectly diminish variation, and hence contribute to both animal welfare and scientific robustness. Ameliorating stressful experiences by use of different training techniques appears to be useful. Despite the increased awareness of refinement by use of training, the number of publications describing training of pigs in detail are limited.

In this study we prepared detailed information regarding how pigs are transitioned from farm pigs to research pigs at our facility. On the basis of our experiences, we created a step-by-step guide to share our experiences.

We engaged our caretakers and had thorough discussions concerning our current practices. Then we designed a checklist to monitor the progression of twenty pigs enrolled in our study. The checklist was further adjusted encompassing all relevant inputs from the caretakers. Ultimately, we tested the new checklist on twenty new pigs. The results show that by working consistently using a checklist, farm pigs become calmer when handled and allow basic outcome measures to be collected within seven days.

Reporting the work done to refine the experiments involving pigs is important to accelerate the use of refinement techniques. We speculate that the lack of peer reviewed training publications may be due to the fact that the work is primarily performed by the caretaker staff, and more rarely by researchers. To further develop and adjust the training procedures, peers should discuss pros and cons of different techniques as well as discuss how obstacles may be addressed.

PD38

COMPARING TRANSLATIONAL SUCCESS RATES ACROSS MEDICAL RESEARCH FIELDS

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Abstract
Many interventions that show promising results in preclinical development do not pass clinical tests. Part of this irreproducibility may be explained by poor animal-to-human translation. Using animal models with low predictability for humans is not ethical, nor efficient.

If translational success rates show substantial variation between medical research fields, future analyses of the common practices in these fields may identify factors contributing to successful translation. We thus assess translational success rates in medical research fields.

The fraction of phase-2 clinical trials with a positive outcome was used as a proxy for translational success. Trials were retrieved from the WHO trial register. Trials were categorized into medical research fields according to the international classification of disease (ICD-10). Low-level categories were pooled to higher-level categories where necessary, to create clusters containing at least 50 trials as a basis for calculating percentages.

Preliminary analyses show that 20.9% of phase-2 trials was terminated, and 65.3% was successful. The research fields with the highest success rates were Lymphoma (83.3%), Influenza (83.1%), and Viral Hepatitis C (82.9%). The lowest success rates were found in Brain Cancer (47.2%), Bladder Cancer (47.1%), and Kidney Cancer (43.2%).

Our preliminary analyses suggest relevant differences in success rates between medical research fields. Final analyses of the trial data will be presented at the conference, supplemented with a literature review assessing translational success described in reviews in the fields of Neuroscience, Pharmacology, and Cancer. Ideas on improving translational success based on differences in research practice between the research fields will be discussed.

PD39

THE IMPORTANCE OF PEER-TO-PEER COMMUNICATION IN TIME OF CRISIS – THE SWISS EXPERIENCE

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Abstract
The partial lockdown imposed by the Federal authorities in March 2020 in Switzerland to fight against the COVID-19 pandemic highlighted in an unexpected manner the importance of the Swiss Animal Facilities Network (SAFN).

Established in 2014 under the auspices of what would become swissuniversities, the members of the SAFN are representatives of the Swiss academic institutions (universities and Swiss Institutes of Technology) that perform in-vivo research. The activities of the SAFN are carried out by the Executive Board, composed of heads of the animal facilities, under the supervision of the Strategic Board. Amongst the important tasks of this network is communication between facilities exchanging experiences at peer level, refinement of common processes, coordination of communication with the different stakeholders i.e., the federal veterinary authorities and elaborating communication texts for the public.

During the crisis situation linked to the COVID-19 pandemic the SAFN proved to be a highly valuable asset. Regular meetings between the members of the Executive Board allowed a timely exchange of ongoing response measures and helped identifying and sharing best possible solutions for common issues faced, in compliance with the sanitary and regulatory requirements. The network maintained close contacts with the veterinary authorities to have them aware of the actual issues and future implications. Last, key information on the consequences of the pandemic for the facilities were communicated in a coordinated manner with the public.

The various communication activities that took place will be presented together with lessons learned and the resulting improvements for more ethical emergency plans.

PD40

ADOPTION OF MINIPIGS – A SECOND LIFE AFTER RESEARCH

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Abstract
The use of animals for scientific purposes is regulated by the EU Directive 2010/63/EU implemented in the German legal framework. These regulations encourage to allow animals a second life outside research after the end of their experimental one. As a key element of the 3Rs principles according to Russel and Burch (1959) this is one example for Refinement.

Transformation of research required the termination of large animal experiments at the Sanofi Frankfurt am Main site. Contact was established with an animal welfare organization which then took over the onward placement of the minipigs to private individuals. Coordinating the delivery of the 27 minipigs to their new homes was a real challenge during the lockdown. Details with legal permissions, inspections and certifications had to be clarified and organized. Before adoption and transport, the health of all minipigs were thoroughly checked again. With the health certificate, all the pigs were able to set off for their new owners safe and sound. The minipigs were re-homed in their existing social groups.

The efforts were well worth it. Pictures and videos from the new owners are showing the minipigs feel super comfortable in their new surroundings and enjoying their second life. We believe that was a real win-win-situation in the sense of applying culture of care, for humans and the animals.

PE01

BUILDING AN ANIMAL LACTATION MODEL: PILOT AMOXICILLIN STUDY IN CONVENTIONAL PIGS AND GÖTTINGEN MINIPIGS

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Abstract
The Work Package 3 of the ConcePTION project focusses on developing a lactation animal model, translatable to humans, to perform non-clinical trials prior drug approval. After an accurate

literature review, the porcine species was selected. A preliminary trial with amoxicillin was performed on 6 sows: 3 conventional farm hybrids and 3 Göttingen minipigs provided by Ellegaard. From arrival, animals were daily trained for milk and blood collection, fulfilling the 3Rs animal welfare principle. Sows were equipped with a peripheral long-term catheter, pivotal for painless blood sampling; milk was manually collected after administration of exogenous oxytocin. Amoxicillin was injected intramuscularly SID, from the second week of lactation until the end, day 28 post-delivery. During the trial, multiple samplings were collected almost daily: milk/blood matched samples from the sows, and piglets blood samples, at different time points, while on the first day a PK analysis on sows' blood was performed. Once aliquoted, samples were stored at -80°C and delivered to BioNotus GCV, which performed the analyses. Amoxicillin was constantly quantifiable in sows' plasma and milk; confirming that it is consistently capable of passing the blood/mammary barrier. On the other hand, the drug was almost always under the detection limit in piglets' plasma; indeed, only 9 out of 133 samples showed detectable amoxicillin levels. The results of this preliminary trial strengthen the promising application of the swine as preclinical model for *in vivo* lactation studies, considering ethical factors, feasible group size, milk volume and physiological similarities with humans.

PE02

MICROBIOTA CHANGES AFTER LOCAL COLITIS TREATMENT WITH A DRUG-ELUTION HYDROGEL WITH BIOLOGICS IN RAT

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Abstract

Background: The individual genetics and intestinal microbiota compromise treatment outcome in inflammatory bowel disease (IBD). Biologics as anti-TNF or anti-integrin have improved IBD management. However, little is known about its effect on commensal microbiota. The development of a new endoscopic drug-elution hydrogel allows for a local treatment during colonic inflammation, leading to lower needs of dosage and a decrease in systemic secondary effects.

Aim: To test the efficacy of anti-integrin local treatment using hydrogel and to assess associated changes in gut microbiota.

Methods: TNBS-colitis was induced in 12 SD male rats housed conventionally. Three days after TNBS induction, anti-integrin diluted in hydrogel formula (n = 5) or saline (n = 7) was administered transrectally. Study endpoint and sample collection was set at 4 days post-treatment. A sham colitis group was also included (n = 7). Body weight, colonic ulcer area and colonic weight/length were evaluated. Cecal microbiota was analyzed through massive sequencing.

Results: Body weight drop was partly recovered after hydrogel with anti-integrin treatment in TNBS-induced animals. Colonic ulcerated areas were also significantly reduced. Colitis led to a decline in the Firmicutes/Bacteroidetes ratio within the inflamed non treated group. Conversely, this microbial change was not present in the treated animals. Specific changes were observed in different bacterial taxons. For instance, Blautia decreased in non-treated animals while in treated rats the relative abundance of this genus was partially recovered.

Conclusion: The present proof-of-concept study shows that anti-integrin local treatment through hydrogel ameliorates inflammatory parameters and partially reverts the microbial changes which are usually present during intestinal inflammation.

PE03

A LASER INDUCED PORCINE MODEL OF OUTER RETINA DEGENERATION FOR TESTING OF CELL THERAPIES

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Abstract

Currently over 30 million people world-wide suffer from non-treatable vision loss and blindness associated with childhood onset and age-related eye diseases caused by degeneration of the photoreceptors (PRs), the retina pigment epithelium (RPE), or the choroid. Recent work suggests that RPE tissue transplant, the size of a human macula (~20 mm^2), is feasible and similar approach may be required for degenerated PR and choroid replacement. Currently there is no good translational animal model to test safety and efficacy of a 20 mm^2 clinical dose. Here we developed a versatile and accessible pig model to generate discrete or complete degeneration of various outer retina layers to mimic different types and stages of retinal degeneration. Using a micropulse laser procedure with adjustable power (1%, 1.5% or 2% duty cycle) we obtained different degrees of degeneration in RPE only, RPE plus PRs, or RPE plus the choroidal vasculature. Longitudinal follow up using adaptive optics and optical coherence tomography-angiography (OCT and OCT-A) along with automated image analysis confirmed progressive damage to cone photoreceptors, RPE, and the choroid consistent with increasing laser power. Functional assessment of the retina with multi-focal electroretinogram confirmed localized damage to the pig visual streak, a structure equivalent to the human macula. This versatile large animal model is optimal for testing both cell replacement and restorative gene therapies for multiple retinal degenerative diseases (age-related macular degeneration, retinitis pigmentosa, choroideremia), and the use of clinically relevant imaging and functional modalities allow quicker translation to patients.

PE04

INTESTINAL MICROBIOTA DETERMINES THE OUTCOME OF COLITIS PATHOGENESIS IN INTERLEUKIN 10-DEFICIENT MICE

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Abstract
The complex community of intestinal microbes conveys significant benefits to host physiology. However, changes in microbiota composition and function have been associated with the development of multiple disorders such as inflammatory bowel disease. In this study, we determined how the microbial composition influences the pathogenesis of colitis in an interleukin 10 (IL10)-deficient mouse model.

