UFAW International Animal Welfare Conference 2024

Scientific Programme

Welcome to the UFAW International Animal Welfare Conference 2024

We are excited to welcome you to Porto for UFAW's annual international conference. This historic city, known for its rich cultural heritage and picturesque riverfront provides an inspiring location for a gathering dedicated to advancing animal welfare science. Our hosts, the University of Porto, have provided us with an excellent venue, and we thank the University for their help in organising this meeting.

We are delighted to have so many of you joining us again this year, and we extend our gratitude to all the speakers, poster presenters, session chairs, delegates and those joining us online.

As is always the case with UFAW meetings, this year's scientific programme features a diverse array of both talks and poster presentations, addressing a wide range of animal welfare issues and species. We feel this is one of the great strengths of UFAW meetings, that we bring together a diverse range of presenters and attendees who can all learn something from each other.

As well as supporting animal welfare science, UFAW is committed to supporting those who work in animal welfare science. Therefore, alongside the scientific programme, an in-person workshop will run parallel to Session 8 on the afternoon of Thursday 11 July, exclusive to those joining us in Porto. This workshop is an opportunity to discuss careers in animal welfare science outside academia which should be of particular interest to those early in their careers.

The staff of UFAW's journal *Animal Welfare* will attend the conference and will be very happy to discuss your publishing queries. Please visit us at the *Animal Welfare* journal stand in the Foyer.

If you aren't already signed up as a UFAW member, you can visit our Fundraising Manager Eilidh in the Foyer to sign-up for a low annual fee today. This is a really exciting time to join us, so please do stop by for a chat to find out more.

To support UFAW's mission to ensure that the latest developments in animal welfare science are open to all, we will be streaming the talks live online for those unable to be with us in person. Posters can also be accessed online; a link can be found at the bottom of each page of the list of posters.

We would like to thank our conference sponsor, Charles River, for their generous support of this meeting.

A special thanks also to our dedicated UFAW office staff - Sam Griffin, Jane Moorman, and Tina Langford—whose efforts have ensured a smooth registration process.

Finally, your feedback is important to us, so please let us know your thoughts on the meeting by completing the post-conference online survey. We will use this information to improve our upcoming meetings. For specific comments or questions about the meeting please email us at: events@ufaw.org.uk

Thank you for joining us. We look forward to two days of engaging discussions and a shared passion for Science in the Service of Animal Welfare.

Huw Golledge, Stephen Wickens, Birte Nielsen, Eilidh Muir, Carly Halliday, Paulo Vaz-Pires, and Anna Olsson
UFAW Conference Organising Committee

Join the conversation
#UFAW2024

The Universities Federation for Animal Welfare (UFAW)

The Universities Federation for Animal Welfare (UFAW) is an international and independent scientific and educational animal welfare charity and membership society. Our vision is a world where the welfare of every animal affected by humans is maximised through a scientific understanding of their needs and how to meet them.

We try to bring about this change by:

DISCOVERING what matters to animals

DEVELOPING scientific solutions to animal welfare problems

DISSEMINATING evidence-based animal welfare information

Support Science in the Service of Animal Welfare

You can help make even bigger strides in animal welfare science by donating, leaving a legacy or becoming a member of UFAW.

Find out more: **ufaw.org.uk/support** or **ufaw.org.uk/membership**

Stay up to date with the latest developments in animal welfare science

There are many ways to stay connected and keep up to date with our latest news and opportunities, including via our website and social media channels.

We are pleased to announce that we will soon be starting a more regular email newsletter with details of our latest news, research and funding updates, events and ways you can support us.

To sign up to receive our email newsletter, please visit **ufaw.org.uk/signup**

UFAW Membership

UFAW is a registered, independent, international scientific and educational animal welfare charity and membership organisation. We receive no government or statutory funding.

Our vision is a world where the welfare of all animals affected by humans is maximised through a scientific understanding of their needs and how to meet them.

As a member of UFAW you will receive exclusive discounts on our publications and exciting updates on our work. Visit our dedicated stand in the Foyer to find out more about our membership or to sign up today. You can also find out more at: **ufaw.org.uk/membership**

Conference location: Porto, Portugal

Porto is the second largest city in Portugal, after Lisbon. It is the capital of the Porto District and one of the Iberian Peninsula's major urban areas.

Located along the Douro River, in the northwest of Portugal, it is one of Europe's oldest cities dating back to a settlement before the Roman Empire. Founded by the Celts, its combined Celtic-Latin name, Portus Cale, is thought to be the origin of the name Portugal.

In 1996, Porto's historic centre was recognised as a World Heritage Site by UNESCO. Architectural highlights of the city include the cathedral, Sé do Porto, its oldest surviving building which dates back to the 12th century, together with the Romanesque Church of Cedofeita and the gothic church Igreja de São Francisco.

Other highlights include baroque Cleric church and tower (Igreja e Torre dos Clérigos), the 19th century Stock Exchange Palace (Palácio da Bolsa), the tile-adorned and still working São Bento railway station, which is in the centre of the city, and the gardens of the Palacio de Cristal which are next-door to ICBAS, the conference venue.

Travelling around Porto:

Porto is well served by buses and a Metro system:

- STCP Buses
- Metro Porto

The closest bus stop to the conference venue (ICBAS) are Palácio (served by the 12M, 13M, 200, 201, 207, 507 and 601 buses) and Hosp. St. António (served by the 12M, 13M, 200, 201 and 207 buses).
The closest Metro station is São Bento (Line D - Yellow line) which is a 20 minute walk from ICBAS.

Porto also has a tram system, which was built in 1895. Three routes remain, one of which will take you from the city centre along to the Douro river to the mouth of the estuary in 30 minutes and its beach (Line 1 - Passeio Alegre, Foz do Douro). Fare for a single trip is €3.50.

Porto.CARD - Official City Pass: One of the best ways to travel around and explore the city is through the Porto.CARD. This gives an option of free and unlimited access to all public transport and free or discounted access to a range of museums, monuments and discounts at participating restaurants and shops. Valid for 1, 2, 3 or 4 days and available from €6.00.

Find out more about Porto here:

- Visit Porto
- Visit Porto: Tips and practical information
- Map of Porto
- YouTube: Visit Porto and North of Portugal – The Majestic Adventures of Ofelia de Souza
- YouTube: Visit Porto and North of Portugal – City Breaks Part II (Porto)

Conference venue: University of Porto

Venue:

Abel Salazar Institute of Biomedical Sciences (ICBAS)

Address:

Rua Jorge Viterbo Ferreira, 228 Porto 4050-313, Porto, Portugal

GPS: 41.175300, -8.604572

What3Words: blazing.wins.panthers.

About ICBAS:

The Abel Salazar Institute of Biomedical Sciences (ICBAS) was founded in 1976 and is part of the University of Porto. ICBAS is a multidisciplinary school specializing in the life sciences including medicine, veterinary science and aquatic sciences. A 3D tour of the venue is available here.

Charles River - #UFAW2024 sponsor

A huge thank you to our headline sponsor, Charles River, for supporting this week's conference

Registration:

Registration will take place in the lobby of ICBAS Building A from 08.15 on Wednesday 10 July.

On registering, delegates will receive a lanyard, badge and timetable, which allow access to the meeting and to lunch and refreshments. The conference abstract booklet will only be available online so if you need a hard copy, you will need to print it out in advance. Please ensure you wear your badge and it is visible at all times.

Please note that only registered delegates can attend the scientific programme and that registration is for an individual, not an institution, and is not transferable.

Talks will take place in the "Salão Nobre" lecture theatre, located on the 4th floor of building A, and accessed by a lift or stairs from the lobby of building A.

The poster sessions will be held in the "Foyer", the room through which the lecture theatre is accessed. Lunch and refreshments will be served from the bar area, the catering point adjacent to the Foyer, at the times indicated in the timetable. Delegates have access to the outdoor terrace.

Should you have any general questions or queries, please address these to the staff at the registration desk in the lobby. Cloakroom facilities are available on request.

We have a packed conference schedule, so delegates are requested to take their seats in plenty of time before the start of each session. These will start promptly at the time indicated in the programme.

Speakers:

The conference will use a PC based computer system running Office 365 to run all PowerPoint presentations, so presentations should be formatted for such. Please bring the final version of your talk, loaded on a USB Memory stick, so it can be uploaded in advance. Talks for those speaking in the morning of 10 July should be loaded on to the PC in the "Salão Nobre" lecture theatre during initial registration, which will be from 08.30. Those speaking in the afternoon of the 10 or on the 11 July should load their talk during the refreshment and lunch breaks. Please ensure that your presentation is named such that the first author's surname and the session and date on which the talk is taking place is clear, eg 'Smith 3 Stress and welfare 10 July'.

UFAW Grants

Among UFAW's top priorities is the promotion and support of high quality science that will lead to substantial advances in animal welfare, and the promotion of education in animal welfare – particularly at university and college level.

Lack of knowledge and understanding of animals' environmental and psychological needs, and how these can be recognised and met, remains greater than is often assumed. A great deal of both fundamental and applied research remains to be done in these areas.

Awards are made to support a wide range of project types, and to recognise outstanding work in animal welfare science.

To find out more, please visit: **ufaw.org.uk/grants**

Poster sessions:

Poster sessions: There will be two separate poster sessions during the conference. Posters with a first author whose surname starts A-J will present their poster on day 1 (10 July). Posters with a first author whose surname starts with K-Z will present their poster on day 2 (11 July).

Badges:

Badges have a coloured dot to represent different roles at the meeting:

Organisers and helpers – Blue
Speaker - Red
Poster presenter – Light blue (with a number to indicate which of the 2 days the poster is being presented on)

Session 8, Thursday 11 July:

Session 8 is a parallel session. Delegates have a choice of listening to talks in the "Salão Nobre" lecture theatre or attending a joint UFAW/ISAE workshop on 'Animal welfare as a profession – beyond academia'. This workshop will take place in Monoblock 2, on the ground floor of ICBAS (level zero), between buildings 1 and 2. Afterwards, all delegates will reconvene in "Salão Nobre" for the closing of the conference.

Internet access:

To access free Wi-Fi during the meeting connect to the following:

Network name: ufaw2024
Password: ufaw2024

Photography and video:

We will be taking photographs and recording videos throughout the conference. If you do not wish to be filmed or photographed, please let a member of staff know at registration. Delegates are kindly requested to not take multiple photographs or record talks during the conference, as this is distracting for others

Attendance certificates:

For those that need one, an attendance certificate can be picked up from reception. Please ensure that you collect one before the end of the conference.

Drinks reception:

A drinks and cheese reception will be held on the terrace of Building A on the evening of the 10 July from 17.50.

UFAW LINKs Scheme

University LINKs is an international network of UFAW Links people, members, and supporters at universities, research institutes, and colleges around the world, reflecting the ever-growing interest in animal welfare science within the participating institutions.

The aims of the University LINKs scheme are to promote animal welfare science and the objectives of UFAW while providing a forum for the involvement of members and supporters.

If your university is not currently part of the UFAW LINKs scheme but would be interested in applying to join, please contact Stephen Wickens: wickens@ufaw.org.uk or visit **ufaw.org.uk/links**

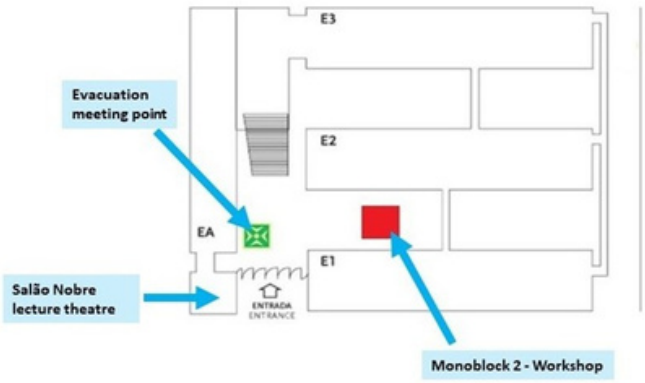
Catering:

Tea, coffee and lunch will be served from the catering station adjacent to the lecture theatre and poster room, on level 4 of Building A, at the times indicated in the timetable. Delegates have access to the outdoor terrace.

The food provided will be predominantly vegetarian with vegan and meat options. If, when registering, you indicated a particular food requirement - eg gluten free then please inform the caterers and check food labels.

Safety:

In the event of a fire or other emergency where the building must be evacuated, please leave via the nearest emergency exit. The alarm will be given by a continuous audible siren. Please use the stairs and not the lifts. Delegates should assemble next to the North Gate (gate between Building A and Building 1). A check that everyone attending the conference is present will then be made. Do not return to the building unless authorised to do so.



In case of sudden illness or accident, call 112 (National Emergency Number) directly. The operator of the Emergency Center will ask you for information about the victim, allowing you to provide quick and effective assistance and the appropriate means of rescue. After calling 112, you should immediately contact the Concierge – on 0220 428 500 or Ext. 5000 so that they can direct rescuers to the scene.

UFAW Mentoring Partnership

UFAW is dedicated to advancing animal welfare science globally, particularly in areas where it is still developing. One of our key initiatives is supporting the next generation of animal welfare scientists.

Not all students have ready access to the help and resources required to plan a scientific research proposal. By providing early career guidance in project planning and experimental design, UFAW helps to ensure their research is meaningful and scientifically sound.

The scheme pairs students with mentors to guide them in project planning, ensuring a solid scientific foundation. UFAW believes this partnership greatly benefits both mentors and students.

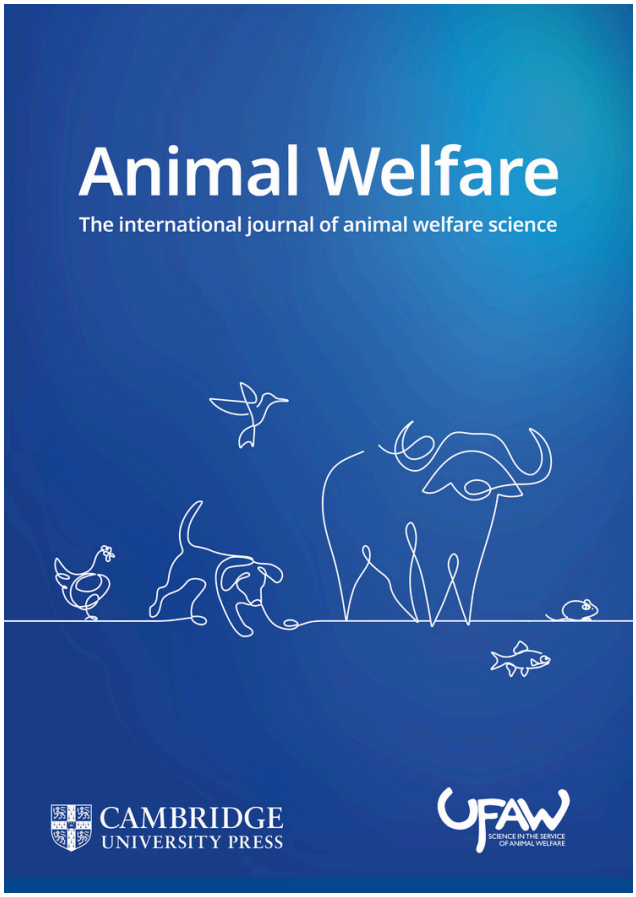
Mentors, primarily early career researchers with expertise in animal welfare science, will support students, mainly undergraduates or master's level, including veterinary medicine students interested in animal welfare research.

If you would like to know more about the scheme, please email: carter@ufaw.org.uk or visit **ufaw.org/mentoring**

Animal Welfare Journal

In January, we celebrated one year of our official journal *Animal Welfare* being a Gold Open Access journal published by Cambridge University Press.

The move to Open Access aligned with our mission to ensure that evidence-based animal welfare information is disseminated widely, and to all those who can make use of it, anyone can now read the articles in *Animal Welfare* without a subscription.



During 2023, we published 57 papers and 15 book reviews.

You can view our most downloaded papers of 2023 at cambridge.org/most-downloaded, highlights include:

- Assessing the animal welfare impact of fourteen control and dispatch methods for house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*)
- Challenges in farmed insect welfare: Beyond the question of sentience
- Estimating global numbers of farmed fishes killed for food annually from 1990 to 2019
- Cats just want to have fun: Associations between play and welfare in domestic cats.

Come and meet the staff of UFAW's journal *Animal Welfare* who will be available at the conference and will be very happy to discuss your publishing queries. You can also visit the journal home page here: cambridge.org/animalwelfare


UFAW
SCIENCE IN THE SERVICE OF ANIMAL WELFARE
Scientific Programme: Talks
Timetable and Speaker Abstracts

Day 1: Wednesday 10 July

All timings are GMT+1 / UTC+1/ BST

08.30 - 09.05	**Registration and poster set up**
09.05 - 09.20	**Welcome and Introduction**: Huw Golledge *(UFAW, UK)* and Anna Olsson *(University of Porto, Portugal).*
09.20 - 11.00	**Session One - Huw Golledge (*UFAW*)**
09.20 - 10.00	**Keynote talk: What is wild animal welfare like and why should we care about it?** Clare Palmer (*Texas A&M University, USA)*
10.00 - 10.20	**But is farm animal welfare a public good?** Beth Clark, Albert Boaitey and Carmen Hubbard *(Newcastle University, UK)*
1020 - 10.40	**Younger dams without older litters in the cage increases mouse pre-weaning survival** Gabriela Morello, Sara Capas-Peneda, Sophie Brajon, Sofia Lamas, Igor Lopes, Colin Gilbert and Anna Olsson *(University of Porto and Sociedade Portuguesa de Inovação, Porto, Portugal; Babraham Institute, UK)*
10.40 - 11.00	**Monitoring animal welfare in agriculture and fish farming at a national level** Angela Bergschmidt (*Thünen Institute of Farm Economics, Germany)* et al
11.00 - 11.40	**Break: Refreshments**
11.40 - 13.00	**Session Two - Jo Edgar (*University of Bristol, UK*)**
11.40 - 12.00	**Optimising population density for wild animals' welfare** Simon Eckerström Liedholm and Luke Hecht *(Wild Animal Initiative, USA; Durham University, UK)*
12.00 - 12.20	**Ending rodenticide use: Could fertility control be the answer?** Julie Lane, Bex Pinkham, Sarah Beatham, Simon Croft and Matthew Gomm *(Animal and Plant Health Agency, York, UK)*
12.20 - 12.40	**Assessing animal welfare risk in fibre-producing animals by applying the Five Domains framework** Kaja Salobir, Marlene Kirchner, Thainá Landim De Barros, Shari Cohen and Daniela Haager *(VIER PFOTEN International, Austria; FOUR PAWS Australia, Australia)*
12.40 - 13.00	**Short Talks:** **Window of opportunity: integration of internal chat hatches in equine housing, impacts the physiology and behaviour of stabled horses** Kelly Yarnell, Anna Gregory, Theresa Robertson, Gareth Starbuck and Rupert Palme *(Nottingham Trent University, UK; University of Veterinary Medicine, Austria)* **Here comes trouble: investigating risk factors and behavioural correlates of barbering in laboratory mice** Lauren Young and Georgia Mason *(The Rs Collaborative, USA; University of Guelph, Canada)* **Factors related to life expectancy and cause of death of dogs in Italy** Mariana Roccaro *(Alma Mater Studiorum University of Bologna, Italy)* et al
13.00 - 14.30	**Lunch and poster session 1**

Day 1: Wednesday 10 July

All timings are GMT+1 / UTC+1/ BST

14.30 - 15.50	**Session Three - Nuno Franco (*i3S, Portugal*)**
14.30 - 14.40	**UFAW Medal for 'Outstanding Contribution to Animal Welfare Science' / UFAW 'ECR'** UFAW Award Presentations
14.40 - 15.20	**Serendipity, sentience, and science: do crustaceans feel pain?** Robert Elwood, winner of the 2024 UFAW Medal
15.20 - 15.40	**Short Talks:**
	Validation of live behavioural observations for laboratory mice: a tool for welfare science and animal care Aileen MacLellan, Emma Nip, Aimée Adcock and Georgia Mason *(Canadian Council on Animal Care, Ottawa Hospital Research Institute, University of Ottawa and University of Guelph, Canada)*
	The 3Hs Initiative: Housing, Handling and Habituation. Methods to refine the lifetime experience of laboratory rodents. Justyna Hinchcliffe, Megan Jackson, Julia Bartlett, Jennifer Davies, Emma Robinson *(University of Bristol, UK)*
	Impact of owners' support strategies on the behaviour of dogs facing a novel stimulus Julia Miller, Camila Cavalli, Amin Azadian and Alexandra Protopopova *(Wroclaw University of Environmental and Life Sciences, Poland; University of British Columbia, Canada)*
15.40 - 16.20	**Break: Refreshments**
16.20 - 17.40	**Session Four - Vittoria Elliot (*WAI, Germany*)**
16.20 - 16.40	**Bringing shrimp into the fold of animal welfare science** Hannah McKay and William McAuliffe *(Rethink Priorities, USA; Rethink Priorities, UK)*
16.40 - 17.00	**Animal welfare with Chinese characteristics: Chinese poultry producers' perceptions of, and attitudes towards, animal welfare** Qing Yang, Cathy Dwyer, Belinda Vigors, Ruqian Zhao and Fritha Langford *(University of Edinburgh, Scotland's Rural College (SRUC) and Newcastle University, UK; Nanjing Agricultural University, China)*
17.00 - 17.20	**Zoophilia and animal welfare in Europe: Legal challenges and welfare concerns** Szilvia Vetter *(University of Veterinary Medicine Budapest, Hungary)*
17.30 - 17.50	**How many "enrichments" is enough? Using systematic review and meta-analysis to assess the health impacts of meeting laboratory rodents' needs** Jessica Cait, Charlotte Winder and Georgia Mason *(University of Guelph, Canada)*
17.50 - End	**Evening reception**

Day 2: Thursday 11 July

All timings are GMT+1 / UTC+1/ BST

09.10 - 09.15 **Welcome and Introduction** Birte Nielsen *(UFAW, UK)*

09.15 - 11.00 Session Five - Birte Nielsen (*UFAW*)

09.15 - 09.35 **Boredom in ferrets *(Mustela furo)* – assessing and ameliorating the limbo between sleep and stimulation**
Charlotte Burn, Alice Dancer, Jennifer Bizley and María Díez-León *(The Royal Veterinary College, University College London, UK)*

09.35 - 09.55 **What do we owe feral animals?**
Peter Sandøe, Janne Winther Christensen, Christian Gamborg, Alistair Lawrence and Clare Palmer *(University of Copenhagen and Aarhus University, Denmark; Scotland's Rural College (SRUC), and University of Edinburgh, UK; Texas A&M University, USA)*

09.55 - 10.15 **Refining the monitoring of weight in laboratory macaques *(Macaca mulatta)* and mice *(Mus musculus)*: use of percentile growth curves**
Claire Witham, Katie Stupples, Faye Peters, Sebastian Merritt, Jim Willshire, Sonia Bains, Michelle Stewart and Sara Wells *(Medical Research Council and Black Lab Consulting, UK)*

10.15 - 10.35 **Open science for animal welfare and applied ethology**
Anna Olsson, Helen Gray, Christian Nawroth *(University of Porto, Portugal; Newcastle University, UK; Research Institute for Farm Animal Biology, Dummerstorf, Germany)*

10.35 - 10.55 **Striking a balance between Iberian Lynx conservation efforts and animal welfare**
Alexandre Azevedo, Martin Whiting and Manuel Magalhães-Sant'Ana *(Vasco da Gama University School, Coimbra and University of Lisbon, Portugal)*

10.55 - 11.35 **Break: Refreshments**

11.35 - 13.00 Session Six - Rebecca Meagher (*Dalhousie University, Canada*)

11.35 - 11.55 **Small animals, big data: harnessing technological advances to study rat welfare**
Vikki Neville, winner of the 2024 UFAW Early Career Researcher award

11.55 - 12.15 **Rearing pigs with play opportunities: the effects on disease resilience in pigs experimentally inoculated with PRRSV**
Karolína Steinerová, John Harding, Sarah Parker, Heather Wilson, Arthur Finatto, Haoming Liu and Yolande Seddon *(University of Saskatchewan, Canada)*

12.15 - 12.35 **Implementing sustainable welfare practices in research settings: adoption of non-aversive handling of mice**
Patricia Turner, Judy Murray, Carly O'Malley, Sarah Thurston and Elizabeth Nunamaker *(Charles River, USA; University of Guelph, Canada)*

12.35 - 12.55 **Short Talks:**

Analysis of the effects of temporary outdoor access during the fattening phase on pig welfare, health and performance
Anissa Jahoui, Solenn Gavaud, Franck Guiraud, Julie Lion, Blandine Lieubeau, Julie Hervé and Céline Tallet (*PEGASE, Oniris and GenESI, INRAE, France)*

Why workshops work: Influence of education on positive reinforcement training with goats
Jennifer Meier, Viviane Theby, Lorenz Gygax, Edna Hillman and Carola Fischer-Tenhagen (*German Federal Institute for Risk Assessment (BfR), Tierakademie Scheuerhof and Humboldt-Universität, Germany)*

What's in it for the dogs? Assessing the outcomes of a prison-based dog training program from an animal behaviour and welfare perspective
Parizad Baria-Unwalla *(University of Porto, Portugal)* et al

Pan-African network for laboratory animal science and ethics (PAN-LASE): Education and training in research animal sciences, welfare and ethics across Africa
Josiah Kantiyok *(Johan Vet Network, Nigeria)* et al

12.55 - 14.20 **Lunch and poster session 2**

Day 2: Thursday 11 July

All timings are GMT+1 / UTC+1/ BST

14.20 - 15.20	**Session Seven - Mark Rutter (*Harper Adams University, UK*)**
14.20 - 14.40	**Should all animals be treated equal? Sex-differences in the enjoyment of rat tickling** Vincent Bombail *(Scotland's Rural College) et al*
14.40 - 15.00	**"Waiting and seeing" – Why do new adopters decline dog behaviour support, and which doggy demographic factors make uptake less likely?** Lauren Samet, Kassandra Giragosian, Carys Williams, Joshua Woodward, Eleanor Jordan, Rachel Casey and Emma Buckland *(Dogs Trust, UK)*
15.00 - 15.20	**Short Talks:** **Corticosterone levels in blood and feathers of broiler chickens using liquid chromatography-mass spectrometry (LCMS) method as an indicator of animal welfare** Patricia Soster de Carvalho *(Ghent University, Belgium) et al* **Using Bluetooth beacons to examine ewe-lamb distance as an indicator of welfare concerns in sheep** Michelle Reeves, Aimee Walker, Fiona Kenyon, Anthony Waterhouse, Ann McLaren, Claire Morgan-Davies, Nicholas Nils Jonsson, Emma Baxter and Cathy Dwyer *(SRUC, University of Edinburgh, University of Glasgow and Moredun Research Institute, UK)* **The enigma of the pariah bird (Gallus domesticus)** Joanne Edgar and Elizabeth Paul *(University of Bristol, UK)*
15.20 - 16.00	**Break: Refreshments**
16.00 - 17.40	**Session Eight Presentations OR Workshop (in-person delegates only)**
16.00 - 17.40	**Presentations - Chair: Ruan Daros (*Pontifícia Universidade Católica do Paraná, Brazil*)**
16.00 - 16.20	**Mission impossible accomplished? On the incoherent integration of the harm-benefit analysis into law and policy documents in European countries** Dominik Hajosi and Herwig Grimm *(University of Vienna, Austria and Columbia University, USA)*
16.20 - 16.40	**Connecting biologging and wild animal welfare** Michael Beaulieu *(Wild Animal Initiative, USA)*
16.40 - 17.00	**Rethinking use of the forced swim test in depressive disorders research** Kimberley Jayne *(People for the Ethical Treatment of Animals) et al*
17.00 - 17.20	**The story so far: hypobaric hypoxia as a potential refinement for killing laboratory mice** Jasmine Clarkson (*University of Glasgow, Newcastle University) et al*
16.00 - 17.30	**Workshop: Animal welfare as a profession – beyond academia.** Located in Monoblock 2 (Level zero) Chaired by Birte Nielsen, UFAW, and Sara Capas Peneda and Anna Olsson, i3S). *(This workshop is also open to delegates at the ISAE South West Europe regional meeting).*
17.40 - 18.00	**Closing statement**


UFAW
SCIENCE IN THE SERVICE OF ANIMAL WELFARE
Scientific Programme:
Talks
Abstracts for Talks - Day One

KEYNOTE SPEAKER

T1

WHAT IS WILD ANIMAL WELFARE LIKE AND WHY SHOULD WE CARE ABOUT IT?

Clare Palmer
Texas A&M University, Texas, USA
c.palmer@tamu.edu

Wild-living wild mammals, birds and fish can - like animals kept by humans - have good or bad welfare. But until recently, wild animal welfare was only (sometimes) considered in the context of wildlife management or control. However, this is now changing, for at least two reasons. First, wild animal lives are increasingly impacted by human activities, including global climate change. And second, new waves of philosophical thinking have highlighted the importance of *all* suffering, including that of wild-living wild animals. However, taking wild animal welfare seriously appears to raise overwhelming difficulties, both theoretically and practically. For instance, are we supposed to be policing predation? In this talk, I will try to address such issues head-on.

I'll begin by considering whether there's anything distinctive about wild animal welfare. Like any sentient being, wild animals can be well- or malnourished, healthy or sick, can live in a more or less welcoming physical environment, and can exercise more or less natural behaviours. They share this with farm, laboratory, zoo and companion animals. But, I'll suggest, *autonomy* can be seen as especially important for the welfare of wild animals.

However, that wild animals can have good or bad welfare doesn't give us ethical guidance about whether we have responsibilities to *do* anything about wild animal welfare. And here's where some difficult issues arise.

Despite being routinely ignored (for instance in building new roads and housing), from almost all ethical positions, *harming* individual wild animals matters - although such harms may carry different weights, depending on the relative importance of human interests and environmental values in relation to animal suffering.

What I'll focus on here, however, is not so much ethical issues raised by *harming* wild animals, but those raised by *helping* them. Here there are strongly defended, and divergent, ethical views; I'll discuss three of these (though they may best be understood as points on a spectrum).

- First are broadly *ecological* views in which wild animals are primarily understood as parts of wild ecological systems and species. Here, helping wild animals is seen through an ecological lens; unless (for instance) an animal's *species* is threatened, assisting individual wild animals is not only not ethically required, it risks undermining other values such as *naturalness*, and so is discouraged.
- Second are broadly *relational* ethical views. While people don't have *general* obligations to assist wild animals, for instance in the face of diseases or predation, such obligations might be generated by anthropogenic harms.
- Third are views - defended from within a variety of ethical theories - that the suffering of *all* animals, whether wild or domesticated, is of equal importance; and we should endeavor to help all of them, provided that such assistance doesn't make matters worse down the line.

Having laid out this territory, I'll then make some suggestions about how to navigate the conflicts here. I'll argue that (a) There are good reasons to minimize harms to wild animals, for instance in conservation interventions (b) There are also good reasons to consider ways of helping animals significantly harmed by human activities (c) If there are occasions where naturally suffering wild animals can be helped at low cost and low risk, there is at least reason to consider such interventions.

However, in all these cases, I'll suggest it's important to weigh values, including the value of human welfare, environmental justice, species protection and ecosystem function. While wild animal welfare should be taken seriously, it shouldn't be regarded as the *only* value at stake.

BUT IS FARM ANIMAL WELFARE A PUBLIC GOOD?

T2

Beth Clark, Albert Boaitey, and Carmen Hubbard

Centre for Rural Economy, School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK
beth.clark@newcastle.ac.uk

There is debate surrounding whether farm animal welfare (FAW) should be considered a 'public good', where public goods are farm system outputs not rewarded by markets yet provide benefits to society. Those who argue for its classification highlight the additional benefits from improved animal and subsequently public health for both consumers of animal products and more widely citizens. Those who argue against highlight the role of the free market in providing acceptable levels of FAW. However, research suggests a 'market failure', meaning that markets alone fail to deliver socially acceptable levels. Subsequently, government intervention and legislation are needed to ensure good FAW provision.

Whilst the market and consumer purchasing have a role to play, there are other mechanisms for the public to express their concerns and preferences for higher welfare, particularly in their role as citizens. This includes political referendums and donations to not-for-profits organisations that enable the public including non-consumers (ie., vegans, vegetarians) to influence FAW standards. This paper considers the public good argument concerning how relatively free markets affect FAW. Using two examples, it examines public perceptions as a public good and the use of taxpayers' money to fund FAW. The first example uses a nationally representative sample and employs an ordered logistic regression model, to explore the delivery of FAW as a public good in the UK. It also reports findings related to the importance of FAW in food choices and who should be responsible for the delivery of FAW in the UK. The second example uses choice experiments, to investigate US public support for different mechanisms for ensuring high(er) FAW, and how this varies by dietary categories (eg., omnivores, flexitarians, vegans. vegetarians). Findings demonstrate clear support for FAW to be considered as a public good and the use of taxpayers' money to support its delivery. Additionally, the results show that the public's valuation is higher in political (referendum) contexts and amongst non-animal product consumers compared to market scenarios and omnivores.

Valuing the societal economic benefits from improved FAW is crucial if high(er) FAW standards are required. However, societal gains are difficult to measure. Thus, if consumers do not view themselves as responsible, their beliefs or actions are unlikely to drive change. Delegation of responsibility by citizens (and consumers) to their governments (through tighter regulations) does not and cannot absolve them of responsibility for the consequences. Delegation is not an abdication of responsibility.

YOUNGER DAMS WITHOUT OLDER LITTERS IN THE CAGE INCREASES MOUSE PRE-WEANING SURVIVAL

T3

Gabriela Morello[1,2], Sara Capas-Peneda[1,2], Sophie Brajon[1,2], Sofia Lamas[1,2], Igor Lopes[3], Colin Gilbert[4] and Anna Olsson[1,2]

[1] Laboratory Animal Science, IBMC-Institute of Molecular and Cellular Biology, University of Porto, Porto, Portugal
[2] i3S – Institute for Investigation and Innovation in Health, University of Porto, Porto, Portugal
[3] Sociedade Portuguesa de Inovação, Porto, Portugal
[4] Babraham Institute, Babraham, Cambridge, UK
gabriela.morello@i3s.up.pt

When attempting to reduce mouse breeding for research, a problem remaining largely unaddressed is the issue of mouse pre-weaning mortality. Studies have been reporting mortality levels from less than 10% to 49%, often reaching above 20%. Considering an average of 4.5 million mice used in EU research yearly, and assuming a conservative mortality level of 20%, up to 1.1 million mice may have been dying annually, before being available for use in science. Furthermore, the more pups that are bred, the more breeding resources are needed, making this a world-wide animal welfare, economic, logistic, and sustainability issue. Pre-weaning mortality, reproductive, and welfare parameters have previously been linked with social and environmental factors, such as cage enrichment (eg. nest material and amount), bedding material, dam handling and parity, cage temperature and light intensity, and more recently, litter overlap, which happens when new pups are born in the presence of older pups already in the cage. Still, how these social factors interact with the cage microenvironment to impact pup survivability remains unknown. Therefore, this study aimed to evaluate pup survival as function of the most relevant environmental and social factors for mouse pups, and their degree of importance relative to pup survival. A total of 3380 pups from 509 C57BL/6J litters were counted twice daily from birth until day four post-partum for accurate detection of mortality. Pup probability to die was modelled as a function of dam age, number of pups born, number and age of older pups in cage. Additional measurements were performed for 172 litters (1181 pups), to continuously monitor cage temperature, light intensity, vibration, and frequency of human movements near mouse cages, for four days post-partum. Nests were scored daily regarding their height and closure of the walls surrounding the nest cavity. A Decision Tree was built to describe the environmental and social pathways leading to pup death. Probability of pups to die increased with the increase in dam age, number and age of older pups in the cage, and in small (≤6 pups) and large (>11 pups) focal-litters. Higher temperatures (>23.6°C) and nest scores (>3.75) compensated some of the socially-risky situations for pup death. These findings can be implemented in strategies for reducing pre-weaning mortality, for a more welfare-friendly and sustainable mouse breeding for science.