We analyzed IL10-deficient mice of two distinct genetic backgrounds (C3H and B6) each housed in different husbandries (two strict specific pathogen free (SPF) and one experimental SPF barrier). Histopathological investigation of colonic tissue showed that mice of both backgrounds developed no or mild form of inflammation when housed in strict SPF units, whereas mice housed in experimental SPF showed moderate to severe colitis. Inflammatory lesions were characterized by hyperplasia of crypt epithelium and infiltration of immune cells in the intestinal wall. Furthermore, mice housed in experimental SPF displayed increased expression of pro-inflammatory cytokines indicating an enhanced activation of mucosal immune response. In addition, the reduced expression levels of sealing tight junction proteins and mucus pointed to defects in epithelial barrier functions. 16S rRNA gene sequencing showed that microbiota composition is distinct in all three analyzed barriers based on host genetic background and origin. In this context, the presence of *Lachnospiraceae* and *Ruminococcaceae* families was associated with a protective effect, whereas the increased abundance of *Bacteroidales* and *Verrucomicrobiaceae* was linked to a detrimental effect.

Altogether, our results showed that the specific composition of intestinal microbiota has a strong impact on health status of IL10-deficient mice.

PE05

PATHOLOGICAL FINDINGS UNDERLYING ABDOMINAL DISTENSION IN AN EXPERIMENTAL FACILITY OF LABORATORY MICE

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Abstract
Introduction: Abdominal distension (AD) is a non-specific clinical sign commonly reported in laboratory mice. The identification of the underlying cause only based on physical examination results in a lack of accuracy in the pre-mortem diagnosis.
Aims: Describe and quantify the macroscopic lesions contributing to AD in laboratory mice and to establish a differential diagnosis.
Methodology: Cases of AD in mice reported to the veterinary area of the PCB Animal facility were clinically inspected and were submitted for necropsy. Histopathology analysis was only performed for selected cases.
Results: 91 Cases of AD during the period 2019–2020 were included in the study (41 females (47.25%) and 48 males (52.74%). 17.97% of the animals were younger than 6 months; 20.22% were 6–12 months old and 64.04% were older than 12 months. 71 necropsies were performed. Most of the lesions were localized in the liver (28%), spleen (16%), urinary tract (13%), mesenteric lymph nodes (11%) and female reproductive tract (11%). Hepatomegaly due to neoplastic disease (mostly histiocytic sarcoma) was the major cause of AD (27.72%). Neoplastic splenomegaly and mesenteric lymphadenopathy represented respectively 14.85% and 10.89% of the lesions contributing to AD. Other less common lesions included seminal gland hyperplasia, hydronephrosis, urinary bladder distension, kidney neoplasia, hydrometra, uterine neoplasia, pyometra, foetal retention, pregnancy, ovarian cyst, hemoperitoneum and ascites and gastrointestinal distension.
Conclusions: The most common cause of AD was neoplastic hepatomegaly in mice older than 12 months. This study should provide data for *pre* or *post mortem* diagnosis for AD in laboratory mice.

PE06

A QPCR ASSAY FOR THE DETECTION OF STAPHYLOCOCCUS AUREUS IN LABORATORY ANIMAL HEALTH MONITORING

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Abstract
When employing rodents for biomedical research, a thorough hygienic monitoring program is necessary for keeping animals healthy and obtaining reliable data. In order to improve sensitivity for the detection of specific agents and further the reduction of animals used, molecular assays are necessary. One focus has been on the development of quantitative real-time polymerase chain reaction (qPCR) assays for the analysis of animal-derived and environmental samples.

Staphylococcus aureus (*S. aureus*) is an opportunistic bacterium with a broad host spectrum. As clinical and also subclinical infection of laboratory animals can massively influence research data, it is crucial to monitor the existence of *S. aureus* in breeding and experimental colonies. However, until today, validated protocols for the detection of *S. aureus* in environmental samples are missing. Therefore, we aimed at the development of a highly sensitive qPCR assay.

A novel primer probe set, based on detection of the virulence factor Nuclease, was confirmed by testing the assay on *S. aureus* type species, other Staphylococci, and unrelated mouse

commensals. It was validated within different barrier units using different sample types and results were compared to cultural analysis of sentinel animals.

The assay was suitable to detect *S. aureus* without cross-reactivity to other bacterial species, indicating high diagnostic specificity. It also revealed outstanding diagnostic sensitivity and allowed for faster and more accurate results compared to cultural diagnostic of sentinel mice.

This assay demonstrated to be beneficial during routine health monitoring of laboratory mouse colonies and was promising for environmental sampling strategies.

PE07

A NOVEL AND HIGHLY SENSITIVE QPCR ASSAY DETECTS *CLOSTRIDIUM PILIFORME* IN EAD MATERIAL

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Abstract
Health monitoring (HM) of laboratory rodents is the fundamental basis for preserving animal health and ensuring research validity. *Clostridium* (*Cl.*) *piliforme*, the causative agent of Tyzzer's disease, is a common pathogen in laboratory mouse colonies and should therefore be included in routine HM protocols.

As modern molecular techniques come along with higher diagnostic sensitivity and specificity compared to traditional methods, it became common to perform Polymerase-Chain-Reaction (PCR) analyses of the exhaust air dust (EAD) material of individually ventilated cage (IVC) systems to screen larger animal cohorts. However, until today, validated protocols for the detection of *Cl. piliforme* in EAD material are missing.

We currently observed diarrhoea and haemorrhagic enteritis in a 23 weeks old B6-*Stat3*^{tm3Vpo} Tg(*alfaMHC-cre*)2176Mds mouse which was housed within an experimental unit. *Cl. piliforme* was detected in the intestinal content by using a novel quantitative Realtime-PCR (qPCR) assay, which we developed for the use in our routine HM program. Positive findings were confirmed by conventional PCR analysis and third-party testing. Subsequent analysis of the EAD material of all IVC racks in the experimental unit revealed nucleic acids of *Cl. piliforme* in two adjacent IVC racks. Consequently, we performed extensive serological analyses and detected seropositive animals in two different mouse strains, including animals related to the mouse suffering from clinical manifestation. No specific antibodies were detected in the sentinel mice.

Thus, EAD analysis using our novel qPCR assay served as a powerful screening method for the highly sensitive detection of *Cl. piliforme* in routine HM procedures.

PE08

SUDDEN DEATH OF IMMUNOCOMPROMISED-MICE CAUSED BY CYTOLYSIN INDUCED SEPTICEMIA AFTER INFECTION WITH *PAENICLOSTRIDIUM SORDELII*

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Abstract
Immunocompromised mouse strains serve as powerful models in biomedical research; However, health management of colonies is challenging as animals are highly susceptible for infections with common pathogens and opportunistic bacteria. Therefore, breeding colonies should be housed within strict hygienic barriers to maintain their health integrity. Nonetheless, there is a risk of infectious disease development whenever animals are relocated to experimental barriers for research procedures.

We currently observed per-acute manifestation of severe diarrhoea and sudden deaths in three independent cohorts of NOD.Cg-*PrkdcscidIl2rg*^{tm1Wjl}/SzJ (NSG) and NOD.Cg-*Rag1*^{tm1Mom} *Il2rgtm1*^{Wjl}/SzJ (NRG) mice, which were housed within an individually venitaled cage system located in an experimental barrier unit.

Gross pathology revealed hemorrhagic or edematous inflammation of the intestines, while massive cell lysis of the intestinal epithelium was observed by histopathological analysis.

Intestinal content of affected animals was transferred to healthy recipients by oral gavage and induced the same disease phenotype after 4–6 days, proving an infectious etiopathogenesis. While extensive microbiological and virological diagnostics ruled out infections with common murine pathogens, *Paeniclostridium sordellii* was isolated from blood, organs, and intestinal contents of 13 out of 23 of the affected mice. Subsequent Polymerase-Chain-Reaction analysis for common toxin genes excluded presence of lethal toxin but showed that the isolated bacterial strains consistently expressed a cholesterol-dependent cytolysin. Our data reveal that immunocompromised animals are more susceptible for fatal septicaemia due to toxin induced damage of intestinal epithelium and subsequent intestinal hyperpermeability.

These findings shed light on *Paeniclostridium sordellii* and other *Clostridiae* as emerging pathogens, causing infectious disease in immunocompromised mouse colonies.

PE09

GALLERIA MELLONELLA MODEL HOST: A POTENTIAL IN VIVO TOOL TO ASSESS ANTIBODY FUNCTIONALITY

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Abstract
Larvae from Galleria Mellonella (G. mellonella) are susceptible to all human pathogens and are used as model host for pathogenicity and in vivo toxicology studies 1–2. Here we would like to assess the possibility to use this model as a tool for testing antibody functionality. Larvae will be injected with sera, antibodies purified from hyper-immune sera or monoclonal antibodies and then will be infected with a lethal dose of bacteria testing the ability of the antibodies to protect the host. Just as an example of the possible impact of this approach in R&D, should we consider testing 50 candidates in 2 animal models of infection using 4 representative bacterial strains and 30 animals per group, it would take around 3 years and more than 15.000 mice to collect reliable efficacy data. With the proposed approach, sera against 50 antigens can be obtained in 4 months from about 250 mice. It would take 4 additional months then to test them in the G. mellonella infection model using the same number of bacterial strains, allowing the down selection of a list of the best candidates to be eventually confirmed in vivo. With a hypothetical list of 15 antigens to be tested in mice we could be able to save around 65% of animals and 50% of time to reach the same results. Additionally, using sera from humans, a possible bridging between clinical and preclinical data could be also assessed.

PE10

EFFECT OF CHRONIC ANTIDEPRESSANTS AND GLUCOCORTICOIDS IN JUDGEMENT BIAS AND HOMECAGE BEHAVIOUR IN MICE

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Abstract
Chronic administration of glucocorticoids or antidepressants is extensively used to promote and reduce depressive-like states, respectively. This paradigm has been widely validated by neuroscientists, but husbandry conditions of mice in course of these experiments have also been shown to impair animal welfare. In this experience, affective states were studied after 4-weeks of daily intraperitoneal injection of dexamethasone (a glucocorticoid receptor agonist) or fluoxetine (an antidepressant that selectively inhibits serotonin reuptake). The Dexamethasone and Fluoxetine groups were compared to mice that were only being handled or receiving saline injections. In total, 32 female and 36 male Swiss mice (stock NLAE:NIH[SWISS]), housed in standard cages, were used. Animal welfare was studied by means of a Judgement Bias (JB) Task that evaluates the latency to seek a reward after the presentation of full (positive or negative) or ambiguous cues. In this task, animals with more positive affective states have shorter latencies after the ambiguous cue and are operationalized as 'optimists', while the opposite occurs for animals in negative affective states. In addition, live-scans of the behaviour of the animals in their homecages were taken. Our results indicate that mice from the Dexamethasone group were the most 'optimistic' ($p < 0.05$). These data are in contrast with our initial predictions, since prior experiments with dexamethasone had revealed that mice showed signs of anxiety and depression-like behaviour in traditional behavioural tasks. The implications of these findings to assess affective states in future experiments, along with their association with certain homecage behaviours, will be discussed.

PE11

STREPTOZOTOCIN-INDUCED DIABETIC RATS – COLONIC STRUCTURAL CHANGES ARE PRESENT WITH A SHORTER PROTOCOL

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Abstract
Dysmotility is a complication of diabetes mellitus (DM) that investigators commonly study using rodent models in long protocols (>4 weeks). Considering that streptozotocin (STZ) is the agent of choice to induce DM, we aimed to assess whether 2 weeks are sufficient to induce colonic alterations that resemble those observed in long-lasting STZ models.

DM was induced in adult male Wistar rats ($n = 11$) by a single injection of STZ (IP,55 mg/kg) after a 4h fasting period and under tramadol (20 mg/kg, PO) analgesia. Eight rats were used as controls. Animals were daily monitored. After two weeks rats were euthanized, colon was weighed, measured and segments of the proximal (PC) and distal (DC) colon were processed for histological evaluation.

STZ-induced rats showed hyperglycemia compared to controls (>500mg/dL *vs* 99.30±3.29mg/dL;$p < 0.05$) and exhibited transient mild piloerection and classic DM signs: polyphagia, polydipsia and polyuria. Compared to controls, colon of diabetic rats showed increased longitudinal length (25.75±0.77cm *vs* 19.63±0.47cm), circumferential perimeter (15.45±0.58mm *vs* 11±0.46mm) and length/body weight (8.23±0,31cm/g *vs* 4.66±0,1cm/g)($p < 0.05$ for all). Histology showed that colonic wall thickness of STZ-induced animals was higher than controls (PC:666.66±32.340μm *vs* 389.24±39.03μm; DC:570.93±27.16μm *vs* 430.42±26.26μm; $p < 0.01$).

Our study shows that only two weeks after STZ-DM induction animals present typical DM signs and colonic structural changes that resemble those published by others using longer STZ-induced DM. These data suggest that a shorter refined protocol can be used to study diabetic intestinal alterations.
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PE12

DEALING WITH DATA OVERLOAD? CUSTOM DATA MANAGEMENT IN A GNOTOBIOTIC FACILITY TO IMPROVE COMMUNICATION

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Abstract
Running a specialised animal facility, like a gnotobiotic facility, requires a large amount of data collection as well as an often-complicated work schedule. Due to the nature of gnotobiotics, requiring rigid protocols and quality control, this results in a large amount of data logging to be recorded. Additionally, due to the very specialised nature of work in this type of facility, Gnotobiotic technicians will often be carrying out experimental procedures on behalf of laboratory staff meaning that experimental data must be recorded to a "lab book" level. In many facilities these records are kept on paper. The TRI Gnotobiotic facility has created a centralised customised database that manages the day to day running of the facility including a daily work schedule for technicians to follow, animal husbandry requests, experimental procedure scheduling and result recording, shipments of animals, maintenance of facility equipment and consumable ordering requests. The database can provide up to date reporting on facility usage, cross-referencing of data between isolators and experiments, assists with budgeting, and can be remotely accessed to check on progress. This customised database allows for efficient management of all aspects of a specialised research facility. Effective communication of work procedures to technicians, management of animals from a welfare perspective and accurate communication to budget holders for responsible management of a research facility are all achieved through this medium.

PE13

AUTOLOGOUS BLOOD-DERIVED PATCHES: A NEW MEANS OF PREVENTING POSTSURGICAL ADHESIONS

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Abstract
Intraabdominal adhesions – internal wound surfaces inadvertently fusing with, and sticking to, other organs when healing – are a common complication after abdominal surgery. In human patients, these adhesions can lead to pain, infertility, and might even result in life-threatening bowel obstructions. Prior studies suggest that using a patient's own blood, a biological patch, consisting only of elements present in the blood, can be generated, and applied to increase healing of a wound. Could these patches be used to improve healing inside the abdominal cavity, and to prevent the formation of adhesions?

In the present study we investigated autologous blood-derived patches as a novel strategy to prevent adhesions. The patches were applied in a surgical set-up where the uterine horns of 40 female Lewis rats were damaged. Each rat served as its own control, with one patch treated uterine horn and one untreated. All adhesions were assessed blinded and evaluated macro- and microscopically, 14 days after surgery. The patches significantly reduced the incidence and extent of adhesions, assessed macroscopically in treated uterine horns when compared to untreated controls.

The autologous patches successfully reduced the formation of postsurgical adhesions compared to no treatment. We did not observe any adverse events linked to the patches, or any histological difference. In summary, we believe that this study confirms the potential of autologous blood-derived adhesion prophylaxis in surgical use. These initial findings have enabled us to take our idea into a larger animal model, on the way to the clinic.

PE14

CONTROLLING SPREAD OF *PSEUDOLOMA NEUROPHILIA* BETWEEN ZEBRAFISH FACILITIES

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Abstract
The rapidly increase in the use of zebrafish (*Danio rerio*) in biomedical research areas such as toxicology, developmental biology, cancer, or infectious disease has generated interest in infectious agents affecting this model and their impact on scientific studies. The most important and widespread pathogens of zebrafish in research facilities are *Pseudoloma neurophilia* and *Mycobacterium* spp.

Before moving fishes to a new facility we implemented strategies to eliminate pathogens we had in the old facility especially *Pseudoloma neurophilia*. Since this pathogen is resistant to chlorine surface common disinfection protocols due to intra-ovum transmission, we decided to develop several protocols for avoiding introduction of Pseudoloma to the main facility, mostly a strict quarantine and biosecurity policies. As the pathogen primarily infects the hindbrain and the spinal nerver roots and then spread to ovarian and testis tissue we only selected young animals for spawning. We also followed a third generation rederivation procedure (two steps quarantine) with "eggs only policy" and

have evaluated several chlorine disinfection protocols to compare fry survival and pathogen persistence.

The control of pathogens process in fish research facilities is relatively new but it should be as important as in mammalian research models since pathogens are causing severe morbidity and underlying chronic conditions that cause low grade or subclinical infections that may confound research results. Although we have only been using these measures for a short time, so far we haveńt found Pseudoloma in the PCR tests of the new facility.

PE15

REFINEMENT OF MANNAN-INDUCED PSORIATIC ARTHRITIS MOUSE MODEL USING NON-INVASIVE IMAGING TECHNIQUES

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Abstract
Psoriatic arthritis (PsA) is a poorly understood chronic inflammatory disease induced by several factors and affecting skin and articular joints. A single intraperitoneal exposure to mannan from Saccharomyces cerevisiae can induce an acute inflammation in DBA mouse strain which is similar to human PsA. In addition to macroscopical observational parameters (psoriasis and arthritis scoring/ears thickness/body weights), lesions induced in this animal model were evaluated using several non-invasive techniques: Optical Coherence Tomography (OCT) for psoriasis related parameters (epidermis thickness) evaluation, Fluorescent Molecular Tomography (FMT) and Thermography (FLIR) for arthritis/inflammation related parameters evaluation (MMP expression/surface temperature).

After validation of PsA lesions macroscopically and with conventional technique (histology), various reference treatments were tested like Betamethasone (glucorticoïd) PO, Methotrexate (antimetabolite) IP, and Cyclosporine (immunosuppressant) PO. Treatments were able to reduce skin and arthritis lesions, especially Betamethasone, and enabled to validate this animal model. The latter seemed to be a robust model to evaluate the efficacy of new therapeutic strategies.

The use of imaging techniques allowed non-invasive evaluation of lesions in complement to clinical scoring and a longitudinal monitoring of treatment efficacy. Correlation established in this animal model between non-invasive imaging technique (OCT for skin lesions) and histology showed the interest for using non-invasive imaging techniques. Results generation was accelerated using this original approach and allowed to validate this animal model as a potent preclinical model to better understand this pathology.

PE16

BEHAVIORAL DIGITAL RECORDINGS

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Abstract
During *in vivo* early stages studies using mice, the follow-up of animals comprises short clinical checks during the day, body weight, body temperature, etc. To better address the monitoring of clinical and behavioral signs, we worked on the automatization of this follow-up by using digital tools. In collaboration with Deepomatic, we used night video recordings coupled to an Artificial Intelligence (AI) and Machine Learning to target standard and specific behaviors such as eating, drinking, moving, grooming, rearing, climbing.

The AI based solution for animal monitoring and behavior tracking can be useful for phenotyping and accelerating drug candidates' selection, by introducing safety endpoints in early efficacy studies. This solution refines the current procedures by collecting continuous data and allowing real time analysis. Targeting nocturnal activity also improves reliability of the data, especially in rodents which are more active during the night.

We evaluated the AI sensitivity and predictivity and are now working on the deployment of this automated tracking system in different therapeutics areas and scientific contexts.

PE17

USEFULNESS OF AN EXPERIMENTAL MODEL OF EXTRACORPOREAL BLOOD PURIFICATION IN RESEARCH AND DEVELOPMENT

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Abstract
Extracorporeal blood purification (ECBP) is a therapy frequently used in patients especially during kidney failure. This technique has constantly improved, and the development of an animal model has become essential to assess the effectiveness of new ECBP devices. Indeed, although *in vitro* tests (replacement) allow proof of concept, they do not allow the assessment of all physiological parameters that could be modified during ECBP. Because of their body mass and blood volume similar to human and their low-stress character, sheep are good animal model. Because several sessions can be performed on the same animal (reuse), each sheep is its own control (reduction). Moreover, the post-surgical period (only catheter equipment) is not painful and the ECBP sessions are conducted in the presence of congeners to respond to their herd behavior. During ECBP session, the sheep are conscious, can drink and eat (refinement). The welfare is observed

through rumination (a physiological process and an indicator of sheep's low stress level).