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MONITORING ANIMAL WELFARE IN AGRICULTURE AND FISH FARMING AT A NATIONAL LEVEL

T4

Angela Bergschmidt[1], Leonie Geef[1], Caroline Gröner[1], Julia Johns [1], Caroline Over[1], Barbara Prottengeier[1], Hanna Treu [1], Laura Wieczorreck [1], Joachim Krieter [2], Katja Krugmann [2], Nina Heil [3], Michael Koch [3], Sally Lühken[4], Karen Kauselmann[4], Isa Kernberger-Fischer[4], Cindy Nyanzi[4], Michael Marahrens[4], Lars Schrader[4], Jan Brinkmann[5], Dörte Frieten[5], Viola Magierski[5], Solveig March[5], Robby Andersson[6], Anke Redantz[6], Kathrin Toppel[6], Marlen Bielicke[7], Edna Hillmann[7], Christel Simantke[7], Regina Magner[8], Ute Schultheiß[8], Selina Zang[8], Karina Klase[9], Dieter Steinhagen[9], Felix Teitge[9], Vincent Lugert [10]and Stefan Reiser [10]

[1] Thünen Institute of Farm Economics, Braunschweig, Germany
[2] Christian-Albrechts-University of Kiel Institute of Animal Breeding and Husbandry Kiel, Germany
[3] Federal Statistical Office, Unit G14 'Animal Husbandry and Fisheries' Wiesbaden, Germany
[4] Friedrich-Loeffler-Institute, Institute for Animal Welfare and Animal Husbandry Celle, Germany
[5] Thünen Institute of Organic Farming, Animal Welfare Working Group, Westerau-Trenthorst, Germany
[6] Osnabrück University of Applied Sciences, Department of Animal Husbandry and Products, Osnabrück, Germany
[7] Humboldt University of Berlin Animal Husbandry Systems and Ethology Berlin, Germany
[8] Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V., Darmstadt, Germany
[9] Hanover University of Veterinary Medicine Foundation Department of Fish Diseases and Fish Husbandry, Hanover, Germany
[10] Thünen Institute of Fisheries Ecology Aquaculture Division Bremerhaven, Germany
angela.bergschmidt@thuenen.de

Animal Welfare in husbandry is a topic of high relevance to European citizens. In the most recent Eurobarometer survey, 93 % of the interviewed persons answered the question 'How important is it to protect the welfare of farmed animals?' with 'important'.

In 2021, EU farmers reared 76 million cattle, 142 million pigs, 60 million sheep, 11 million goats, and billions of poultry. Yet, due to missing information, it is neither possible to describe the status quo nor the developments of animal welfare in the European Union. The lack of data on animal welfare indicators (eg. mortality, lameness, foot pad lesions) prevents member states from designing relevant animal welfare strategies and makes it difficult to evaluate the effectiveness of existing EU animal welfare legislation and support measures. In the German 'National Animal Welfare Monitoring' (NaTiMon) project, a consortium of 10 institutions developed a concept for a regular and systematic measurement of animal welfare in livestock farming at national level. With the involvement of stakeholders, suitable indicators were selected, possibilities for the use of existing data identified and procedures for the collection of missing data developed. Indicators for husbandry, transport and slaughter of cattle, pigs, chickens, turkeys, sheep, goats and of rainbow trout and carp from aquaculture were included, as well as context-indicators describing conditions of livestock farming. These findings for Germany cannot be scaled up to EU-level without consideration of existing differences in the monitoring programmes between member states. Each member state has its own system of data collection and data recording. In addition, structures of farming and processing differ. On the other hand, common features exist: eg., each member state has a milk recording system, official veterinarians are present at ante- and post-mortem inspection and all countries have organisations which can perform animal welfare audits, to record animal-welfare data that has not yet been collected. In our presentation, we will summarise the key findings from the NaTiMon-project and explain how its results can provide input to the process of implementing a European animal welfare monitoring system. Because the steps recommended for the implementation of a future animal welfare monitoring system in Germany also hold for the European level:

1. Create a legal basis.
2. Provide an institutional basis and infrastructure.
3. Provide funds for implementation.
4. Enable the use of existing data
5. Implement the collection of missing data.
6. Publish an animal welfare monitoring report.

OPTIMISING POPULATION DENSITY FOR WILD ANIMALS' WELFARE

T5

Luke Hecht[1,2] and Simon Eckerström Liedholm[1]

[1] Wild Animal Initiative, 5123 W 98th St, Minneapolis, MN, USA
[2] Department of Biosciences, Durham University, Stockton Road, Durham, UK
luke.hecht@wildanimalinitiative.org

The size of a population relative to limiting resources is likely to impact welfare through factors including resource accessibility, social interactions (both affiliative and agonistic), predation risk, and disease transmission. The shape of the relationship between population density and wild animal welfare for a given population may depend on which age groups struggle the most when resources are limited, and how mature adults respond behaviorally and physiologically based on their life history traits. In general, for populations near their ecological carrying capacity, welfare is likely to be higher when adults limit immediate reproduction (defined as 'self-imposed fertility control') in favor of somatic maintenance and parental care, than when reproduction continues unabated and survival is reduced instead. Although usually thought of only as a non-lethal approach to "pest" control, wildlife contraception has the potential to improve wild animals' welfare above natural baselines by averting negative consequences of high population density. Wildlife contraception is likely to have the most positive impact on welfare in populations of animals who sacrifice somatic maintenance first when resources become limiting, and who have low juvenile survival (and thus potentially also welfare) at their natural carrying capacity. We present a framework, based on these principles, for predicting how much a given species stands to benefit from wildlife contraception based on its life history strategy.

ENDING RODENTICIDE USE: COULD FERTILITY CONTROL BE THE ANSWER?

T6

Julie Lane, Bex Pinkham, Sarah Beatham, Simon Croft and Matthew Gomm

National and Wildlife Management Centre, Animal and Plant Health Agency, York, UK
julie.lane@apha.gov.uk

Wild rodents can cause a significant risk to public health and safety and in some circumstances (eg. grey squirrel) to our biodiversity. For these reasons it is imperative to have forms of control to mitigate these conflicts. One of the main ways of controlling these species is the use of rodenticides, such as cholecalciferol and anticoagulants, both of which are known to be markedly inhumane. It is accepted that the use of rodenticides is one of the biggest issues in relation to animal welfare in the UK. The instigation of the Campaign for Responsible Rodenticide Use (CCRU) has helped in promoting responsible use of rodenticides to reduce secondary poisoning and to reduce use overall but it is clear that the only way of addressing the welfare concerns is to find a viable alternative (s). Across the world, fertility control is being seen as a complementary and alternative method for wildlife management. We have been developing an oral fertility control method to address grey squirrel control in an effective and humane way without impacting the environment and non-targets. We will discuss the progress of this research both in the laboratory and the field and its applicability to other species (eg. mice and rats) and situations. As part of our research we have been modelling the potential success of fertility control on reducing grey squirrel populations. This research has demonstrated that fertility control when applied in conjunction with other lethal methods is most effective at quickly and significantly reducing densities of grey squirrels to numbers low enough to mitigate most of the economic and environmental problems they cause. To incorporate this finding methods of lethal control for rodents such as use of spring traps will be discussed with respect to the humaneness and efficacy both alone and in tandem with fertility control. Although it is important to note that this does not prevent fertility control being used on its own, it would just take longer to reduce numbers.

The use of term vermin for rats and mice (due to the fact they can spread disease) and their proclivity across the world has probably delayed the investment into finding humane methods for their control. The use of fertility control either alone or in conjunction with other methods may go some way in addressing this significant worldwide welfare issue.

ASSESSING ANIMAL WELFARE RISK IN FIBRE-PRODUCING ANIMALS BY APPLYING THE FIVE DOMAINS FRAMEWORK

T7

Kaja Salobir[1], Marlene Katherina Kirchner[1], Thainá Landim De Barros[1], Shari Cohen[2] and Daniela Haager[1]

[1] VIER PFOTEN International, Vienna, Austria
[2] FOUR PAWS Australia, Sydney, Australia
daniela.haager@vier-pfoten.org

Nearly 5 billion farm animals, including waterfowl, cattle, sheep, goats and alpacas, are affected by the fashion industry and their welfare requires urgent attention. Various textile standards and certification schemes have emerged to try to address this issue; however, there is a gap of knowledge about the criteria used by these standards and consequently the endorsement of high animal welfare. Our study aimed to develop an animal welfare risk assessment tool. We first defined the structure of the tool, based on the Five Domains framework, then the indicators were defined based on international literature, current farming practices and the Welfare Quality and AWIN protocols. To have one single score for each animal welfare risk, we aggregated the scores at the single-measure level using a decision tree and then, to have a single score for each provision, a Choquet integral was used. We applied the risk assessment tool to 17 different textile standards and policies considering the information publicly available. The final results were classified according to the overall animal welfare risk, ranging from probability for very poor animal welfare to probability for excellent animal welfare. Our results showed that only one standard had an "acceptable" animal welfare risk category, with the remaining ones having low or very low scores, representing a significant risk to animal welfare. This highlights the inadequacy of current industry textile standards to ensure high levels of animal welfare and an urgent need for standard requirements to be improved to provide a greater opportunity for higher animal welfare. While industry standards are promising in raising the standard of animal care, they do not yet fully mitigate the welfare risks faced by the majority of farm animals. The proposed animal welfare risk assessment tool needs further on-farm application to bridge the gap between standards and on-farm practices. This research encourages the scientific community to investigate on-farm welfare conditions of farm animals in the textile industry and improve standards to promote a more ethical and sustainable farming practices.

WINDOW OF OPPORTUNITY: INTEGRATION OF INTERNAL CHAT HATCHES IN EQUINE HOUSING, IMPACTS THE PHYSIOLOGY & BEHAVIOUR OF STABLED HORSES

T8

Kelly Yarnell [1], Anna Gregory [1], Theresa Robertson [1], Gareth Starbuck [1] and Rupert Palme [2]

[1] School of Animal, Rural & Environmental Science, Nottingham Trent University, UK
[2] Department of Biomedical Sciences, University of Veterinary Medicine, Vienna, Austria
kelly.yarnell@ntu.ac.uk

Equine housing systems have received considerable research attention, with the overall aim of improving horse welfare whilst retaining the convenience and control of stabling. Positive welfare has been reported in horses living in extensive housing systems, and major changes to existing stabling report improved well-being. However, such changes are often not feasible for most horse owners who wish to improve welfare by offering horses the opportunity to express natural behaviour, especially when turnout is limited. This study investigated the impact of a minor modification (chat hatch) to existing equine housing upon physiological and behavioural indicators of positive welfare in the horse. Horses (n=8) spent one week each in three types of housing design over a period of four weeks. The housing designs were 1. Horses usual social box (SB, 2. Socially restricted housing (Rh), 3. Modified restricted housing with chat hatch (MRh), 4. Return to horses' usual social box (RSB). Continuous behavioural recordings assessed time spent recumbent and time spent visually alert over the stable door. Faecal samples were collected daily from each horse for measurement of cortisol metabolites. Key findings showed a significant difference ($p=<0.001$) for standing alert behaviour. Horses spent significantly less time with their head over their door once a chat hatch had been installed, suggesting that chat hatches offered improved visual contact with conspecifics. There was also a difference in recumbency behaviour, with horses lying down more once a chat hatch had been installed. There was no change in faecal cortisol metabolite levels. Findings suggest that when horses have internal visual access to conspecifics via a chat hatch, they utilise this modification and their welfare is improved. Chat hatches are a minor, low cost change that many horse owners could accommodate to improve housed welfare, rather than expensive, large scale installations or redevelopment of existing equine housing, particularly if space is limited or extensive modification is not possible.

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HERE COMES TROUBLE: INVESTIGATING RISK FACTORS AND BEHAVIOURAL CORRELATES OF BARBERING IN LABORATORY MICE

T9

Lauren Young[1,2] and Georgia Mason[2]

[1] The 3Rs Collaborative, Denver, CO, USA
[2] Campbell Centre for the Study of Animal Welfare/Department of Integrative Biology, University of Guelph, Guelph, ON, Canada
lyoung05@uoguelph.ca

Barbering in laboratory mice involves the abnormal self- or allo-plucking of fur and/or whiskers. It has welfare implications for victims, especially if affecting whiskers; and likely for barbers too, since increased by sub-optimal conventional housing. Barbering may even indicate psychological abnormality, if similar to the human condition, trichotillomania. However, barbering's aetiology remains uncertain, and its emergence, unpredictable. Here, to test hypotheses about risk factors and aetiology, we surveyed University of Guelph facilities monthly for a year (Study 1), and opportunistically analysed a pre-existing ethological dataset (Study 2).

Study 1 collected data over 13 months from 10 rooms with reported allo-barbering, representing 21 cages of fur/whisker barbers and 533 control cages. Logistic regressions were run separately on the two barbering forms. Fur barbering was predicted by environmental factors: being housed closer to the ceiling (odds ratio: 12.45 [0.583,13.638], p = 0.091), and, unexpectedly, further from the room door (odds ratio: 35.20 [2.196,641.913], p = 0.011). Whisker-barbering was predicted by demographic factors: age (odds ratio: 2.73 [1.303,5.708], p = 0.008) and being female (odds ratio: 16.67 [1.475,166.667], p = 0.023). Consistent with these differential risks, fur- and whisker-barbering did not predict each other (p = 1.000) indicating they are ethologically unrelated.

Study 2 focussed on whisker-barbering, using past data to investigate three hypothesised aetiologies: it originates from social dominance (predicting that barbers will aggress their victims), or from social affiliation (predicting elevated prosocial interactions), or instead that it resembles human trichotillomania (predicting increased anxiety and depression-like behaviour). Data came from 110 regularly-screened female mice, housed in mixed-strain trios (each a Balb/c, DBA, and C57Bl/6), in 33 conventional cages and 22 'enriched' cages. Ten C57Bl/6s became barbers: all conventionally-housed (a significant housing effect: p = 0.003), and barbering Balb/cs. Behaviour in these cages was compared to the 22 conventional cages without barbering, via general linear models with 'group' (barbering present/absent), age (young or middle-aged) and group*age as predictors. One difference emerged. Barbered Balb/cs received more agonism than non-barbered Balb/cs (F1,28 = 2.99, p = 0.095) and barber C57Bl/6s were more agonistic than non-barber C57Bl/6s, albeit only in middle-aged animals (F1,28 = 4.26, p = 0.049): aggressive interactions that increased in the weeks preceding detection of barbering. Environmental enrichment is thus a good preventative strategy for at-risk female mice, and increased agonism a potential warning sign of its emergence: results confirming the welfare significance of whisker-barbering.

Go to poster

FACTORS RELATED TO LIFE EXPECTANCY AND CAUSE OF DEATH OF DOGS IN ITALY

T10

Mariana Roccaro[1], Romolo Salini[2], Marco Pietra[3], Micaela Sgorbini[4], Eleonora Gori[4], Maurizio Dondi[5], Paolo E. Crisi[6], Annamaria Conte[2], Paolo Dalla Villa[2], Michele Podaliri[2], Paolo Ciaramella[7], Cristina Di Palma[7], Annamaria Passantino[8], Francesco Porciello[9], Paola Gianella[10], Carlo Guglielmini[11], Giovanni Alborali[12], Sara Rota Nodari[12], Sonia Sabatelli[3] and Angelo Peli[1]

[1] Department for Life Quality Studies, Alma Mater Studiorum University of Bologna, Rimini, Italy
[2] Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G.Caporale, Teramo, Italy
[3] Department of Veterinary Medical Sciences, Alma Mater Studiorum University of Bologna, Ozzano dell'Emilia, Italy
[4] Department of Veterinary Sciences, University of Pisa, via Livornese, Pisa, Italy
[5] Department of Veterinary Science, University of Parma, Parma, Italy
[6] Faculty of Veterinary Medicine, University of Teramo, Teramo, Italy
[7] Department of Veterinary Clinical Science, University of Naples Federico II, Naples, Italy
[8] Department of Veterinary Sciences, University of Messina, Messina, Italy
[9] Department of Veterinary Medicine, University of Perugia, Perugia, Italy
[10] Department of Veterinary Sciences, University of Turin, Turin, Italy
[11] Department of Animal Medicine, Production and Health, University of Padova, Padua, Italy
[12] Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia-Romagna, Brescia, Italy
mariana.roccaro2@unibo.it

The long and intense selection process of the domestic dog has led to its exceptional phenotypic variability, but also, in some cases, to a severe reduction of breed genetic variability and the unintentional amplification of negative characteristics. An improved understanding of dog life expectancy and causes of death (COD) is necessary to guide health management decisions, breed selection, and improve dog welfare.

To analyse the lifespan of dogs in Italy, identify the most common causes of death, and evaluate possible risk factors, anonymised medical records were collected from 9 veterinary teaching hospitals and 2 public health institutions. Data regarding breed, sex, neuter status, age, diagnosis, and mechanism of death were retrieved. COD was classified by pathophysiologic process (PP) and organ system (OS).

Of the 4957 dogs that died between 2004 and 2020 included in the study, 2920 (59.0%) were purebred, 2293 (46.2%) were female, 3005 (60.6%) were intact, 2883 (58.2%) were euthanised. Overall median longevity was 10.0 years. Median longevity was significantly longer for crossbreds and small-sized dogs, but there was significant variation across breeds. The breeds with the highest median age at death were the Yorkshire terrier, English cocker spaniel, and West Highland white terrier (13 years), whilst the lowest median age at death was recorded for the American bulldog (5 years), English bulldog (6 years), American pit bull terrier and Bernese Mountain dog (7 years). Neutering appeared to be positively related to longevity in both sexes, although an improved understanding of the relationship between gonadal status and cause of death is needed. The most frequent COD by PP was neoplasia (34.0%), which occurred more frequently in large breeds, namely German shepherd, Labrador retriever and Boxer. Degenerative diseases mostly affected small-sized dogs like Miniature pinscher and Dachshund. Diseases of the renal/urinary system were most frequently responsible for COD (15.0%), prevalently degenerative and inflammatory/infectious. Substantial variation in median longevity according to COD by PP and OS was detected.

Our results suggest that the primary focus should shift from mere life expectancy to an in-depth investigation of COD, to help identify priority diseases in specific breeds, capitalise the efforts to improve breed health, and assist owners in purchasing a purebred dog and making health management or end-of-life decisions. Besides its national relevance, this study is of global interest as it sheds light on the risk factors related to disease and longevity, and on breeds affected by a worryingly short life expectancy.

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UFAW MEDAL FOR 'OUTSTANDING CONTRIBUTION TO ANIMAL WELFARE SCIENCE' AND UFAW EARLY CAREER RESEARCHER OF THE YEAR

The **UFAW Medal for Outstanding Contributions to Animal Welfare Science** is a prize that recognises the exceptional achievements of an individual scientist who has made fundamental contributions to the advancement of animal welfare over a number of years. The award is open to individuals whose research, teaching, service and advocacy has had international impact and significantly benefited the welfare of animals.

This year's winner of the UFAW Medal is Professor Emeritus Robert Elwood

Previous winners:

- 2023 Professor Per Jensen (Linköping University, Sweden)
- 2022 Professor Jane Hurst (University of Liverpool, UK)
- 2021 Professor Joy Mench (University of California, Davis, USA)
- 2020 Professor Daniel Weary (University of British Columbia, Canada)
- 2019 Professor Paul Hemsworth (University of Melbourne, Australia)
- 2018 Professor Paul Flecknell (Newcastle University, UK)
- 2017 Professor Sandra Edwards (Newcastle University, UK) and Professor Jeff Rushen (University of British Columbia, Canada)
- 2016 Professor Donald Broom (University of Cambridge, UK) and Professor Christopher Wathes (The Royal Veterinary College, UK)
- 2015 Professor David Mellor (Massey University, New Zealand) and Professor Georgia Mason (University of Guelph, Canada)
- 2014 Professor Mike Mendl (University of Bristol, UK) and Professor David Fraser (University of British Columbia, Canada)

The UFAW Early Career Researcher of the Year Award is a prize that recognises the achievements of young scientists who have made significant contributions to improving the welfare of animals. The award is open to students who are currently studying for a doctoral degree and to individuals who are within six years of the end of their PhD work.

This year's winner of the UFAW Early Career Researcher of the Year Award is Dr Vikki Neville

Previous winners:

- Dr Sara Hintze (University of Natural Resources and Life Sciences, Vienna, Austria).and Dr Jordan Hampton (University of Melbourne, and Murdoch University, Australia)
- 2022 Dr Jessica Martin (University of Edinburgh, UK) and Dr Nienke van Staaveren (University of Guelph, Canada)
- 2021 Dr Jamie Ahloy Dallaire (Université Laval, Canada) and Jen-Yun Chou (University of Pennsylvania, USA)
- 2020 Dr Irene Camerlink (Polish Academy of Sciences, Poland)
- 2019 Dr Marisa Eramus (Michigan State University, USA)
- 2018 Dr Rebecca Meagher (University of Reading, UK)
- 2017 Dr Pol Llonch (Universitat Autonoma de Barcelona, Spain)
- 2016 Dr Rowena Packer (The Royal Veterinary College, UK)
- 2015 Dr Jasmeet Kaler (University of Nottingham, UK)
- 2014 Dr Lisbet Pluym (Ghent University, Belgium)

UFAW AWARD PRESENTATION

T11

Winner of the 2024 UFAW Medal:

SERENDIPITY, SENTIENCE, AND SCIENCE: DO CRUSTACEANS FEEL PAIN?

Robert Elwood
Queen's University, Belfast, Belfast, Northern Ireland, UK
r.elwood@qub.ac.uk

Do crabs and lobsters feel pain? This question was posed during a chance meeting with a celebrity chef. Is a pub the place to start a science project? What could possibly go wrong?

All animals are prone to tissue damage, and they typically have rapid nociceptive reflexes that enable the animal to withdraw from the damaging stimuli. These reflexes are effective in reducing immediate tissue damage. However, at least in humans, there is a second response to tissue damage that we call pain. The emotional experience of pain is generated in the brain and appears to cause long-term changes in motivation that modify behaviour. Pain thus enhances long-term protection so that the animal avoids situations that previously resulted in tissue damage and pain. The negative affective state of pain might also guide responses towards the specific site of a wound that enhance recovery.

This presentation considers behavioural and physiological criteria that might help to distinguish nociceptive reflexes from pain in crustaceans (or other animals). Rapid avoidance learning and prolonged memory indicate central processing rather than mere reflexes and are consistent with the experience of pain. Complex, prolonged directed grooming or rubbing demonstrate an awareness of the specific site of stimulus application. Trade-offs with other motivational systems indicate central processing, and these demonstrate that responses go beyond reflexes. Further, long-term changes in behaviour following a noxious experience can last for at least 24hrs, which is not consistent with reflex responses. The data of these experiments go beyond the idea of just nociception but do not provide total proof of pain. The idea of pain in crustaceans is still disputed by some. Despite some vigorous objections the increasing evidence that is consistent with the idea of pain is changing attitudes. There is an increasing acceptance that these animals MIGHT experience pain. There are moves to improve the welfare of these animals. The food industry is beginning to consider the possibility of pain and suffering of decapods and there are moves to avoid dismembering or boiling live animals without prior stunning.

VALIDATION OF LIVE BEHAVIOURAL OBSERVATIONS FOR LABORATORY MICE: A TOOL FOR WELFARE SCIENCE AND ANIMAL CARE

T12

Aileen MacLellan[1,2,3], Emma Nip[4,5], Aimée Adcock[4,5] and Georgia Mason[5,6]

[1] Canadian Council on Animal Care, Ottawa, Ontario, Canada
[2] Ottawa Hospital Research Institute, Ottawa, Ontario, Canada
[3] Department of Anesthesiology and Pain Medicine, University of Ottawa, Ottawa, Ontario, Canada
[4] Department of Animal Biosciences, University of Guelph, Guelph, Ontario, Canada
[5] Campbell Centre for the Study of Animal Welfare, University of Guelph, Guelph, Ontario, Canada
[6] Integrative Biology, University of Guelph, Guelph, Canada
aileen.maclellan@gmail.com

In laboratory mice (*Mus musculus*), live "in-person" observations of homecage behaviours offer a practical, non-invasive tool for welfare assessment that can be implemented during both research and daily health checks. However, the validity of live observation can be negated by "observer effects", where human presence alters the behaviour of the animals being assessed. Observer effects have been well-studied in zoo and free-living wild animals, but not in laboratory animals to date. Addressing this oversight has become pressing: the Canadian Council on Animal Care's 2021 Guidelines on Animal Welfare Assessment now require inclusion of behavioural indicators during regular animal assessments. For mice, we therefore sought to validate live observations by assessing whether observers impact activity levels and widely used behavioural indicators of welfare (stereotypic behaviour, aggression, and time spent "inactive-but-awake": a depression-like response). Forty-eight female mice (n=16 C57BL/6, n=16 DBA/2J, n=16 BALB/c) were housed in mixed strain trios and reared to adulthood in 16 conventional laboratory cages. For six consecutive days, cages were video recorded for 4-hours during the dark phase (09:00-13:00). On four of these days, human observers were present, with one of two female observers ("1" and "2") simulating scan-sampling live observations – approaching each cage every 20 minutes and recording the behaviour of each mouse. The two Observer Absent, two "Observer 1" Present, and two "Observer 2" Present days were pseudorandomized across the six days. Videos were scored, by an observer blind to treatment and study aim, via continuous sampling during every alternate 10-minutes. Repeated Measures General Linear Mixed Models (with cage as a random effect) revealed no effect of observer presence on total activity ($F=1,229.7=1.36$; $p=0.242$), stereotypic behaviour ($F1, 233.2=1.06$; $p=0.350$), inactive-but-awake behaviour ($F1,123.5=0.61$; $p=0.4351$) or aggression ($F1, 233.5=1.72$; $p=0.191$). There were also no interactions with Strain ($p < 0.5$). Furthermore, across all categories, individual differences in behaviour were consistent across Observer Present/Absent days; and there were no differences between the two observers ($p < 0.5$). Results therefore provide evidence of the validity of live observations for female mice, across three strains. Efforts to minimize the risk of observer effects should still always be implemented (eg., quiet observations by familiar individuals), and replication is now needed (eg., with male mice/observers, and additional strains). Yet for now, this study provides promising support for the continued use of this practical welfare assessment tool.

Go to poster

THE 3HS INITIATIVE: HOUSING, HANDLING AND HABITUATION. METHODS TO REFINE THE LIFETIME EXPERIENCE OF LABORATORY RODENTS

T13

Justyna Hinchcliffe, Megan Jackson, Julia Bartlett, Jennifer Davies and Emma Robinson

School of Physiology, Pharmacology and Neuroscience, University of Bristol, Bristol, UK

justyna.hinchcliffe@bristol.ac.uk

Achieving positive affective states in laboratory rodents is a key component of good animal welfare and plays an important role in enhancing stress-coping mechanisms and resilience. In preclinical research, continuous refinements in husbandry, handling, housing, and methods for drug administration are objectives that contribute to the well-being of laboratory animals but also underpin the quality and rigor of scientific research. The 3Hs Initiative: Housing, Handling, and Habituation provides a comprehensive framework focused on refining the lifetime experience of laboratory mice and rats and methods which increase their positive affective experiences and reduce cumulative suffering and stress. The refined methods advocated by the initiative, such as positive handling techniques, the increase of environmental complexity with the use of ball pits and playpens, and the adoption of low- or no-restraint dosing techniques, are supported by empirical data using objective assessments of stress responses and/or affective state eg. the affective bias test, recording of rats' ultrasonic vocalisations or tests measuring the anxiety behaviours. The implementation of these scientifically validated methods not only contributes to the welfare of laboratory rodents but also has the potential to reduce data variation, therefore improving the scientific integrity of preclinical research.

Go to poster

IMPACT OF OWNERS' SUPPORT STRATEGIES ON THE BEHAVIOUR OF DOGS FACING A NOVEL STIMULUS

T14

Julia Miller[1,2], Camila Cavalli[2], Amin Azadian[2] and Alexandra Protopopova[2]

[1] Department of Immunology, Pathophysiology and Veterinary Preventive Medicine, Wroclaw University of Environmental and Life Sciences, Poland
[2] Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Canada
julia.miller@upwr.edu.pl

Introduction: Dogs turn to humans for cues on how to react in ambiguous situations. Owners may use different strategies to support their dogs in the presence of a potential stressor.

Hypothesis: We aimed to assess the impact of owner behaviour on the stress levels and behaviour of dogs facing a potential stressor. We hypothesized that dogs whose owners were using active support strategies would show lower stress levels compared to dogs whose owners remained passive.

Method: After a habituation phase, a remote-controlled car placed in a plastic tub was turned on for 60s. Fourty-eight pet dogs were quasi-randomly assigned to groups: Control (n=12, the owner sat at a distance and did not interact with the dog), Calming (n=12, the owner sat at a distance while talking in a soothing way and petting the dog if possible), Approach (n=12, the owner approached the tub and touched it, while talking to the dog) and Treats (n=12, the owner sat a distance and provided a treat every 5 s after the car was turned on), counterbalanced for age, sex, and C-BARQ fear subscales scores. The dogs' stress levels were evaluated holistically on a 4-point scale by two experimenters. A partial-interval procedure with 5 s time bins was used to measure affiliative behaviours and behaviours related to the object.

Results: Dogs in the Control group gazed at the owners less frequently than dogs from all other groups (ps < 0.038). They also spent significantly less time in the proximity of their owners than dogs in the Treats group ($Z = 3.91$, $p < 0.001$). Significantly lower stress levels were observed in the Treats group than in the Approach group ($Z = 2.89$, $p = 0.023$). Dogs in the Approach group spent more time in the proximity of the object than dogs in the Control ($Z = 3.05$, $p = 0.014$) and Treats group ($Z = 4.34$, $p < 0.001$). There was a positive correlation between stress levels and object proximity ($r = 0.37$).

Discussion: Owners are sometimes advised to ignore a dog who may be scared, but this passive strategy reduced the dogs' affiliative behaviours and looking for reassurance. Another possible suggestion is encouraging the dog by approaching the stressor. Dogs may follow their owners when they approach a novel object, but proximity to the object may increase stress.

Go to poster

BRINGING SHRIMP INTO THE FOLD OF ANIMAL WELFARE SCIENCE

T15

Hannah McKay and William McAuliffe

Rethink Priorities, California, USA and Eastbourne, UK
hannah@rethinkpriorities.org

Even though around 440 billion shrimp are slaughtered every year, there are few requirements or guidelines for protecting farmed shrimp. A greater understanding of farming practices and their implications for shrimp welfare is sorely needed to make concrete recommendations to legislators and certifiers. However, this is hampered by the absence of a dedicated research program within an animal welfare science framework, resulting in a reliance on industry sources or academic studies primarily focused on enhancing production efficiency. To begin prioritising how best to safeguard shrimp welfare and to discern the largest knowledge gaps, we quantitatively compared 17 welfare threats to shrimp according to their duration, severity, and prevalence in the population. We modelled the welfare losses caused by each threat using a Monte Carlo approach to account for scientific uncertainty at each stage. Our main finding that is robust to uncertainty is that long-lasting welfare threats, such as high stocking density, cause more adverse welfare impacts to more shrimp than short-lived experiences, such as harvest and slaughter, even though the latter is likely more intensely painful at any one moment. Unfortunately, these chronic threats are the very issues that have received the least attention from an animal welfare science perspective. From this work, we discuss some high-priority research questions that animal welfare scientists could solve with a dedicated research program. For example, sustained conditions such as high stocking density and elevated temperatures emerge in our model as potentially important challenges, yet our understanding of shrimp responses and preferences in these environments remains rudimentary. How much space do shrimp need to feel comfortable and avoid aggression from dominant individuals? Do shrimp exhibit behavioural fever? None of these questions are likely to be investigated by science aimed at improving production efficiency because mitigating these welfare issues cannot be justified by economic considerations alone. Studies conducted with an animal welfare science lens will help stakeholders make evidence-based reforms that are feasible for producers and impactful for shrimp welfare. By presenting our quantitative approach to examining shrimp welfare threats, along with several important and open research questions, we hope to provide some direction for integrating the nascent field of shrimp welfare into animal welfare science.

ANIMAL WELFARE WITH CHINESE CHARACTERISTICS: CHINESE POULTRY PRODUCERS' PERCEPTIONS OF, AND ATTITUDES TOWARDS, ANIMAL WELFARE

T16

Qing Yang[1], Cathy Dwyer1,[2], Belinda Vigors[1], Ruqian, Zhao[3] and Fritha Langford[1,4]

[1] Royal (Dick) School of Veterinary Studies, University of Edinburgh, Edinburgh, UK
[2] Department of Animal Behaviour and Welfare, Scotland's Rural College (SRUC), Edinburgh, UK
[3] College of Veterinary Science, Nanjing Agricultural University, Nanjing, China
[4] School of Natural and Environmental Science, Newcastle University, Newcastle, UK
s1362029@ed.ac.uk

China's poultry industry faces challenges in adopting and sustaining cage-free systems for poultry production. Effective interventions are crucial to support producers transitioning from cages to alternative systems or maintaining cage-free systems to improve animal welfare. While most Chinese egg farms adopt conventional battery cages, the transition to cage-free systems has only recently started. In contrast, the broiler sector has widely converted from floor-based systems to cages. However, little is known about how Chinese poultry producers perceive animal welfare in relation to cage-free systems and the importance of animal welfare in poultry production, which hinders welfare improvement for billions of laying hens and broilers.

This research explores Chinese poultry producers' perceptions of and attitudes towards animal welfare and their evaluations of and decisions on different housing systems concerning animal welfare. Thirty semi-structured in-depth interviews were conducted with owners and managers of large-scale laying hen farms (annual stock of 12,000-13 million laying hens) and broiler farms (annual production of 2 million-520 million broilers) with different production systems.

Results suggest that Chinese poultry producers are familiar with the term "animal welfare" and demonstrate a good understanding of all the factors influencing animal welfare in poultry production. However, animal welfare was not prioritised in the decision-making processes for selecting a housing system. Chinese broiler producers showed less interest in adopting cage-free systems than egg producers. External factors, such as profitability, leadership, and organisational policies, primarily influenced housing choices rather than animal welfare values. In particular, economic motives drove some egg producers towards cage-free systems, prompted by consumers' and companies' demand for cage-free eggs committed to transitioning away from cages by 2025. This study also highlights that producers believe that animal welfare should be improved within a Chinese context, and applying Western animal welfare standards in China may not be the most effective strategy.

These findings indicate that although Chinese poultry producers have adequate knowledge of animal welfare, economic incentives seem more promising for steering the shift towards and maintaining cage-free poultry production. Adopting and sustaining higher welfare production systems in the Chinese poultry industry requires tailored tactics that take into account economic, social, and administrative factors. Gaining a deeper understanding of producers' perceived opportunities and barriers in transitioning to cage-free systems can contribute to developing practical approaches.

ZOOPHILIA AND ANIMAL WELFARE IN EUROPE: LEGAL CHALLENGES AND WELFARE CONCERNS

T17

Szilvia Vetter

Centre for Animal Welfare, University of Veterinary Medicine Budapest, Budapest, Hungary
vetter.szilvia@univet.hu

The aim of the paper is to present certain current animal welfare and legal aspects of zoophilic acts in Europe. Zoophilia is a topic that raises numerous issues still considered taboo today, including questions concerning the welfare, health, and safety of animals, as well as potential impacts on human health, or issues related to the development of the illegal animal pornography industry. The question also has moral implications, and in connection with zoophilia, the much-debated issue of the dignity of animals is also raised. Research and scientific literature on this topic is currently limited internationally, although cases that come to light provoke strong public reactions. Various variations of zoophilia and zoophilic acts are observed, necessitating a distinction between zoophilia as a psychiatric disorder and zoophilic acts with legal significance. Firstly, the paper defines the animal welfare significance of different degrees of zoophilia, which can be categorized into ten classes, from desires that do not require the use of living animals at all to desires whose satisfaction involves torturing animals (zoosadism) or even killing them (homicidal zoophilia). The legal prohibition and sanctioning of sexual relations with animals are known but not consistent across Europe, with varying approaches in national legislation. The paper provides an international comparative analysis of the legal aspects of zoophilic acts in the 27 countries of the European Union, focusing particularly on the strictness and degree of differentiation of regulations, as well as on the legal assessment of animal pornographic products. Finally, preliminary results of a Hungarian online survey on the public opinions and experiences related to zoophil acts are presented, with the survey being conducted between October 31st and December 31st, 2021, with 1764 respondents.

HOW MANY "ENRICHMENTS" IS ENOUGH? USING SYSTEMATIC REVIEW AND META-ANALYSIS TO ASSESS THE HEALTH IMPACTS OF MEETING LABORATORY RODENTS' NEEDS

T18

Jessica Cait[1],[2], Charlotte B Winder[2],[3] and Georgia Mason[1],[2]

[1] Department of Integrative Biology, College of Biological Science, University of Guelph, Guelph, ON, Canada
[2] The Campbell Center for the Study of Animal Welfare, University of Guelph, Guelph, ON, Canada
[3] Department of Population Medicine, Ontario Veterinary College, University of Guelph, Guelph, ON, Canada
caitj@uoguelph.ca

Laboratory rodent housing often fails to meet rodents' behavioral and physiological needs. We previously found that compared to well-resourced (often called 'enriched') housing, conventional cages increase mortality rates and the morbidity of stress-sensitive experimentally-induced diseases (anxiety, cancer, cardiovascular disease, depression, stroke). This systematic review and meta-analysis updates and re-analyzes this dataset, and supplements it with an author survey (via protocol https://hdl.handle.net/10214/26983), to test the hypothesis that cages meeting more needs are better for rodent health. This hypothesis predicts that providing more types of resources ('enrichments' meeting different needs) will result in dose-dependent health benefits. We also explored whether this relationship was linear. If so, each additional resource would have equivalent value, but if in contrast it was logarithmic (as a biologically plausible alternative), additional resources would have diminishing returns as health approaches an optimum. Updating previous searches (May 24, 2020, updated May 6, 2022, via Ovid, CABI, Web of Science, Proquest, SCOPUS) yielded 1,589 further publications. After screening for inclusion criteria (published in English, using mice or rats, and providing resources in long-term housing), this yielded 47 new articles, totaling 232 unique articles in the combined dataset (using 5236 mice, 2793 rats). Each beneficial resource type (additional space, burrowing substrates, chewing/gnawing materials, environmental complexity, foraging opportunities, fresh plant material or its odours, nesting material, shelters, sweet or high fat food, wheels) was given one point if added to well-resourced cages, up to a potential maximum of ten (with well-resourced cages in practice supplying 1-5 additional resources over control conditions). The prediction was met for disease morbidity: as more resource-types were supplied (compared to controls), health benefits linearly increased ($F_{1,164}$= 5.85, $p = 0.0167$; each addition increased the standardized mean difference by 0.10 [0.02-0.17]). No such effect occurred for mortality ($F_{1,13} = 0.61$, $p = 0.4490$), but power was low. Risk of bias (assessed using the Systematic Review Center for Laboratory animal Experimentation 'SYRCLE' tool) in included studies was high; however, effects were large and overall confidence in the analysis was considered high. Overall, providing multiple resources is thus important for rodent health: here, providing up to five additional resource-types (the maximum we could assess) steadily reduced morbidity. However, since there was little evidence of diminishing returns over this range, additional resources should be supplied if the aim is to achieve peak health and welfare.

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UFAW
SCIENCE IN THE SERVICE OF ANIMAL WELFARE
Scientific Programme: Talks
Abstracts for Talks - Day Two

BOREDOM IN FERRETS (*MUSTELA FURO)* – ASSESSING AND AMELIORATING THE LIMBO BETWEEN SLEEP AND STIMULATION

T19

Charlotte Burn[1], Alice Dancer[1], Jennifer Bizley[2] and María Díez-León[1]

[1] Department of Pathobiology and Population Sciences, The Royal Veterinary College, Hertfordshire, UK
[2] Ear Institute, University College London, London, UK
cburn@rvc.ac.uk

Boredom is an aversive state of sub-optimal arousal. Scientific investigation of boredom in animals is in its infancy. Here we summarise findings from a series of studies in laboratory ferrets, and evaluate some of the overarching themes that emerge for both assessing and ameliorating animal boredom. We comment on methodology, and then explore what kinds of experiences can relieve boredom, asking whether these experiences must always be stimulating, and what behaviours seem to replace boredom behaviour once it has been reduced.

To assess boredom like states in ferrets and enable us to test hypotheses, we used either sensation-seeking tests, or a sub-optimal arousal framework to help interpret spontaneous behaviour, or both combined. These methods effectively differentiated between treatments hypothesised to relieve boredom in ferrets, and whilst results were often complex, they were mostly in the expected directions, even when treatments were masked from observers. To help ameliorate boredom, provision of stimulating environmental enrichment or experiences is often suggested. This aligns with the theory that boredom reflects sub-optimal arousal, and thus increasing arousal through stimulation should offer some relief. To date, we have found that exploratory play outside the cage, novel objects inside the cage, positive reinforcement experiences, and (to a lesser extent) a complex cage environment, reduced at least some signs of boredom in the ferrets. In a ferret owner questionnaire, respondents also suggested additional ways to relieve boredom in their ferrets, and suggested behaviours that they considered to indicate when their ferrets were bored.

Taken together, the results suggest that stimulating experiences do reduce signs of boredom, but paradoxically there are also early signs that relaxing environmental enrichments may be effective. If this proves to be the case, then it may reflect that boredom is a kind of limbo state between a desire for greater arousal versus a reality of low arousal; this would mean that boredom could be ameliorated both by stimulation that meets the desire for greater arousal, and by calming experiences that reduce that same desire. Of interest is that, when we investigated which behaviours replaced the boredom behaviours, we observed that – as boredom indicators decreased – the behaviours that increased included both active investigatory and play behaviours and, in contrast, sleep. These findings can contribute towards developing better ways to help captive animals lead both more engaged and more restful lives, by reducing the limbo in arousal that characterises boredom.

WHAT DO WE OWE FERAL ANIMALS?

T20

Peter Sandøe[1,2], Janne Winther Christensen[3], Christian Gamborg[2], Alistair Lawrence[4,5] and Clare Palmer[6]

[1] Department of Food and Resource Economics, University of Copenhagen, Frederiksberg C, Denmark
[2] Department of Veterinary and Animal Sciences, University of Copenhagen, Denmark
[3] Department of Animal and Veterinary Sciences, Aarhus University, Denmark
[4] Scotland's Rural College (SRUC), Edinburgh, UK
[5] Roslin Institute, University of Edinburgh, UK
[6] Department of Philosophy, Texas A&M University, USA
pes@sund.ku.dk

A sharp distinction is often drawn between domestic and wild animals regarding our welfare-related duties. Domestic animals are genetically selected, controlled and confined by humans, and humans are generally seen as responsible for taking care of them. Wild animals that are not genetically selected by humans, and that live their lives relatively independently of us, are viewed differently. According to a widespread ethical view, reflected in legislation in many countries, wild animals should be left to live their own lives and their welfare is not our responsibility. This view (which obviously is open to question) might work if it was possible to uphold that domestic and wild animals are two separate, non-overlapping, categories. However, increasingly, the domestic/wild distinction is not clearcut. One group that blurs these boundaries consists of the so-called feral animals. These are animal populations with domesticated origins that have lived independently of humans for shorter or longer durations. One example is the population of Soay sheep currently living on the uninhabited island of Hirta in the Scottish Hebrides. The size of the population varies dramatically – in some years the population has more than halved due to fluctuations in carrying capacity. Officially, these sheep have the legal status of wild animals. However, two local veterinarians have challenged this status, arguing that those in charge of the island have a duty of care to the sheep and must limit starvation, which could be done through population control in combination with supplementary feeding. Other examples are populations of feral horses, including the so-called Sable Island horses in northern Canada, and another population in the Namibian desert where similar welfare issues have caused controversy. Here, some have argued in favour of intervening by supplementary feeding and parasite control. In this presentation, we will conduct an ethical analysis of cases like these, using them to defend the view (a) that we need a more complicated view of what should constitute a "wild-domestic" animal spectrum and (b) that this more complicated view should be part of informing decisions about our duty of care. In making this case, we'll also reject the view that all animals, whether wild or domesticated, should be treated the same (which has been increasingly proposed within some schools of animal ethics). Rather, we will defend a more contextual approach where both concerns for preventing suffering and for respecting the autonomy of the animals play a role.

REFINING THE MONITORING OF WEIGHT IN LABORATORY MACAQUES (*MACACA MULATTA*) AND MICE (*MUS MUSCULUS*): USE OF PERCENTILE GROWTH CURVES

T21

Claire Witham[1], Katie Stupples[1], Faye Peters[1], Sebastian Merritt[1], Jim Willshire[3], R. Sonia Bains[2], Michelle Stewart[2] and Sara Wells[1,2]

[1] Centre for Macaques at MRC Harwell, Medical Research Council, Salisbury, UK
[2] Mary Lyon Centre at MRC Harwell, Harwell Campus, Oxfordshire, UK
[3] Black Lab Consulting, Salisbury, UK
c.witham@har.mrc.ac.uk

Weight loss is a key metric in animal health and welfare. In laboratory research certain levels of weight loss (15% and 20%) are commonly used as humane endpoints. However weight loss is usually a calculation that relies on the last recorded weight and fails to capture whether an animal is growing as expected. Juvenile and adolescent animals should still be growing and increasing in weight. In human health, percentile growth curves for weight and other measurements are used to identify whether a child is growing as expected. We propose that percentile growth curves are a more refined way of monitoring growth in rhesus macaques and mice and take into account healthy growth.

For macaques we used 15 years of breeding colony weight records to construct percentile growth curves for male and female rhesus macaques (*Macaca mulatta*; 8291 weights in total from 830 macaques; taken between 2008 and 2023). For mice we data collected from C57BL/6Ntac male and female mice that underwent behavioural phenotyping. We used the GAMLSS package in R to fit Lamda-Mu-Sigma models to the weights (separate models for males and females of each species). This model allows both the plotting of an individual animal's weight across time on the centile growth curves and given an animal's weight and age to calculate a Z-score.

We demonstrate with case studies how percentiles and Z-scores can be used to capture both weight loss and failure to grow and how events such as procedures and injuries may impact growth. This is now being used on a routine basis in the macaque breeding colony to identify animals with potential weight issues.

OPEN SCIENCE FOR ANIMAL WELFARE AND APPLIED ETHOLOGY

T22

Helen Gray[1], Christian Nawroth[2]and Anna Olsson[3]

[1] School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK
[2] Research Institute for Farm Animal Biology, Dummerstorf, Germany
[3] i3S - Institute for Research and Innovation in Health, University of Porto, Portugal
olsson@i3s.up.pt

Open Science (OS) includes sharing resources, methods, and results through the research process, to make research more robust and knowledge more accessible. In light of the current replication crisis, transparency is critical for impactful research. OS practices have a significant impact on research conduct in fields like Psychology - many psychology journals now have preprint-friendly policies and/or offer the submission of Registered Reports. However, in Applied Ethology and Animal Welfare, standardized OS guidelines and institutional training opportunities are limited. To assess the prevalence of OS practices, we surveyed all attendees of the virtual International Congress of the International Society for Applied Ethology 2021. Of 372 sent emails, 112 completed surveys were returned (30.1%). Preprinting and pre-registration were not common among respondents (24%, and 11%, respectively). Lack of training (compared to lack of time, support, incentives, or fear of plagiarism) was the biggest barrier, both for self-reports and as potential explanations for why others haven't used preprints/pre-registration. Of those having published a preprint/pre-registered study protocol, most did so to disseminate results (preprints, 81%), and for internal quality control (pre-registration, 67%). Open data were the most widespread open science practice among respondents. Although over 75% of respondents said they share data at least sometimes, less than 25% had heard of the FAIR (findability, accessibility, interoperability, reusability) for open data, and the predominant way to share data were as supplementary material to a paper. This suggests that respondents shared data to meet journal requirements, rather than as part of a comprehensive understanding of good open science practice. Against the background of these findings, we argue that the applied ethology and animal welfare research community needs an active discussion of how best to implement OS practices in the field, and we aim for this presentation to be a starting point.

STRIKING A BALANCE BETWEEN IBERIAN LYNX CONSERVATION EFFORTS AND ANIMAL WELFARE

T23

Alexandre Azevedo[1,2] Martin Whiting[2]and Manuel Magalhães-Sant'Ana[2]

[1] CIVG – Vasco da Gama Research Center / EUVG –Vasco da Gama University School, Coimbra, Portugal

[2] CIISA—Centro de Investigação Interdisciplinar em Sanidade Animal, Faculdade de Medicina Veterinária, Universidade de Lisboa, Lisbon, Portugal

ax.c.azevedo@gmail.com

The successful recovery of the once critically endangered Iberian lynx (*Lynx pardinus*) through captive breeding and reintroduction programs stands as a conservation milestone. However, the singular emphasis on species preservation may inadvertently overlook the welfare of individual animals involved in these efforts, namely prey animals. This case study delves into the ethical considerations surrounding ex-situ conservation practices for the Iberian lynx. Iberian lynx conservation has welfare costs for the lynxes themselves, mostly linked to a lifetime in captivity or the stress of reintroduction, which are carefully considered and accounted for. However, there are also welfare costs for the rabbits used to feed the lynxes. This is particularly relevant when it comes to the use of live rabbits, which is considered necessary to allow the acquisition of hunting skills that are essential to survive in the wild, once the lynxes are reintroduced. Using a utilitarian framework, while drawing from the paradigm of laboratory animal science, we critically analyse the ethical implications of these conservation practices. Our examination highlights a significant gap: while the use of animals for conservation mirrors utilitarian principles akin to those in scientific research, it lacks comparably well-defined regulations and practices safeguarding animal welfare. Specifically, when assessing the welfare of the rabbits utilized as food for the lynxes, our analysis reveals notable opportunities for enhancement. Lessons gleaned from laboratory animal science, including proactive welfare-oriented harm-benefit analyses, ethical assessments during intervention planning, and the application of the 3Rs principles, shed light on potential improvements. This case study underscores the need to re-evaluate our approach to animal welfare in conservation initiatives. It showcases the value of multidisciplinary perspectives, emphasizing the often-overlooked welfare concerns and advocating for a more comprehensive ethical framework in animal conservation practices.

UFAW AWARD PRESENTATION

T24

Winner of the 2024 Early Career Researcher of the Year:

SMALL ANIMALS, BIG DATA: HARNESSING TECHNOLOGICAL ADVANCES TO STUDY RAT WELFARE

Vikki Neville

Bristol Vet School, University of Bristol, Langford, UK
vikki.neville@bristol.ac.uk

Over the past few decades, technological advances have been made at an astounding rate: social media platforms have gained widespread popularity, academic search engines have developed, and rapid growth in computing power has driven huge progress in AI and spawned more powerful approaches to data analysis. This has fundamentally changed the sorts of research questions we can address and the approaches we can take to answer them. In this talk, I will outline how technology has played a pivotal role in how my colleagues and I have tackled various research questions with an animal welfare focus.

More specifically, I'll provide a few examples of studies we have conducted that have been expedited or only made possible with modern technology: a mapping review of 1000+ articles, an online survey of pet rat owners to inform laboratory rat welfare, and an operant task to examine rat foraging behaviour as a potential novel measure of their welfare.

I'll also discuss how the burgeoning field of computational psychiatry might inform how we conceptualise and study animal emotions. One central facet of this field is the application of computational modelling to characterise and understand neuropsychiatric disorders, including affective disorders such as major depressive disorder and generalised anxiety disorder. As such, I'll provide a precis of the core features of computational modelling and how it might help us to better understand and measure animal emotions. In particular, I'll outline the utility of a reinforcement learning framework for building computational models to study emotions in a translational manner.

Finally, I'll outline how translating decision-making tasks used in computational psychiatry for use in rats had led us to build our own operant equipment using a Raspberry Pi. Although only in the initial stages of development, it is already clear that this equipment will allow us much greater flexibility in the studies we conduct, will dramatically reduce the cost of our research, and most importantly will mean that we can make our hardware and software entirely open source to foster innovation and enhance reproducibility in our field.

REARING PIGS WITH PLAY OPPORTUNITES: THE EFFECTS ON DISEASE RESILIENCE IN PIGS EXPERIMENTALLY INOCULATED WITH PRRSV

T25

Karolína Steinerová[1], John Harding[1], Sarah Parker[1], Heather Wilson[2], Arthur Finatto[1], Haoming Liu[2], and Yolande Seddon[1]

[1] Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada
[2] VIDO, Vaccine and Infectious Disease Organization, University of Saskatchewan, Saskatoon, SK, Canada
karolina.steinerova@usask.ca

The benefits of positive emotions on health are established in humans, and initial work suggests similar effects in farm animals. Since play is associated with positive emotions, providing pigs with play opportunities may enhance their ability to recover quickly from infections. This would contribute to the reduction of the effects of diseases such as porcine reproductive and respiratory syndrome virus (PRRSV), which negatively impacts pig welfare and productivity. This study explored the effect of rearing pigs with play opportunities on disease resilience when challenged with PRRSV. Litters were assigned to either play (n=5 litters, mean: 15 pigs/litter, PLY) or control (n=4 litters, mean: 13 pigs/litter, CON) treatments at birth. In PLY, play was promoted with extra space and enrichment objects, for three hours/day from five days of age until euthanasia at 65±2 days (mean±SD). At weaning (25±2 days), 28 pigs (14/treatment) were selected. After transport to a disease containment facility, at 43±2 days (0 days post-inoculation, DPI), the pigs were inoculated with 1x106 TCID50 PRRSV/pig. Skin lesions, blood, respiratory distress (subtle (if moderate distress) or obvious (if severe) abdominal effort with/without increased respiration (>40 breaths/minute), total body weight, and behaviour were collected pre- and post-inoculation. All pigs were euthanized at 22 DPI. Relative to CON, PLY pigs exhibited fewer skin lesions following the mixing of non-pen mates for transport and throughout the infection ($p \leq 0.001$). The viral load did not differ between treatments. The probability of experiencing moderate and severe respiratory distress for PLY was 35% whereas for CON 91% ($p \leq 0.001$). PLY pigs that suffered from the distress, experienced it for fewer days (PLY: 4.1±0.7, CON: 11.6±1.6, (mean±SEM), $p \leq 0.001$). PLY pigs tended to have a higher ADG than CON throughout the infection ($p=0.063$) and were more feed efficient. The number of monocytes, a progenitor of tissue macrophages where PRRSV predominantly replicates, was lower in PLY on 8 DPI and remained at its baseline on 21 DPI, whereas in CON the monocyte count exceeded its baseline ($p=0.006$). PLY pigs continued to play during the infection, emphasizing the rewarding properties of play. Results suggest that the performance of play, as an activity contributing to positive emotions, modified the immune, clinical, and behavioural response to PRRSV infection enhancing disease resilience. Stress reduction leading to a lower inflammatory response may be involved. Data supports play as a promising tool to support the quality of life for farmed pigs with benefits for pig health and producers

IMPLEMENTING SUSTAINABLE WELFARE PRACTICES IN RESEARCH SETTINGS: ADOPTION OF NONAVERSIVE HANDLING OF MICE

T26

Patricia Turner[1],[2], Judy Murray[1], Carly O'Malley[1], Sarah Thurston[1]and Elizabeth Nunamaker[1]

[1] Global Animal Welfare & Training, Charles River, Wilmington, MA, USA
[2] Dept of Pathobiology, University of Guelph, Guelph, ON, Canada
patricia.turner@crl.com

The welfare benefits of low stress handling (LSH) or non-aversive handling of mice have been discussed and documented for at least the past decade within laboratory animal science, but broad uptake of the technique has remained low across all sectors in which research with mice occurs – in North America and elsewhere. Stakeholder interviews have indicated that those working in vivaria are aware of the technique. However, when questioned about practices in their own facilities, respondents have indicated that LSH would be too difficult to implement without more resources, that researchers would never agree to adopt the concept or that this is not a concept that can be prioritized because only mice are involved and/or because the impact is perceived to be low. In evaluating animal welfare goals for a large multi-national contract research organization breeding mice for future research purposes as well as working with mice in discovery and preclinical safety settings, it was determined that adopting LSH techniques in mice would be a highly significant and impactful goal, because of the very large number of mice produced and worked with across sites each year. Factors to consider before implementing a company-wide goal included that almost every company site (>100) worked with research mice across four business units with distinct management differences and goals, in 13 countries in which employees spoke nine languages. To introduce and implement this significant transformation of practices required development of a broad change management strategy that would demonstrate sustainability, appeal to the goals of a wide range of stakeholders, and permit for flexibility, given the cultural, facility, equipment, financial, and other resource differences between sites. In this session we will showcase a change management strategy for implementing low stress handling of mice across a large commercial organization that emphasized fiscal restraint and sustainability while remaining focused on enhancing overall animal welfare.

ANALYSIS OF THE EFFECTS OF TEMPORARY OUTDOOR ACCESS DURING THE FATTENING PHASE ON PIG WELFARE, HEALTH AND PERFORMANCE

T27

Anissa Jahoui[1, 2], Solenn Gavaud[2], Franck Guiraud[3], Julie Lion[2], Blandine Lieubeau[2], Julie Hervé[2] and Céline Tallet[1]

[1] Institut Agro Rennes Angers, INRAE, PEGASE, Saint Gilles, France
[2] Oniris, INRAE, IECM, Nantes, France
[3] INRAE, GenESI, Venours, Rouillé, France
anissa.jahoui@inrae.fr

Currently in the European Union, less than 1% of pigs are raised with access to outdoor areas. In the PANORAMA project, we analysed the effects of giving pigs temporary access to a pasture during the fattening phase on their welfare, health and performance. Indeed, temporary access appears as a valuable option for farmers who can give their animals limited outdoor access, in order to improve their welfare, particularly during the fattening phase, which is the longest physiological stage. In this context, we studied 150 pigs in three batches, reared in a conventional barn without any outdoor access (O-) (75 males and 75 females) and 150 pigs reared with access to a pasture (O+) twice a week, for 4 hours in mornings (75 males and 75 females), from D76 to D150. Pigs were regularly weighed (D70, D133 and D150). We observed the behaviour of pigs (feeding, resting, exploring, social behaviours…) by scan sampling, for 2h in the morning (inside vs outside), and 2h in the afternoon (inside for both groups), during the first two weeks, week D104 to D107 and the last week. To evaluate the stress experienced by pigs, we scored body lesions and measured the level of salivary cortisol (D104 and D150). Also, we quantified IgA level in saliva at D150, since it was shown to increase with positive emotions. Linear mixed effects models were used to evaluate the effect of outdoor access on these variables. Data obtained on two batches (100 O- and 100 O+) showed almost no effect of the sex on the variables studied. As expected, pigs with outdoor access (O+) spent less time resting and more time exploring outside than control pigs did inside. Also, during the afternoon, inside, O+ pigs spent significantly more time resting and eating than O- pigs did. Interestingly, both groups exhibited similar growth performance until slaughter. At the end of the fattening phase (D150), O+ pigs showed significantly less severe body injuries than the O- pigs did. At D104 and D150, O+ had significantly lower salivary cortisol levels than control pigs did. Finally, at D150, the level of salivary IgA was significantly lower for O+ pigs. Altogether, our study should provide new knowledge for a better understanding of the consequences of outdoor access on pigs' welfare, health and performance.

Go to poster

WHY WORKSHOPS WORK: INFLUENCE OF EDUCATION ON POSITIVE REINFORCEMENT TRAINING WITH GOATS

T28

Jennifer Meier[1], Viviane Theby[2], Lorenz Gygax[3], Edna Hillman[3] and Carola Fischer-Tenhagen[1]

[1] Affiliation: German Federal Institute for Risk Assessment (BfR), Centre for the Protection of Laboratory Animals (Bf[3]R), Berlin, Germany
[2] Tierakademie Scheuerhof; Wittlich, Germany
[3] Humboldt-Universität zu Berlin, Faculty of Life Sciences, Albrecht Daniel Thaer-Institute of Agricultural and Horticultural Sciences, Animal Husbandry & Ethology, Berlin, Germany
jennifer.meier@bfr.bund.de

Experimental procedures involving farm animals often induce stress, attributed, amongst others, to the inherent restraint methods employed. Mitigating stress is crucial, and one effective approach is the application of positive reinforcement training, aligning with the 3Rs principles of refinement. Trainer skills, however, may influence the feasibility and success of animal training. The potential influence of trainer skills as well as the education of animal trainers are rarely described in literature but are necessary information for the implementation of positive reinforcement training as a refinement measure. This study aims to address this gap by investigating the influence of educational programs on animal trainers.

To assess the effectiveness of such programs, we compared the training outcomes of two participant groups tasked with training goats to exhibit a behaviour facilitating simulated venipuncture. One group underwent a comprehensive two-day workshop, while the other relied on self-instructed learning through specific literature. Training success was evaluated using a bespoke assessment protocol. Statistical analysis strongly supported significantly greater training success in the workshop group, as evidenced by both objective and subjective measures. Furthermore, a notable 73% of workshop participants claimed full implementation of acquired knowledge, contrasting with only 13% in the self-instructed book group. These findings underscore the importance of more intensive education for trainers, suggesting that well-informed caregivers can achieve greater success in animal training.

In conclusion, for the successful implementation of positive reinforcement training as a refinement measure, animal caretakers should undergo thorough instruction, emphasizing the pivotal role of educational programs in enhancing training outcomes. Since positive reinforcement training can reduce stress for animals during handling procedures, competent and educated animal trainers can make a contribution to improve animal welfare.

Go to poster

WHAT'S IN IT FOR THE DOGS? ASSESSING THE OUTCOMES OF A PRISON-BASED DOG TRAINING PROGRAM FROM AN ANIMAL BEHAVIOUR AND WELFARE PERSPECTIVE

T29

Parizad Baria-Unwalla[1,2], Gabriela Munhoz Morello[1,2], Maria Queiroz[3], Sofia Maria Ferreira Morais[1,4], I. Anna Olsson[1,2] and Ana Catarina Vieira de Castro[1,2,5]

[1] Instituto de Biologia Molecular e Celular, Universidade do Porto, Porto, Portugal
[2] i3S – Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal
[3] Pelos2, DTC Social, Touguinhó, Portugal
[4] Departamento de Biologia, Universidade do Minho, Braga, Portugal
[5] Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, Porto, Portugal
baria.parizad91@gmail.com

Prison-Based Dog Training Programs (PBDTPs) are gaining popularity across the world for their benefits to inmates in terms of mental and emotional health, and reduced recidivism. However, the implications for the dogs have never been studied. This study assesses the outcomes of PBDTPs from an animal behaviour and welfare perspective through a collaboration with a recently started PBDTP in Portugal. Shelter dogs were transported to and from the prisons twice a week where they underwent training sessions with the inmates. Each cohort of dogs was trained for 12 weeks. Dogs were tested for potential improvements in socialization and handling skills and basic training skills using two validated tests: the Temperament Test (TT) developed by Valsecchi *et al* in 2011 and refined by Barnard *et al*. in 2019, and the Basic Education Test (BET) adapted from the American Kennel Club's Canine Good Citizen Test. Simultaneously, dog welfare was assessed using behavioural and physiological measures, including recording stress-related behaviours and overall behaviour states during training sessions at the prisons, measuring salivary cortisol levels, and conducting cognitive bias tests (CBT). Out of 45 dogs, 98.33% showed an improvement in BET scores (average score 12.37 pre-program, 15.47 post-program) and 84.44% showed an improvement in TT scores (average score 48.15 pre-program, 15.47 post-program). During the training sessions at the prisons, the frequency of stress-related behaviours displayed by the dogs (n=33) during weeks 2, 7, and 11 were 9.88, 7.55 and 7.42 respectively. For the cognitive bias test, 52.94% of dogs took lesser time to approach the neutral bowl in the post-program testing, however average latency to approach the neutral bowl increased from 2.29 seconds to 3.06 seconds. Salivary cortisol was also collected during training and non-training days, which will be compared to assess dog welfare alongside the cognitive bias test results. This project aims to answer two important questions about PBDTPs: how they affect the dogs' welfare and whether they succeed in achieving the desired improvements in the dogs' behavioural skills. While our preliminary results show an improvement in behavioural skills, the results on welfare measures are not yet conclusive, but complete results will be available at the time of the congress. The results of this study will provide the first comprehensive and systematically collected evidence on how participation in a PBDTP affects dog behaviour and welfare.

Go to poster

PAN-AFRICAN NETWORK FOR LABORATORY ANIMAL SCIENCE AND ETHICS (PAN-LASE): EDUCATION AND TRAINING IN RESEARCH ANIMAL SCIENCES, WELFARE AND ETHICS ACROSS AFRICA

T30

Josiah Kantiyok[1], David Lewis[2], Bert Mohr[3], Ouajdi Souilem[4], Abdussamad Abdussamad[5], Tamsyn Fourie[6], Ngalla Jillani[7], Louise Martin[8], Mok Mokopasetso[9], Lawrence Mugisha[10], Atunga Nyachieo[11], Abelouafi Benmouloud[12], Khadiga Gaafar[13] and Sohair Fahmy[14]

1 Johan Vet Network, Nigeria
2 School of Biomedical Sciences, Faculty of Biological Sciences, University of Leeds, UK
3 Scientific Veterinary Consulting Inc., South Africa
4 Laboratory of Physiology and Pharmacology, National School of Veterinary Medicine, University of Manouba, Tunisia
5 Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary Medicine, Bayero University, Kano, Nigeria
6 LAS Veterinary Consultancy, South Africa
7 Institute of Primate Research, Kenya
8 Institute of Laboratory Animal Science, University of Zurich, Switzerland
9 Botswana Vaccine Institute, Botswana
10 College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB), Makerere University, Uganda
11 Institute of Primate Research, Kenya
12 Department of Nature and Life Sciences, University of Algiers 1, Algeria
13 Zoology Department, Faculty of Science, Cairo University, Egypt
14 Zoology, Faculty of Science, Cairo University, Egypt
ktj4102@gmail.com

Pan-African Network for Laboratory Animal Science and Ethics (PAN-LASE) was established in 2017 to enhance humane animal welfare and ethics in research animals across Africa. It pioneered a support network for the development and provision of education and training in laboratory animal science (LAS) and ethics through provision of educational opportunities for all those involved in the care and use of research animals. It is delivered as Train the Trainer activities, such that learners are equipped with the knowledge, skills and resources to deliver similar activities within their own networks or country. This has helped in making available opportunities for education and training in animal welfare and Laboratory Animal Science (LAS) in African countries such as Kenya, Nigeria, South Africa, Tunisia, Botswana, Egypt and Uganda. In the 4–5years since the establishment of PAN-LASE, 3,232 colleagues from 28 African countries have participated in our educational activities. Returning to their home institutions, participants have both established and strengthened institutional and regional hubs of knowledge and competence across the continent, with significant support from national and regional LAS association as well as other international organizations. In 2019 PAN-LASE at a meeting of experts in Tunisia pioneered the production of the document “Guidelines for the Establishment and Functioning of Animal Ethics Committees (Institutional Animal Care and Use Committees) in Africa” for adoption in the region to facilitate uptake and global acceptance of quality research from African institutions. Key challenges and opportunities for PAN-LASE going forward include the formalization of our network; the sustainability of education and training programmes beyond start-up funding; strengthening of supportive governance frameworks at institutional, national and regional levels; the availability of Africa-centric educational resources and implementation of effective models of educational provision. Our activities are enhancing humane animal welfare and the quality of the research undertaken across Africa. They enable African researchers to undertake world-leading research to offer solutions to the many challenges facing the continent. PAN-LASE seeks to create awareness of its activities for possible collaboration/partnerships with relevant stakeholders to strengthen animal welfare & ethics in research animals in Africa.

Go to poster

SHOULD ALL ANIMALS BE TREATED EQUAL? SEX-DIFFERENCES IN THE ENJOYMENT OF RAT TICKLING

T31

Vincent Bombail[1], Sarah Brown[2], Jessica Martin[2], Simone Meddle[2], Michael Mendl[3], Emma Robinson[4], Tayla Hammond[1,2], Birte Nielsen[5], Megan LaFollette[6], Ignacio Vinuela-Fernandez[7], Emma Tivey[2]and Alistair Lawrence[1,2]

[1] Scotland's Rural College (SRUC), West Mains Road, Edinburgh, UK
[2] The Roslin Institute and Royal (Dick) School of Veterinary Studies, University of Edinburgh, UK
[3] Bristol Veterinary School, University of Bristol, Langford House, Langford,UK
[4] University of Bristol, School of Physiology, Pharmacology and Neuroscience, Biomedical Sciences Building, University Walk, Bristol. UK
[5] Universities Federation for Animal Welfare, Wheathampstead, UK
[6] The North American 3Rs Collaborative, 1312 17th St PMB 70570, Denver, USA
[7] Bioresearch Veterinary Services, University of Edinburgh, UK
vincent.bombail@sruc.ac.uk

Heterospecific play (rat tickling), where the human hand mimics aspects of juvenile rough and tumble play, has been proposed as a practical approach for inducing positive affect and enhancing rat welfare. Our aim was to refine the standard rat tickling protocol. Previous research has found individual differences in response to the standard tickling protocol which emphasises pinning (where the rat is lifted and placed in a supine and potentially aversive position). We propose playful handing (PH), as a tickling method that involves less pinning, and where the human hand adapts flexibly to the rats' behavioural responses. We hypothesised that Ultrasonic Vocalisations (USV) production, as a marker of positive affective state, would decrease in rats experiencing PH with increasing levels of pinning. In a pre-registered study protocol, we investigated USV response over 6 PH sessions (each of 30 seconds), with treatment groups experiencing 0 (P0), 1 (P1) or 4 (P4) pins, compared to a control group where the hand was present but did not engage in interactions (C). We used male and female Wistar rats (n=16 per treatment group), aged between 3-7 weeks over the experimental period. By the end of 6 days of treatments, all PH groups exhibited a rise in USV production ($p<0.001$), indicating that all PH variations induced a positive affective state. This effect of PH treatments on USV was apparent by the 3rd day of testing ($p<0.001$). In partial support of our prediction, post-hoc analysis found that the P1 treatment produced significantly more USV than P4 ($p<0.05$); the P0 treatment was not different to P4. We also found a significant sex x treatment interaction ($p<0.001$) and post-hoc analysis suggests that the preference for P1 was driven by females ($p<0.05$); female P0 and P4 and all male PH treatments did not differ from each other. We also recorded USV in the 1 minute before treatment was applied and again our analysis found that P1 produced the most USV ($p<0.05$) during this anticipatory period. Our results importantly point to a sex difference preference for tickling style with females preferring PH with less pinning which we assume matches their evolved preferences for less rough and tumble play. We also confirm previous work indicating that rat tickling induces positive affect and that this effect can be seen after just 3 days of short 30 second sessions. PH (inc. tickling) thus provides a practical approach to enhancing laboratory rat welfare.