Created in 2000, this model has allowed improving various therapies, such as renal ECBP, hepatic ECBP, ECBP following intoxication (drug, poisons), or extracorporeal membrane oxygenation.

Over the past ten years, 53 different experiments, involving the ovine model of ECBP, have been performed in our research unit, 80% of which were renal ECBP.

In addition to the results generated for the human benefit, we have adapted ECBP to treat dogs suffering from acute renal failure in the veterinary hospital of VetAgro Sup by adapting the ECBP method to pets.

PE18

THE CHANGE STATION AS A HUB OF COMMUNICATION IN THE ANIMAL ROOM

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Abstract
A substantial part of the communication concerning animals in experiments takes place in/at the change station. By communication we mean the creation and the exchange of data concerning these animals and signalling of special states, services, discrepancies, etc. This internal and external communication with other participants has a direct influence on the refinement of the animals.

Since communication in a clean room takes place under difficult working conditions, the efficiency of information exchange is very important. Here, the type of communication means, standardization and especially automation play an important role.

Different systems with incompatible interfaces are often an obstacle to communication. Additional electronic equipment carries the risk of additional contamination bridges and interrupted hygiene.

The aim of the paper is to show the status of development and considerations using electronic cage cards as dynamic representatives of cages and contents and their integration into a modern change station as a communication hub. The paper is aimed at researchers, animal welfare officers and animal caretakers.

PE19

A NEW GROUP HOUSING APPROACH FOR NON-HUMAN PRIMATE METABOLISM STUDIES

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Abstract
Understanding the absorption, distribution, metabolism and excretion (ADME) of candidate drugs in preclinical species is an integral part of the safety and efficacy evaluation in drug development. For this purpose, the housing of single animals in metabolism cages has historically been common practice for ADME studies. Whilst mini-pigs and dogs are selected wherever possible, non-human primates (NHPs) are used where there is no suitable scientific alternative. Having undergone only minimal revisions over the past 30 years, the traditional single-housing metabolism cage design for NHPs significantly limits normal vertical movement and social behaviours in primates. Minimising animal suffering and improving welfare is an important aspect of working with animals in research and Novo Nordisk A/S, together with collaborators, has focused on this area for many years. A novel metabolism cage for group housing of NHPs has been designed in a joint collaboration between Novo Nordisk A/S and Covance Inc. The advantages of this novel cage are extensive, including a significantly increased cage volume and ability for socialisation, as well as improvements to alleviate stress and boredom. The excretion balance data from six male NHPs housed in single or group metabolism cages were compared using the radiolabelled test compound [^{14}C]-quetiapine. Welfare, in terms of stress and behaviour, when animals were single or group housed was also assessed. Mean recoveries of radioactivity were shown to be comparable irrespective of housing design (83.2% for group-housed animals vs. 87.1% for single-housed animals), supporting the potential suitability of NHP group housing for future metabolism ADME studies.

PE20

CAGE-LEVEL ENVIRONMENTAL SAMPLING PROVIDES INCREASED SENSITIVITY IN *PNEUMOCYSTIS CARINII* DETECTION

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Abstract
Regular monitoring of rodent colonies for infectious agents is critical to maintain research colony health and prevent inadvertent experimental variability. A variety of testing methods and sample types have been evaluated to detect infection with *Pneumocystis* spp. However, due to the complex life cycle and shedding patterns of this opportunistic fungus, antemortem serologic testing or postmortem PCR testing of lung tissue from affected animals remains the gold standard. Unfortunately, commonly used antemortem samples for PCR analysis, such as faeces and oral swabs, are insensitive for detecting this agent in infected rodents. Further complicating detection, is the low rate of transmission from colony animals to soiled bedding sentinels. To address these issues, we investigated the use of pooled cage-level swabs as a means of PCR detection for *Pneumocystis carinii* compared with other commonly used sample types. We demonstrate that swabs of specific zones within cages housing known-positive rats can be used as an alternative antemortem sampling strategy.

PE21

BODYWEIGHT, LOCOMOTION, AND BEHAVIORAL RESPONSES IN THE NAKED MOLE-RAT (*HETEROCEPHALUS GLABER*) AFTER LIPOPOLYSACCHARIDE ADMINISTRATION

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Abstract
The naked mole rat (NMR) has unique biological characteristics that include, among others, a long, healthy lifespan, low pain sensitivity, and cancer resistance. These attributes are attracting interest in the animal as a model for ageing, pain, cancer, and other areas of biomedical research. In ageing, pain, and cancer, inflammation plays a key role. Characterization of inflammation and its effects on other biological processes may be a requisite step in establishing this animal as a model for these conditions. Our study explored the effects of inflammation induced by lipopolysaccharide (LPS) on body weight, locomotor activity, and other behaviours of the NMR. LPS caused weight loss, which was not prevented by TAK 242 pre-treatment. LPS caused dullness and reduced movement in home cages but failed to depress locomotion in the open field test (OFT). Urination, defecation, and activity freezing in OFT were rare and not affected by LPS. Weight loss due to LPS and failure of TAK 242 to prevent it reflects what has been reported in other models. Failure of LPS to depress locomotion in OFT suggests unique crosstalk between immune system and brain or alternatively, that motor responses or their control centres are tolerant to depressive effects of novel environment and inflammation. The absence of activity freezing and rare urination and defecation in OFT suggests that novel environment or LPS do not induce anxiety in NMR. These findings contribute to the understanding of the unique biology of NMR and support it as a relevant model for inflammatory research.

PE22

SKELETAL MALFORMATIONS IN MICE AND THE MAGIC OF X-RAY DIAGNOSTICS

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Abstract
As an attending veterinarian of a laboratory animal facility, we are daily inspecting mice that present with an altered general health, behavior, habitus, or organ pathology. Whereas the majority of conditions is either clearly visible to the human eye (such as corneal opacities, organ prolapses, tooth anomalies or skin wounds) or can quite reliably be diagnosed based on distinct palpatorial criteria (such as the mouse genitourinary syndrome, hydronephrosis, enlargement of liver, spleen or lymph nodes), some other alterations simply leave us guessing. By using a small-scale X-Ray machine, intriguing insights into especially skeletal alterations have been made. As an example, whereas parenting dams are suspected to sometimes bite off their pups' tail tip, potentially associated with an extensive grooming behavior, more substantial loss of the tail, digits or even paws were found to be associated with extensive appendicular bone malformations. Also, kinked tails that are frequently misinterpreted as caused by injuries or rough handling, were found to be associated with distinct vertebrae malformations. Also, in cases of lameness that was not found to be associated with obvious inflammatory processes (such as arthritis) or neurological problems, spontaneous fractures or malformations of vertebrae, the pelvis or the appendicular skeleton were found. Even though in laboratory mice, the radiological diagnostics are so far not followed by a medical treatment, this information can be used in future cases to even better interpret animal health burden and prognosis and to increase the overall knowledge in laboratory animal sciences.

PE23

NATURÉS CURIOSITIES – BILATERAL GYNANDROMORPHISM IN MICE

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Abstract
This case report summarises the topic of a male C57BL/6 mouse delivered from a commercial vendor reported with an enlarged scrotal area. At visual and palpatory inspection, ambigous sex characteristics were observed. Briefly, neither testes nor a vaginal opening was detected. During diagnostic section, a small penis, a left-sided testis, epididymis, and vas deferens, as well as a right-sided ovary, fallopian tube, and enlarged uterine horn were detected. Organs were processed for histological evaluation of gonadal status. Briefly, male as well as female reproductive organs were developed physiologically. Spermatogenesis was found to be qualitatively normal but quantitatively substantially reduced. The ovary presented follicle-like structures. For determination of the chromosomal sex, X-inactivation was assessed by Xist expression. Xist expression was found to be negative, suggesting an XY karyotype for the gynandromorphic mouse. Gynandromorphism is an overall extremely rare finding mostly observed in insects, spiders, crustaceans, other arthropods, and birds. Bilateral gynandromorphism further specifies a midline seperation of male vs female characteristics, as observed for the internal genitalia in the mouse presented here. We suggest that the loss of the Y-chromosom in one cell of an XY two-cell stage, consequently leading to XY i.e. male and X0 i.e. female cell progeny during cell division, might offer a possible explanation for the bilateral development of functional reproductive organs of both XY and X0 origin in the present gynandromorphic mouse.

PE24

CMS: A REFINEMENT AND REDUCTION INITIATIVE THAT CAN ALSO INCREASE DATA QUALITY

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Abstract
The capillary micro sampling method (CMS) technique has many advantages over other blood sampling methods in rodents. It does not require sedation, anesthesia, or heavy fixation of the animals during sampling and in addition, the sample volume is small and hence many samples can be taken per animal, which reduces the number of animals per experiment. Mice and rats are 2–3 minutes prior to sampling placed in a cage with bedding material under a heating lamp. One of the lateral tail veins is punctured with a 23G needle, and once a fairly large blood droplet appears at the puncture site, an EDTA coated 10 ul capillary (Sigma-Aldrich, Brøndby, Denmark) is placed just above the droplet, and the capillary is filled. The capillary is held and handled with a capillary holder unit (KABE LABORTECHNIK GmbH, Nümbrecht-Elsenroth, Germany). Right after sampling the capillary containing the whole capillary blood sample is placed in a small tube with purified water (100μL) and the sample is shaken to mix blood and water and to lyse the blood. This procedure makes it possible to take up to 8 samples within 24 hours on a mouse or rat without exceeding the maximally allowed amount of blood. The method can also be applied in guinea pigs without preheating, where the CMS is taken from either v. Saphena or v. Cephalica. The bioanalysis of the CMS samples is performed via the UPLC-MS/MS method, and it can be done via a fully automated robotic liquid handling system.

PE25

HEMATOLOGY ANALYZER RESULTS IN IMMUNODEFICIENT MICE: MIND THE TRAP!

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Abstract
Background: Immunodeficient mice are characterized by severe physiologic leucopenia. Veterinary hematology analyzers using flow cytometry differentiate white blood cells according to their granularity and fluorescence.
Objective: Is an hematology analyser previously validated in immunocompetent mouse reliable for leukocytes count in an immunodeficient strain?
Methods: Forty EDTA blood specimens from 8-week-old male and female NSG mice were analyzed with two hematology analyzers (IDEXX ProCyte Dx, SYSMEX XT 2000iV) and by microscopic evaluation from blood smears. Differential white blood cell percentages obtained with the analyzers and microscopic evaluation were compared.
Results: XT-2000iV produced abnormal leucocytes differential scattergrams (fused neutrophils and lymphocytes clouds) and numerous analytical flags warning of low reliability of the differential white blood cell numerical data preventing comparison with microscopic count. White blood cell differential counts comparisons were made between ProCyte Dx results and blood smear analysis. The main findings were a statistically significant effect of the method (analyzer compared with manual; $P < 0.001$) on mononuclear leucocytes, with mean counts being 10 fold lower for lymphocytes and 10 fold higher for monocytes on blood smear evaluation.
Conclusion: With regard to differential white blood cell populations, analysis of blood smears showed that, although the hematology ProCyte Dx analyzer had been validated in C57BL/6J mice, NSG strain lymphocytes and monocytes were over- and underestimated respectively when comparing automated to manual counts. This analytical bias can be prevented by systematic microscopic differential white blood cell count.

PE26

DEVELOPMENT OF A PROTOCOL FOR ASSESSING THE WELFARE OF A RESEARCH SHEEP FLOCK

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Abstract
Over time, animal status has changed considerably and is today at the heart of the debate in our society. Consumers and citizens are asking questions about animal welfare and respect, especially for laboratory animals.

The image of the half-free sheep, grazing serenely and in a state of well-being, is imprinted in the collective mind. However, when new animals arrive in our research flock, they are sometimes unsocialized and seem wild and frightened, even during the distribution of food, which should be a pleasant moment. Therefore, can these sheep be considered as being in a state of well-being? How can this be assessed? How to measure sheep welfare improvement over time due to socialization by the laboratory staff or the impact of our research protocols on animal welfare especially when animals are re-used?

In order to answer these questions, we carried out a literature review to adapt animal welfare assessment grids for farm animals to sheep, according to sheep main needs and behaviors.

We therefore propose a protocol to assess welfare indicators at the herd level, at the introduction of a new animal or over time. It can also be adapted at the individual level before and after the experiments. These indicators may be translated into a welfare score expressed as a percentage. The higher the percentage, the better the welfare.

These grids could be valuable tools to improve the refinement of protocols implemented on sheep in our research unit.

PE27

EVALUATION OF THE ESTROGENIC ACTIVITY OF DIETS USED IN SCIENTIFIC PROTOCOLS WITH RODENTS

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Abstract
The question of nutritional composition and the source of ingredients is an essential element in any in vivo study. In addition to these aspects, which ensure optimal nutrient balance and quality, it has become essential to take into account the presence of potentially interfering substances such as endocrine disruptors. These are capable of inducing a wide range of effects on an organism's metabolisms and can therefore influence the results of a study. In standard natural ingredient diets, soybean-based ingredients such as extruded seeds or meal contain phyto-estrogens, mainly in the form of isoflavones. Beyond their presence and nature, determining their endocrine disrupting activity is crucial. In this study, estrogenic activity on the estrogen receptor alpha was assessed using the human cell line HeLa-9903 (hERα) according to OECD 455 guideline. Two commercial diets with and without soy were compared. For both references, two batches were tested, with three replicate points per modality. Only the diet with soy showed estrogenic activity, which was low. For the diet without soy, the estrogenic activity was below the quantification threshold of 0.1 ng Eq E2/g feed. These standard diets thus meet the limits and recommendations on Endocrine Disruptors in relation to the receptor (ERα). Nevertheless, as the soybean food contains a slight estrogenic activity, it is necessary to consider this for studies where this property must be identified and controlled or not relevant.

PE28

EFFECT OF WEANING ON *CAMPYLOBACTER* INFECTION IN A UK BREEDING COLONY OF RHESUS MACAQUES

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Abstract
The separation of captive rhesus macaques (*Macaca mulatta*) from their mother is a major stressor and separation age has been identified as a candidate for refinement. There is evidence that adverse rearing increases susceptibility to gastrointestinal infections and disorders. However, no study has assessed the link between maternal separation and subsequent *Campylobacter* infection. We took advantage of historical records at the Medical Research Council's Centre for Macaques, where monkeys are screened annually for *Campylobacter* presence from rectal swabs. *Campylobacter* is a genus of gram-negative bacteria linked in the aetiology of diarrhoea that is prevalent in facilities housing nonhuman primates for research use. We sampled records for monkeys that had two consecutive observations: one group pre- and post-weaning (Female = 110; Male = 179); one group that remained in the natal group (Female = 54; Male = 70). We fit a generalized linear mixed model to data from the second health screen: *Campylobacter* presence was the outcome variable, specifying year as a random effect and controlling for main effects of sex, presence of *Campylobacter* in the group, group size, and *Campylobacter* presence in first health screen. We found that weaned monkeys had a significantly higher incidence of *Campylobacter* ($p = 0.03$). Fitting another model to the separated individuals at the second health screen, assessing the effect of separation age on *Campylobacter* incidence, we found a marginally non-significant negative association between weaning age and *Campylobacter* incidence ($p = 0.07$). These findings corroborate earlier research highlighting the benefits of later weaning.

PE29

MOLECULAR HYDROGEN PROTECTS MOUSE SPERM MITOCHONDRIA FROM OXIDATIVE STRESS AND IMPROVES SPERM MOTILITY

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Abstract
Oxidative stress caused by the imbalance between reactive oxygen species (ROS) and biological antioxidant system leads to an increase in damaged human sperm and subsequent male infertility. Because molecular hydrogen (H_2) acts as therapeutic antioxidant by selectively reducing cytotoxic oxygen radicals (Ohsawa et al., Nat Med, 2007), we hypothesized that H_2-treatment is beneficial for the prevention of oxidative stress-induced impairment in mice sperm.

To investigate the effect of H_2 on injured sperm, they were collected from the epididymis tail of mice and suspended in medium. Hydrogen peroxide was added to the sperm suspension to a concentration of 0.3 mM, and the sperm suspension was treated with. In addition, they were incubated for an additional 20 minutes with or without H2 saturated culture. To assess sperm damage, the number of untreated motile sperm was compared to the number of motile sperm in the damaged sperm. The H2 saturated culture solution was added thereto, and the functional recovery effect of H2 was observed.

Fresh sperm (motility rate: 82.4%) were treated with hydrogen peroxide, resulting in damaged sperm with low motility rate (14.6%). H_2-treatment significantly restored their motility rate (63.9%) accompanied by improvement of intrasperm ATP content. Fertilization rate of damaged sperm was markedly improved from 37.6% to 59.2% by H_2-treatment.

Because of the rapid diffusion and high membrane permeability, H_2 can reach and react with intrasperm ROS, possibly in mitochondria and improve low sperm motility. Our results strongly suggest that H_2 is a new promising tool for male infertility treatment.

PE30

BONE PARAMETERS MEASUREMENT AND ANALYSIS IN C57BL/6J AND BALB/C MICE VIA *IN VIVO* IMAGING

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Abstract
Mice are one of the most common animal models for studying skeletal development and regulation of bone formation/resorption. The bone structure in mice is developed rapidly within the first 2 months of age, while from the age of 6 months, the changes are negligible. In the present study, we assessed the changes in bone parameters (bone density, size, asymmetry, etc) with age in two wild-type mouse strains. Our goal was to develop a non-invasive method with standardized procedures and establish reference ranges for both male and female animals of two widely used strains.

X-ray images were collected from C57BL/6J and BALB/c mice between the ages of 6 to 46 weeks, using the In Vivo Xtreme system (Bruker). The Bone Density Software (Bruker), designed for *in vivo* x-ray analysis, was used in order to quantify changes in bone parameters.

Longitudinal growth of long-bones was observed until the age of 6–7 months when, a growth plateau was reached. C57BL/6J mice showed lower bone density values when compared to BALB/c. The results correspond with bone growth analysis findings, using invasive-terminal methods. Therefore, we suggest that the non-invasive imaging method may be efficiently used for the *in vivo* monitoring of bone changes, leading to animal number reduction, replacing methods that require euthanasia.

PE31

IMPROVED *IN VITRO* FERTILIZATION RATE AFTER ORAL TREATMENT OF MALE B6N MICE WITH D-ASPARTATE

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Abstract
Sperm cryopreservation is the preferred method for archiving mouse lines and is usually performed when males are sexually mature (13 weeks). We previously reported that *in vitro* D-Aspartate (D-Asp) treatment increases the quality and the fertility of spermatozoa from 9–11-week-old C57BL/6N (B6N) males. Therefore, we investigated the effect of oral D-Asp administration to B6N males to obtain insights into the mechanisms that lead to improved *in vitro* fertilization. A dose of 20 mM sodium D-Aspartate was supplied in drinking water for 2 or 4 weeks to males of different ages so that they were 9 or 16 weeks old when sacrificed. Control mice were not treated. The IVF rate, birth rate, hormone levels (luteinizing hormone (LH), epitestosterone, testosterone), sperm quality, capacitation rate and acrosome reaction were analysed. Both in 9-week-old and 16-week-old mice, the IVF rate was significantly higher after D-Asp treatment than in controls, whereas the birth rates were not affected. D-Asp also increased the LH, epitestosterone, and testosterone levels in testes and serum. A general improvement in sperm quality was observed in D-Asp-treated mice with respect to motility, sperm abnormalities, capacitation rate, and acrosome reaction in both age groups. The results indicate that 2 weeks of oral D-Asp treatment is sufficient to improve IVF rates in both sexually immature and mature male mice due to higher sperm quality. Therefore, less mice could be used to generate embryos, thereby contributing to the 3Rs.

PE32

MONITORING OF PAIN AND WELLBEING IN A CHRONIC COLITIS *IL10*-DEFICIENT MOUSE MODEL

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Abstract
Investigating the welfare of mice during animal experiments is essential for ethical and legal reasons. Therefore, scoring systems such as the live Mouse Grimace Scale (lMGS) were developed to detect pain and suffering at an early stage. Aim of this study was the evaluation of the lMGS as an indicator for pain during chronic intestinal inflammation.

Therefore, cage-side observation of orbital tightening, nose bulge, cheek bulge, ear position, and whisker change of mice was conducted in addition to common clinical scoring and body weight measurement during disease development. The clinical scoring included the evaluation of the activity and purity of the eyes, fur, and body openings.