"WAITING AND SEEING" – WHY DO NEW ADOPTERS DECLINE DOG BEHAVIOUR SUPPORT AND WHICH DOGGY DEMOGRAPHIC FACTORS MAKE UPTAKE LESS LIKELY?

T32

Lauren Samet, Kassandra Giragosian, Carys Williams, Joshua Woodward, Eleanor Jordan, Rachel Casey and Emma Buckland

Dogs Trust, London, UK
lauren.samet@dogstrust.org.uk

In the field of dog rehoming, undesirable dog behaviours can have a negative impact on both adopter and dog wellbeing as well as increasing risk of unsuccessful adoption outcomes (eg., re-relinquishment). As part of rehoming objectives, and to assist in the management and prevention of undesirable dog behaviours, many charities offer various types of behaviour support to aid owners and their dogs. Here, we present results from a mixed-methods study investigating factors and themes related to the decline of free over-the-phone dog behaviour support services offered by Dogs Trust to new adopters. Dogs Trust is a dog welfare charity based in the United Kingdom that offers three scheduled post-adoption support (PAS) calls in the first four months of a dog's adoption, at 2-days, 2-weeks, and 4-months. Data from these calls, collected between the 9th June 2019 and the 9th December 2019, showed that at least one behaviour of concern, categorised broadly into aggression-related [ARB], separation-related [SRB], or other behaviour of concern [OB], was reported by adopters in 6,338 PAS calls made to 3,797 adopters during this time. All adopters reporting behaviours of concern were offered the free support service and yet, for 68.8% of these calls, help was declined. Generalised linear mixed-effects modelling and post-hoc testing were used to investigate factors associated with support being declined. Statistically significant factors included: call timepoint - declining support was significantly more likely at 2-weeks post-adoption compared to 2-days; and the type and number of behaviour/s reported during a call - declining support more likely when adopters reported an ARB or SRB individually compared to simultaneously, or when reporting an OB either alone or alongside another behaviour (ARB or SRB individually > ARB and SRB simultaneously > only OB > OB with another behaviour). Meanwhile, inductive thematic analysis explored themes in adopters' reasoning for declining dog behaviour support and identified *awareness but no action yet*, *managing behaviour*, *feeling support not needed*, and *belief of cause*, as basis for not accepting help offered. These mixed-method results offer us insights into adopter attitudes towards dog behaviours whilst also highlighting a need for future studies to explore whether accepting this type of support can predict greater likelihood of adoption success.

CORTICOSTERONE LEVELS IN BLOOD AND FEATHERS OF BROILER CHICKENS USING LCMS METHOD AS AN INDICATOR OF ANIMAL WELFARE

T33

Patricia Soster de Carvalho[1], Camila Lopes Carvalho[1], Kobe Buyse[2,5], Wout Verbeure[3], Annelike[3] Dedeurwaerder[3], Maarten De Gussen[4], Frank Tuyttens[2,5] and Gunther Antonissen[1]

[1] Department of Pathobiology, Pharmacology and Zoological Medicine, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[2] Flanders Research Institute for Agriculture, Fisheries, and Food (ILVO), Melle, Belgium
[3] Poulpharm Bvba, Izegem, Belgium
[4] Vetworks Bvba, Aalter, Belgium
[5] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
patricia.sosterdecarvalho@ugent.be

The growing concern of many citizens regarding animal living conditions have highlighted the need for reliable methods to assess the welfare of animals. Increased blood corticosterone (CORT) is a well-accepted indicator of acute stress in poultry. Nevertheless, the process of obtaining blood samples is recognized as a stressful measurement, where CORT levels may be influenced by the procedures of capturing, handling, and blood extraction. Evaluating CORT in feathers has been proposed as a superior matrix for documenting longer-term stress without being affected by handling stress for taking the samples. The objective of this trial was a first step towards validating the corticosterone in feathers by testing a dose-related response to long-term oral administration of corticosterone. Treatments consisted of daily oral administration of six doses of corticosterone concentration (0, 1, 2, 3, 4 and 5 mg/kg) from 1 to 42d-old. A total of 60 one day-old male Ross 308 slow feathering chicks were allocated to six floor pens, with ten broilers per pen. The chickens were considered as experimental unit and blocked in pens with two doses per pen. For example, the first pen consisted of 5 birds from the first treatment (0 mg/kg) and 5 birds from the second treatment (1 mg/kg). Blood and feathers from the back at d14, 28, and 42 and feathers from the wing and tail at d42 were collected for analysis of corticosterone levels using LCMS. R Studio was used for variance analysis, and when significant, the means were compared by a Tukey test at 5% significance. CORT levels in plasma and tail feathers from 42 d-old chickens, increased with increasing levels of corticosterone administered orally ($P<0.05$). CORT levels in dorsal and wing feathers at 42d also increased with increasing levels of CORT administrated orally up to 4mg/kg but did not significantly increase further at 5 mg/Kg ($P<0.05$). Body weight gain (BWG) was impaired by increasing levels of CORT dosage, which may have affected total accumulated dose animals received. There was no correlation between plasma levels and dorsal feathers at age 14d, 28d, and 42d ($P>0.05$). Plasma and feathers levels of CORT are not comparable. Chronic exposure to increasing CORT levels throughout the lifespan of chickens is reflected in the CORT levels in feathers as measured by LCMS. It still needs to be determined whether repeated exposure to short-term increases in CORT levels equally results in elevated feather CORT levels.

Go to poster

USING BLUETOOTH BEACONS TO EXAMINE EWE-LAMB DISTANCE AS AN INDICATOR OF WELFARE CONCERNS IN SHEEP

T34

Michelle Reeves[1,5], Aimee Walker[2,3], Fiona Kenyon[4], Anthony Waterhouse[2], Ann McLaren[2], Claire Morgan-Davies[2], Nicholas Nils Jonsson[3], Emma Baxter[1]and Cathy Dwyer[1,5]

[1]SRUC, Animal and Veterinary Sciences, Roslin Institute Building, Edinburgh, UK
[2]SRUC, Hill and Mountain Research Centre, Kirkton, Crianlarich, UK
[3]University of Glasgow, Institute of Biodiversity Animal Health and Comparative Medicine, Garscube, Glasgow, UK
[4]Moredun Research Institute, Pentlands Science Park, Bush Loan, Penicuik, Midlothian, UK
[5]University of Edinburgh, Royal Dick School of Veterinary Sciences, Edinburgh, UK
michelle.reeves@sruc.ac.uk

Precision Livestock Farming (PLF) technology offers the opportunity to measure animal welfare remotely and in real-time. Monitoring ewe and lamb welfare on hill farms during outdoor lambing is difficult. This study tested Bluetooth Low Energy (BLE) beacons in collars communicating via a Long Range (LPWAN) transmitter to monitor ewe-lamb distance (ELD) as a potential indicator of ewe and lamb welfare during lambing. Before lambing, 23 Scottish Blackface and Lleyn ewes were fitted with collars containing BLE beacons and receivers communicating with a LPWAN gateway. Lambs were fitted with collars containing BLE beacons within 24 hours of birth. The Received Signal Strength Indicator (RSSI) of the 16 nearest beacons for each of the receivers on ewe collars was recorded every 5 minutes for 6 weeks. Natural infection with lameness, mastitis, and gastrointestinal parasites was allowed to occur, with treatments triggered if faecal soiling scores exceeded 3 on the AWIN scale or body condition score fell below 2.5 for ewes. Welfare assessments were conducted weekly where every sheep was assigned a dag (0-no soiling to 4-wide area of soiling), fleece (0-even fleece cover/1-loose fleece and shed areas) and lameness score (0-sound to 3-recumbent or reluctant to move). RSSI were converted to distance in metres using Walker *et al*.'s (2023) equation and interpreted as the ELD. Generalised Linear Mixed Models were used to examine the effect of day of observation, ewe breed, ewe and lamb lameness, dag and fleece score on ELD. While 15 ewes were affected by the welfare concerns studied, there was too little variation in the lamb welfare scores to model their relationship with ELD. Successful transmission of ELD via LPWAN occurred throughout the study period, except on one day, where the connection was lost for 3 hours. ELD ranged from 0 to 50m, with a median of 5m (IQR=11m) and a mean(SD) of 9m (8.6m). Ewe dag score, day of observation, and ewe breed had no effect on ELD. Ewes with no fleece problems (score 0) had a higher adjusted mean ELD (0.86m±0.02) than ewes with fleece problems (score 1) (0.76m±0.02)($p<0.001$). Sound ewes had a higher adjusted mean ELD (0.85m±0.02) than lame ewes (0.77m±0.02)($p<0.001$). These findings suggest that ewe welfare concerns could shorten ELD, meaning it could be used as an indicator of ewe welfare in extensive lambing conditions. This study also shows the welfare monitoring potential of PLF technology for complementing in-person supervision in extensive systems.

Go to poster

THE ENIGMA OF THE PARIAH BIRD (*GALLUS DOMESTICUS*)

T35

Joanne Edgar and Elizabeth Paul

Bristol Veterinary School, University of Bristol, Langford, UK
j.edgar@bristol.ac.uk

The impact of the social environment on an individual's welfare will depend upon their social responsiveness, but there has been little work to determine the extent of individual variation. A subset of birds that appear to be socially unresponsive are known in the egg industry as 'pariah birds'. Anecdotally, pariahs show a reduced behavioural repertoire, attract conspecific aggression and spend a large proportion of time away from other hens. There are likely to be welfare and health implications for these individuals but no work has been carried out to quantify the behavioural differences between pariahs and the rest of the flock. Our study aimed to quantify behavioural differences between pariahs and controls, and determine whether pariahs also show reduced capacity for two social attributes that are likely to rely on a capacity for social responsiveness; "social learning" (SL) - acquiring new behaviour from observation of a rewarded conspecific, and "socially-mediated arousal" (SMA) - the increased behavioural and physiological arousal/alertness when an animal witnesses a conspecific's stress.

Pariah birds (n=16) were obtained from a commercial farm (n=8) and our own university poultry unit (n=8). They were each housed for three weeks in pens with four other birds (non-pariahs) including a matched control hen (5 birds per group, 16 groups). For the first two weeks, home pen behaviour was recorded using overhead cameras. During week 3, capacity for SMA was determined by measuring eye temperature and behavioural responses to a group of familiar conspecifics receiving air puffs (mildly aversive stimuli). In a separate test, SL propensity was assessed in a screen-pecking task, whereby observers watched either an untrained demonstrator or a demonstrator trained to peck a circle on a screen for a mealworm reward.

In their home pens, pariahs spent less time feeding and more time standing alert and being the target of aggression, than control birds. Pariahs were observed on the floor less than controls, instead spending more time on perches. Both pariahs and controls showed a reduction in eye temperature upon witnessing conspecifics being air puffed, indicating SMA. Both groups also increased screen pecking (but not circle pecking) after watching the trained demonstrator. There were no differences between the two groups in responses during the SMA and SL tests. In summary, pariahs show no evidence of reduced capacity for social responsiveness, but they do show behavioural differences that indicate compromised welfare.

MISSION IMPOSSIBLE ACCOMPLISHED? ON THE INCOHERENT INTEGRATION OF THE HARM-BENEFIT ANALYSIS INTO LAW AND POLICY DOCUMENTS IN EUROPEAN COUNTRIES

T36

Dominik Hajosi[1,2] and Herwig Grimm[1]

[1] Messerli Research Institute, Department of Interdisciplinary Life Sciences, University of Veterinary Medicine Vienna, Medical University of Vienna, University of Vienna, Vienna, Austria

[2] Institute of Comparative Medicine, Columbia University, New York, NY, USA

dh2906@cumc.columbia.edu

The use of animals for research purposes is regulated by several laws in detail in many countries. One of the most influential legal frameworks pertaining to the use of laboratory animals in the European Union (EU) is the Directive 2010/63/EU (Directive). Member states of the EU (MS) were required to transpose the content of the Directive into national laws by 2013. In general, the intention of the Directive was to harmonize the legislation among MS whenever animals are used for scientific purposes. However, there are certain aspects within the Directive in which a MS is given room for maneuver. Therefore, it allows for some flexibility in the interpretation of its content. This may result in deviations in MS' national legislation and differences in the overall implementation, particularly in the project evaluation. The Directive covers all aspects of the use of animals for scientific purposes and demands that MS implement certain requirements. The relevant details for the project evaluation process are outlined in Article 38, and it is stated that projects should be assessed based on the overall evaluation of the objectives, severity of experiments, and compliance with the 3Rs, and it should also include a harm-benefit analysis (HBA) as an integral part of the process. is of vast importance for the research community to apply coherent standards to achieve harmonization in the research review process to ensure not only high-quality and reproducible research but also the highest standards of welfare for the affected animals. Although the EU has published guidance documents, including one pertaining to the project evaluation and HBA, which should facilitate the implementation of the HBA requirement successfully, it seems that it remains unclear how to carry out the HBA as a centerpiece of the project evaluation. In this study, we investigated the HBA's operationalization in MS and the extent of consistency of the HBA implementation in national legislation and available policy documents. Our results show that there are deficits in the transposition of the HBA requirement into national laws, significant discrepancies in available policy documents relating to the HBA, and insufficient consistency in the HBA's implementation

CONNECTING BIOLOGGING AND WILD ANIMAL WELFARE

T37

Michael Beaulieu

Wild Animal Initiative, Minneapolis, MN, USA
michael.beaulieu@wildanimalinitiative.org

Animal welfare is a rapidly evolving field that is currently expanding beyond its traditional boundaries, from animals under human management to those living in the wild. This current development is highly challenging, but it could be facilitated by the experience gathered by adjacent research fields. Among these fields, the field of biologging appears to be a strong candidate, as many of the physiological and behavioural indicators of welfare could be measured in free-ranging animals using such technology. During this talk, I will present the results of the review of the biologging and animal literature and show that interactions between both fields have remained quantitatively and qualitatively limited. On the one hand, welfare studies using biologging approaches have remained rare and mostly restricted to non-wild animals belonging to a limited number of taxa. On the other hand, biologging studies have typically been conducted in a large variety of wild animal species but they have rarely focused on welfare (except for the welfare effects of device attachment). Importantly, most of the data collected by biologging studies are inherently connected to animal welfare (eg., space use, vocalizations) and could therefore be reinterpreted using a welfare framework to assess how animals experience their life in response to the natural conditions they encounter. To stimulate further interactions between the fields of biologging and wild animal welfare, I will highlight these opportunities, with potential to both studies using historical data and tailor studies. I will also describe the unique characteristics of biologging that make this methodology well suited to assessing the welfare of animals in the wild. Finally, I will also demonstrate how considering the welfare of wild animal subjects might contribute to a better interpretation of data collected through biologging. Connecting biologging and wild animal welfare will likely have a great impact for both research fields, first by extending the current scope of biologging to a new and promising research area, and second by enhancing our understanding of how most animals on Earth experience their life.

RETHINKING USE OF THE FORCED SWIM TEST IN DEPRESSIVE DISORDERS RESEARCH

T38

Kimberley Jayne[1], Emily Trunnell,[2] Julia Baines[1], Constança Carvalho[3], Kathrin Herrmann[4] and Gilly Stoddart[1]

[1] People for the Ethical Treatment of Animals UK, London, UK
[2] People for the Ethical Treatment of Animals US, Washington, DC, US
[3] ISPA – Instituto Universitário, Lisbon, Portugal
[4] Johns Hopkins Center for Alternatives to Animal Testing, Baltimore, USA
kimberleyJ@peta.org.uk

A behavioural experiment known as the forced swim test or Porsolt test has been used for decades in research into depressive disorders. The procedure involves placing a small animal, such as a mouse or rat, into an inescapable beaker of water and recording the latency for them to stop swimming and the duration of floating behaviour on the assumption that those who begin floating more quickly or for longer are displaying "behavioural despair". However, in recent years, a growing body of literature has critiqued the validity of the forced swim test as a model of depression. For example, it has been argued that immobility during the procedure may be a positive sign of learning, conserving energy, and adapting to a new environment, not one of despair.

Concerns about the welfare of animals used in the forced swim test, coupled with questions over its scientific merit, have sparked a critical re-evaluation of its acceptability in contemporary research. As a result, pharmaceutical companies, academic institutions, funding bodies, and regulators are increasingly opposing the procedure or reviewing their policy on its authorisation.

This presentation delves into the global shift away from use of the forced swim test, providing a comprehensive overview of the welfare and scientific concerns associated with it. This presentation also identifies areas in which the procedure is still used and includes a review of recent research articles to assess the scientific rationale provided for continuing to use it.

To support stakeholders involved in the funding, reviewing, and publishing of projects that use the forced swim test, we highlight factors to be considered when undertaking a harm-benefit analysis and determining whether to authorise the procedure as part of a programme of work.

By analysing current use of the forced swim test alongside the collective shift away from it, this presentation aims to explore efforts within the scientific community to promote ethical practices and enhance the translational relevance of project outcomes.

THE STORY SO FAR: HYPOBARIC HYPOXIA AS A POTENTIAL REFINEMENT FOR KILLING LABORATORY MICE

T38

Jasmine Clarkson[1,2], Jessica Martin[2,3] Ross Muers[4], Matthew Leach[5], Julian Sparrey[6] and Dorothy McKeegan[1]

[1] School of Biodiversity, One Health and Veterinary Medicine, College of Medical Veterinary and Life Sciences, University of Glasgow, Glasgow, UK
[2] School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK
[3] The Royal (Dick) School of Veterinary Studies and The Roslin Institute, University of Edinburgh
[4] Centre for Neuroscience, University of Glasgow, Glasgow, UK
[5] Comparative Biology Centre, Newcastle University, Newcastle upon Tyne, UK
[6] Livetec systems Ltd, Wrest Park, Silsoe, Bedford, UK
jasmine.clarkson@newcastle.ac.uk

Millions of mice are used annually for scientific purposes worldwide, with the majority killed either during or after the scientific work. Public trust and acceptance of animal use for biomedical research is underpinned by robust application of the 3Rs and minimisation of unnecessary harms. Approved killing methods are assumed to be humane, and therefore, are often referred to as 'euthanasia'. Exposure to a rising concentration of carbon dioxide (CO_2) gas remains one of the most widely used killing methods for rodents, despite robustly evidenced welfare concerns. Therefore, there is an urgent need to find a practical, high-throughput alternative to exposure to CO_2 that provides better welfare outcomes during killing.

We investigated whether gradual decompression (hypobaric hypoxia) offered a reliable methodology and improved the welfare of laboratory mice at killing compared to CO_2 exposure (hypercapnic hypoxia). Behaviourally, we demonstrate that although gradual decompression is associated with elongated latencies to loss of posture and death, mice exhibit species-typical behaviour during induction suggesting a minimally negative animal experience. To support our interpretation of spontaneous behaviour, we also explored brain activity via intracranial electroencephalogram (iEEG) recordings, aiming to define the conscious phase of concern during killing with these methods. Additionally, we explored two fill methods for CO_2 (top and bottom fill) given the variation in fill application across the UK and globally.

In the iEEG results, all terminal treatments resulted in the transition from higher frequency (~8Hz) to slow wave (delta <4Hz) activity before becoming isoelectric. However, we confirmed that brain activity differs during gradual decompression compared to CO_2 exposure. CO_2 resulted in a gradual reduction in power from higher to lower frequencies, with peak power in delta occurring after loss of posture. Gradual decompression resulted in a sharp transition in peak power from alpha to delta frequencies, with the onset of peak delta power occurring (~105s) substantially before loss of posture (~280s). These findings support the hypothesis of early cognitive impairment and gradual loss of consciousness during the longer induction phase of decompression.

Our findings are encouraging, providing further evidence that gradual decompression is associated with better welfare outcomes compared to exposure to CO_2. These findings, along with features such as consistent performance and scalability, support the notion that gradual decompression could be the basis of major refinement for the way that we kill millions of laboratory mice worldwide.


UFAW
SCIENCE IN THE SERVICE OF ANIMAL WELFARE
Scientific Programme:
Workshop
Animal welfare as a profession
– beyond academia.

Joint workshop for the UFAW 2024 conference and ISAE South West Europe regional meeting

ANIMAL WELFARE AS A PROFESSION – BEYOND ACADEMIA

Brianna Gaskill[1], Huw Golledge[2], Gabriela Morello[3]

[1] Novartis, Cambridge, MA, USA
[2] UFAW, Wheathampstead, UK
[3] i3S - Institute for Research and Innovation in Health, University of Porto, Portugal

The aim of the workshop is to discuss how animal welfare expertise can be used in jobs that are not directly linked to scientific research at universities and research institutes. To start the discussion, three panellists will give brief presentations on their personal experiences of switching between jobs in university faculties and non-academic or private organisations.

The workshop is aimed at undergraduate and PhD students, early career researchers (ECRs), lecturers and people likely to give career advice to students, and anyone thinking about leaving academia.

Delegates do not need to register for the workshop, but please make sure you are in the room (Monoblock 2) by 16:20. At the end of the workshop, delegates from the UFAW 2024 conference will reconvene in “Salão Nobre” for the closing of the conference

Hope to see many of you at the workshop, and we look forward to hearing your questions and contributions to the discussion!

Best wishes from the organisers,
Sara Capas Peneda, Birte Nielsen (UFAW), and Anna Olsson

Posters with a first author whose surname starts A-J will present their poster on day 1 (10 July).

Posters with a first author whose surname starts with K-Z will present their poster on day 2 (11 July).

LIST OF POSTERS A-J (10 JULY)

1. **Britian, A nation of pet lovers? Determining levels of anthropomorphism on the welfare of animals in the United Kingdom**
   Luke Ashcroft, Emma Blundell and Louise Bell *(University Centre Myerscough)*
2. **An assessment of behavioural and physiological indicators of arousal in captive species**
   Louise Bell, Stephanie O'Mahony and Chloe Searle *(Myerscough University Centre)*
3. **The effect of enclosure illumination colours on behaviour in two nocturnal mammal species; *(Galago moholi and Petarurus breviceps)***
   Sophie Boxall, Frankie Kerridge, Louise Bell and Neil Trickett *(University Centre Myerscough)*
4. **Measuring emotions in working donkeys using eye temperature, spontaneous blink rate, and heart rate variability**
   Syed S. U. H. Bukhari, Alan McElligott and Rebecca Parkes *(City University of Hong Kong)*
5. **A retrospective study of the suspensory ligament and flexor tendon injuries of the Pakistani dancing horses**
   Syed S. U. H. Bukhari, Sundas UrooJ and Rebecca Parkes *(City University of Hong Kong)*
6. **Activity budget of Humboldt penguins (*Spheniscus humboldti*) under human care at Sea Life Porto and how environmental enrichment may influence activity levels**
   Jacira Carvalho, Ana Ferreira and Ana Magalhães *(Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto)*
7. **'Ignorance is bliss': does the public want to know about farm animal health and welfare?**
   Beth Clark, Amy Proctor, Niamh Mahon and Lewis Holloway *(Newcastle University)*
8. **Addressing gaps in our knowledge for assessing wild animal welfare**
   Anne Clay, Janire Castellano Bueno, Grey Fernandez and Vittoria Elliott *(Wild Animal Initiative)*
9. **Exploring cow vocalization as a precision livestock technology to address animal welfare during dry-off**
   Julien S.K. D'hallewin, Simon Renault, Maya Zachut, Antonello Cannas and Eugene Ungar *(University of Sassari)*
10. **Sold a pup? Do early life experiences, purchasing practices, owner characteristics and dog demographics impact on later canine health outcomes?**
    Fiona Dale, Claire Brand, Dan O'Neill, Zoe Belshaw, Bree Merritt, Camilla Pegram, Kim Stevens and Rowena Packer *(Royal Veterinary College)*
11. **Animal welfare in cost-benefit analysis and social welfare functions: a critical review to guide practical application**
    Sara Dusel and Christine Wieck *(University of Hohenheim)*
12. **Understanding the welfare of wild animals and how to improve it**
    Vittoria Elliott, Janire Castellano Bueno, Luke Hecht and Simon Eckerström Liedholm *(Wild Animal Initiative)*
13. **Challenges and opportunities for advancing Nile tilapia welfare in Egyptian aquaculture**
    Wasseem Emam, Radi Mohammed, Ahmad Hamza and Mahmoud Eltholth *(Ethical Seafood Research)*
14. **Enhancing diabetes mellitus research through the application of the 3Rs principles**
    Marisa Esteves-Monteiro, Daniela Menezes-Pinto, Mariana Ferreira-Duarte, Manuela Morato and Margarida Duarte-Araújo *(Institute of Biomedical Sciences Abel Salazar, University of Porto)*
15. **Perceptions of herpetofauna positive lists among the UK public**
    Hannah Feasby and Helen Tedds *(Hartpury University)*
16. **Understanding non-zoo visitors' perceptions of animal welfare and the role of zoos**
    Tsz Ting Fok *(University of Salford)*
17. **A systematic review of animal welfare indicators and their validity**
    Björn Forkman, Pol Llonch and Angela Ramon Perez *(University of Copenhagen)*

18. **The place of animals in care homes: can their welfare be protected?**
    Marie Fox *(University of Liverpool)*
19. **The LAS-learning project – free e-learning courses for laboratory animal welfare and ethics teaching**
    Nuno H Franco, Luís Cordeiro and Ivo ACW Tiebosch *(i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto)*
20. **Developing a program to proactively initiate animal welfare and 3Rs advancement within a pharmaceutical company**
    Brianna Gaskill and Jennifer Lofgren *(Novartis)*
21. **Enhancing dairy cow welfare monitoring using PLF: the ClearFarm algorithm for the farmers' platform**
    Yaneth Gómez, Natàlia Blasco-Andreo, Artemis Llabrés-Brustenga, Ester Jara-Lorente, Kevin Chow, Joan Serra-Sagrista, Greta Berteselli, Elisabetta Canali, Heng Lun Ko, Xavier Manteca and Pol Llonch *(Autonomous University of Barcelona)*
22. **Identifying potential strategies for reducing relinquishment where dog behaviour is a contributory reason for relinquishment**
    Katrina Holland, Sarah Weidman, Ben Cooper, Rachel Casey and Robert Christley *(Dogs Trust)*
23. **Prevalence and age distribution of incisor wear in Dohne Merino ewes (*Ovis aries*)**
    Sophie Holt, Garv Sharma and Fritha Langford *(Newcastle University)*
24. **Capybaras in the city: understanding urban coexistence**
    María José Hötzel, Selene Siqueira da Cunha Nogueira and Katia Medved Nunes Sayn *(Universidade Federal de Santa Catarina)*
25. **Dental disease predispositions in a pedigree rabbit population**
    Maria Jackson, Michaela Betts, Joanna Hedley and Charlotte Burn *(The Royal Veterinary College)*
26. **Weaning practices alter the trajectory of lamb brain development**
    Charlotte Johnston, Mandi Carr, Lachlan Douglas, Mitch Douglas, Logan Jenkins, Jane Morphett, Wayne Pitchford, Vasiliki Staikopoulos, Josh Woenig, and Mark Hutchinson *(University of Adelaide)*
27. **Chronobiological insights in zebrafish: exploring trunk and skin mucus cortisol fluctuations**
    Sara Jorge, Luís Félix, Benjamín Costas and Ana Valentim *(University of Porto)*
28. **Tip of the iceberg: few effects of maternal stress on maternal behaviors, but altered physiology with implications for offspring development in pigs (*Sus domesticus*)**
    Cathinka Jørgensen, Ulrike Gimsa and Liza Moscovice *(FBN - Research Institute for Farm Animal Biology)*

LIST OF POSTERS K-Z (11 JULY)

29. **Use of bio-loggers to explore the effect of hatchery processing line on heart rate and body temperature of day-old broiler chicks**
    Imad Khan, Patricia Soster de Carvalho, Camila Lopes Carvalho, Bassem Khalfi, Kobe Buyse, Frank Tuyttens, and Gunther Antonissen *(Ghent University)*
30. **Assessment of pre-slaughtering activities at Akinyele International Cattle Market, Ibadan, Nigeria**
    Priscilla Komolafe, Olaniyi Babayemi and Kehinde Thomas *(Bamidele Olumilua University of Education Science and Technology)*
31. **Mule trains to mountain roads: exploring how working mules (*Equus asinus x Equus caballus*) support resilient communities in the Himalayas**
    Laura Kubasiewicz and Tamlin Watson *(The Donkey Sanctuary)*
32. **Oral administration of corticosterone reduces body weight and feather growth**
    Camila Lopes Carvalho, Patricia Soster de Carvalho, Imad Khan, Bassem Khalfi, Kobe Buyse, Wout Verbeure, Annelike Dedeurwaerder, Maarten De Gussen, Frank Tuyttens, and Gunther Antonissen (*Gent University*)
33. **Case study on zoo-based European bison reintroduction: behaviour and welfare**
    Giovanna Marliani, Pier Attilio Accorsi, Camillo Sandri, and Caterina Spiezio (*Department of Medical Veterinary Medical Sciences - University of Bologna*)
34. **Chimpanzee symphony: exploration of music as environmental enrichment**
    Giovanna Marliani, Rebecca Borlini, Giulia Russo, Helena Maria Menghini, Pier Attilio Accorsi, Marco Seneci, Camillo Sandri, Caterina Spiezio *(Department of Veterinary Medical Science – University of Bologna).*
35. **Scientific knowledge mobilization in the definition of animal welfare legal standards: a French case**
    Laura Martin-Meyer (*INRAE (French National Research Institute for Agriculture, Food and Environment)*)
36. **Effect of calf pairing age on exploratory, play, and idle time behaviour**
    Michail Moroz, Camila C. Martin, and Ruan Daros (*PUCPR*)
37. **A home-made, home-cage system for monitoring body temperature in group-housed laboratory mice, for welfare assessment and biomedical research**
    Diogo Moutinho, Bárbara Bastos, and Nuno Henrique Franco (*CIBIO - Universidade do Porto*)
38. **Are track systems better for welfare? A comparison of welfare indicators between pasture-kept and track system-managed horses and ponies in the UK**
    Cynthia Naydani and Tamsin Coombs (*University of Edinburgh*)
39. **Browsing the options for good welfare: asking giraffes what trees they prefer**
    Zoe Newnham and Paul Rose (*Marwell Wildlife/ University Centre Sparsholt*)
40. **Impact of dietary tryptophan on the growth performance, stress level and gut morphology of weanling pigs**
    Ayoola Oluyemi, Funmi Adebiyi, Omotolani Olatunji, Victor Ajayi, and Olufemi Adebiyi (*Bogoro Research Centre, Afe Babalola University, Ado-Ekiti*)
41. **Thermoregulatory response of West African dwarf male goats of various coat colours to diurnal temperature changes**
    Femi Oyeniyi and Emmanuel Ewuola (*Ekiti State Polytechnic*)
42. **Feed based on symbiotics as a factor influencing fish welfare**
    Assel Paritova and Altay Ussenbayev (*S. Seifullin Kazakh Agro Technical Research University*)
43. **A Delphi consultation survey on indicators of parrot welfare**
    Andrea Piseddu, Yvonne van Zeeland, and Jean-Loup Rault (*University of Veterinary Medicine Vienna*)

44. **Cinereous vulture's (*Aegypius monachus*) welfare in a breeding centre: activity budget, behaviour analysis and use of space**
    Margarida Plácido, Oriol Tallo-Parra, and Marina Salas (*Antwerp Zoo Centre for Research and Conservation*)
45. **Risk factors for barbering in laboratory mice**
    Anna Ratuski, Jacob Thiel, Jamie Ahloy-Dallaire, Stephen Felt, and Joseph Garner (*Stanford University*)
46. **Behaviours of farmed shrimps (*Penaeus vannamei*) in grow-out pond: what we know**
    Lola Reverchon-Billot and Aurélia Warin (*Bankiva*)
47. **Behaviours of farmed shrimps (*Penaeus vannamei*) with human intervention: what we know**
    Lola Reverchon-Billot and Aurélia Warin (*Bankiva*)
48. **Global Equid Knowledge-Exchange Community (GEKEC): bringing working equids into the welfare equation.**
    João B. Rodrigues, Michelle Whitham-Jones, Tamlin Watson, Laura Kubasiewicz (*The Donkey Sanctuary*)
49. **The rehoming process in dogs: investigating short and long-term effects of rehoming on contact-seeking behaviour, memory, and stress in shelter, rehomed, and non-rehomed dogs**
    Lina S. V. Roth, Cornelia Sulonen, and Jenny Löf (*Linköping University*)
50. **Housed dairy cows utilise varied environmental enrichments and show diverse inter-individual variation in habituation**
    Alison L. Russell, Laura V. Randall, Jasmeet Kaler, Nikki Eyre, Jake Thompson, and Martin J. Green (*University of Nottingham*)
51. **Effects of cat music on behaviour of cats hospitalized for long periods**
    Sabrina Sato, Paula Wolfgan, and Ruan Daros (*PUCPR*)
52. **Assessing the welfare of lions (*Panthera leo*) and tigers (*Panthera tigris*) under human care – The CatWell protocol**
    Sara Sequeira, Xavier Manteca, and Sabine Hartmann (*FOUR PAWS International*)
53. **Agroforestry tree leaves as an alternative to antimicrobial drugs for sustainable parasitic control in sheep of Jammu and Kashmir, India**
    Azad Mandeep Singh and Kour Kawardeep (*Skuast-Jammu*)
54. **Regulating rescue: UK dog rescues as a welfare blind spot**
    Sarah Singh and Marie Fox (*University of Liverpool*)
55. **Locomotion and mobility assessment for brown bears (*Ursus arctos*) under human care**
    Elena Stagni, Marta Brscic, Marlene Kirchner, Sabine Hartmann, Barbara Contiero and Irene Redtenbacher (*FOUR PAWS International*)
56. **Exploring the link between neurotransmitters and vocalisations in pigs during positive human-animal interactions**
    Suzanne Truong, Joachim Litman, Oceane Schmitt, Avelyne Villain, Attilio Rocchi, Giorgio Mattaliano, Winfried Otten, and Jean-Loup Rault (*University of Veterinary Medicine Vienna*)
57. **Addressing pain in zebrafish: analgesia for a traumatic brain injury model**
    Ana Valentim, Beatriz Custódio, Elena van Os, Sofia Guimarães, and Anna Olsson (*i3S - Instituto de Investigação e Inovação em Saúde*)
58. **End of life, a good death? Interconnecting lifescapes and implications for mule (*Equus asinus x Equus caballus*) welfare at end of life in Nepal**
    Tamlin Watson, Laura M Kubasiewicz, Caroline Nye, and Sajana Thapa (*The Donkey Sanctuary*)
59. **Investigating behaviour and faecal cortisol metabolite levels in harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in rehabilitation**
    Michal Zatrak, Richard Ilderton, Matthew Geary, Kirsty Shaw, and Robyn Grant (*Manchester Metropolitan University*)
60. **The first steps in animal welfare teaching in higher veterinary education of Kazakhstan**
    Aikumys Zhumakayeva and Altay Ussenbayev (*S. Seifullin Kazakh Agro Technical Research University*)

BRITAIN, A NATION OF PET LOVERS? DETERMINING LEVELS OF ANTHROPOMORPHISM ON THE WELFARE OF ANIMALS IN THE UNITED KINGDOM

P1

Luke Ashcroft, Emma Blundell and Louise Bell

Animal Studies Department, University Centre Myerscough, UK
lashcroft@myerscough.ac.uk

Animals play a significant role within society with 52% of adults in the United Kingdom (UK) owning a pet. As animals are housed and used across different industries, human caregivers and observers can be regularly exposed to their presence. This exposure can result in strong, neutral and weak human-animal bond's whereby strong bonds result in a mutually beneficial human-animal relationship. Positive and somewhat beneficial relationships of this type can often lead to anthropomorphic behaviour from the human caregiver or neutral observer and thus, determining the potential impact of this is important. Anthropomorphic behaviour or, as often referred to, anthropomorphism is described as projecting and attributing human traits and mental states onto animals. Regardless of the 'deemed' benefit to the human caregiver or observer, this can often cause positive and negative effects on human caregiver perception, animal husbandry and management and ultimately in some cases, animal welfare. This study, therefore, aimed to determine the existence and levels of anthropomorphism across the UK to assess how this could impact animal welfare. A questionnaire was created to distribute to the public to assess their perceptions and experiences of anthropomorphic behaviour and aimed to gather specific demographic data which may influence this behaviour. The questionnaire was shared online using popular social media sites resulting in 234 respondents. Each participant was scored to determine their anthropomorphic level and were compared to specific demographics and pre-determined answers to questions likely to determine their potential influences on anthropomorphism. The results indicated that two demographics influenced displays of anthropomorphism, and included age ($P<0.05$), with younger age groups showing higher levels of anthropomorphism and education level ($P<0.05$), with participants with higher education qualifications showing lower levels of anthropomorphism. Participants who 'fed their animals human foods' ($P<0.001$), 'dressed their animals' ($P<0.001$), and 'picked up smaller animals and placed them in bags' ($P<0.01$), showed higher levels of anthropomorphism. Such findings were not surprising considering how commonly such images are shared and promoted on social media posts. Thematic analysis of scenario-based questions determined that anthropomorphism could influence peoples' actions in welfare situations and as such could likely negatively impact animal welfare. To prevent such deleterious impacts, the relevance of anthropomorphism and its potential impacts could be wider discussed within animal and citizenship education programmes to teach younger and older generations the needs of animals.