The chronic colitis was induced in female C57BL/6J.129P2-*Il10*^{tm1Cgn}/J (*Il10*$^{-/-}$) mice using 2% dextran sodium sulphate (DSS) for 4 days in the drinking water. For welfare assessment, lMGS, body weight, and the clinical score were monitored twice a week. The inflammation was determined by magnetic resonance imaging (MRI) and intestinal histology 4 weeks after colitis induction.

After DSS treatment reduced weight was detectable. However, we detected no differences in the clinical scoring as well as in lMGS. MRI analysis showed an increased colon wall thickness indicating ongoing intestinal inflammation. In addition, histological scoring reveals a mild intestinal inflammation characterized by lymphocytic infiltration, a hyperplasia of the crypts, and a decreased number of goblet cells.

The results of the study demonstrated, that the lMGS and the clinical scoring seem not to be sufficient to evaluate pain or impaired wellbeing in a mild chronic colitis mouse model.

PE33

EVALUATION OF SUBSTRATE MATERIALS IN A RODENT HEALTH MONITORING PROGRAM

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Abstract
Recent studies have evaluated filter paper or other commercially available environmental monitoring products to replace the use of live animals in rodent colony health monitoring. This pilot study compares the use of readily available substrates in a real-life program.

We evaluated four different substrate materials: 1) sterile flocked swab; 2) serology card; 3) filter paper and 4) environmental monitor filter, placed in an empty animal cage. A combination of all substrates remained in place for the duration of the study and exposure to dirty bedding occurred with each cage change. Sentinel animal feces served as the control samples. Six test cages, placed in barrier and conventional rooms in four facilities, simulated real-time sentinel animal cage placement.

Submission of samples occurred at 8 and 12 weeks, with PCR analysis performed for Helicobacter species, with the addition of MNV in mice and Boone Cardio-virus in rats.

Comparison of genomic copy number determined the sensitivity between test samples. The most consistent and sensitive test substrate for all agents was the sterile flocked swab. Filter paper and environmental monitor filter were less sensitive and reliable but tested nearly identical. Sentinel faeces failed to detect most Helicobacter species, yet was the only test sample to detect Boone Cardio-virus. The serology card was unequivocally the least sensitive.

This preliminary study demonstrates the potential usefulness in using sterile flocked swabs as a test substrate in an environmental rodent health-monitoring program. There is a broader implication, that the most comprehensive program may include various types of test substrates.

PE34

PDX TUMOR GROWTH COMPARISONS IN THE ULTRA-IMMUNODEFICIENT NOD. CB17-*PRKDC*^{SCID} *IL2RG*^{TM1}/BCGEN (B-NDG) MOUSE MODEL

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Abstract
The purpose of the study was to compare the growth of various PDX models in the two ultraimmunodeficient mouse models NSG™ (Jackson Laboratory) and B-NDG (Inotiv). Four breast cancer PDX models ER+ WHIM20 and WHIM81, Her2+ WHIM43, and triple negative WHIM5, and one melanoma PDX WM4071-2, was utilized. For models WHIM20, WHIM5, and WM4071-2 all mice were injected with tumor cells on the same day, whereas for WHIM43 BND-G mice were injected in two separate batches. The WHIM81 studies were carried out at different times for the NSG™ and B-NDG animal cohorts. Studies utilizing WHIM5, WHIM20, WHIM43 and WM4071-2, included a group of athymic nude mice as well. For all models, mice were injected with 1.5x106 cells/mouse. The cells were mixed 1:1 with PBS:Corning Matrigel GFR and the injection volume was 100 μL/mouse. For all models except WHIM81, the tumors grew well and with very similar rate in both B-NDG and NSG™ mice. WHIM20 and WHIM43 grew significantly slower in the Athymic nude mice compared to both of the ultraimmunodeficient mouse models, however, the growth of WHIM5 was comparable between all three models. The results from the WHIM81 model suggests faster growth in the B-NDG model compared to the NSG™, however, it is also possible that this is due to the different batches of tumor cells utilized at each implantation event. Thus, the B-NDG model represents a novel ultraimmunodeficient mouse model that can have great utility for tumor studies, particularly for hard to grow or slower growing tumor models.

PE35

VIRTIFICATION OF MOUSE EMBRYOS IN IMBB-FORTH MOUSE FACILITY

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Abstract
The IMBB animal facility, is a part of the EU funded INFRAFRONTIER program and is involved with the production, archiving and in the distribution of mouse models for translational research. Through the funds provided, we recently upgraded the transgenic and cryopreservation unit of our facility. Our main

project for the last 18 months is the embryo cryopreservation of ~120 mouse strains and testing the viability of thawed embryos in-vitro and in vivo. Furthermore, we work on organizing a database of our facility mouse biobank.

Mouse embryo cryopreservation will help to secure mouse stains against genetic drift, preventing loss of phenotype. Also, it will help to reduce costs associated with animal colony maintenance. Embryo cryopreservation may also be combined with embryo transfer rederivation to achieve pathogen-free strains of mice in occasion of an infection.

To successfully cryopreserve a genetically engineered mouse strain, it is essential to take into account the percentage of thawed embryos that will carry the mutation, the percentage of thawed embryos that will be viable, as long as the live birth/weaning rates following embryo transfer.

Procedures for embryo cryopreservation include inducting of super-ovulation in females of the selected stain and mating them with male studs. Collecting the two-cell-stage embryos in M2 medium. Treating suitable embryos in DMSO, loading the selected embryos into labeled cryotubes and putting them in 0°C for 5 minutes. Adding cryoprotecting agent DAP213 in cryotubes and putting them in 0°C for another 5 minutes. Freezing and storing the cryotubes in liquid nitrogen tanks.

PE36

MATERNAL EXPOSURE TO SEMI-SYNTHETIC VERSUS GRAIN-BASED DIET AFFECTS OFFSPRING GROWTH AND SUSCEPTIBILITY TO OBESITY

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Abstract
Maternal nutrition during gestation and lactation has a long-term impact on growth, development, and function of different organs in the offspring, a process termed "nutritional programming". Many studies investigating programming effects of specific maternal nutritional interventions use either semi-synthetic or grain-based rodent diets as standard background diet. However, the potential impact of standard background diet choice has not been assessed systematically. We investigated if type of maternal diet (i.e., grain-based vs semi-synthetic) during early lactation in our published infant milk formula (IMF) nutritional programming model could contribute to programming effects in the offspring, including alterations to growth patterns and adult susceptibility to obesity. Dams and litters (C57BL/6J mice) were bred on grain-based growth diet and either remained on this diet or were switched to semi-synthetic growth diet (AIN-93G) during early lactation (postnatal [PN] day 2 to PN16). From PN16 to PN42, animals were fed AIN-93G-based diet containing IMF. From PN42 to PN126, mice received either AIN-93M (maintenance) or AIN-93M with a moderate increase in fat (Western style diet, WSD). Mice were fed grain-based diets throughout the study in the reference group. We assessed growth and body composition development in the post-natal period. Maternal exposure to semi-synthetic diet during early lactation led to an increased growth velocity in adolescence and impaired WSD-induced fat mass accumulation in adulthood compared to grain-based diet fed controls. These data reinforce the impact of maternal nutrition in programming vulnerability to an obesogenic diet in adulthood and warrant attention in the design of future nutritional programming experiments.

PE37

SEMI-SYNTHETIC AND GRAIN-BASED RODENT DIETS DIFFERENTIALLY AFFECT HEALTH OUTCOMES IN ADULT C57BL/6J MICE

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Abstract
Semi-synthetic and grain-based diets are common rodent diets for biomedical research. Both diets are considered as nutritionally adequate to support breeding, growth, and long life, yet there are fundamental differences between them that may affect metabolic processes. We have characterized the effects of semi-synthetic and grain-based diets on breeding outcomes, metabolic phenotype, and microbiota profile in adult mice. Healthy 8-week-old male and female C57Bl/6J mice were fed semi-synthetic (AIN-93) or grain-based (Teklad) diets and after 2 weeks acclimation, all animals were mated once. Dams and offspring were used for a separate study. Non-pregnant females and males remained on the diets for 12 weeks; changes in body weight and body composition were regularly monitored and fecal samples collected for microbiota analysis. Preliminary analyses show that body fat accumulation of mice was lower on semi-synthetic diet than on grain-based diet. Both sexes showed reduced cecum weight after 12 weeks of semi-synthetic diet exposure and in males liver weight was lower. Microbiota alpha and beta diversity changed rapidly and profoundly depending on diet type. Mating resulted in pregnancy in 56% of females on AIN-93 and 76% of females on the grain-based diet. Our study shows that type of rodent diet may affect fertility whilst influencing metabolism and health of laboratory mice. These factors have the potential to influence other experimental outcomes. Semi-synthetic and grain-based diets are not interchangeable and careful consideration and increased understanding of the consequences of diet choice can support improvements in experimental design and reproducibility of study results.

PE38

SEMI-SYNTHETIC DIETS AND HEPATIC HEALTH IN RODENTS: A SYSTEMATIC SCOPING REVIEW AND META-ANALYSIS

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Abstract
The liver is an essential organ that is involved in vital functions including drug and nutrient metabolism. Diet is known to affect liver health and physiology, yet the potential influence of standard rodent diets for preclinical models may often be overlooked. Rodent diets generally fall into two categories: grain-based and semi-synthetic diets. To date, a review on the physiological effects of semi-synthetic diets on hepatic health indices in rodents is lacking. We used a systematic scoping approach to capture relevant published literature and descriptive and meta-analyses to quantify the effects of semi-synthetic versus grain-based diets on food intake, body weight, and liver physiology in mice and rats. Surprisingly, most studies comparing these diets were conducted in rats. While food intake appeared to remain unaffected by diet type, rats exposed to semi-synthetic diets experienced increased body weight gain compared to those fed grain-based diets. In rats, our meta-analysis showed that semi-synthetic diets were associated with a significant increase in absolute liver weight. Moreover, descriptive data revealed increased steatosis scores, as well as serum triglycerides and cholesterol levels, in rats receiving a semi-synthetic diet. This systematic quantification of the effects of semi-synthetic versus grain-based diets on hepatic health represents a reminder about the importance of diet choice in experimental design. Increased awareness and consideration of these effects should result in improved interpretation of (liver related) experimental outcomes, a reduction in variation within- and between-studies and better reproducibility of preclinical models.

PE39

SOCIAL HIERARCHY AND TEST ORDER AFFECTS BEHAVIORAL PERFORMANCE OF ADULT MALE C57BL/6J MICE

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Abstract
Mice are commonly used for behavioral research. In the wild, mice live in colonies and establish complex social hierarchies. In the lab, (social) housing conditions and test procedures may vary widely. While social housing of mice is preferred over individual housing to accommodate the animal's social needs, it inevitably leads to differences in handling order of individuals within one cage, as well as temporal separation from the cage mate prior to and during behavior tests such as elevated plus maze (EPM) test. We have characterized the effects of social hierarchical status and testing order on behavioral outcomes of laboratory mice living under various (social) environmental conditions.

From weaning onwards, male C57BL/6J mice were housed individually or socially (n = 2 siblings/cage). A subgroup of socially housed animals was habituated to intermittent separation from their cage mate during adulthood. At 15 weeks of age, animals were exposed to the EPM test to assess anxiety-like behavior and the tube test to determine the hierarchical status (socially housed animals only).

Housing condition did not appear to affect anxiety-like behavior. However, within the socially housed group, subordinate mice that were tested first showed a higher level of anxiety-like behavior compared to subordinate animals tested second, while testing order did not affect anxiety-like behavior in dominant mice.

In conclusion, social hierarchical status and testing order affects behavioral performance of adult male C57Bl/6J mice. Increased awareness and understanding of the consequences of housing and handling practices on experimental outcomes support experimental design and reproducibility of results.

PE40

STATE OF THE ART RODENT STRAIN DOCUMENTATION SOFTWARE

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Abstract
Accurate documentation of genetic properties of rodent strains is essential. Since Directive 2010/63/EU requests a breeding permit for burdened strains an adequate phenotypic evaluation of strains is necessary. The German National Committee had developed guidelines for this, based on the clinical observation of litters and 7 animals of each sex. The Directive further requires careful breeding planning and legal assurance that excess animals cannot be further used.

Our animal management software records the genetic background, and all carried alleles of animal strains. The documentation allows clear identification of genetically engineered strains, which is relevant because the carcasses of killed laboratory animals can be given to zoo animals for feeding, provided that these animals have not been part of animal experiments and did not represent genetically engineered organisms. In our software severity assessment of rodent strains is based on observations detected during the mandatory daily visual inspection of all animals. These clinical observations are supported by electronically stored general strain data, statistical key features (e.g. litter size, rearing losses) and specific results of patho-histological examinations. By summarizing "observations" into categories, a severity assessment can be generated for any strain for any time window and considering all relevant animals. In the software the breeding purpose and experimental demand of the bred animals has to be documented for each strain. An animal exchange has been programmed, in which all researchers are shown the surplus animals of specific working groups. The annual laboratory animal reporting according to EU requirements can be generated automatically.

PE41

ANTHROPOMETRICAL PARAMETERS IN EXPERIMENTAL OBESITY IN SPRAGUE-DAWLEY RATS

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Abstract
The study compares the predictive value of anthropometrical parameters for obesity side effects. Ten male Sprague-Dawley rats, 420.9±11.66g, were divided into two groups. The control received standardised food (180kcal/kg), while the obesity group was feed on hyperlipidic diet (2259kcal/kg) for 11 weeks long. The body weigh (BW), BMI, Lee index and waist-height ratio were determined weekly. The difference in body weight gain was notable since the 6th week ($p < 0.05$); at the end of the study the obesity group exhibited a body weight gain of 60% vs 37.5% control ($p < 0.001$). Waist-height ratio reveled a difference starting to the 7th week, while BMI and Lee index showed differences in the 8th week. Person correlation test showed high correlation among all anthropometric values; similarly, a high correlation was seen between each parameter and biochemical panel, average diameter of adipocytes, and malondialdehyde (MDA). BMI, similar to BW, exhibited a correlation of $r = 0.855$ ($p < 0.01$) compared to plasma triglycerides, $r = 0.699$ ($p < 0.01$) for cholesterol, $r = 0.763$ ($p < 0.05$) plasma glucose $r = 0.631$ ($p < 0.05$), insulin activity and MDA $r = 0.656$ ($p < 0.05$). Histopathological morphometric evaluation showed that BMI was also highly corelated with diameter of adipocytes $r = 0.922$ ($p < 0.001$). Lee index and waist-height ratio revealed inferior r indexes. In the present study, all anthropometrical parameters had predictive value for metabolic syndrome, they were associated with dyslipidemic profile. However, the BMI proved to be by fare the most valuable.
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PE42

OPTIMIZATION OF SKIN SENSITIZATION TESTING STRATEGY *IN VITRO* FOR MEDICAL DEVICE EXTRACTS

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Abstract
Before marketing, medical devices have to be tested in accordance with ISO EN 10993-10 to avoid skin sensitization. This standard predominantly refers to *in vivo* tests, however, it doesn't exclude the use of alternative *in vitro* methods, which have been sufficiently technically and scientifically validated. It is foreseen that due to the complexity of the sensitization endpoint, combination of several methods will be needed to address all key events of the skin sensitization AOP. The objective of this study was to evaluate the sensitization potential of 97 commercially available samples of medical devices using a combination of *in vivo* (LLNA DA, OECD TG 442A), *in chemico* (DPRA, OECD TG 442C) and *in vitro* (LuSens, OECD TG 442D) methods with the aim to enhance the testing strategy for safety assessment of medical device extracts, to optimize the test and extraction procedures and to extend the applicability domains of separate *in vitro* methods recently successfully validated for chemicals. A good agreement between *in vitro* and *in vivo* results was achieved regarding the absence of skin sensitization potential; however, discrepancies in positive classifications have been recorded. The mismatch between *in vitro* and *in vivo* results might be caused by specific response of the immune system of the living organism, however, the in vitro methods are suggested as feasible for bottom-up skin sensitization testing, starting with *test* methods accurately identifying non-sensitizing medical device extracts. Supported by ERDF/ESF project "International competitiveness of NIPH in research, development and education in alternative toxicological methods" (No. CZ.02.1.01/0.0/0.0/16_019/0000860).

PE43

THYMUS IN C57BL/6 MICE; A MORPHOLOGICAL STUDY FROM ADOLESCENCE TO SENESCENCE

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Abstract
Thymus is a very important organ for immunity. Its function plays a role even in the embryonic development, when thymus is being populated by hematopoietic stem cells. Although there are numerous publications on the morphological appearance of this organ, none has described so far, its changes occurring in the C57BL/6 mice of both sexes for an extended life span.

In our study, we used animals, belonging to different age groups: young adults (2–5), adults (6–9), old adults (10–12) and aged animals (12–16 months). All animals (at least 2 from each group) were to be euthanized due to breeding overpopulation resulting from other experimental protocols carried out in our lab. Animals were kept in conditions in fully accordance with the EU Directive 2010/63/EU.

As it was expected the weight of the older mice thymuses was substantially lower from the ones belonging to other age groups.

The preliminary results from the semi-thin tolouidine stained specimens (following transcardial perfusion and paraffin or resin embedding) had already shown major differences in the cytoarchitecture of all different cell types contained in the tissue. There is an apparent difference in the cortex/medulla lymphocyte density between the young adult and the aged animals.

The detailed cellular appearance of the specific histological stains along with the in-depth examination with electron microscopy will shed light in the communication between the different thymic cell types as the animal ages and will provide information for future reconstruction of the organ to be used as an alternative for research.

PE44

FORELIMB COMPARATIVE ANATOMY OF DIFFERENT LABORATORY ANIMAL SPECIES

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Abstract
The spectrum of laboratory animals used in research is widening through the years in a universal attempt for animal model validation and reproducibility. Hence, comparison among species used for scientific purposes is fundamental. Among them, anatomical and morphological studies serving this cause are essential. This study compares the skeleton of the forelimb (from scapula to toes) of the following animal species: mouse, rat, rabbit, dog, pig, sheep, marmosets, and rhesus macaques.

Animals are derived from different sources: rodents, lagomorphs, Canidae, Suidae and Bovidae are provided from the animal facility of the Lab of Anatomy, Histology and Embryology and/or Companion or Farm Animal Clinic from Veterinary School of Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki. The two nonhuman primate species are collected from the BioBank of Biomedical Primate Research Centre, Rijswijk, The Netherlands.

Computerized scans were performed to all left feet from male animals followed by maceration and reconstruction of the whole foot from the existing bones.

Specific morphological parameters of all species are measured and compared in order to provide an integrated approach to the issue. Our results will be compared with already existing studies with distinctive approaches in different species. The evaluation will facilitate the choice of the most appropriate animal model for musculoskeletal and other research.

PE45

INVESTING IN THE FUTURE: RESEARCH & INNOVATION PARK, ELPEN

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Abstract
The private company ELPEN focuses on supporting innovation and cooperation with the scientific and research community of our country. The company consistently invests 10% of its annual turnover in research programs and since 1996 has established the first and largest private Experimental, Educational & Research Center in Greece. Today, ELPEN materializes a new investment at Spata, Attica, aspiring to create a Park as an ecosystem for innovation related to health and life sciences, where ideas will flow freely between the various activities hosted in the Park, aiming to combine academic research, entrepreneurship and education.

In particular, the company is creating a 15,000 m^2 establishment that will host the first wet-lab incubator in Greece, fully equipped with the latest technology instruments. Moreover, a Research Institute for translational research, a Precision Medicine Core, a Biobank focused in omics-technology analysis rather than long-term, sample storage and an Artificial Intelligence core supported by big data created in other Park activities. A 13,500 rodent capacity animal facility, and a pre-clinical CRO using animal and cell culture models will provide services to all residents as well as third parties, while a 350-seat auditorium will host events for both internal and external parties. We envision an environment where talented scientists will find the appropriate conditions and the top-notch infrastructure required in order to stay or return to Greece, accelerating the growth of our country's life sciences ecosystem.

PE46

CONSTRUCTION: HOW A COMMUNICATION PLAN PRESERVES ANIMAL WELFARE, QUALITY RESEARCH, AND RELATIONSHIPS BETWEEN STAKEHOLDERS

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Abstract
Construction in and around biomedical research facilities is a frequent source of stressors not only for the lab animals who reside there but also for all other key stakeholders – the researchers, veterinarians, animal care staff, administrators, construction management personnel, and others. Through our work with a number of facilities navigating such issues, we have identified some communication strategies and best practices that help such projects run more efficiently and with limited impact on animals and the studies involving them. Such practices also help to give voice and information to key stakeholders, which helps to promote open communication and positive relationships during the inevitable stressors of a construction or renovation project. This presentation will review some successful and unsuccessful case studies and provide a template for how to best navigate an upcoming construction project.