Go to poster
Back

AN ASSESSMENT OF BEHAVIOURAL AND PHYSIOLOGICAL INDICATORS OF AROUSAL IN CAPTIVE SPECIES

P2

Louise Bell, Stephanie O'Mahony and Chloe Searle

Department of Animal Studies, School of Natural Sciences, Myerscough College and University Centre, UK
lbell@myerscough.ac.uk

Arousal and/or stress is a homeostatic response to pressure or pain, caused by intrinsic or extrinsic stressors. There are two common types of stress indicators in captive species – behavioural and physiological. Behavioural indicators include abnormal repetitive behaviours (stereotypic behaviour), changes in activity levels, increased disease prevalence or a diminished body condition. Different taxa display different behavioural stress indicators. For example, birds can pluck their feathers, carnivores can pace and ungulates can bite themselves. Physiological indicators include high levels of stress-related hormones (eg. cortisol), increased heart rate or increased blood pressure, which also indicate arousal. Cortisol testing is a common method used to investigate stress. Blood, saliva, faeces and urine are often collected for analysis. A study was conducted to delineate the behavioural and physiological indicators of arousal, assess current welfare and discuss stress management strategies in a range of captive animals. Through the alleviation of stress, we can observe not only enhancements in animal welfare but also significant improvements to conservation efforts, ethics and research methodologies. To achieve this, saliva cortisol levels were analysed using an ELISA test. Saliva samples were collected from a range of domestic and/or captive species, including donkeys (*Equus africanus asinus*), dogs (*Canis lupus familiaris*), reindeer (*Rangifer tarandus*), dairy cattle (*Bos taurus*), Sulcata tortoise (*Centrochelys sulcata*) and a skunk (*Mephitidae*). Control samples were collected before a stressor event and expected high cortisol samples were collected shortly after a stressor. Stressor events included but were not limited to, routine health/veterinary checks (farrier, dentist or vaccinations), hydrotherapy, robotic milking and gundog training/event days. Furthermore, behavioural observations on an Amazon parrot (*Psittacus amazona*) and an African Grey parrot (*Psittacus erithacus*) were carried out before and after the introduction of a new enclosure mate. Results from this project will provide valuable insights into the different indicators of stress across a varied range of captive species and determine the effect that routine events have on cortisol levels. Further study can evaluate how the routine events could be altered to decrease the incidence of stress to the animals.

Go to poster
Back

THE EFFECT OF ENCLOSURE ILLUMINATION COLOURS ON BEHAVIOUR IN TWO NOCTURNAL MAMMAL SPECIES; (*GALAGO MOHOLI* AND *PETARURUS BREVICEPS*)

P3

Sophie Boxall[1], Frankie Kerridge[1], Louise Bell[1] and Neil Trickett[2]

[1] Animal Studies Department, University Centre Myerscough, UK
[2] Wild Discovery, UK
fkerridge@myerscough.ac.uk

Captive Mohol bushbabies (*Galago moholi*) and sugar gliders (*Petaurus breviceps*) are nocturnal mammals frequently housed on reversed light cycles so visitors can observe their active behaviours during the daytime. During our daytime, coloured, low-intensity lights can be used to mimic moonlight and as a result, nocturnal individuals may be subjected to artificial light 24 hours a day. Evidence is accumulating that light exposure at night can affect health and behaviour and thus, studies are needed to determine whether any detrimental effects are seen. This study aims to assess the effect of red and green enclosure illumination on the behaviour of the two species. A sample size of five Mohol bushbabies at Wild Discovery and two sugar gliders at University Centre Myerscough's Animal Unit were used in this study. The bushbabies were observed using instantaneous sampling for a total of 12 hours with 30-second intervals and the sugar gliders using continuous recording for a total of 48 hours per individual. Results demonstrated a significant association ($P < 0.05$) between active behaviour and the colour of the lighting for the bushbabies, with most activity occurring under green lighting and least under red. Sugar glider results showed a significant difference ($P < 0.05$) in behaviours at different times of the day and under each coloured lighting, being most active under the red lighting and least under the combined green and red light. Differing results suggest that lighting in captive environments needs to be species-specific with their activity monitored to determine if the lighting promotes reversed activity or inactive behaviour.

Furthermore, as time of the day differed for the sugar gliders, it is advised that timers are used to mimic the day and night cycle from the species' home range to avoid an excessive artificial day length, which the animals are not 'ecologically adapted' to. Future studies should investigate the suitability of timed cycles and the potential use of dimmers to replicate lunar phases as a form of environmental enrichment as current conditions are unvarying.

Go to poster
Back

MEASURING EMOTIONS IN WORKING DONKEYS USING EYE TEMPERATURE, SPONTANEOUS BLINK RATE, AND HEART RATE VARIABILITY

P4

Syed SUH Bukhari[1,2], Alan McElligott[2,3] and Rebecca Parkes[1,2,4]

[1] Department of Veterinary Clinical Sciences, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[2] Centre for Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[3] Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[4] Large Animal Medicine and Surgery Department, School of Veterinary Medicine, St. George's University, True Blue, St. George's, Grenada, West Indies
habukhari2-c@my.cityu.edu.hk

Quantitative measures of emotion are important for objectively assessing animal welfare. However, there is no research on emotion in donkeys. We used 34 donkeys to investigate eye temperature (ET), spontaneous blink rate (SBR), and heart rate variability (HRV) as measures of stress and positive emotions. ET, SBR, and HRV were measured using a FLIR thermographic camera, a GoPro camera, and a Polar heart rate monitor, respectively. Donkeys were subject to three different treatments: positive, negative, and control. The positive treatment was provision of high-quality lucerne, and the negative treatment was the sound of clippers close to the donkey's ear. Donkeys in their current living environment without positive or negative treatment were used as the control. We collected nine minutes of data per donkey, three for each treatment. The data was analyzed using a linear mixed-effects model and Pearson correlation. SBR increased significantly with the positive treatment compared to control (18.94±5.83 to 37.94±8.37 blinks per min, $p<0.001$), and decreased significantly with the negative treatment compared to control (18.94±5.83 to 12.20±5.89 blinks per min, $p<0.001$). A significant increase in ET was found for negative treatment compared to control (34.55±0.93 to 35.75±0.99°C, $p<0.001$). HRV was significantly higher with positive treatment compared to control (47.26±17.52 to 80.23±27.23 ms, $p<0.001$). There was a significant strong negative correlation between change in ET and HRV between control and negative treatment ($r = -0.71$, $p<0.001$). A significant moderate negative correlation was found between change in ET and HRV between control and positive treatment ($r = -0.59$, $p<0.001$). A significant moderate positive correlation was demonstrated between change in SBR and HRV between control and negative treatment ($r = 0.54$, $p<0.001$), and a significant moderate positive correlation was found between change in SBR and HRV between control and positive treatment ($r = 0.56$, $p<0.001$). ET and SBR correlated with HRV, which is a standard and conventional measure of stress and emotion in horses and other mammalian species. Stressful situations can cause increased ocular vasodilation, leading to higher ET. Additionally, positive events cause a rise in SBR due to the increased release of dopamine. We demonstrated the use of ET, SBR, and HRV as a measure of stress and positive emotions in working donkeys. We have shown that SBR is a simple, valid, and quick way to measure stress and positive emotions in donkeys without the need for sophisticated equipment, which is important in low-resource settings.

Go to poster
Back

A RETROSPECTIVE STUDY OF THE SUSPENSORY LIGAMENT AND FLEXOR TENDON INJURIES OF THE PAKISTANI DANCING HORSES

P5

Syed SUH Bukhari[1,2], Sundas UrooJ[3] and Rebecca Parkes [1,2,4]

[1] Department of Veterinary Clinical Sciences, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[2] Centre for Animal Health and Welfare, Jockey Club College of Veterinary Medicine and Life Sciences, City University of Hong Kong, Hong Kong SAR, China
[3] Department of Clinical Medicine and Surgery, Faculty of Veterinary Science, University of Agriculture Faisalabad, Pakistan
[4] Large Animal Medicine and Surgery Department, School of Veterinary Medicine, St. George's University, True Blue, St. George's, Grenada, West Indies
habukhari2-c@my.cityu.edu.hk

Dancing horses (*Equus caballus)* are famous athletes in the Indian subcontinent, used for display and competition. There are four major types of dance ie. Chokhri, Dhamal, Rair, and Pallat. However, musculoskeletal injuries have yet to be studied in this population. We investigated the prevalence of and factors associated with suspensory ligament (SL), superficial digital flexor (SDFT), and deep digital flexor tendon (DDFT) injuries in the Attock region of Punjab, Pakistan. A retrospective cohort study assessed the medical records of 104 dancing horses from six studs from 2018 to 2023. Univariable and multivariable regression models were used to assess factors associated with ligament and tendon injuries. Dance type, age, daily training duration, and trainer type were all retained in the final model. A total of 42.38% (n=42) of horses were injured and 15.38% (n=16) recovered following veterinary intervention. SL was the most frequently affected structure in the overall study population (36.53%; n=38), with SDFT and DDFT affected in 30.77% (n=32) and 15.38% (n=16) of horses respectively. Horses performing Rair were more likely to injure SDFT when compared to Chokhri dance ($P<0.001$). For horses performing Rair, injured animals were younger compared to other types of dance ($P<0.001$). The type of trainer and daily training duration were also significantly associated with tendon and ligament injuries in dancing horses ($P<0.001$). As for other equestrian sports, the type of work and training a horse is subjected to has a direct impact on the occurrence of musculoskeletal injuries. These findings can be used to plan future research into mechanism and prevention and, in the longer term, improve owner education, veterinary care, and the welfare of dancing horses.

Go to poster
Back

ACTIVITY BUDGET OF HUMBOLDT PENGUINS (*SPHENISCUS HUMBOLDTI*) AT SEA LIFE PORTO AND HOW ENVIRONMENTAL ENRICHMENT MAY INFLUENCE ACTIVITY LEVELS

P6

Jacira Carvalho[1], Ana Ferreira[2] and Ana Magalhães[1,3,4]

[1] Behavioural Sciences, Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, Porto, Portugal
[2] SEA LIFE Porto, Porto, Portugal
[3] Addiction Biology, i3S - Instituto de Investigação e Inovação em Saúde and Instituto de Biologia Molecular e Celular (IBMC), Universidade do Porto, Porto, Portugal
[4] Instituto Universitário de Ciências da Saúde, CESPU, CRL, Gandra, Portugal
up201905553@edu.icbas.up.pt

Humboldt penguins *(Spheniscus humboldti)* are a penguin species classified as “vulnerable” on the International Union for Conservation of Nature (IUCN) Red List, mainly as a negative result of human activity. Keeping animals under human care is one of the methods used to contribute to the species’ conservation. This implies the guaranteeing of both their mental and physical well-being, therefore it is critical to continue striving to improve the living conditions of animals in captivity. A first step towards this goal involves introducing environmental enrichment (EE). This study aimed to identify which EE devices would help improve walking, exploratory, and swimming-related behaviors of Humboldt penguins at SEA LIFE Porto, with the added goals of extending their swimming time and expanding the display area they actively use, thereby contributing to the overall welfare of the animals. Observations of eight penguins were conducted ad libitum over 17 days to construct an ethogram specific to this group of animals. Following the exclusion of videos characterized by poor visibility conditions, a total of 80 systematically recorded videos were analyzed using The Observer XT 11.5 software. Recordings occurred at 11 AM and 3 PM, both either with and without the presence of EE. An instantaneous scan sample was made every minute, resulting in 15 scan samples per video. The identified behaviors were then classified into 11 categories related to maintenance, nest-building behaviors, locomotion on land, swimming, social interactions, stationary activities, and agonistic behaviors. The implementation of EE led to significant differences, including increased locomotion on land and nest-building behaviors, as well as a decrease in maintenance and stationary behaviors. Initial findings suggest that EE positively influences the penguin's behavior, mostly by promoting increased activity on land. The results might have been impacted by the penguins' reproductive cycle phase, emphasizing the importance of long-term research with continuous monitoring throughout the cycle.

Go to poster
Back

'IGNORANCE IS BLISS': DOES THE PUBLIC WANT TO KNOW ABOUT FARM ANIMAL HEALTH AND WELFARE?

P7

Beth Clark[1], Amy Proctor[1], Niamh Mahon[2] and Lewis Holloway[3]

[1] Centre for Rural Economy, School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, UK
[2] The James Hutton Institute, Craigiebuckler, Aberdeen, UK
[3] School of Environmental Sciences, University of Hull, Cottingham Road, Hull, UK
beth.clark@newcastle.ac.uk

Farm animal health and welfare (FAHW) is a longstanding concern for numerous stakeholders. For the public, it raises altruistic concerns (eg., animal welfare standards) and individual concerns (eg., food safety and quality), the latter particularly for consumers of animal products. These concerns have led to calls for greater transparency and traceability of how and where food is produced, and a more distributed responsibility for ensuring this across different stakeholders. Information asymmetry between food producers and the public remains a key issue, with information on production processes and standards often not reaching the end consumer. The extent to which consumers desire more information on FAHW also remains unclear.

Qualitative research was undertaken with members of the UK public to explore their information preferences and perceptions on responsibility for FAHW. Six online focus groups were run with a combined 36 participants. Focus group discussions centred around animal product consumption, information preferences, and responsibility for FAHW. Focus groups were recorded, transcribed verbatim and analysed using thematic analysis.

Results indicate that FAHW was not a priority for most consumers of animal products. FAHW information was rarely used whilst purchasing except when looking for the production method of eggs. Whilst participants claimed to care about FAHW, and expressed concerns about animal production, only some had a desire for further information on food. This was to enable them to make more informed purchasing decisions. For others, competing factors such as price and time were a barrier to information use. For some participants, a desire to remain informed was a deliberate means to facilitate a sustained consumption of animal products given that FAHW information could potentially make them reconsider their food choices. Participants viewed a range of stakeholders responsible for FAHW, particularly farmers, government, and food retailers. Participants had sympathy for farmers given the constraints they face and power dynamics in supply chains. Participants also viewed themselves as responsible for FAHW, although less than other stakeholders eg., farmers, government. This responsibility was for both their roles as citizens and consumers, with participants providing several ways their responsibility could be enacted.

Findings indicate a tension between a desire for greater transparency on where animal products have come from and how they have been raised and a need to not be overburdened with information as consumers in particular. The paper makes recommendations for the communication of FAHW for different stakeholders, including discussions around labelling.

Go to poster
Back

ADDRESSING GAPS IN OUR KNOWLEDGE FOR ASSESSING WILD ANIMAL WELFARE

P8

Anne Clay[1,3], Janire Castellano Bueno[1,4,] Grey Fernandez[1] and Vittoria Elliott[1,2]

[1] Science Department, Wild Animal Initiative, USA
[2] Smithsonian Institution, USA
[3] Department of Environmental Science and Policy, College of Science, George Mason University, USA
[4] Faculty of Medical Sciences, Newcastle University, UK
anne.clay@wildanimalinitiative.org

Wild animal welfare is a novel field that takes an animal-centric approach to understanding the conscious experiences of animals in their natural habitats. How individual animals experience their welfare has a strong influence on their ability to make decisions in the wild, and in turn drives their social interactions and behaviours. At the same time, the welfare states of wild animals rely on their surrounding natural environment, increasingly subjected to rapid environmental change and human-dominated landscapes. Understanding and validating observable behavioural and physiological measures as indicators of welfare is crucial for assessing the welfare states of sentient animals in the wild. However, assessing affective states in uncontrolled wild settings presents its own set of unique challenges such as the presence of larger species ranges, unpredictable environmental conditions, and poor accessibility to individual animals. Additionally, certain indicators of affective state in captive settings may be less reliable in the wild, where daily activities such as escaping predators and foraging for food are more adaptive to survival. This talk will highlight the need to understand the welfare of wild animals, while addressing the practical and ethical challenges of conducting these studies on free-ranging animals in natural settings. We do this by first introducing the significance of framing sentient animals in terms of their conscious experiences for wildlife research and practice. Second, we focus on the challenges of measuring animal welfare in wild settings, what criteria qualify behavioural and physiological indicators as accurate in natural contexts, and what might differentiate them from studies in captive settings. Finally, we conclude with recommendations for future research to address gaps in the knowledge needed to better understand the welfare experiences of wild animals in the wild.

Go to poster
Back

EXPLORING COW VOCALIZATION AS A PRECISION LIVESTOCK TECHNOLOGY TO ADDRESS ANIMAL WELFARE DURING DRY-OFF

P9

Julien D'hallewin[1], Simon Renault[2], Maya Zachut[3], Antonello Cannas[1] and Eugene Ungar[4]

[1] University of Sassari, Dept. of Animal Sciences, Sassari, Italy
[2] École Nationale Vétérinaire de Toulouse, Toulouse, France
[3] Department of Ruminant Science, Institute of Animal Science, Agricultural Research Organization – The Volcani Institute, Rishon LeZion, Israel
[4] Department of Natural Resources, Institute of Plant Sciences, Agricultural Research Organization – The Volcani Institute, Rishon LeZion, Israel
j.dhallewin@studenti.uniss.it

Dairy cows conceive during lactation and are generally dried off in the last two months of gestation. Drying off, in conjunction with concomitant barn management practices, may affect animal welfare and, consequently, follow on productivity. To assess the impact of drying off practices on welfare in dairy cows, vocalizations (bellowing) were detected via continuous acoustic monitoring. Treatments were: [1] Control, CNT (lactating cows, n= 5); [2] Social Disturbance, SOC (barn transfer, n= 11); [3] Sudden Drying, SUD (n= 5); [4] Partial Drying, PAR (step reductions in milking frequency; n= 10); [5] Gradual Drying, GRD (change in diet and milking frequency; n= 5). Vocalizations were monitored starting from one day before to one day after the first (or only) transition in the drying process. Cows were tested in small groups (5-11 animals) according to the availability of cows to be dried off. Time zero (T0) was the day of last milking in SUD, PAR, GRD cows, or transition day in SOC cows, or a random day in CNT cows. To trace vocalizations, recordings were scanned visually for a characteristic waveform, which was confirmed aurally, and then timestamped and classified as being of high or low intensity. Ninety-eight cow-days were analysed, covering the core days of T-1, T0 and T+1. A total of 6700 vocalizations were annotated, comprising 3679 of high and 3021 of low intensity. An analysis of variance was performed of daily vocalizations, with factors: Treatment and Relative-day-number in the model. Both factors were significant. In "gradual" treatment, there is currently insufficient data to make a clear determination. Treatment means (vocalizations per day), ranked lowest to highest, were CNT= 2.4; SOC= 13.4, SUD= 24.5 and PAR= 33.1. The mean vocalizations per day according to relative-day-number were 4.2, 16.0, 30.9 for T-1, T0, and T+1, respectively. The high vocalization type was a better indicator of poor welfare than the low type, or the sum of both types. This statement was indicated by a minimal rate of high vocalization in the control, and a clear upward trend with relative day in the "partial" and "social" treatments. Based on these results, welfare appear to be impaired by drying and its component stresses, and in a way that differs among drying protocols.

Go to poster
Back

SOLD A PUP? DO EARLY LIFE EXPERIENCES, PURCHASING PRACTICES, OWNER CHARACTERISTICS AND DOG DEMOGRAPHICS IMPACT ON LATER CANINE HEALTH OUTCOMES?

P10

Fiona Dale[1] Claire Brand[2], Dan O'Neill[1], Zoe Belshaw[3], Bree Merritt[2], Camilla Pegram[1], Kim Stevens[1] and Rowena Packer[2]

[1] Department of Pathobiology and Population Sciences, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts, UK
[2] Department of Clinical Science and Services, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts, UK
fidale@rvc.ac.uk

Despite common assertions that puppies purchased from non-recommended sources (eg., 'puppy farms') have poorer future welfare, there is little evidence about the long-term health outcomes for such acquisitions. The COVID-19 pandemic precipitated a surge in inexperienced owners acquiring puppies sold with reduced provenance transparency that increased the risk of acquisition from poor-welfare sources. Examples included owners being less likely to view their puppy in-person prior to purchase, less likely to see the dam at purchase and more likely to collect their puppy away from its place of birth than pre-pandemic (2019). Furthermore, 'Pandemic Puppy' owners were less likely to seek breeders that health tested their breeding dog(s) than 2019 owners. Compounding these purchase-related risk factors, COVID-19 restrictions on non-urgent and face-to-face appointments reduced access to veterinary care, with pre-sale health checks by a veterinary professional less likely in Pandemic Puppies compared to puppies acquired pre-pandemic in 2019.This study investigated the impact of these early-life and provenance-based risk factors, as well as owner and dog demographics, upon adult dog health outcomes at 21-months of age. An online longitudinal questionnaire from January-July 2022 followed a subset (n=1742) of 'Pandemic Puppies' (n=4369) originally surveyed in November–December 2020. Of n=985 responding owners, the majority (94.5%) reported at least one canine health problem since November-December 2020. The most prevalent disorders were enteropathy (75.4%), skin (26.8%), ophthalmological (25.1%), upper respiratory tract (18.5%) and ear disorders (17.6%). Multivariable modelling revealed purebred dogs and those insured or owned by first-time owners had higher odds of having ≥1 disorders. Veterinary costs were higher for insured dogs and dogs weighing 30-40 kg (compared to 10-20 kg), but lower for dogs with owners aged ≥75 years old (compared to owners aged 45-54 years). Owners who reported they had spent more than expected on veterinary care since the last survey were: more likely to own a dog that was female; was insured; have requested health test results for their puppy's parents; have purchased a puppy whose breeder had provided primary vaccination; purchased a puppy without a microchip; to have reported health issues they were concerned about soon after acquisition, and bought a puppy to encourage exercise. The results suggest that longer term health outcomes are linked to how and from where a puppy is acquired and that greater purchasing prudence is needed by prospective owners to avoid being 'sold a pup'.

Go to poster
Back

ANIMAL WELFARE IN COST-BENEFIT ANALYSIS AND SOCIAL WELFARE FUNCTIONS: A CRITICAL REVIEW TO GUIDE PRACTICAL APPLICATION

P11

Sara Dusel and Christine Wieck

Department of Agricultural and Food Policy, University of Hohenheim, Stuttgart, Germany
sara.dusel@uni-hohenheim.de

There is a growing body of literature on how to include and monetise animal welfare in policy evaluations by means of cost-benefit analysis and social welfare functions. Powerful calls for practical application have recently been published. Yet, policy analysts who seek to implement any of these approaches in practice are faced with substantial challenges because the published studies differ considerably regarding their empirical contexts, methodologies, and underlying normative assumptions. We believe that the lack of synthesis in the literature impedes the inclusion and monetisation of animal welfare in cost-benefit analyses and social welfare functions. This represents a barrier to the diffusion of findings from animal science into policy evaluations. We conduct a critical review of the scientific and grey literature with the aim to synthesise the available material, to facilitate an informed debate on how to deal with conflicting normative assumptions, and to eventually guide the practical application of approaches to include animal welfare in policy evaluations. The results of the critical review are presented in the form of a checklist that allows to better comprehend key steps of the methodologies and associated normative controversies. For each step in cost-benefit analysis and social welfare functions, the checklist gives an overview of the alternative options discussed in the literature, and points to any remaining research gaps. Beside the academic debate, this is relevant for practical policy analysts who need to make methodological choices for their policy questions at hand. With our critical review, we support the diffusion of scientific advances from animal science into policy evaluations by means of cost-benefit analysis and social welfare functions.

Go to poster
Back

UNDERSTANDING THE WELFARE OF WILD ANIMALS AND HOW TO IMPROVE IT

P12

Vittoria Elliott[1,2], Janire Castellano Bueno1,[3], Luke Hecht[1] and Simon Eckerström Liedholm[1]

[1] Wild Animal Initiative, Germany
[2] National Museum of Natural History, Smithsonian Institution, Washington D.C., USA
[3] Newcastle University, Bioscience Institute, UK
vittoria.elliott@wildanimalinitiative.org

This talk seeks to build on an increased interest in free-ranging wild animals among the animal welfare science community by introducing the science of wild animal welfare. First, we will explore some of the ways in which we can gain a better understanding of what the lives of animals are like in the wild and gain insight into individual welfare experiences. The talk will briefly discuss why we, as scientists, should care, explore how we might better understand wild animals' welfare, and consider how we might responsibly intervene to improve their welfare.

The talk will briefly introduce some of the techniques and methods available to us to assess animal welfare in the wild, highlighting some ongoing studies that are both developing and applying a variety of approaches. On the way, we will discuss some of the synergies with other disciplines, such as animal behaviour science, comparative cognition, and ecosystem ecology, and identify some of the challenges and opportunities presented by studying animals in the wild.

Finally, the talk will walk the audience through a set of recent examples of studies exploring the potential for improving the lives of wild animals through welfare-enhanced approaches to wildlife contraception and management, and by considering how welfare can improve conservation and rehabilitation interventions. The talk will leave the audience to consider how we might go beyond a mitigation approach to a welfare enhancement approach.

Go to poster
Back

CHALLENGES AND OPPORTUNITIES FOR ADVANCING NILE TILAPIA WELFARE IN EGYPTIAN AQUACULTURE

P13

Wasseem Emam[1,2], Radi Mohammed[3], Ahmad Hamza[4] and Mahmoud Eltholth[5]

[1] Institute of Aquaculture, University of Stirling, Scotland, UK
[2] Ethical Seafood Research, UK
[3] Department of Aquaculture, Kafr El Sheikh University, Egypt
[4] Aquavet Egypt
[5] Department of Health Studies, Royal Holloway University, London, UK
mahmoud.eltholth@rhul.ac.uk

The Egyptian Nile tilapia farming sector has grown rapidly over the previous decades placing Egypt as the world's third largest producer. With this rapid growth, the sector has undergone a process of intensification with supplemented feed and higher stocking densities. Although intensification is likely to compromise animal welfare, little is known about the current status of tilapia welfare in the country. This study aimed to establish the standard handling and management practices involved in tilapia farming from hatchery to consumer, in order to identify potential interventions for improving the situation. A series of workshops were held with key stakeholders in the centres of tilapia production, including farm owners and workers, feed mill operators, and aquaculture practitioners. Outcomes of these discussions suggest that the concept of animal welfare is lacking in Egyptian tilapia aquaculture and that there is a need to raise awareness amongst relevant stakeholders around the importance of high welfare practices in improving tilapia health, productivity, and ultimately quality. Key impactful interventions could include reducing stocking densities and improving the massive capture and slaughter processes.

Go to poster
Back

ENHANCING DIABETES MELLITUS RESEARCH THROUGH THE APPLICATION OF THE 3RS PRINCIPLES

P14

Marisa Esteves-Monteiro[1],[2] Daniela Menezes-Pinto[2], Mariana Ferreira-Duarte[2], Manuela Morato[2], Margarida Duarte-Araújo[1]

[1] Department of Immuno-Physiology and Pharmacology, Institute of Biomedical Sciences Abel Salazar, University of Porto (ICBAS-UP), LAQV-REQUIMTE, Porto, Portugal
[2] Laboratory of Pharmacology, Department of Drug Sciences, Faculty of Pharmacy University of Porto (FFUP), LAQV-REQUIMTE, Porto, Portugal

Diabetes mellitus (DM) is a prevalent disorder with significant public health impact that demands translational studies using animal models. Our work involved applying the 3Rs principles in DM research, starting with the refinement of the Streptozotocin (STZ) type 1 DM model. Fasting before STZ-induction is often recommended, but the optimal duration is debatable, with some researchers restricting food for up to 24 hours. Additionally, STZ-induction is frequently performed without analgesia. To improve animal welfare, we modified the STZ-induction protocol, opting for a shorter fasting period and administering tramadol for analgesia.

On the induction day, 22 male Wistar rats underwent a 4-hour morning fast with free access to water. STZ (55mg/kg) was intraperitoneally injected under tramadol analgesia (20mg/kg,PO) given just before. Eight rats that did not undergo any procedure were used as controls. Diabetic status was confirmed if blood glucose was ≥250mg/dL 48 hours post-STZ injection. Baseline glycemia was similar between control animals and STZ-induced rats before fasting (105.63±6.31mg/dL vs 99.30±3.29mg/dL, respectively, $p>0.05$). Results demonstrated a successful induction rate of 86.4%, with STZ-induced rats exhibiting elevated glycemia (395.09±13.80mg/dL) within 48 hours. By day 14, most STZ rats displayed glycemia above 500mg/dL and ketone bodies, while control animals maintained glycemia at 105.57±4.76mg/dL. During the protocol, diabetic animals exhibited classic DM signs (polyphagia, polydipsia, and weight loss) demonstrating the effectiveness of STZ-induction in rats using a refined protocol with a shorter fasting period and analgesia, that ensures animal welfare without compromising experimental outcomes.

To study type 2 DM, we adhere to the European directive 2010/63/EU (which advocates the sharing of organs and tissues of euthanized animals) leading to the reduction of the number of animals used. We obtained tissues from rats with a genetic model of type 2 diabetes (Goto-Kakizaki), generously provided by another Portuguese research group, rather than using additional animals solely for our study.

Innovatively, we decided to study spontaneously diabetic pets (dogs and cats) that presented a promising translational avenue, enabling us not only to juxtapose our findings with those from laboratory animals but also to contemplate the potential replacement of their use in certain circumstances.

Hence, our examples illustrate the implementation of the 3Rs in DM research: refining the STZ model; reducing the number of animals through inter-groups collaboration and replacing laboratory animals with pets. These approaches aim to uphold ethical standards in research while enhancing our understanding of DM.

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Go to poster
Back

PERCEPTIONS OF HERPETOFAUNA POSITIVE LISTS AMONG THE UK PUBLIC

P15

Hannah Feasby and Helen Tedds

Department of Animal and Agriculture, Hartpury University, UK
hannah.feasby@hartpury.ac.uk

The herpetofauna pet trade in the UK has become increasingly popular and easily accessible to pet owners. Herpetofauna are now often found in general and specialist pet shops as well as online. Concerns have been raised around the exotic pet trade in the UK often with a focus on herpetofauna. This is due to the effects this trade can have on environmental, human and animal health, animal welfare as well as ethical and moral considerations. Subsequently, there has been a call for greater control over exotic pet keeping particularly looking at herpetofauna. Currently, the UK has legislation that brings limitations or bans on owning certain species listed in legislation such as the Dangerous Wild Animal Act 1976 and The Invasive Alien Species (Enforcement and Permitting) Order 2019. These pieces of legislation are known as negative lists. However, governments in other countries such as Norway and Belgium have implemented a novel approach to control the problem. This approach is known as the positive list. This means that only species on the positive list can be kept as pets. This has resulted in calls for the UK government to implement the positive list into UK law. However little research has been carried out surrounding the views of people involved in the trade regarding the possible implementation of the positive list. Some limited research has been conducted looking into governmental views. However, no research has been carried out looking into the views of the public, reptile keepers or stakeholders regarding the list or how this may affect them. The proposed research will aim to identify and critically analyse the potential impacts the implementation of the positive list may have on laypersons, reptile owners, stakeholders, and professionals in the UK. It will do this by collecting both quantitative and qualitative data via a survey distributed to the public that will collect their views on the implementation of the list. This project hopes to help inform the government whether it should implement a positive list and how this may impact stakeholders, the public and reptile owners. As well as identify what issues/considerations must be addressed if creating and implementing a positive list in the UK.