PE47

FORMALIN-FIXED, PARAFFIN-EMBEDDED SAMPLES IN ANIMAL RESEARCH: A SOURCE FOR RNA EXPRESSION ANALYSIS

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Abstract
Formalin fixation and paraffin embedding (FFPE) of tissue samples is a standard preservation procedure used in human diagnostic pathology and in animal research. Appropriately prepared FFPE tissues can be stored at room temperature for decades without concern for degradation of macromolecules. Over the past few years, advances in methodology have made it possible to extract and analyze RNA or even recover proteins from FFPE tissues. Today, commercially available reagents designed for FFPE tissue and appropriate methodology are routinely used in human diagnostic pathology. FFPE is a method that best preserves tissue and cells morphology and enables easy and cost-effective storage. Therefore, FFPE tissues together with associated diagnostic records (information on treatments, genetic or microbiological status, nutritional and environmental factors, stage of disease, etc.) may represent an invaluable untapped resource for molecular research and retrospective analysis not only in clinical but also in animal research. Since the amount of tissue is often a limiting factor for sampling quality in animal research, FFPE tissue can also enable the use of diverse methods on small tissue samples (i. e. histological and molecular analysis like RNA expression using PCR or proteomic analysis) and consequently lead to a reduction of small laboratory animals.

Although FFPE tissue offers a great potential for studying RNA expression profiles using RT-qPCR in animal research, it provides also a number of technical challenges that need to be carefully addressed. Therefore, we would like to present our own experience, challenges, and advantages of working with FFPE tissue in animal research.

PE48

CHALLENGES OF 3R INDUSTRIALIZATION: THE EXAMPLE OF TETANUS VACCINES

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Abstract
GSK identifies, develops, and manufactures innovative medicines, vaccines, and consumer healthcare products. GSKs animal studies are conducted with high standards of humane care and treatment. These studies represent a small but vital part of our procedures to develop future products and perform the mandatory release of vaccines.

Recently, the European Pharmacopoeia adopted 16 revised monographs on tetanus vaccines, including the suppression of three animal tests. Despite this progress, the in-vivo *Test for absence of toxin* remains still in place.

A replacement of this test by an *in vitro* method is desirable from animal welfare and innovation perspectives. Although expected to be eventually replaced, this process can take years and even decades to realize. Therefore, it is GSK's 3R program initiative to proactively replace it with the Binacle (binding and cleavage) ELISA, developed by the Paul-Ehrlich-Institut.

The Binacle has demonstrated its suitability by an international collaborative study (BSP136) as a more sensitive *in vitro* alternative to the *Test for absence of toxin* for tetanus neurotoxins (TeNT).

Binacle relies on reagents as: Synaptobrevin, the substrate cleaved by TeNT, and the polyclonal antibody specific for cleaved Synaptobrevin. Further not all reagents comply with EMA guidelines and GMP standards, which is a critical requirement for the assay's industrialization as release test. GSK therefore aims to overcome this challenge for a timely replacement of the last in vivo TeNT safety test by developing and validating Syb2 and Anti-Syb2 monoclonal antibodies under the required quality standards.

PE49

HOSPITAL WASTEWATERS – CYTO/GENOTOXICITY ASSESSED BY NON-ANIMAL METHODS

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Abstract
Awareness of water quality issues has increased significantly over the last decade within the European Union. Numerous scientific studies have confirmed that hospital wastewaters (HWW) are often cytotoxic, or genotoxic, or both. However, evaluation of the cyto-/genotoxic effects of the compounds in HWW is not a simple matter, mainly due to the variable characteristics of the HWW which depend on the type of hospital activity. Chemical analyzes, which are required by current legislation, cannot correctly determine all the toxic effects of these complex environmental matrices, and should be accompanied by a battery of relevant bioassays. We monitored the cyto/genotoxic potential of HWW from 5 hospitals in the Czech Republic by means of specific in vitro methods, i.e. single cell gel electrophoresis assay (Comet assay), bacterial reverse mutation test (Ames test), chicken egg genotoxicity asssay, Allium cepa test, cell transformation assay, and hen's egg test for micronucleus induction. Our study confirmed that all tested HWW samples can be assessed as potentially genotoxic in the used tests with the exception of the bacterial Ames test. The evaluation of samples in the Ames test might be affected by adjustment of the samples before testing, particularly sample sterilization by filtration which may lead to the unavoidable removal of genotoxicants adsorbed on the filter. Contamination of chlorinated HWW by microbiological agents appears to be the key factor causing significant cellular and nuclear damage in this

study. Supported by ERDF/ESF project "International competitiveness of NIPH in research, development and education in alternative toxicological methods" (No. CZ.02.1.01/0.0/0.0/16_019/0000860).

PE50

THE FISH EMBRYO ACUTE TOXICITY TEST AS A SUITABLE METHOD FOR HOSPITAL WASTEWATER TESTING

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Abstract
Hospital wastewater is a very heterogeneous mixed substance which requires the selection of a sufficiently sensitive battery of tests for assessment of its toxicity. The Fish Embryo Acute Toxicity (FET) Test has been designed to determine acute toxicity of chemicals on embryonic stages of fish and proposed as an alternative to experiments with adult fish. In recent years, fish embryos were used not only for the assessment of toxicity of chemicals but also for environmental and wastewater samples. In this study the acute toxicity of treated wastewater from seven hospitals in the Czech Republic was investigated. The main purpose was to compare the sensitivity of *Danio rerio* embryos with the sensitivity of two other aquatic organisms commonly used for wastewater testing – *Daphnia magna* and *Aliivibrio fischeri*. For the aim of this study, in addition to the lethal endpoints of the FET test, sublethal effects such as delayed heartbeat, lack of blood circulation, pericardial and yolk sac edema, spinal curvature and pigmentation failures were evaluated. Based on the calculation of the teratogenic index (TI), the teratogenic potential of all samples was demonstrated. The results of this study show that the FET test, especially with the addition of sublethal effects evaluation, can be considered as a sufficiently sensitive and useful additional tool for ecotoxicity testing of the acute toxicity potential of hospital effluents.

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PE51

THE GUNN RAT IN THE 2022: A NEW MODEL BETTER REPRESENTING THE HUMAN SCENARIO

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Abstract
The Gunn rat, presenting a spontaneous mutation in the UGT1A1 enzyme, is the model for severe neonatal hyperbilirubinemia and Crigler-Najjar type I syndrome, both conditions presenting a large variability of the neurological symptoms in human subjects (motor, auditory, cognitive; transitory or permanent, until death). In the last decades, the toxicity of bilirubin to the rodent CNS has described triggering the landmark cerebellar hypoplasia, with apparent absence of behavioural deficits. In 2016, we stated observing in our colony (bread in a microbiologically controlled conditions -barrier and housed in individually ventilated cages -IVC) a variability of the phenotype. In hyperbilirubinemic (jj) pups with a not apparent phenotype (LP: low phenotype animals), behavioural deficits may be detected only by tests (rotarod, beam walking). Differently, tremors, balance problems, inability to reach and maintain the rear position, up to wobbly gait are observed in the more severe phenotype jj rats (MSP).

The animal facility staff was immediately trained to monitor the MSP animals and to avoid them any pain, suffering, distress and lasting harm.

The MSP heterozygous females showed a highest fertility compared to the number of offsprings/mating observed in the LP colony, whereas the percentage of deads/mating and jj pups/mating were comparable between the two phenotypes.

Blood bilirubin levels did not differ between LP and MSP jj animals, while an enhanced cerebellar hypoplasia is present in MSP rats.

Our findings strengthen the notion that our current 2022 Gunn rat is a redeveloped good model for the severe neonatal hyperbilirubinemia and Crigler-Najjar type I syndrome.

PE52

HOW TO IMPROVE AND REFINE THE ELEVATED PLUS MAZE FOR LABORATORY MICE

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Abstract
The daily light-dark cycles synchronize behavioural and physiological processes to the external environment. Light is the most important environmental cue that coordinates many aspects such as activity, maintenance behaviours, or hormonal regulation. Mice are among the main animals used in behavioural neuroscience and preclinical research laboratories. Although nocturnal, they are generally tested during the day (i.e., during their resting phase). Even if convenient for experimenters, a perturbation of the sleep-wake cycle such as manipulations during the day can generate some stress to the animal, produce few reliable data, contributing to reproducibility issues, and may lead to negative consequences for health, physiology, behaviour, and cognition. Then the testing moment could be an important variable affecting animal behaviour.

Rodents seem to be less anxious during the dark phase, however, a lack of data regarding the effect of the testing moment on behaviour and anxiety has recently been highlighted. Several studies emphasized conflicting results; these differences can be explained by various divergent methodological aspects between laboratories such as procedure parameters but also by the way

of collecting and interpreting behavioural data. In addition, the concrete lack of parametric studies can lead to reproducibility difficulties.

We compared four different behavioural assessment times to determine which would generate the least anxiety in mice. A previous study in our laboratory showed that the way of analysing behaviour can influence results. In order to improve the power and reliability of the analysis, we refined our systematic observation method and implemented repeated measurements.

PE53

DOES BEHAVIOUR PREDICT OVERWEIGHT IN CAPTIVE GROUP-LIVING RHESUS MACAQUES?

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Abstract
Overweight and obesity are relatively prevalent problems in captive non-human primates (NHPs). NHPs in social groups experience the same housing conditions, yet not every individual develops overweight. Individual variation in adiposity may result from differences in behaviour related to energy intake and expenditure and to dominance rank. Understanding how behaviour contributes to overweight may result in possibilities to reduce it. This study investigates whether behaviour predicts overweight in captive female rhesus macaques (*Macaca mulatta*) housed in three social groups at the Biomedical Primate Research Centre in Rijswijk, the Netherlands. Relative adiposity was quantified with a species-specific weight-for-height index with two years between measurements. Behavioural data were collected on food intake, activity budgets and dominance rank at baseline. High relative adiposity was associated with little moving and foraging at baseline, but not related to food intake or dominance rank. Higher-ranking females had a higher increase in relative adiposity compared to lower-ranking monkeys, while there was no effect of food intake or activity budgets. These results suggest that high dominance rank is a risk factor for becoming overweight, while the time spent on several activities is merely a consequence and not a cause. Thus, behaviour related to energy intake and expenditure is likely not useful to predict overweight in captive group-living NHPs.

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