Go to poster
Back

UNDERSTANDING NON-ZOO VISITORS' PERCEPTIONS OF ANIMAL WELFARE AND THE ROLE OF ZOOS

P16

Tsz Ting Fok

School of Science, Engineering and Environment, University of Salford, Salford, UK
t.t.fok@edu.salford.ac.uk

Recent research understands zoo visitors' perceptions and knowledge about zoos, but there is a lack of studies on how non-zoo visitors perceive zoos. One of the problematic animal welfare conflicts in zoo management is how to create a balanced relationship between zoos and the public, especially non-zoo visitors. The overwhelming majority of worldwide zoos depend on visitors for their financial survival. Considering the major strength of zoos is utilizing the presentation of living animals in a natural context that facilitates human-animal interaction; zoos need to think carefully about how the public faces the zoos' images of conservation, education, research, and entertainment, as well as animal welfare concerns. This research aims to fill the literature gap by investigating non-zoo visitors' perceptions about zoos, using online interviews with non-zoo visitors in Hong Kong and the UK. National and international zoo animal welfare topics will be discussed. Interviews were conducted with anti-zoo organizations and the general public who had not visited a zoo in the last five years. Structured interviews were selected. The three primary themes were: 1. Demographics and zoo perceptions, 2. Role of zoos, and 3. Suggestions for zoo further development. Thematic analysis was applied. Reviewing existing literature on the public perceptions of the zoo's role, there is a lack of studies on the comparison between Hongkongers and Westerners viewing zoos. As Hong Kong was formerly a British Colony, findings from Hong Kong and the UK can be crucial for conducting future comparison studies with those areas with a similar background or history. Aiming to deepen the understanding of non-zoo visitors' perceptions of zoos, this study will present and compare the nature and motivations of respondents from Hong Kong and the UK. Ultimately, this study aims to investigate if zoos are the bridge to connect people and animals and provide some new insights and suggestions for the future development of zoos from the public.

Go to poster
Back

A SYSTEMATIC REVIEW OF ANIMAL WELFARE INDICATORS AND THEIR VALIDITY

P17

Björn Forkman[1], Pol Llonch[2] and Angela Ramon Perez[2]

[1] Department of Animal and Veterinary Sciences, University of Copenhagen, Denmark
[2] Department of Animal and Food Science, Autonomous University of Barcelona, Spain
bjf@sund.ku.dk

Animal welfare is a multidimensional concept covering many different aspects of the life of an animal. Two systematic reviews of the scientific literature were done to map available indicators, and measurements of these indicators, in fattening pigs and broilers. To give a structure to the indicators they are divided up into the five domains (Good feeding, Good housing, Good health, Appropriate behaviour and the Mental domain), but also the welfare consequences proposed by EFSA (EFSA AHAW panel 2022, Welfare of Pigs on Farm). In total 136 indicators for pigs and 65 indicators for broilers were found. For both species the majority of indicators were found for on-farm animal welfare challenges (55% for the pigs and 65% for the broilers). While most welfare indicators were related to challenges occurring on-farm, most of the measures for the indicators were taken at slaughter. The domain for which most indicators were found was Good health, this was especially true for broilers in which approximately 80% of the indicators were indicators of Good health, the corresponding number for pigs was close to 30%. The validity of the indicators that were measured was in most cases supported by the literature. In the literature there is less information about the repeatability and generality of the measures (eg. possible differences between breeds or sexes).

To investigate the availability of currently commercial alternatives a web-search was complemented by a survey to an expert panel consisting of scientists, technical providers and slaughterhouse personnel. In addition to questions concerning the existence of commercial alternatives the respondents were asked about the validity of them. For these the validity was often called into question, not least because of the lack of data from the trials done by the company.

Go to poster
Back

THE PLACE OF ANIMALS IN CARE HOMES: CAN THEIR WELFARE BE PROTECTED?

P18

Marie Fox

School of Law and Social Justice, University of Liverpool, UK
marie.fox@liverpool.ac.uk

Recent medical and vet humanities scholarship has addressed the issue of accommodating companion animals in care/residential homes. Typically, the focus has been on how maintaining bonds with their companion animal/s can mitigate grief and loss during an older person's transition to life in a care setting. Studies show that companion animals can foster continuities and connections which may contribute to positive adjustment for older people. This paper focuses, instead, on the implications for the welfare of the animals concerned. It draws on thematic analysis of 29 qualitative interviews in England with older people living in care homes, their relatives, care home staff and other relevant stakeholders, including animal charities (eg. Blue Cross, Dogs Trust), conducted as part of a Dunhill Medical Trust-funded project. The study highlights concerns about what happens to animals who may be abandoned or euthanised if they cannot be accommodated within care homes. However, it also demonstrates the complexity of planning and putting adequate structures in place to accommodate animals and reveals ambivalence on the part of participants regarding pets permanently residing within care homes. Thus, while the study showcases examples of good practice, where successful cohabitation between an older person and companion animal was achieved, it also demonstrates how policies regarding pets in care spaces were often unclear, absent or subject to sudden change. Interview data with stakeholders also highlights how the challenges of ensuring the welfare of animals in care homes is compounded by the fragmentation of ownership and legal responsibility under the Animal Welfare Act 2006. This legislation intersects in complex ways with the ethico-legal responsibilities of the various professionals and carers involved in managing the transition of older people to care spaces. This paper therefore questions whether care homes can truly be animal friendly spaces which meet the needs of companion animals, particularly when they cohabit with an older person who has no human family to support them or who has developed dementia. It explores what the multi-layered concept of 'home' might mean in the lives of humans and animals and the practical challenges of caring for different breeds/species of animals and evaluating their needs in the care home context. The paper concludes by assessing the mechanisms/legal reforms that could be deployed to attribute clear and enforceable legal responsibility for ensuring animal welfare in such relationships and spaces.

Go to poster
Back

THE LAS-LEARNING PROJECT – FREE E-LEARNING COURSES FOR LABORATORY ANIMAL WELFARE AND ETHICS TEACHING

P19

Nuno Franco, Luís Cordeiro and Ivo Tiebosch

i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal
nfranco@ibmc.up.pt

The European Commission has set minimum education and training requirements for professionals carrying out different functions in laboratory animal use. This follows a modular structure that includes mandatory core modules, function-specific modules of which some are species-specific, as well as modules for additional tasks, such as Designated Veterinarians or Inspectors. The European Union had previously funded in 2019-2021 the development of six e-learning courses on these modules, which are freely available on the ETPLAS website (https://www.etplas.eu). Their success (7 300 registered users and 11 500 completed courses in the first two years) has led now to the funding of the LAS-Learning project (2022-2024, https://las-learning.onesource.pt/en), which gathered 24 experts to develop 13 additional courses, and a cohort of more than 100 professionals voluntarily reviewing and testing them. Courses include species-specific modules for mouse, rat, zebrafish, and farm animals (namely ruminants, pigs and domestic fowl) on “Basic and Appropriate Biology” (EU-3.1) and “Recognition of pain, suffering and distress” (EU-5), as well as non-species specific modules such as “Ethics, Animal Welfare and the 3Rs” (levels 1 and 2, respectively EU-2 and EU-9), along with task-specific modules, such as “Designated Veterinarian” (EU-24), “Inspectors” (EU-26) and a new module “Competence Assessor” (EU-27). Having been primarily devised to provide reference, harmonized contents for education and training on laboratory animal science across the European Union, these soon-to-be 19 free, peer-reviewed, modules (plus 2 others from third parties) will constitute high-quality teaching resources to use as stand-alone or in a blended-learning arrangement in courses. This may be of particular relevance in countries where there is little coverage of the expertise on these topics or species, in Europe or elsewhere, including developing countries where training opportunities may be scarce. This talk will highlight how these new educational resources covering animal welfare, animal biology, pain assessment, ethics, and several other relevant topics can be used for the training and continuing education of both researchers and animal care professionals, promoting the welfare of several species of animals used for scientific purposes globally.

Go to poster
Back

DEVELOPING A PROGRAM TO PROACTIVELY INITIATE ANIMAL WELFARE AND 3RS ADVANCEMENT WITHIN A PHARMACEUTICAL COMPANY

P20

Brianna Gaskill and Jennifer Lofgren

Novartis, Cambridge, MA, USA
brianna.gaskill@novartis.com

Animal welfare advancements, even when well supported by quality research, may still encounter barriers to successful implementation, such as cost, personnel time, and buy-in. Understanding these barriers are important for the successful development of a program designed to promote 3Rs advancement. In order to understand the unique needs, barriers, and benefits of 3Rs implementation by scientists in the pharmaceutical industry, scientists at Novartis were asked to fill out a short survey. Scientists expressed a unanimous desire for a formal program that would provide access to resources that would encourage and de-risk 3Rs focused initiatives. They also believed that a formal program would benefit their research, increase awareness of the 3Rs, and improve data quality. This survey data helped gain support from leadership to establish a program supporting the proactive development, evaluation, and incorporation of 3Rs techniques or technology into the drug discovery and development research process: the Innovation in 3Rs Granting program. In its inaugural year, the program received proposals from 4 global sites and 16 disease or functional areas, spanning each of the 3Rs. Applications were first evaluated on creativity and impact by an internal scientific review board. Selected applications next met with research stakeholders, such as the IACUC and biostatisticians, where applicable. Finalists then presented a detailed plan of their project and were evaluated for scientific rigor and feasibility. Five projects were ultimately selected for funding. Three applications utilized non-animal models (organoids, organ on a chip, and AI software) that has the potential to Reduce the number of animals needed for that type of research. Two projects investigated new strategies to improve post-operative care of mice and identify earlier humane endpoints to Refine and improve animal welfare. At the end of the funding cycle, grant recipients, and their scientific line managers, report that the grants de-risked piloting new technologies and methodologies that may not only bring 3Rs advancements to their research but also improve operational efficiency and enhance data quality. Data from the supported research was presented internally through a series of webinars, externally at 3 conferences, and 2 manuscripts are currently in preparation for peer reviewed publications. While there is a general consensus that the 3Rs and animal welfare are important to the ethical use of animals in research, determining ways to inspire action and eliminate barriers to the implementation of new approaches is necessary to drive continued improvement in drug discovery.

Go to poster
Back

ENHANCING DAIRY COW WELFARE MONITORING USING PLF: THE CLEARFARM ALGORITHM FOR THE FARMERS' PLATFORM

P21

Yaneth Gómez[1], Natàlia Blasco-Andreo[2], Artemis Llabrés-Brustenga[2], Ester Jara-Lorente[2], Kevin Chow[2], Joan Serra-Sagrista[2], Greta Berteselli[3], Elisabetta Canali[3], Heng Lun Ko[1], Xavier Manteca[1] and Pol Llonch[1]

[1] Department of Animal and Food Science, Faculty of Veterinary Medicine, Autonomous University of Barcelona (UAB), Barcelona, Spain
[2] Department of Information and Communications Engineering, School of Engineering, Autonomous University of Barcelona (UAB), Barcelona, Spain
[3] Dipartimento di Medicina Veterinaria e Scienze Animali, Università degli Studi di Milano, Lodi, Italy
yanethrocio.gomez@uab.cat

The ClearFarm project developed a software platform for monitoring dairy cow welfare on farms, designed for both farmers and consumers. It was constructed following the Five Domains model of animal welfare, which includes nutrition, housing, health, natural behavior, and mental state. Continuous data from accelerometry collars and ruminal boluses feed the algorithm, analyzing how parameters recorded by the sensors could contribute to evaluating each welfare domain. For instance, the time spent feeding and ruminating, drinking frequency, and rumen temperature provide insight into the cow's nutrition domain. The platform provides daily welfare scores per cow, categorized into health, nutrition, and housing scores. Behaviour domain could not be included due to lack of data from sensors. Scores range from 0 to 10, and are colour-coded: red (0-3), yellow (3-7), and green (8-10), indicating the likelihood of the cow experiencing welfare-compromising conditions.

The farmers' interface algorithm, utilizing unsupervised learning, aims to detect deviations in daily PLF parameters, assuming that cows with welfare issues deviate from normal behavioral and physiological patterns. Normal thresholds, based on scientific literature, were set for each PLF parameter (in the absence of disease or external stressors). Machine learning models for mastitis and acidosis detection, developed from data in four herds, are undergoing refinement to minimize false alarms. The consumer interface's algorithm, utilizing supervised learning, has been previously published.

Currently, the ClearFarm platform is undergoing validation in a test set to ascertain its predictive capacity. The validation set indicates promising performance as an early animal welfare alert tool for farmers and a means to inform consumers about product welfare issues.

Go to poster
Back

IDENTIFYING POTENTIAL STRATEGIES FOR REDUCING RELINQUISHMENT WHERE DOG BEHAVIOUR IS A CONTRIBUTORY REASON FOR RELINQUISHMENT

P22

Katrina Holland, Sarah Weidman, Ben Cooper, Rachel Casey and Robert Christley

Dogs Trust, London, UK
katrina.holland@dogstrust.org.uk

To reduce relinquishment, we need evidence demonstrating which interventions are likely to be effective for which owners. As problematic dog behaviour is a commonly cited reason for relinquishment, this study focussed on cases in which dog behaviour was reported as a factor involved in owners either considering relinquishment, but keeping their dog, (group 1) or relinquishing their dog (group 2). We aimed to identify the factors that owners reported helped to keep them and their dog together (amongst group 1) or factors they believed would have helped (amongst group 2). An online survey collected quantitative and qualitative data from people who had either relinquished (n=107) or considered relinquishing (but kept) (n=112) a dog in the UK or Republic of Ireland (at least partly) to behaviour. Respondents in group 1 were asked to select which factor(s) were involved in their decision to keep their dog. Group 2 respondents, who would have preferred to keep their dog, were asked to select which factor(s) they believed would have enabled this. All respondents were asked to score the importance of each factor (on a 0-10 scale). Free-text responses (n=164) to open-ended questions about the support that helped/would have helped the dog remain with them were analysed using reflexive thematic analysis. Amongst group 1 respondents, the most commonly reported reasons for why the dog remained with them were “because I decided I would prefer to keep them” (84%) and “help with advice and support on behaviour and management training” (77%). These items were also rated as the most important factors (median ratings of 9.50 and 7.05 respectively). Amongst group 2 respondents, “help with advice and support on behaviour and management training” was the support offering they most frequently believed would have helped them keep their dog (66%). This was also the item scored as most important by this group (median rating 8.60). The qualitative analysis indicated the importance of owners seeing progress in their dog’s behaviour, or feeling hopeful about this possibility, in diverting owners from potential relinquishment. These findings demonstrate the potential for owners, who are considering relinquishing their dog due (at least partly) to behaviour, to change their minds. To reduce the number of behaviour-related relinquishments, accessible and effective behaviour and training support is needed and should include an emphasis on helping owners to acknowledge positive changes in their dogs’ behaviour.

Go to poster
Back

PREVALENCE AND AGE DISTRIBUTION OF INCISOR WEAR IN DOHNE MERINO EWES (*OVIS ARIES*)

P23

Sophie Holt[1], Garv Sharma[2] and Fritha Langford[1]

[1] School of Natural and Environmental Science, Newcastle University, Newcastle upon Tyne, United Kingdom

[2] Faculty of Science and Engineering, Macquarie University, Sydney, New South Wales, Australia

a.holt5@newcastle.ac.uk

As grazing ruminants, incisor health is important to sheep and sheep farmers. Loss of sheep incisor apparatus functionality is a significant factor in culling from flocks worldwide. However, there is very little recent research on sheep dental disorders, the distribution across ages, breeds or systems, the aetiology of conditions, and none on the potential impact on the welfare of the sheep. This preliminary study sought to establish the prevalence of incisor wear in ewes, distribution across ages, and assess potential relationships with body weight and body condition score (BCS). Dohne Merino ewes from a single, extensively grazed Australian pastoral farm (total flock size: 32,000) were assessed for this study during routine husbandry assessments. 818 ewes, aged between two and 10 years, were assessed. Each ewe was assessed for BCS using hands-on palpation in a weigh crate. An incisor assessment was undertaken using the degree of dentine exposure to assess tooth wear using an ordinal score of 0-3. Wear score 3 was considered excessive wear, with wear of a third of the dental crown. An endodontic ruler was used to measure the central incisors (mm). Data was analysed in R. Wear score 3 was present in one or more incisors of 35% of 2-year-old ewes, 89% of 3-years, 98% of 4-years, 99% of 5-years and 99% of 7+year-old ewes. Farm culling practices excluded the 6-year-old age group, and analysis combined the 7 to 10 years due to lower numbers. Incisor wear was associated with body weight and BCS ($P<0.01$); as incisor wear increased, body weight and body condition reduced when controlled for age. The mean incisor length decreased linearly from 19 (+/- SE 0.12) mm for 2-year-olds to 10 (+/- SE 0.29) mm for the 7+-year-old ewes. Incisor length varied with body weight and BCS ($P<0.01$). 58% of ewes in the 7+-year-old cohort had all incisors present, 1% had lost all eight incisors. Where more incisors were present, ewes had higher BCS ($P<0.01$). These results suggest that incisor wear could be more prevalent than previously documented, especially in younger ages. While not a direct welfare indicator, the link to BCS implies that sheep with higher incisor wear struggle to maintain nutrition reserves, impacting production and welfare. Higher incisor wear results in exposure of dentine and pulp, often provoking a painful inflammatory response called pulpitis. Further studies are underway to investigate the production and welfare impacts in more detail.

Go to poster
Back

CAPYBARAS IN THE CITY: UNDERSTANDING URBAN COEXISTENCE

P24

María José Hötzel[1], Selene Siqueira da Cunha Nogueira[2] and Katia Medved Nunes Sayn[1]

[1] Laboratório de Etologia e Bem-Estar Animal, Universidade Federal de Santa Catarina, Brasil

[2] Laboratório de Etologia Aplicada, Universidade Estadual de Santa Cruz, Brasil

hotzel.ensinoremoto@gmail.com

Conflicts between humans and wildlife are rising globally. The presence of capybaras in urban environments in Brazil has caused concerns due to the transmission of Brazilian Spotted Fever. The capybara population appears to be increasing in Florianópolis. Although the population increasingly discusses the presence of capybaras, there is no formal record of their population, potential problems they may cause, nor the opinion of civil society on the matter. This study aimed to make an initial characterization of the presence of capybaras in Florianópolis based on reports from residents and analyze their perceptions on the topic. An invitation circulated on social media platforms, prompting individuals over 18 years old residing in Florianópolis to respond to an online questionnaire with close and open questions on a voluntary and anonymous basis. Between July and September 2023, 1505 people responded. In 2023, capybaras were sighted in all neighborhoods of Florianópolis, including groups with offsprings, indicating population growth. Participants expressed predominantly positive attitudes towards capybaras ("My biggest fear is for them, uninformed people, malicious individuals, car accidents, etc."; "They should be protected and placed in a safe habitat") and had superficial knowledge about capybara biology (88.3%) and potential issues involved, such as disease transmission (37,1%), traffic accidents (10,2%), incidents with domestic animals (55,5%), and the destruction of native forests or urban gardens (42,2%). People showed positive attitudes towards capybaras, considering them beautiful (60,7%) and cute (54,4). They agreed with statements such as "capybaras are part of nature and should be left in peace, even in urban areas" (70,2%) and "It is important for people to see capybaras in the city, as long as their population is not causing problems" (81,8%). After being informed about some problems caused by capybaras in urban environments, people generally considered these issues important: disease transmission (97,4%), destruction of urban gardens (76,9%), incidents with domestic animals (92,4%) and traffic accidents (98,1%). Despite this, 63,0% disagreed that "This animal causes problems in urban environments; measures need to be taken to reduce its population in Florianópolis". Controlling the capybara population is necessary due to its continuous growth. However, dealing with wildlife is a topic that raises debates among different stakeholders and to ensure the sustainability of this control, it is crucial to consider the perspective of civil society and animal welfare when choosing the management strategies and techniques adopted.

Go to poster
Back

CONFORMATIONAL PREDISPOSITIONS TO DENTAL ABNORMALITIES IN A PEDIGREE RABBIT POPULATION

P25

Maria Jackson[1], Michaela Betts[1], Joanna Hedley[2] and Charlotte Burn[1]

[1] Pathobiology and Population Sciences, The Royal Veterinary College, Hawkshead Lane, Hatfield, Hertfordshire, UK
[2] Beaumont Sainsbury Animal Hospital, The Royal Veterinary College, Royal College Street, London, UK
mjackson7@rvc.ac.uk

Dental disease is an important disorder of companion rabbits, reportedly affecting 15.36% of them. Lop-eared and brachycephalic conformations have inconsistently been associated with dental abnormalities, but previous studies relied on small sample sizes or retrospectively accessed records where breed could not be confirmed. We aimed to further investigate conformational risk factors for dental abnormalities in a pedigree population, with breed and conformation accurately reported, and rabbits systematically examined.

We physically examined 435 pedigree rabbits at British Rabbit Council rabbit shows and studs using an otoscope for oral examination. Relationships between conformation and dental abnormalities were analysed using binary logistic generalised estimating equations.

Most rabbits had erect ears (61.15%), and were brachycephalic (41.38%), male (63.22%), and of entire neuter status (98.39%). The median rabbit age was 1.29 years and median estimated adult bodyweight was 2.16kg. General signs of illness were rare, but 33.56% of rabbits showed some degree of ocular discharge, including mild hyperlacrimation. Incisor examination was tolerated by 97.24%, and 68.05% showed no abnormalities. Only five rabbits had malocclusion (1.15%), but 25.25% had slanted or curved incisor occlusal surfaces. Full cheek teeth examination was performed on 87.13% of rabbits. Normal sharp edges were common (74.25%), abnormal spurs were rare (3.45%), and 55.40% showed no cheek teeth abnormalities.

Lop-eared rabbits had higher odds than erect-eared rabbits for ocular discharge (odds ratio [OR]: 4.034, 95% confidence interval [CI]: 1.475 – 11.030, p=0.007) and slanted or curved incisor occlusal surfaces (OR: 1.862, 95% CI: 1.079 – 3.214, p=0.026), but not for any other dental abnormalities. More dolichocephalic rabbits had increased odds of cheek teeth step- or wave-mouth (OR: 1.394, 95% CI: 1.114 – 1.744, p=0.004) and short caudal cheek teeth (OR: 1.450, 95% CI: 1.017 – 2.068, p=0.040). Brachycephaly showed no associations with dental abnormalities.

An accompanying questionnaire found breeders considered rabbit dental abnormalities to cause pain and/or quality of life decline, with tooth root abscesses causing most harm of the examples suggested, followed by tooth overgrowth, and incisor malocclusion.

This study adds to evidence that dental abnormalities are multifactorial. Sharp cheek teeth edges that may be commonly misdiagnosed as abnormal were frequently observed in healthy rabbit mouths, providing further evidence of their normalcy. Research is needed to verify any relationship between lop ears and incisor occlusal surface abnormalities, because these abnormalities are not usually considered conformation-related, so could instead have environmental aetiology. The clinical relevance of the observed degree of ocular discharge and abnormal incisor occlusal surfaces is also unclear.

Go to poster
Back

WEANING PRACTICES ALTER THE TRAJECTORY OF LAMB BRAIN DEVELOPMENT

P26

Charlotte Johnston[1,2], Mandi Carr[2,3], Lachlan Douglas[4], Mitch Douglas[4], Logan Jenkins[5], Jane Morphett[1,2], Wayne Pitchford[2,3], Vasiliki Staikopoulos[1,5], Josh Woenig[1,2,5] and Mark Hutchinson[1,2,5]

[1] School of Biomedicine, Faculty of Health Sciences, University of Adelaide, Adelaide, South Australia, Australia
[2] Davies Livestock Research Centre, University of Adelaide, Roseworthy, South Australia, Australia
3 School of Animal and Veterinary Sciences, University of Adelaide, Roseworthy, South Australia, Australia
[4] Tantallon Livestock, Australia
[5] Australian Research Council Centre of Excellence for Nanoscale BioPhotoincs, University of Adelaide, Adelaide, South Australia, Australia
charlotte.johnston@adelaide.edu.au

Early life events can influence lifetime wellbeing and resilience through altered brain development. In livestock, husbandry practices performed at a young age can shape future productivity and functional integrity. The neurobiological consequences of such practices in humans and rodents are well understood. To date, there has been little research on the influence of husbandry practices on brain development in livestock. This study aimed to discern the potential impact of weaning strategy on brain development and shed light on the welfare implications of such strategies. Focusing on the frontal cortex and hippocampus, this study documented the neuroanatomical consequences of two distinct weaning protocols

Twenty-two lambs (4mths at weaning) were weaned according to traditional practices or a novel education protocol. The modified weaning protocol involves a structured period of handling with a trained stockperson with the aim of moving the mob in a calm fashion and developing a mutual trust between handler and stock. Following weaning, all lambs were raised and slaughtered based on normal farm practice. Whole brain samples were scavenged at abattoir. Formalin preserved brain sections were stained with haematoxylin and eosin to quantify brain morphology and cellular density.

In the modified weaning group, the hippocampal cell density was 32.2% greater than the control group ($p < 0.05$). The hippocampus is involved in learning and memory processes. Increases in hippocampal cell density may be involved in improved capacity for learning. These factors are likely to benefit livestock in their ability to navigate new pastures and adapt to feedlots, for example. A reduction in hippocampal cell density has been associated with psychiatric conditions, such as schizophrenia in humans, and is termed hippocampal insufficiency.

Conversely, cell density in the frontal cortex was 36.71% lower in the modified weaning group compared to controls ($p<0.001$). The frontal cortex is vital for decision-making. Increased cell density in the frontal cortex has been associated with increased microglial activity during stress-induced depression in rodents. Further analysis needs to be undertaken to decipher the cellular populations involved, such as the neuronal and glial balance. Given the immense volume of nervous tissue collected at abattoirs globally, there is scope for larger studies to better understand the neurological consequences of a variety of husbandry procedures and other farming practices. Moreover, neurobiological evidence, such as presented here, can be used at scale to allow for the identification of welfare-positive and evidence-based practices that make an objectively measurable difference to animal welfare.

Go to poster
Back

CHRONOBIOLOGICAL INSIGHTS IN ZEBRAFISH: EXPLORING TRUNK AND SKIN MUCUS CORTISOL FLUCTUATIONS

P27

Sara Jorge[1,2,3], Luís Félix[4,5], Benjamín Costas[2,3] and Ana Valentim[1]

[1] i3S—Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal
[2] Centro Interdisciplinar de Investigação Marinha e Ambiental, (CIIMAR), Matosinhos, Portugal
[3] Instituto de Ciências Biomédicas Abel Salazar (ICBAS), Universidade do Porto, Porto, Portugal
[4] Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB), University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal
[5] Instituto para a Inovação, Capacitação e Sustentabilidade da Produção Agroalimentar (Inov4Agro), University of Trás-os-Montes and Alto Douro (UTAD), Vila Real, Portugal
sara.jorge@i3s.up.pt

In zebrafish, cortisol is mainly extracted from trunk, which is terminal. Despite the increasing interest of the research community in non-terminal methods, they remain poorly studied. Also, there is a notable absence of established guidelines for sampling timing and baseline values of cortisol sampled from different matrices.

The present study measured the daily rhythmicity of cortisol in two zebrafish matrices: the trunk (terminal method) and skin mucus (non-terminal alternative). The animals were under a controlled 14:10 h light: dark cycle with lights on from 8 am to 10 pm. Cortisol sampling was conducted at five time-points: 7 am, 9 am, 1 pm, 5 pm and 9 pm. Animals were not fed before sampling to not interfere with cortisol levels. Trunk samples (n=18/time point) and pooled skin mucus from 3 fish (n=6/ time point) were used as experimental units. The cortisol levels were determined using a commercially available Enzyme-Linked Immunosorbent Assay.

Results showed no correlation of cortisol levels between matrices throughout time, but they were negatively correlated at 7 am ($p=0.007$, $r=-0.966$). Both matrices peaked at the light onset, but trunk cortisol exhibited an additional peak at 1 pm. No sex influence on the cortisol patterns was observed. Based on our data´s variability, we suggest sampling the matrices in the morning, preferably near the beginning of the light phase.

Our study will contribute to optimize sampling practices to ensure the animals are collected in periods of reduced cortisol levels with minimal interference. Recognizing the importance of standardization, future research should prioritize the removal of external influences on cortisol levels or report their precise timing. Additionally, skin mucus appears to be a suitable alternative to trunk sampling to assess cortisol levels, as the fluctuation remains more stable throughout the day, facilitating repeated measurements.

Go to poster
Back

TIP OF THE ICEBERG: FEW EFFECTS OF MATERNAL STRESS ON MATERNAL BEHAVIORS, BUT ALTERED PHYSIOLOGY WITH IMPLICATIONS FOR OFFSPRING DEVELOPMENT IN PIGS (*SUS DOMESTICUS*)

P28

Cathinka Jørgensen, Ulrike Gimsa and Liza Moscovice

Research Institute for Farm Animal Biology (FBN), Competence Field Behavior and Husbandry, Dummerstorf, Germany
jorgensen@fbn-dummerstorf.de

Pigs in conventional livestock farming are subject to several challenges, mostly associated with suboptimal housing conditions that interfere with the process of rearing young. These conditions increase the chances for maternal stress during the critical period of lactation, when the sow is providing offspring with resources to survive and develop. Maternal stress during lactation could lead to changes in maternal behavior and milk content, causing changes in maternal care that influence offspring short- and long-term health. We aimed to investigate how maternal stress during the lactational period could influence maternal care, by analyzing changes in sow behaviors (aggression, general activity, nursing events, social interactions and non-nutritive social contact), and milk content, focusing on hormones important for stress regulation (cortisol) and social bonding (oxytocin). From lactation day 2-15, sows were treated with an injection of adrenocorticotropic hormone (ACTH; n = 7) or a saline solution (n = 7), to simulate a high- or low- stress condition. Milk samples were collected during the treatment period to investigate the effect of maternal stress on sow cortisol and oxytocin in milk. In addition, behavioral data and saliva samples for cortisol analyses were collected during a single 4-h maternal separation (MS) followed by a reunion on day 19 or 20 of lactation, and during a matched control day. Video recordings were analyzed using the Noldus® Observer XT 15 software. Results indicate no significant effects of maternal stress on sow behaviors under control conditions, although there was a tendency for ACTH-treated sows to lay less on their sides during control days. ACTH-treated sows showed short-term increases in milk oxytocin and milk cortisol compared to saline-treated sows, but only milk cortisol showed sustained differences over the lactational period. During the maternal separation and reunion, ACTH and saline-treated sows did not differ behaviorally. However, all sows had significant increases in salivary cortisol, but only the ACTH-treated sows showed a more sustained effect after MS. Even though the sows seem to have a dampened stress transmission to offspring at the behavioral level, physiological changes in milk reveal a hidden pathway for stress transmission, with potential long-term implications.

Go to poster
Back

USE OF BIO-LOGGERS TO EXPLORE THE EFFECT OF HATCHERY PROCESSING LINE ON HEART RATE AND BODY TEMPERATURE OF DAY-OLD BROILER CHICKS

P29

Imad Khan[1], Patricia Soster de Carvalho[1,2], Camila Lopes Carvalho[1], Bassem Khalfi[3], Kobe Buyse[3,4], Frank Tuyttens[3,4] and Gunther Antonissen[1]

[1] Department of Pathobiology, Pharmacology and Zoological Medicine, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[2] Poulpharm bvba, Izegem, Belgium
[3] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[4] Flanders Research Institute for Agriculture, Fisheries, and Food (ILVO), Melle, Belgium
imad.khan@ugent.be

Day-old broiler chicks in modern hatchery farms undergo an automated processing line where they are removed from the hatcher, placed on a conveyer belt, separated from egg shells and unhatched eggs, counted, and then recollected in transportation crates. This study was conducted to test the use of Star-Oddi's Micro-HRT bio-loggers, that measure heart rate (HR), body temperature (BT) and Electrocardiograms, in day old chicks and to assess the impact of hatchery processing line on HR and BT as stress indicators in broilers. A total of ten male and ten female day-old chicks with an average weight of 47.31 grams were randomly selected from a basket at a hatchery in Belgium. The birds were anesthetized with Isoflurane, and Micro-HRT loggers were surgically implanted in their coelomic cavity approximately 12 h before the first measurements. The loggers were connected to the computer with a communication box device and programmed by the application Mercury, which were provided by the manufacturers. Loggers were set to record at a sampling rate of every 30 minutes from 3 to 7:30 am. In addition, HR and BT were sampled at a higher frequency of every 15 sec from 5 to 5:30 am. The chicks passed through different stages of the processing line from 5:06 to 5:12 am. The quality of HR data was graded by the quality index (QI), an algorithmic assigned value, where QI0 is 'great', QI1 is 'good', and QI2 and QI3 indicate reduced quality. Only QI0 graded measurements (52.8 percent) were utilized for further analysis. Outliers (>500 bpm and <150 bpm) were removed. A significant ($P < 0.05$) increase in HR (368±42 bpm) was observed when the hatcher was opened. A further increase in HR (443±15 bpm) was recorded when the chicks were dropped onto the conveyer belt. Although the HR decreased post-processing, it remained elevated (371 ± 18 bpm) for at least 2 hours after the process, compared to pre-processing values (257± 9 bpm). In contrast, BT was not significantly affected. The largest increase in HR was observed upon opening the hatcher and turning on the light inside it. However, this might be attributed to a normal physiological transition from sleep to wakefulness. Further in-depth studies with increased statistical power are needed to thoroughly explore the effect of processing line on acute stress of day-old chicks. This study provided valuable insights into the feasibility of using implantable bio-loggers in day-old chicks.

Go to poster
Back

ASSESSMENT OF PRES-SLAUGHTERING ACTIVITIES AT AKINYELE INTERNATIONAL CATTLE MARKET, IBADAN, NIGERIA

P30

Priscilla Komolafe[1], Olaniyi Babayemi[2] and Kehinde Thomas[3]

[1] Department of Agricultural Science and Technology, Bamidele Olumilua University of Education Science and Technology, Ikere-Ekiti, Ekiti State Nigeria
[2] Department of Animal science, University of Ibadan, Nigeria
[3] Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria
komolafe.priscilla@bouestiedu.ng

In recent time in the Nigerian livestock industry, Animal welfare is gradually gaining traction. Humane handling of animal prior to slaughter has been known to enhance their well being. Although legislation have been in existence and awareness on ethical handling of animals has started, there seem to be little compliance to humane cattle handling per-slaughter. Therefore, the study was carried out to assess the effect of per-slaughtering practices on cattle in Akinyele International Cattle Market, Ibadan, Nigeria. The transient slaughter slab of Akinyele International Cattle Market was used for the study. The study area was purposively selected being the hub of cattle supply in the South western Nigeria. Appraisal of the physical attributes and pre-slaughtering activities at Akinyele International Cattle Market was closely monitored for 12 hours (7am-7pm) for 35 consecutive days by direct observation with the aid of check list, recorder, and camera. The physical appraisal of cattle observed were: Number of cattle, sex, age (calves, yearling and <2years), Posture on arrival at the abattoir (Standing or wheeled by using Cart), Body Condition Score (BCS) using the adapted Canadian scale 1-5 (1-2= emaciated/rickety 3-5= fleshy/meaty), state of cattle (Live or Slaughtered before arrival at the slaughter slab) skin diseased cattle, slaughtering methods (slashing or Pierce-Bled) Restraining (Restrained and Unrestrained). Data obtained were analysed using descriptive statistics and Pearson's correlation at α0.05 (SPSS 20). The result of the study revealed that a total of 1,893 cattle were assessed in which 19.9% were slaughtered in transit, 81% were wheeled to the slaughter slab, 58% had BSC (1-2), 66.1% were unrestrained. And 11.1% were pierce-bled. There was a significant and positive correlation coefficient between breed of cattle and state of cattle ($r=0.116$; $p<0.01$), sex and BCS ($r=0.181$; $p<0.01$), sex and state of cattle ($r=0.107$; $p<0.01$), sex and restraining ($r=0.103$; $p<0.01$), size and BCS ($r=210$; $p<0.01$), age and restraining ($r=0.140$; $p<0.01$), posture and skin disease ($r=0.062$; $p<0.01$), BCS and sex ($r=0.181$; $p<0.01$), BCS and size ($r=0.210$; $p<0.01$), BCS and restraining ($r=0.226$; $p<0.01$), as well as state of cattle and restraining ($r=0.193$; $p<0.01$). The type of cattle as regards the physical appraised cattle and pre-slaughtering activities observed in Akinyele International Cattle Market during the period of the study were undesirable, not at par with best practices and compromised cattle welfare.

Go to poster
Back

MULE TRAINS TO MOUNTAIN ROADS: EXPLORING HOW WORKING MULES (*EQUUS ASUNUS X EQUUS CABALLUS*) SUPPORT RESILIENT COMMUNITIES IN THE HIMALAYAS

P31

Laura Kubasiewicz[1], Tamlin Watson[1] Sajana Thapa[2] and Caroline Nye[3]

[1] The Donkey Sanctuary, Sidmouth, Devon, UK
[2] Animal Nepal, Dhobhighat, Lalitpur 44600, Nepal
[3] Centre for Rural Policy Research, University of Exeter, Exeter, UK
tamlin.watson@thedonkeysanctuary.org.uk

In remote, mountainous communities, people often rely on working equids for access to basic subsistence. Despite the central role of equids within these communities, their value and welfare often go unnoticed and unprotected by the wider world. In the Manaslu Valley, Nepal, equids and humans alike must navigate an unpredictable and often dangerous environment, with both short-term occurrences such as extreme weather events, and longer-term shifts in tourist demand as a result of development; in this case, the construction of a new road network. Through semi-structured interviews, questionnaires and equid welfare assessments, we explored the role of pack mules in supporting the lives of local people, gained insight into how uncertainty and risk are managed by those living in this volatile environment, and investigated the human drivers of differences in mule welfare. We found mules to enable a level of resilience in their owners and the wider community in the face of long-term changes to the social and economic structure of the landscape in the Manaslu Valley. Mule owners in particular felt that more options were available for them to maintain their livelihood should tourism be displaced following the road construction. Short-term but ongoing risks, however, were more of a pressing concern for many mule owners, with implications for livelihoods, human wellbeing and equid welfare. Mule owners must constantly balance the risks of working through often treacherous conditions with losing valuable income but keeping themselves and their mules safe by refusing work. Development of transport networks in the Himalayan region have brought both positive and negative change to the communities residing there. Where easier access to urban areas has provided opportunities for both personal and financial growth, it may also have caused a gradual loss of specialised generational knowledge on equid care and a loss of traditional support networks for those who rely on equids. In the Manaslu Valley, this loss may be reflected in a lack of connection between husbandry experience and equid welfare. Mules form the backbone of communities living in remote areas, but their role is poorly recognised formally within the sustainable development sphere. Better integration of animal welfare needs into the sustainable development goals would give strength to both humanitarian aid initiatives and those aimed at improving the lives of working animals, which would greatly benefit mules and humans alike.

Go to poster
Back

ORAL ADMINISTRATION OF CORTICOSTERONE REDUCES BODY WEIGHT AND FEATHER GROWTH

P32

Camila Lopes Carvalho[1], Patricia Soster de Carvalho[1,2], Imad Khan[1], Bassem Khalfi[3], Kobe Buyse[3,4], Wout Verbeure[2], Annelike Dedeurwaerder[2], Maarten De Gussen[5], Frank Tuyttens[3,4] and Gunther Antonissen[1]

[1] Department of Pathobiology, Pharmacology and Zoological Medicine, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[2] Poulpharm Bvba, Izegem, Belgium
[3] Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium
[4] Flanders Research Institute for Agriculture, Fisheries, and Food (ILVO), Melle, Belgium
[5] Vetworks Bvba, Aalter, Belgium
camila.lopescarvalho@ugent.be

Corticosterone is an important hormone in poultry that plays a crucial role in modulating physiological responses after stimuli, making it a key indicator to understand avian stress. Nonetheless, taking blood samples can be invasive and stressful and may influence plasma corticosterone levels. This stress hormone elicits various responses, including the disturbance of normal feather growth. Assessing feather morphology could present a less intrusive, albeit indirect, alternative for blood sampling. This study aimed to investigate broiler chicken feather morphology in response to different levels of supplemented corticosterone. Sixty male Ross 308 broilers were randomly distributed across six floor pens, each containing ten broilers. The experiment included six treatments: T1 (0 mg/kg), T2 (1 mg/kg), T3 (2 mg/kg), T4 (3 mg/kg), T5 (4 mg/kg), and T6 (5 mg/kg) of orally administered corticosterone from day 1 to 42. At day 42, the broilers were euthanized, weighed, and the left and right first primary feathers were analyzed for length of the rachis, depth (outer and inner vanes), length of barbs (outer and inner vanes), and angle (outer and inner vanes) using Image J (National Institutes of Health, Bethesda, USA). We found an inverse linear relationship between corticosterone dosage (T1 to T6) and average body weight ($p<0.001$; R^2 0.68). Body weight was positively correlated with rachis and barbs length ($p<0.05$), suggesting that decreased weight corresponds to shorter lengths. Adding bodyweight as covariable, increasing corticosterone dosage had a negative effect on rachis length ($p=0.003$) but no effect on barb length ($p=0.098$), indicating a decrease in length with increasing dosage. Corticosterone doses nor body weight had a discernible effect on the other feather measures. These findings of a stunted feather growth not only advance our understanding of the nuanced relationship between corticosterone exposure, broiler weight, and feather morphology but also contribute valuable insights into stress hormone impacts on avian physiology, particularly within the context of feather development.

Go to poster
Back

P33

CASE STUDY ON ZOO-BASED EUROPEAN BISON REINTRODUCTION: BEHAVIOUR AND WELFARE

Giovanna Marliani[1], Pier Attilio Accorsi[1], Camillo Sandri[2] and Caterina Spiezio[2]

[1] Department of Veterinary Medical Science, Alma Mater Studiorum – University of Bologna, Ozzano Emilia (BO), Italy
[2] Parco Natura Viva – Garda Zoological Park, Bussolengo, Italy
giovanna.marliani2@unibo.it

Zoos play a pivotal role in biodiversity conservation, serving as potential reservoirs for animal reintroduction programs. A notable success story is the reintroduction of the European bison (*Bison bonasus*), which faced extinction in the wild after World War I. Simultaneously, it is essential for zoos to prioritize the welfare of the animals under their care. This study focuses on assessing the welfare and behavioural competences of two European bison housed at Parco Natura Viva (PNV) for a reintroduction program.

Two daily 20-minute sessions per animal per day were run while wisents were in the outdoor area for a total of 1559 minutes of video recordings collected through continuous focal animal sampling. The subjects were a male (M) and a female (F) sub-adults housed in a social group with three adults and one calf. The data were analysed using BORIS© (Behavioral Observation Research Interactive Software) and RStudio. The individuals' activity budget and behavioural richness were described through the Behavioural Variety Index (BVI), and modified Spread of Participation Index (SPI) was calculated to assess the homogeneity of enclosure's use.

Both subjects spent more than 30% of their time engaged in feeding behaviour, followed by lying and standing, which collectively were over 34% of the observation time. European bison were involved in social interactions (M=4.36%; F=6.85%), both affiliative and aggressive. In terms of behavioural richness, the Behavioural Variety Index (BVI) shows that both subjects displayed 67% of behaviours of wild counterpart. The SPI was 0.396 for the female, and 0.355 for the male, indicating that they used all areas of the enclosure but spent more time in preferred areas, such as feeding point. According to our results, we can suggest that naturalistic resources distributed within the enclosure can both facilitate varied usage of different zones and encourage a range of species-specific behaviours. Moreover, living in a social group seems to contribute to the development of social and communicative competence.

Findings underline that appropriate environment and social group lead to behavioural diversity, use of the entire enclosure and absence of abnormal behaviours. Ensuring behavioural competence has the potential to improve the success of reintroduction program, and the welfare and resilience of individuals post-reintroduction.

Go to poster
Back

CHIMPANZEE SYMPHONY: EXPLORATION OF MUSIC AS ENVRIONMENTAL ENRICHMENT

P34

Giovanna Marliani[1], Rebecca Borlini[1], Giulia Russo*[1], Helena Maria Menghini[1], Pier Attilio Accorsi[1], Marco Seneci[2], Camillo Sandri[2] and Caterina Spiezio[2]

[1] Department of Veterinary Medical Science, Alma Mater Studiorum – University of Bologna, via Tolara di Sopra 50, 40064 Ozzano Emilia (BO), Italy
[2] Parco Natura Viva – Garda Zoological Park, Loc. Figara 40, 37012 Bussolengo, Italy
rebecca.borlini@studio.unibo.it

The question of whether music functions merely as noise or could serve as an effective enrichment for animals, enhancing welfare conditions, continues to be an area of ongoing exploration. Previous research on this topic shows conflicting results, emphasizing the need for further investigation to clarify the true impact of different types of music on non-human primates. This research project aims to evaluate the music as an environmental enrichment for a colony of seven chimpanzees (Pan troglodytes) currently housed at Parco Natura Viva (PNV), considering the influence of music on the behaviour and overall welfare of these animals.

This study consists of four ten-day periods: the first and the third period, the baseline (BP), during which the animals were observed without musical stimuli; the second and the fouth period with musical enrichment (EP). Two ropes, one yellow and one blue, were designated as targets and associated with specific types of music: when pulling or touching the yellow rope, rhythmic music was played; on the contrary, when pulling or touching the blue rope, polyrhythmic music was played. Each animal was observed for a total of 1120 minutes. Individual and social behaviours of each subject were video-recorded and videos were analyzed through focal animal sampling using BORIS © (Behavioral Observation Research Interactive Software), with data processed using RStudio. Non-parametric tests were used to compare the duration of the behaviour between the baseline and period with music.

Results show variability across individuals with significant differences between the two periods only for a few subjects. During the period with music, each chimpanzee interacted with at least one of the ropes, however not all interacted with both. Differences in the frequency of interactions with ropes varied across subjects. The findings of this study suggest the possible effects of music as enrichment on the behaviour of at least a few chimpanzees. This study highlights the increasing importance of considering animals as individuals to ensure a high standard of welfare and emphasizes the importance of giving them choice and control over their environment to promote positive animal welfare. Future research could investigate which factors and/or individual characteristics can influence the use of enrichment (eg., personality or social rank).

Go to poster
Back

SCIENTIFIC KNOWLEDGE MOBILIZATION IN THE DEFINITION OF ANIMAL WELFARE LEGAL STANDARDS: A FRENCH CASE

P35

Laura Martin-Meyer

INRAE (French National Research Institute for Agriculture, Food and Environment), Auzeville-Tolosane, France
laura.martin-meyer@inrae.fr

Since its first mention in the European Convention for the Protection of Animals Kept for Farming Purposes (1976), the reference to animal welfare has experienced significant growth in European Union law. Moreover, from the very beginning, such standards provided for a close coupling between scientific knowledge and regulatory production, to the extent that some authors have readily spoken about "law scientification" (Joly, 2002). However, many people observe nowadays that animal welfare legal standards lag on considering available scientific knowledge: for instance, the European Food Safety Authority (EFSA) produced more than twenty scientific opinions while the European Union legislation on animal welfare remained unchanged. In addition, neither European nor French legislation is based on a precise definition of animal welfare, which therefore could appear to be vague and ambiguous. As a consequence, it seems that such a “vacant space” is giving rise to controversies within scientific fields, fueled by different approaches to what animal welfare should be: as many authors have noticed, the zootechnician’s view of ‘animal welfare’ is indeed not the same as the one the proponents of recognition of animal complexity and subjectivity are referring to (Desmoulin-Canselier, 2021). As such, the French dispute between the French Agency for Food, Environmental and Occupational Health & Safety and the Academy of Agriculture seems emblematic of the struggles surrounding the establishment of a scientific definition of animal welfare. Considering their technical and political nature, my PhD research assumes that animal welfare legal standards emerge from the co-production (Jasanoff, 2004) of ways of knowing—scientifically—and ways of qualifying—legally—animals. Under what conditions do scientific knowledges become relevant criteria for the construction of legal standards guaranteeing farm animal welfare? Given this, my communication would aim to focus on those science-law interactions by questioning possible tiered authorities within animal welfare sciences and their consequences on the legal framework. To this end, I propose to expose the first results from a series of interviews with individuals involved in the scientific and/or legal fields, which enabled me to draw up a first state of play of the situation.

Go to poster
Back

EFFECT OF CALF PAIRING AGE ON EXPLORATORY, PLAY, AND IDLE TIME BEHAVIOUR

P36

Michail Moroz[1], Camila Martin[2] and Ruan Daros[1]

[1] Graduate Program in Animal Science – Pontifícia Universidade Católica do Paraná, Curitiba, Paraná – Brazil
[2] Universidade Positivo, Curitiba, Paraná – Brazil
r.daros@pucpr.br

Few studies have assessed the effect of multiple pairing ages on the behavior of dairy calves. The objective of this study is to analyze the effect of pairing age on the total play, exploratory, and inactivity behavior of dairy calves during the preweaning period. A total of 148 Holstein dairy heifers in a dairy farm (Paraná, Brazil) were enrolled in this study. The animals were enrolled on the first day of life and allocated to different treatments: early (n = 56; paired at 5-7 days), intermediate (n = 48; paired at 29-31 days), and late pairing (n = 44; paired at 49-51 days). Behaviors were assessed five times per week, twice/day at 8:00 AM and 3:00 PM, every 5 minutes for 30 minutes (14 scans/d), through direct observation until the age of 70 days. A total of 54,688 scans were conducted during the experiment. The data were analyzed using the R software with mixed linear models. Data were aggregated by summing the number of scans for selected behaviors throughout the entire period for each calf. To understand the temporal dynamics of these behaviors, daily data were modelled, and the interaction between treatment and days assessed. There was an effect of pairing age ($P < 0.01$) on total exploratory behavior during the rearing period. Calves housed in pairs early on displayed more exploratory behavior than the other groups ($P < 0.01$). The early, intermediate, and late groups were observed playing on 19.8±2.25, 13.1±2.69, and 17.6±2.71 scans, respectively. There was no difference in play behaviour between the early and late groups ($P = 0.59$) and between the intermediate and late groups ($P = 0.12$); however, calves paired early engaged in more play behavior than those paired in the intermediate period ($P < 0.01$). The inactivity behavior for the early, intermediate, and late treatments summed 54.2±12.8, 226.0±14.0, and 264.7±14.1 scans, respectively, with all groups differencing from each other ($P < 0.01$). For analyses involving daily data, interactions between days and treatment were found for exploration behavior ($P < 0.01$) and inactivity behavior ($P = 0.04$), while the interaction for play behavior between treatment and age was not significant ($P = 0.29$). The early pair housing had positive effects on the exploration and reduced idle time of dairy calves while intermediate pairing is still not sufficient to overcome the major behavioural issues of late pair housing.

Go to poster
Back

A HOME-MADE, HOME-CAGE SYSTEM FOR MONITORING BODY TEMPERATURE IN GROUP-HOUSED LABORATORY MICE, FOR WELFARE ASSESSMENT AND BIOMEDICAL RESEARCH

P37

Diogo Moutinho[1], Bárbara Barbosa[2,3] and Nuno Henrique Franco[3]

[1] Faculdade de Engenharia da Universidade do Porto, Porto, Portugal
[2] BIOPOLIS/CIBIO-InBIO CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Campus de Vairão, Universidade do Porto, Vairão, Portugal
[3] i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto. Porto, Portugal
barbarainb@gmail.com

Advancements in home cage monitoring (HCM) technology have revolutionized how laboratory animals are studied, offering non-invasive and continuous collection of behavioural and physiological data. Such technologies furthermore improve the reliability of research outcomes by detecting subtle changes that traditional methods may often miss, combining cameras, sensors, and various devices to monitor the activity, movement, feeding, drinking, and other vital parameters of an animal in its environment. A particularly challenging parameter to monitor in laboratory rodents is body temperature. The assessment of its variations provides insight into physiological changes that are relevant for assessing animal health and welfare, as well as for studying thermoregulatory mechanisms, eg. during development or experimental disease. However, typical methods, such as use of rectal or infrared thermometers, require removing animals from their home cage and restraining them, which is stressful and itself affects the thermal readout, due to a quick-onset stress-induced hyperthermia. We have hence developed in-house a compact, cost-effective, HCM system for automated, continuous, contactless monitoring of body temperature in laboratory mice, which avoids the impact of handling on both animal welfare and the research output. The system connects an Arduino with Wi-Fi capabilities, an RFID reader, a clock, an SD card module, and six RFID antennas, assembled in a 3D-printed 23 x 17 x 2.5 cm tall box, which fits bellow a standard type-2 cage, that can be placed and removed freely on top of the system. The antennas are arranged in a 3x2 array and read subcutaneously-implanted, small (1.5 mm wide), thermosensitive PIT tags. The antennas can not only continuously monitor the temperature of each of the grouped mice in the cage, but also identify each mouse's approximate position. This allows estimating preferences for certain regions of the cage (which can be used, for example, to monitor time spent by a dam in the nest) or activity. A sensor connected to the system can moreover be fitted within the cage environment to monitor the temperature, humidity, and luminosity above the cage grid. All data can be both transmitted via Wi-Fi (and monitored in real-time using dedicated open-source software) and saved in an SD card. All plans, materials and instructions are freely available for anyone who wishes to build a similar system. This talk will cover our home-made HCM system and its capabilities, as well as some of the applications in our lab to study animal welfare and thermoregulatory mechanisms in laboratory mice.

Go to poster
Back

ARE TRACK SYSTEMS BETTER FOR WELFARE? A COMPARISON OF WELFARE INDICATORS BETWEEN PASTURE-KEPT AND TRACK SYSTEM-MANAGED HORSES AND PONIES IN THE UK

P38

Cynthia Naydani[1] and Tamsin Coombs[2]

[1] Royal (Dick) School of Veterinary Studies, University of Edinburgh, Roslin, UK
[2] Department of Animal Behaviour and Welfare, Scotland's Rural College, Roslin, UK
cynthia.naydani@ed.ac.uk

Conventional husbandry of domestic horses typically centres around individual stabling and/or turnout in grass fields. Social isolation and restricted movement via stabling can provoke issues including gastric ulceration, colic, and stereotypic behaviours, while pasture-based environments can be obesogenic, contributing to the development of laminitis and its comorbidities. Comparatively, track systems limit horses to external perimeters of fields, with resources such as forage, water, and shelter distributed throughout the track. Supporters of this approach report that it facilitates species-normal behaviours including socialisation, increased movement, and foraging opportunities, with subsequent benefits to health and welfare outcomes. However, due to a lack of empirical evidence, it has remained unclear if, and how, these systems impact upon welfare. The aim of this project was therefore to investigate how track systems compared to pasture-based management, as assessed through a welfare lens. Resource-based and animal-based indicators of welfare were collected from 53 horses and ponies managed across seven pastures and five track systems in England, Scotland, and Northern Ireland. Subsequent analyses showed that pastured horses were not more likely to be overweight (ie., BCS >3.5/5) than track-kept horses ($c^2=0.22$, df=1, p=0.64). GPS trackers attached to field-safe headcollars measured distance travelled over 24h. The resulting data showed that pastured equines travelled an average of 5.14km±0.90km per day, while track-kept equines covered 5.88km±1.55km per day. These differences were not significant ($F_{1,32}=3.06$, Adj. $R^2=0.06$, p=0.09). Activity over 24h was quantified using accelerometers measuring total magnitude of movement. Analyses of these data found that equines housed on tracks had a significantly lower average 24-h movement index of 81.67±11.73 compared to 140.22±16.96 for pasture-kept equines ($F_{2,33}=75.3$, Adj. $R^2=0.81$, $p<0.001$). The emotional states of sampled horses, explored via Qualitative Behaviour Assessment found similar results for equines in both systems; neither group were more (or less) likely to experience negative or positive feelings. The research did reveal several limitations in available technology, which future studies should seek to improve. These findings also justify cross-over studies that provide a longitudinal component, examining impacts of different management systems on individual animals who each experience track systems as well as conventional husbandry. Overall, findings emphasised the importance of individual equine assessment and management. The results showed that optimal health and welfare cannot be guaranteed simply via the implementation of a management system carrying a particular label. Instead, it is important to observe individual animals, monitoring physical and behavioural indicators of welfare.

Go to poster
Back

BROWSING THE OPTIONS FOR GOOD WELFARE: ASKING GIRAFFES WHAT TREES THEY PREFER

P39

Zoe Newnham [1,2] and Paul Rose [3,4]

[1] University Centre Sparsholt, Sparsholt, Winchester, UK
[2] Marwell Wildlife, Colden Common, Winchester, UK
[3] Centre for Research in Animal Behaviour, University of Exeter, Exeter, UK
[4] WWT, Slimbridge, Gloucestershire, UK
p.rose@exeter.ac.uk

The correct nutrition of captive species is important for their physical, behavioural, and mental health. For many species, evidence is lacking on what constitutes a correct diet, and measurements and assessment of responses to this essential part of husbandry is required. This paper examines the behavioural responses of captive giraffes (*Giraffe camelopardalis*) to cut tree branches ("browse") from four different species of tree. Although commonly exhibited in zoos worldwide, meeting the nutritional needs of giraffe is considered particularly troublesome, as they have evolved an array of morphological, physiological, and behavioural life history traits related to their dietary niche which cannot be accurately replicated in the zoo. As such, the aim of this research was to determine which species of browse provided the most behavioural benefits to these giraffes. Four tree species - hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), English oak (*Quercus robur*) and goat willow (*Salix caprea*) - representing examples of commonly fed browse in temperate zoos were included in the project. Browsing time, total bites taken, bite rate, chew rate, chew-to-bite ratio and latent behaviour of five adult female giraffe was recorded. Individual giraffe were focal sampled, with the same number of repeats completed for each individual, for each species of browse they were provided with. All data were collected over the spring and summer of 2021 and 2022 at Marwell Zoo, UK. Results showed suggested that browse species consumed had a significant impact on browsing time, total bites taken, chewing rate, chew to bite ratio and behaviour after browse was consumed. Goat willow promoted longer browsing time compared to other species fed. Goat willow also reduced abnormal repetitive behaviour performance and showed the most promotion of foraging and rumination. Browse can be challenging and expensive to source; by understanding which browse is preferred there is maximum benefits to its procurement and minimum wastage. These results can be used to inform future browse provision and plantation planning, with zoos able to prioritise the planting and management of browse species that promote longer browsing times and reduce abnormal repetitive behaviours. Such research applications can therefore replicate the wild feeding ecology of giraffe, providing animals with more opportunities for ingestion of structural fibre and rumination, thus enhancing attainment of positive welfare states.

Go to poster
Back

IMPACT OF DIETARY TRYPTOPHAN ON THE GROWTH PERFORMANCE, STRESS LEVEL AND GUT MORPHOLOGY OF WEANLING PIGS

P40

Ayoola Oluyemi[1], Funmi Adebiyi[2], Omotolani Olatunji[2], Victor Ajayi[2] and Olufemi Adebiyi[2]

[1] Bogoro Research Centre, Afe Babalola University, Ado-Ekiti, Nigeria
[2] Department of Animal Science, University of Ibadan, Nigeria
oluyemiaa@abuad.edu.ng

Tryptophan is an essential amino acid required by animals for protein deposition as well as the production of the neurotransmitter serotonin, which influences mood, eating habits, sleep-wake cycles, and overall behaviour. Despite the standards set by the NRC, which are based on prediction models, there could be wide variations in animal requirements based on breed differences, physiological states, and management conditions, therefore necessitating scenario-specific evaluations. Considering the stress and nutritional changes associated with the weaning process, this study aims to assess how varying dietary tryptophan concentrations affect the stress level, intestinal morphology, and performance of weanling pigs. Pigs (Landrace x Largewhite, n = 27) weaned at 42±2 days old were assigned to three treatments with three replicates in a completely randomized design were used for the experiment, which lasted 8 weeks. The basal diet was supplemented with 0.0%- T1, 0.20%- T2, 0.40%- T3. During the experiment, Feed intake- FI (kg), Weight gained- WG (kg) were measured while the Feed conversion ratio (FCR) was calculated. At the end of the experiment, six animals from each treatment were selected, from which blood samples were collected; these were stunned, slaughtered, and ileal and jejunal mucosal tissues harvested. Data were generated for growth performance, corticosterone level, and histopathology (villus (height and width) and crypt (depth and width)). Data was analysed using one-way ANOVA of SAS software, while significant means were separated using DMRT. There was no significant difference ($P>0.05$) in the FI, but supplementation with tryptophan had an influence ($P<0.05$) on WG and FCR. Pigs in T3 had the highest ($P<0.05$) WG of 3.72kg and subsequently, the least FCR. The level of corticosterone in the serum of pigs in T1(31.72 ng/mL) was the lowest and significantly differs ($P<0.05$) from T2 (43.00 ng/mL) and T3 (43.14 ng/mL), these were all within the normal range. There was no significance ($P>0.05$) in the villi height and width. However, for ileum, cryptal width increased with increasing supplementation, ie T1 (318.82µm), T2 (324.38µm) and T3 (273.54µm). However, in jejunum, cryptal depth significantly differs ($p<0.05$) across the treatments. This is an indication that tryptophan supplementation might improve nutrient uptake. It can be concluded from this study that supplementation of weaner pigs' diets with tryptophan enhanced the growth performance and stress associated with weaning, thereby improving the welfare of the animals.

Go to poster
Back

THERMOREGULATORY RESPONSE OF WEST AFRICAN DWARF MALE GOATS OF VARIOUS COAT COLOURS TO DIURNAL TEMPERATURE CHANGES

P41

Femi Oyeniyi[1,2] and Emmanuel Ewuola[1]

[1] Department of Animal Science, Faculty of Agriculture, University of Ibadan, Oyo State, Nigeria

[2] Department of Agricultural Technology, School of Agriculture, Ekiti State Polytechnic, Isan-Ekiti, Nigeria

femigabriel382@gmail.com

Evidence has been shown by meteorologists of an on-going rise in air temperature globally. This phenomenon is likely to predispose livestock to heat stress conditions especially those reared in the tropics, thus compromising the ultimate welfare of the animals. One of the most commonly reared species in the tropics are goats as they provide economic stability to rural households especially the West African Dwarf (WAD) breed. This study was therefore undertaken so as to investigate if semi-intensively reared male goats of different coat colours experienced heat stress. The goat Unit of the Teaching and Research Farm, University of Ibadan served as the experimental location. Thirty (30) West African Dwarf adult male goats of six different coat colours were grouped into six treatments on the basis of their coat colours viz: Black, Brown, White, White/Black, White/Brown, and Brown/Black. The study was carried out during the low temperature humidity index (THI) of the year – June, July, August. Parameters determined include: Pulse Rate (PR, Beats/minute), Respiratory Rate (RR, Beats/minute), Rectal Temperature (RT, 0C). Ambient Temperature (0C) and Relative Humidity were measured twice daily to estimate THI. Data obtained from the study were analysed using ANOVA at α0.05. At low THI, the average daily PR was significantly higher in Black males (56.48±2.60) than those of other coat colours. The average daily RR was significantly lower in Brown (52.49±2.72) than Brown/Black male goats (54.39±3.00). The PR and RR were higher in the afternoon than in the morning. There was no significant difference in RT among bucks across all the treatments (coat colour groups). The THI had a range of 28.32±0.25 (in the morning) to 30.46±0.19 (in the afternoon) with the average daily being 33.31±0.22. Findings revealed that while bucks of all coat colour groups experienced some form of thermal stress, those with brown coats experienced the least stress. Thermal stress lowers animal welfare as seen in sub-optimal comfort for animals, reduced feed intake impairment of physiological functions. It is recommended that heat abatement measures such as shelter facilities with proper ventilation, sufficient clean water, and shade should be made available for goats reared in the tropics to improve their welfare

Go to poster
Back

FEED BASED ON SYMBIOTICS AS A FACTOR INFLUENCING TO THE FISH WELFARE

P42

Assel Paritova[1] and Altay Ussenbayev[2]

[1] Department of Veterinary Sanitation, Faculty of Veterinary Medicine and Animal Husbandry Technology, S. Seifullin Kazakh Agrotechnical Research University (KATRU), Kazakhstan

[2] Department of Veterinary Medicine, Faculty of Veterinary Medicine and Animal Husbandry Technology, S. Seifullin Kazakh Agrotechnical Research University, Kazakhstan

paritova87@mail.ru

The fish welfare in aquaculture is a growing public concern around the world. Although this topic may be considered controversial, particularly due to the lack of available knowledge, there is nevertheless an urgent need for fish farmers, authorities and scientists to develop criteria, approaches and practices for monitoring and protecting the fish welfare. It is also an integral part of the world agriculture sustainable development. One of the factors influencing for fish well-being is proper feeding of fish with the addition of supplements that improve their immunity and physiological condition. On the framework of the project IRN AP19576848 granted by the Ministry of Higher Education and Science of Kazakhstan we have developed some formulations of extruded feed with symbiotics for catfish (*Clarias gariepinus*) and tilapia (*Oreochromis niloticus*) farmed in the installation of closed water supply at the KATRU Fishery Research Center. Our results shown that experimentally introducing symbiotics into the main diet of tilapia provided increasing the final weight, weight gain and specific growth rate. These indicators were significantly higher in fish raised on a diet with symbiotics (77.28 ± 0.61 g; 46.79 ± 0.64 g; 2.33 ± 0.03% respectively) than in fish grown without symbiotics (73.31 ± 0.73 g; 42.54 ± 0.77 g; 2.17 ± 0.04% respectively). Also, it was noted that the feeding management stimulates fish to feed more efficiently, increases the population survival rate and reduces stress what, generally, provided the fish welfare improving. Currently, symbiotics are widely used in aquaculture as a prophylactic agent. Application of them has revealed a synergistic effect which will make it possible in the future to ensure the well-being of fish by resisting to various infectious diseases.

Go to poster
Back

A DELPHI CONSULTATION SURVEY ON INDICATORS OF PARROT WELFARE

P43

Andrea Piseddu[1], Yvonne van Zeeland[2] and Jean-Loup Rault[1]

[1] Animal Welfare Unit, Center for Animal Nutrition and Welfare, University of Veterinary Medicine Vienna, Vienna, Austria
[2] Division of Zoological Medicine, Department of Clinical Sciences, Faculty of Veterinary Medicine, Utrecht University, Yalelaan, Utrecht, The Netherlands
andrea.piseddu@vetmeduni.ac.at

Parrots can experience several welfare challenges when kept as companions and, despite their popularity, no science-based guidelines are available for owners to assess parrot welfare. The aim of this Delphi study was to identify behaviours, body measurements, husbandry and management conditions that could be used by owners as valid welfare indicators for all parrot species. Sixty-four animal-based and 35 environment-based welfare indicators were sourced from a previous systematic literature review, with an additional 23 identified following consultation with a specialist in avian medicine. The animal-based indicators were grouped in nine categories according to the biological construct they represented (body displays, body measurements, social, sexual, maintenance, locomotor, abnormal, human-directed, and exploratory behaviours) whereas the environment-based indicators were grouped in five categories according to the husbandry or management condition they represented (housing conditions, provision of enrichment, parrot-human interactions, nutrition, social needs). One hundred and fourteen professionals with expertise on parrots were invited in two rounds of online surveys to evaluate these welfare indicators for their validity and feasibility (animal-based indicators) or for their impact on welfare and applicability to parrot species (environment-based indicators). In addition, participants were asked to select and rank the 10 animal-based and 10 environment-based indicators that they considered to be the most important. Forty-two participants completed the first round, and 21 of them also completed the second round.

Experts agreed on 37 animal- and 36 environment-based welfare indicators representing all categories that could be used in practice by owners to monitor the welfare of all/most of parrot species. Four of the 10 highest ranked animal-based indicators included abnormal behaviours that were deemed difficult to adequately evaluate by owners, but the other 6 indicators identified met the feasibility criterion (eg. exploratory, locomotor and human-direct behaviours). For the environment-based indicators, management conditions that allow parrots to express their species-typical behaviours and provide opportunity to meet their biological needs (eg. providing foraging and cognitive enrichment, social companionship) were ranked highest. Findings from this study helped to identify valid and feasible parrot welfare indicators, which could be used to create a science-based welfare assessment tool for evaluating parrot welfare in practice. However, some indicators deemed valid but not feasible for owners may still require the assistance of experts for specific welfare challenges. Additionally, the context, personality traits and characteristics of the individual parrot, and the valence of some indicators, need to be further evaluated.

Go to poster
Back

CINEREOUS VULTURE'S (*AEGYPIUS MONACHUS*) WELFARE IN A BREEDING CENTRE: ACTIVITY BUDGET, BEHAVIOUR ANALYSIS AND USE OF SPACE

P44

Margarida Plácido[1,2], Oriol Tallo-Parra[2,3] and Marina Salas[1]

[1] Antwerp Zoo Centre for Research and Conservation, Royal Zoological Society of Antwerp, Antwerpen, Belkgium
[2] Animal Welfare Education Centre, AWEC Advisors SL, Universitat Autònoma de Barcelona, Bellaterra, Spain
[3] Department of Animal and Food Science, School of Veterinary Science, Universitat Autònoma de Barcelona, Bellaterra, Spain
rplacido.margarida@gmail.com

The translocation into the wild of ex-situ-born young cinereous vultures (*Aegypius monachus*) is one of the conservation measures applied to oppose the current decreasing trend of the globally near-threatened species. Due to the importance of this measure for conservation efforts, reproductive success is crucial as these young are born in breeding centres to captive parents. Securing adequate welfare levels is essential due to the negative consequences a compromised welfare has on reproduction and because it is an ethical responsibility towards wild captive animals. Therefore, welfare assessments are important measures that should be applied in breeding centres. Behaviour and use of space analysis are animal-based tools that give direct information regarding the animal and can be performed remotely using cameras. A species activity budget is important to detect irregularities in individuals' behaviour. However, there wasn't one available at the time of the study. Therefore, the study's first objective was to develop an activity budget and analyse if it could be used as a standard for the captive population. The second objective was to determine if remote behaviour and use of space analysis could detect potential welfare issues in a breeding centre. The species is sensitive to human presence, so the methodology should use remote evaluation methods. The study was developed at Zoo Planckendael's Vulture Breeding Centre (Belgium) on 12 study subjects. The data was collected through cameras and ZooMonitor. The activity budget developed, using the data collected, was then used as a baseline to detect irregularities in the behaviour analysis through dispersion graphs, and heatmaps were utilised for the use of space analysis. The activity budget developed presented similar results to budgets of other species of the Accipitridae family and could be applied as a reference for the species' captive population. The behaviour analysis was able to detect irregular percentages of normal behaviours as well as the presence of abnormal behaviours. The use of space tool detected irregularities in space utilisation and, consequently, the need to improve the enclosure and its surrounding environment. The methodology presented, as well as the obtained results, demonstrate that the analyses of behaviour (including the activity budget) and use of space are capable of detecting possible welfare issues and can be used as part of a welfare assessment protocol in a breeding centre, which will contribute to increasing the reproductive success of the breeding pairs and therefore the conservation status of the species.

Go to poster
Back

RISK FACTORS FOR BARBERING IN LABORATORY MICE

P45

Anna Ratuski[1], Jacob Thiel[2], Jamie Ahloy-Dallaire[3], Stephen Felt and Joseph Garner[1]

[1] Department of Comparative Medicine, Stanford University, California, USA
[2] Campus Veterinary Services, University of California, Davis, California, USA
[3] Department of Animal Science, Université Laval, Quebec, Canada
aratuski@stanford.edu

Barbering is a common abnormal behaviour in laboratory mouse populations, where mice pluck the fur or whiskers of themselves and/or their cage mates. Barbering is concerning for both animal welfare and research quality; it can represent neuropsychological deficits, social stress, impaired thermoregulation due to hair loss, and pain experienced by recipient mice. Causes and prevention of barbering are poorly understood, although there is evidence that both biological and environmental factors play a role in its prevalence. Some risk factors have been identified, such as age, strain, sex, breeding status, being housed with siblings, being housed with a barbering mouse, and use of steel cages (which are no longer commonplace). Since initial work in this area was done 20 years ago, mouse housing has undergone several changes in terms of cage ventilation, provision of nesting material, and materials used for cages and bedding. Here, we provide an updated look at risk factors for barbering behavior in laboratory mice. Using an epidemiological approach, we recorded point prevalence of hair loss in 2941 cages of mice over the course of one year. We then analyzed the relative impacts of biological, environmental, and husbandry factors on barbering in these mice. These factors included the position of the cage on the rack and within the housing room, time of year, temperature, humidity levels, type of cage, bedding and nesting material provided, methods used to mark the animals, number of mice in the cage, genetic strain, sex, and whether they were housed adjacent to other barbering mice. Preliminary analysis shows that certain risk factors for barbering, such as strain and sex, have persisted despite changes in housing. We additionally identified seasonal trends and a “hotspot” effect in which cages adjacent to barbering mice were more likely to be barbers themselves. Our findings can be used to increase understanding of this abnormal behavior and to inform changes in husbandry to reduce its prevalence.

Go to poster
Back

BEHAVIOURS OF FARMED SHRIMPS (*PENAEUS VANNAMEI*) IN GROW-OUT POND: WHAT WE KNOW

P46

Lola Reverchon-Billot and Aurélia Warin

Bureau Bankiva, Gergueil, France
lola.reverchon-billot@bankiva.fr

Over 400 billion shrimps are farmed each year in the world, more than 5 times the total number of all farmed land animals. Despite these facts, our scientific knowledge on shrimp behaviour and welfare is quite weak.

The aim of this study is on one hand to present what we know on shrimp behaviours when they are in pond without any human contact and on the other hand what the topics that need further research are. This study focuses on four main topics based on scientific bibliography: feeding behaviour, social interactions, swimming behaviour and exploratory behaviour. For example, if there is a clear evidence of an increase in aggressive behaviours when food resources are limited, the exact nature of the relationship between shrimp is still unknown. Some authors consider that shrimp are hierarchical with the presence of dominant and subordinate individuals while others show that shrimp rarely interact with each other, giving no clue on hierarchy. The sociability of shrimp has a significant impact on the optimal density specially around feeding time, which is critical in term of animal welfare, resulting in many aggressive behaviours. Improving our knowledge about the social behaviour of shrimp could help with a more effective distribution of food while avoiding abnormal number of conflicts that would lead to better feed consumption.

It is promising to see that shrimp welfare is having a growing interest. However, many topics still need to be clarified especially in commercial conditions to guarantee better shrimp welfare. Furthermore, unlike terrestrial animals, shrimp living conditions in brackish turbid water, hinders shrimp observations. Research needs to focus on the development of reliable tools to observe them directly in turbid water and so we can understand their behaviour better. Once such knowledge is gained, it will be important to disseminate in the field so that it is taken into account to first improve shrimp welfare as well as production and zootechnical performance.

Go to poster
Back

BEHAVIOURS OF FARMED SHRIMPS (*PENAEUS VANNAMEI*) WITH HUMAN INTERVENTION: WHAT WE KNOW

P47

Lola Reverchon-Billot and Aurélia Warin

Bureau Bankiva, Gergueil, France
lola.reverchon-billot@bankiva.fr

Over 400 billion shrimps are farmed each year in the world, more than 5 times the total number of all farmed land animals. Despite these facts, our scientific knowledge on shrimp behaviour and welfare is quite weak.

The aim of this study is on one hand to present what we know on shrimp behaviours when they interact with humans and on the other hand what the topics that need more research are.

This study focuses on four main topics based on scientific bibliography: observation methods, stress signs, handling during sampling and reaction to harvest or slaughter. For example, some scientists argue that slurry ice is the best method to kill shrimp and that they lose their consciousness quickly while others consider that electric stunning is a better and faster way to render them unconscious before they are submerged in a slurry ice bath to finally kill them. One of the issues is that no robust indicators of unconsciousness exist. To date, we still do not know how to differentiate, nor identify paralysis and anesthesia in shrimp and thus what the optimum method to stun and kill shrimp is. In fact, some authors use the absence of coordinated leg movements to measure the effectiveness of stun while some others show that this indicator is not validated as tail flipping of isolated abdomens produces a coordinated movement even though the heart is stopped.

It is promising to see that shrimp welfare is having a growing interest. However, many topics still need to be clarified especially in commercial conditions to guarantee better shrimp welfare. Moreover, several observation methods are in development, which will enable better understanding of shrimp behaviour in turbid conditions. Regarding the slaughtering process, it is necessary to continue research to determine the best indicator of consciousness and thus the best stunning and killing method to improve the end-of-life of many shrimps. Once such knowledge is gained, it will be important to disseminate in the field so that it is taken into account to first improve shrimp welfare as well as production and zootechnical performance.

Go to poster
Back

P48

GLOBAL EQUID KNOWLEDGE-EXCHANGE COMMUNITY (GEKEC): BRINGING WORKING EQUIDS INTO THE WELFARE EQUATION

João Rodrigues, Michelle Whitham-Jones, Tamlin Watson and Laura Kubasiewicz

The Donkey Sanctuary, Sidmouth, Devon, UK
joao.rodrigues@thedonkeysanctuary.org.uk

Around 90% of the 119 million equids worldwide (approximately 53 million donkeys, 58 million horses and 8 million hybrids) are present in low- and middle-income countries, primarily as working animals. These equids play a key role as sustainable and accessible co-workers supporting millions of people in numerous contexts.

Their fundamental work should always be framed with respect for their physical and mental limits, their dignity, the presence of adequate working conditions and ensuring that their health and welfare are seen as priorities. Unfortunately, this may be far from reality, often due to inequality in socio-economic contexts for working equids and their owners.

A lack of equid content in the curriculums of many educational institutions leads to fewer qualified professionals able to provide adequate health services and play an active role in education and raising awareness. Data shows 90% of the equid population in the world receives only 10% of the veterinary care, with working equids suffering the most from this discrepancy.

GEKEC: A learning community of equid advocates and professionals is a joint programme promoted by The Donkey Sanctuary and the Equitarian Initiative with the purpose of creating and developing partnerships with educational institutions and professional organisations, to share knowledge and expertise about equids while raising their profile.

The project includes online courses focused on animal welfare, veterinary medicine, and animal husbandry, and will provide students with both theoretical and practical knowledge on health and welfare of working equids. It also includes educational, scientific, and technical activities using innovative pedagogical approaches, moving from didactic to participatory and problem-based learning, in line with modern academic curricula.

GEKEC intends to promote interest among the academic community about (working) equids; provide curricular support and fill existing gaps; and raise awareness about the unique nature and specific needs of working equids, mainly donkeys and hybrids. The Programme also intends to promote a vibrant online Alumni community who regularly meet to share knowledge and problem solve issues from different cultural contexts.

Ensuring that future generations of professionals understand the value and importance of working equids and that they apply the acquired knowledge in favour of these animals, is certainly an effective way of contributing to their health and welfare and ensure that working equids live and work in the dignified conditions they so deserve.

Go to poster
Back

THE REHOMING PROCESS IN DOGS: INVESTIGATING SHORT AND LONG-TERM EFFECTS OF REHOMING ON CONTACT-SEEKING BEHAVIOUR, MEMORY, AND STRESS IN SHELTER, REHOMED, AND NON-REHOMED DOGS

P49

Lina Roth, Cornelia Sulonen and Jenny Löf

IFM Biology, Linköping University, Linköping, Sweden
lina.roth@liu.se

The rehoming process is stressful for dogs, and currently, an increasing number of dogs are being relinquished and rehomed. The aim of this study was to investigate both short and long-term effects by investigating contact-seeking behaviour, short-term memory, and long-term stress in dogs that are relinquished and living in shelter, dogs that are rehomed, and compare those to non-rehomed dogs that have lived with their owner since they left the breeder. In addition, dog owners completed a relationship questionnaire, and these dyads also performed a behavioural synchronisation test. The result revealed that the shelter dogs had the shortest eye-contact duration in an eye-contact test ($p < 0.01$) and a shorter eye-contact duration than non-rehomed dogs in the unsolvable problem task ($p = 0.017$). However, there was no difference between the three groups in their short-term memory test results. Both rehomed and control dogs synchronised their behaviour with their owner in the behavioural synchronisation test and, interestingly, in the relationship questionnaire, owners of rehomed dogs reported a stronger emotional closeness to their dogs compared to owners of non-rehomed dogs ($p = 0.006$). Analysis of hair cortisol concentrations in the dogs revealed that the shelter dogs had higher long-term stress levels than rehomed dogs ($p = 0.017$), but they did not, however, differ from the control dogs. Hence, even though there might be short-term effects during the rehoming procedure for dogs, this study suggest that rehomed dogs adapt to their new life and develop a strong bond to their owner.

Go to poster
Back

HOUSED DAIRY COWS UTILISE VARIED ENVIRONMENTAL ENRICHMENTS AND SHOW DIVERSE INTER-INDIVIDUAL VARIATION IN HABITUATION

P50

Alison Russell, Laura Randall, Jasmeet Kaler, Nikki Eyre, Jake Thompson and Martin Green

School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington Campus, Leicestershire, UK
alison.russell1@nottingham.ac.uk

With growing demand for the provision of positive welfare for farmed livestock, the need for enrichments which facilitate positive experiences for housed animals is clear. To comprehend the impact of enrichment on welfare, understanding how animals interact with different enrichments is critical. Brushes are a widely established enrichment resource for dairy cows, however, enrichment opportunities beyond this are limited. Resources which animals habituate to rapidly are economically unviable and provide limited welfare benefits. This study aimed to assess the utility of two simple sources of enrichment for housed dairy cows and to evaluate how cows habituate to enrichment over time. Over a nine-week period, two groups of cows (n=75) were provided with i) a novel object (an inflated suspended sailing buoy) and ii) access to an outdoor concrete yard. Study cows were part of a commercial milking herd, permanently housed in a sand-bedded cubicle system and milked robotically. Interaction with enrichments was quantified using sampled continuous 24-hour periods of video footage. After two months the proportion of cows that continued to use the novel object and outdoor yard each day was 88% and 96% respectively. By the end of the trial cows spent a mean of 2.72 ± 0.37 minutes per day interacting with the novel object and 72.76 ± 5.13 minutes outside per day. There was significant variability between cows in the extent of use and habituation to, both enrichments. Although most cows declined their use of enrichment during the study, one-quarter of cows increased the time they spent using enrichments. Linear models revealed a significant positive relationship between how much time individual cows used each enrichment when initially provided and the extent to which they habituated to it by the end of the study ($P<0.05$), with the highest users of enrichment initially showing the greatest decline in enrichment use over time. Linear models also revealed a significant positive relationship between both enrichments, with higher users of the novel object also spending more time outside and cows within their third lactation or higher habituating significantly more to the outdoor yard than younger cows. These results indicate that housed dairy cows will utilise new forms of enrichment if provided, suggesting the availability of these resources to be beneficial. Habituation has previously been reported as a group level response however this is the first study to reveal that dairy cows exhibit diverse inter-individual patterns of interaction and habituation to enrichment.

Go to poster
Back

EFFECTS OF CAT MUSIC ON BEHAVIOUR OF CATS HOSPITALIZED FOR LONG PERIODS

P51

Sabrina Sato, Paula Wolfgan and Ruan Daros

School of Medicine and Life Sciences, Pontifícia Universidade Católica do Paraná, Curitiba, Paraná, Brazil
sabrinati_@hotmail.com

Feline sporotrichosis is a zoonosis that requires long-term isolation during treatment. Keeping cats under veterinary care often exposes them to stressors, including sudden, unpredictable, and loud noises. To help cats cope with this condition, auditory enrichment can be applied. Here we evaluate the effects of exposing cats to cat music on behaviour. Cats (n=11) were housed simultaneously and observed for 18 days at the university veterinary clinic's infectious diseases' isolation ward. Cats were kept in individual double-cages under the same environmental conditions and medical treatment routine. The experiment was composed of three treatments: cat music for 30 minutes (CM), white noise for 30 minutes (WN, positive control) with sound averaging of 55 dB and no sound (NS, negative control). Sounds (CM and WN) played from 7 to 7:30AM before researchers entered the isolation ward. Treatment distribution was pseudorandomized and cats were exposed simultaneously to each of the treatments; two consecutive days for each treatment, twice, totalling four days per treatment. Stress levels were assessed every day via direct behavioural observation that started 20 minutes after treatments' auditory stimuli using the cat stress score (CSS) that ranged from 1 (totally relaxed) to 7 (terrified) and considered the cat's body posture, facial expression, vocalizations, and activity. An interaction test was applied to evaluate cats' behavioural responses to human approach. During the interaction test, a researcher approached the cat cage and inserted a plastic rod through the cage door for 15 seconds. Cats' response were video recorded and analysed using BORIS® following an ethogram that categorized behaviours towards the rod as positive or negative and latency to interact. Cage state was evaluated via video two times per day (morning and afternoon) and considered as: not messy (no items moved) or messy (one or more items moved). There was no difference among treatments for CSS. Cats were faster to interact with the rod after exposed to WN (-3.53± 0.96; $p<0.01$) and CM (-3.82±0.97; $p<0.01$) compared to NS (5.15±0.67). There was a trend ($p=0.06$) for fewer negative behavioural events during the interaction test when cats were exposed to WN (0.27±0.10) compared to NS (0.52±0.10; $p=0.06$). However, regarding cage state, cats had 3.93 (95%CI: 1.30–11.8; $p=0.02$) higher odds to mess their cages when exposed to WN compared to CM.

Go to poster
Back

ASSESSING THE WELFARE OF LIONS (*PANTHERA LEO*) AND TIGERS (*PANTHERA TIGRIS*) UNDER HUMAN CARE – THE CATWELL PROTOCOL

P52

Sara Sequeira[1], Xavier Manteca[2] and Sabine Hartmann[1]

[1] Science Unit, FOUR PAWS International, Vienna, Austria
[2] Department of Animal and Food Science, Universitat Autònoma de Barcelona, Barcelona, Spain
sara.sequeira@four-paws.org

Animal welfare is a mental state comprised by the sum of all the mental experiences of an individual at a given time. Animal facilities have a duty of care towards the animals they keep, to ensure not only their survival but also their welfare. As such, to assess the latter, one must take a holistic approach and consider the individual's health, behaviour and the environment it lives in, using scientifically validated protocols. Most of the currently existing protocols have been developed for farmed animals, and whilst some have already been created for wild animals, none have yet been validated for captive lions and tigers. The CatWell is an animal welfare assessment protocol for lions and tigers under human care, using scientifically validated animal-based indicators. Some of these had already been created, such as a Faecal Scale, which was validated by correlating visual scores of 149 faecal samples with their moisture content analysis results, and by running an inter-observer reliability (IOR) test. Other indicators were created de novo using data collected from a population of rescued lions and tigers, housed in three sanctuaries. A fixed list of descriptors for a Qualitative Behaviour Assessment was developed after a literature review, and tested for reliability through an IOR test using 15 videos from lions (n=9) and tigers (n=6). Quantitative behaviour indicators were also created, with behavioural observations of lions (n=14) and tigers (n=15) over a two-year period, during winter and summer. These indicators reflect the most displayed behaviours and respective frequencies, and will serve as a reference for the population housed in FOUR PAWS sanctuaries. More indicators are currently being created and tested, as this protocol aims to cover animal's physical, physiological, mental and emotional states, according to the 5 Domains Model. The aim is to have a living protocol that allows the adjustment of existing indicators and the inclusion of new ones, as needed. This protocol will allow any facility keeping lions and tigers to accurately monitor their welfare, to adapt individual and general management and husbandry, thus improving the quality of life of many animals of these two flagship species.

Go to poster
Back

AGROFORESTRY TREE LEAVES AS AN ALTERNATIVE TO ANTIMICROBIAL DRUGS FOR SUSTAINABLE PARASITIC CONTROL IN SHEEP OF JAMMU AND KASHMIR, INDIA

P53

Azad Mandeep Singh and Kour Kawardeep

Sher-e- Kashmir University of Agricultural Sciences and Technology, Jammu, India
mandeepsinghazad@gmail.com

Excessive use of antimicrobial drugs have resulted in an increased cost of production in sheep framing. It is very important to introduce cost effective and more sustainable measures to control parasitic load in sheep and goats. Over the last few years, the dietary role of tannins is receiving increasing interest as they may reduce the number of gastrointestinal parasites in ruminants. The present study was carried out to assess the effect of locally available agroforestry tree leaves in hilly areas of Jammu and Kashmir, India on production potential and parasitic control of sheep. 60 sheep were randomly divided into three groups (T1, T2 and T3) with 20 animals in each group in a completely randomized block design for a period of 3 months. The locally available agroforestry trees like, guava (Psidium guajava), neem (Azadirachta indica), jamun (Syzygium cuminii) and mango (Magniferra indica) available in hilly areas of Jammu and Kashmir were used to prepared leaf meal mixtures in 1:1:1:1 proportion. LMM were used at different inclusion levels (T1=0 %, T2=0.5%, T3=1.5%). Data regarding daily feed intake, adult bodyweight, average body weight gain, FCR, body score and fecal egg count were recorded and result were subjected to one way ANOVA accordingly.

The result showed that daily body weight gain, average final body weight, FCR and overall body score were significantly increased in T3 group as compared to T1, T2. Fecal egg count was significantly ($P<0.001$) decreased in T3 groups as compared to T1 and T2. Overall, the use of leaf meal mixture @ 1.5% improved the overall body score and production performance as compared to controlled group. The use of agroforestry leaf meal mixtures can be used as an alternative to the use of antimicrobial drugs. These plant products do not leave any residues. Leaf meal mixtures contain photochemical substances with bioactive principles that would have fewer chances to induce resistance in microorganisms.

Go to poster
Back

REGULATING RESCUE: UK DOG RESCUES AS A WELFARE BLIND SPOT

P54

Sarah Singh and Marie Fox

School of Law and Social Justice, University of Liverpool, Liverpool, UK
sarah.singh@liverpool.ac.uk

Dog rescues play an increasingly critical role in ensuring animal welfare across the UK, as demand for support from this sector continues to grow (particularly post Covid-19 coupled with the ongoing cost-of-living crisis). Rescues, however, remain something of a welfare blind spot. Except for Scotland, animal welfare organisations remain unregulated across the devolved nations of the UK. The lack of legal definition of 'rescue' means that anyone can declare their activities (and premises) as a 'dog rescue'. We argue that the lack of oversight and consequent variation in practice compromises animal welfare. In a study funded by Research England and facilitated by collaborators, Battersea Dogs and Cats Home and the Kennel Club, we undertook interviews (n.17) and focus groups (n.26) with a variety of dog rescues across the UK to explore attitudes towards regulation, as well as the potential barriers to regulating. Our data suggests that a key challenge to regulating dog rescues is accommodating diversity in practice. For example, bigger organisations own premises and employ staff, some contract third parties including commercial kennels, while others favour foster-based models. Stakeholders noted that, even where minimal welfare standards exist, these often privilege easily measurable aspects such as physical environment (eg., dictating specific kennel dimensions), while downplaying the need for good governance which is critical to ensure animal welfare. Failure to recognise what good welfare practice looks like in smaller, less resourced rescues risks closing those organisations down, potentially exacerbating the current crisis in UK dog rescue. Moreover, poorly drafted and/or enforced regulation is potentially detrimental to welfare as it risks increasing the bureaucratic burden on rescues without necessarily driving up welfare standards. Notwithstanding these challenges, our findings suggest that while details are inevitably contested, most participants agree that some form of regulation is necessary to protect animal welfare for the following reasons. First, in setting minimal welfare standards it holds rescues accountable for the welfare of animals in their care. Second, information generated by a duty to report would allow for the identification of sector-wide trends, encouraging earlier welfare-orientated policy interventions. Finally, regulation has the potential to increase the standardisation of policies around critical welfare issues, including, for example, around euthanasia. The paper concludes that, based on the Scottish experience and our data, greater access to resources (including training) must precede any shift towards statutory regulation, to ensure that reforms realise the aim of driving up welfare across this vulnerable sector.

Go to poster
Back

LOCOMOTION AND MOBILITY ASSESSMENT FOR BROWN BEARS (*URSUS ARCTOS*) UNDER HUMAN CARE

P55

Elena Stagni[1], Marta Brscic, Marlene Kirchner[3], Sabine Hartmann[4], Barbara Contiero and Irene Redtenbacher[1]

[1] Wild Animal Department, FOUR PAWS International, Vienna, Austria
[2] Department of Animal Medicine Production and Health (MAPS), University of Padova, Legnaro PD, Italy
[3] Farm Animal & Nutrition Department, FOUR PAWS International, Vienna, Austria
[4] Science Unit, FOUR PAWS International, Vienna, Austria
elena.stagni@vier-pfoten.org

Degenerative joint disease is a chronic painful condition which might negatively affect animal welfare. Brown bears (*Ursus arctos*) under human care are known to suffer from osteo- and spondyloarthritic modifications, especially with increasing age. Brown bears´ resilience contributes to the challenges of an early detection of this disease and of the monitoring of its progression. This study aimed to create a reliable and feasible scoring system to assess the locomotion and mobility of brown bears housed in FOUR PAWS (FP) sanctuaries, during the caretakers´ daily routine. Literature research on existing scoring systems and direct observations of the brown bears housed by FP were conducted to create the assessment tool. Twelve animal-based measures were included and classified as “Symptoms” (n=4) and as “Activity/Mobility” (n=8). The measures, scoring system and their on-field feasibility were discussed during a workshop involving experienced FP caretakers. Caretakers were trained on the assessment and scoring of measures using videos and direct observations in Bear Sanctuary Müritz, Germany. Five participants and the principal investigator assessed on video the locomotion and mobility of eleven bears. The tool was adjusted based on caretaker feedback and, according to that, used to directly assess eight bears in the field. The scores given in the two settings were analysed to test the inter-observer reliability by calculating the Intraclass Correlation Coefficient (ICC) for each measure. The reliability of the data collected on video was high (0.75 to 1; -0.75 to -1) for all measures except one, “back arched”, with an ICC value of 0.72 (0.31 - 0.93; 95%CI), considered moderate (0.5 to 0.75; -0.5 to -0.75). The highest ICC was found for “standing up score” (ICC 1). Regarding the field assessment, four measures had high reliability, one moderate, two weak (0.25 to 0.5; -0.25 to -0.5) and one very weak (0 to 0.25; 0 to -0.25). The highest reliability was found for “loss of coordination” (ICC 1), the lowest was again “back arched” with a value of -0.25 (-2.93- 0.76; 95%CI). Based on the outcomes of indirect and direct observations, “back arched” definition was improved, and the finalized tool was included in the welfare assessment of brown bears in FP sanctuaries. The implication of such tool is to facilitate an early detection of locomotion and mobility changes, to monitor the progression of the disease and/or the effectiveness of pain management to improve overall bear welfare in the aging process.

Go to poster
Back

EXPLORING THE LINK BETWEEN NEUROTRANSMITTERS AND VOCALISATIONS IN PIGS DURING POSITIVE HUMAN-ANIMAL INTERACTIONS

P56

Suzanne Truong[1], Joachim Litman[2], Oceane Schmitt[1,3], Avelyne Villain[2], Attilio Rocchi[4], Giorgio Mattaliano[4], Winfried Otten[5] and Jean-Loup Rault[1]

[1] Animal Welfare Unit, Center for Animal Nutrition and Welfare, Clinical Department for Farm Animals and Safety of Food Systems, University of Veterinary Medicine Vienna, Vienna, Austria
[2] Behavioural Ecology Group, Section for Ecology and Evolution, Department of Biology, University of Copenhagen, Copenhagen, Denmark
[3] Institute of Animal Breeding and Genetics, Faculty of Agricultural Sciences, Nutritional Sciences, and Environmental Management, University of Giessen, Germany
[4] Clinical Unit for Anaesthesiology and Perioperative Intensive Care Medicine, University of Veterinary Medicine Vienna, Vienna, Austria
[5] Institute of Behavioural Physiology, Research Institute for Farm Animal Biology (FBN), Dummerstorf, Germany
suzanne.truong@vetmeduni.ac.at

The potential benefits of human-animal interactions (HAIs) are increasingly recognised in animal welfare frameworks, yet what characterises these interactions as positive remains poorly understood. Neurotransmitters such as oxytocin, dopamine, and serotonin play critical roles in social interactions but have seldom been studied concurrently. In addition, acoustic parameters of vocalisations including duration, Wiener Entropy, mean frequency, and mean fundamental frequency can provide insights into affective states in non-human animals. Exploring the link between neurotransmitters and acoustic parameters could help to better characterise HAIs. In this study, we used a within-subject, 2 × 2 factorial design to study changes in neurotransmitters and acoustic parameters according to human familiarity (familiar 'F' versus unfamiliar 'U') and type of interaction (positive '+' versus neutral '0') for 10 min interaction sessions. Cerebrospinal fluid was repeatedly collected via spinal catheters from 10 pigs, with samples taken before the test (baseline), and 10, 30, 60, 120, and 240 min after the test started. Samples at various timepoints were analysed for oxytocin, dopamine metabolites (DOPAC, HVA), and serotonin metabolite (HIAA). Acoustic parameters were extracted from over 800 pig grunts during the sessions using the SoundChunk R package. Contrary to our prediction, oxytocin concentration tended to be highest in the U0 and lowest in the U+ test. There was no significant effect of test on the dopamine and serotonin metabolites, but there was a significant effect of time on HVA and HIAA with concentrations being higher at 30 min compared to pre-test in all tests. Our preliminary findings show that mean fundamental frequency was significantly higher during the neutral condition compared to the positive condition. Grunts were significantly longer during F+ compared to all other conditions, contrary to expectations that shorter grunts occur during positive contexts with a familiar human. Mean frequency and Wiener Entropy did not differ significantly according to the test conditions. We found that mean fundamental frequency had a strong tendency to be positively associated with an increase in OT concentration, and duration tended to be positively associated with an increase in HVA concentration but negatively associated with an increase in DOPAC concentration. None were associated with a change in HIAA concentration. We will discuss how our findings emphasise the complexity of welfare indicators in the context of positive HAIs, and that the results of our study encourage a multidisciplinary approach to provide a more holistic understanding of positive HAIs.

Go to poster
Back

ADDRESSING PAIN IN ZEBRAFISH: ANALGESIA FOR A TRAUMATIC BRAIN INJURY MODEL

P57

Ana Valentim[1], Beatriz Custódio[1,2], Elena van Os[1,3], Sofia Guimarães[1] and Anna Olsson[1]

[1] i3S - Instituto de Investigação e Inovação em Saúde, Universidade do Porto, Porto, Portugal
[2] ICBAS - Instituto de Ciências Biomédicas Abel Salazar (ICBAS), Universidade do Porto, Porto, Portugal
[3] School of Engineering and Applied Science, Rotterdam University of Applied Sciences, Rotterdam, The Netherlands
amaria@i3s.up.pt

Zebrafish are an already a widely used animal model in research. Despite having the same legal protection as traditional models such as rodents, pain during experimental procedures in zebrafish is often disregarded. Several studies confirm the need for analgesia for fin clipping, however, there are many other potentially painful procedures for which pain and pain control have not been studied. One example is the traumatic brain injury (TBI) model, wherein a stab wound head injury is induced, often to study mechanisms of disease, regeneration, and therapeutic efficacy. In this sense, we aim to study pain during TBI in adult zebrafish and how it is minimized by using the standard analgesic lidocaine as a first approach. This work was done in collaboration with researchers developing this model, with the aim of refining the analgesic protocol.

Mixed-sex (1:1 ratio) AB adult zebrafish were randomly distributed in the following groups (n= 6): TBI (animals subjected to TBI), TBI+A (animals subjected to TBI and 5 mg/L of pre- and post-lidocaine immersion), sham (animals only subjected to anaesthesia). Before the procedure, animals' behaviour was recorded to establish individual baselines. TBI was induced by the introduction of the bevel of a 30 G needle in the adult zebrafish left forebrain under anaesthesia (170 mg/L MS222). After the TBI procedure or anaesthesia, the swimming patterns of all the animals were recorded at 1h, 3h, 24h and 48h for 15min. The analgesic solution exposure ended after the 24-hour time-point. It is expected that the TBI animals show signs of pain, swimming less, spending more time in the bottom of the tank, being more inactive, and having a reduced tank occupation compared with the TBI+A and sham groups. It will be interesting to assess if the animals still feel pain at 48h, or if 24h of analgesic exposure is enough to prevent pain after the procedure. We have already recorded all the videos, but their analysis is ongoing using tracking software. At the time of the conference, we will have the results ready to present.

The results from this study will provide initial insight into TBI as a potentially painful procedure and will show whether the traditional analgesic protocol used for fin clipping is enough to control pain. This type of research is crucial to improve the animal welfare of zebrafish as an animal model and can give indications for other invasive procedures in zebrafish.

Go to poster
Back

END OF LIFE, A GOOD DEATH? INTERCONNECTING LIFESCAPES AND IMPLICATIONS FOR MULE (*EQUUS ASINUS X EQUUS CABALLUS*) WELFARE AT END OF LIFE IN NEPAL

P58

Tamlin Watson[1], Laura Kubasiewicz[1], Sajana Thapa[2] and Caroline Nye[3]

[1] The Donkey Sanctuary, Sidmouth, Devon, UK
[2] Animal Nepal, Dhobhighat, Lalitpur 44600, Nepal
[3] Centre for Rural Policy Research, University of Exeter, Exeter, UK
tamlin.watson@thedonkeysanctuary.org.uk

This presentation describes a study undertaken to explore what end of working life augurs for mules employed for goods distribution in Gorkha region, Nepal. The authors contemplate the connecting threads between humans and mules, exploring how these affect the welfare of mules when their working lives are over. In remote regions in Nepal when mules are retired from work, limited options are available to equid owning communities, where political systems keep marginalised communities marginalised, and dwelling in remote mountain villages only adds to this exclusion. In the absence of external support or guidance, owners turn to systems within their communities to aid decision-making; we explore how mules find themselves positioned within these systems. Using semi-structured interviews, mule owners were invited to discuss their experiences of living with, employing and parting with mules at the end of their working lives. The consequences of redundancy within this study meant an 'out of work' mule's future care, in these remote mountain regions, may range from limited care, decreasing care, abandonment, or permanent incarceration (until the equid dies). This paper contributes to a small but growing body of research investigating what end of life means for equids worldwide, specifically adding to the dearth of literature regarding what this means for working mules and their welfare in Nepal.

Go to poster
Back

INVESTIGATING BEHAVIOUR AND FAECAL CORTISOL METABOLITE LEVELS IN HARBOUR (*PHOCA VITULINA*) AND GREY SEALS (*HALICHOERUS GRYPUS*) IN REHABILITATION

P59

Michal Zatrak[1,2], Richard Ilderton, Matthew Geary[2], Kirsty Shaw[1] and Robyn Grant[1]

[1] Department of Natural Sciences, Manchester Metropolitan University, Manchester, UK
[2] School of Natural Sciences, University of Chester, Chester, UK
[3] Tynemouth Seal Hospital, Grand Parade, Tynemouth, North Shields, UK
michal.zatrak@stu.mmu.ac.uk

Juvenile harbour and grey seals are commonly rescued and admitted for rehabilitation following stranding. However, there are many stressors associated with this practice, including transportation in vehicles, an unnatural environment, and human contact in the form of assisted feeding and invasive medical treatments. These are likely to increase the seals cortisol levels. After acute stress, cortisol levels usually return to their baseline levels; however, chronic stress causes prolonged release of cortisol and has a significant impact on individuals, including affecting their growth, reproduction, immune system, disease resistance and fitness. Hence, stress levels encountered by seals in captivity could have a significant impact on their welfare and potentially decrease their survival probability. This study investigates faecal cortisol metabolite levels in rehabilitating juvenile harbour (n=9) and grey seals (n=10) to establish how these individuals cope with stress. Faecal samples and CCTV footage from rehabilitating seal pups were collected from rehabilitation centres on a daily basis, where possible, from the day of admittance of the seal until the day of release. Faecal samples were used to develop and validate a new enzyme-linked immunosorbent assay (ELISA) to enable cortisol metabolite quantification. CCTV footage was analysed using the behavioural observation research interactive software (BORIS) to yield behavioural time budgets. Linear regression models will then be used to determine whether sex, admission reasons, individual differences, time in captivity and feeding methods affect seal cortisol levels, and whether there is an association between the cortisol levels and behavioural time budgets. By identifying factors that lead to increased cortisol levels and potentially chronic stress, rehabilitation processes could be further optimised to increase seal welfare in ex-situ settings and help improve their survival odds.

Go to poster
Back

THE FIRST STEPS ANIMAL WELFARE TEACHING IN HIGHER VETERINARY EDUCATION OF KAZAKHSTAN

P60

Aikumys Zhumakayeva[2] and Altay Ussenbayev[1]

[1] Department of Veterinary Medicine, Faculty of Veterinary Medicine and Animal Husbandry Technology, S. Seifullin Kazakh Agro Technical Research University, Kazakhstan

[2] Department of Veterinary Sanitation, Faculty of Veterinary Medicine and Animal Husbandry Technology, S. Seifullin Kazakh Agro Technical Research University, Kazakhstan

atay.ussenbay@gmail.com

In the Veterinary Education Core Curriculum of the World Organization for Animal Health, the discipline "Animal Welfare" is introduced as a mandatory subject for students of veterinary faculties, and a graduate veterinarian must have sufficient competencies to assess the state of animal welfare in different habitat conditions. On our initiative, for the first time in the Central Asian region, the Faculty of Veterinary Medicine and Animal Husbandry Technology of the University included the disciplines "Disease Prevention and Animal Welfare", "Animal Welfare and Ergonomics", "Animal Welfare" into the three veterinary educational programs ("Veterinary Safety" for bachelor students, "Diagnostics, Treatment and Prevention of Animal Diseases" and "Food Safety and Quality" for master students). Currently, we are teaching 15 master students and at the next academic year 101 undergraduate students of the 2nd-year and first-year master students will be involved into these disciplines; within the framework of existing funded scientific projects of the faculty, doctoral and undergraduate students carry out research work on the welfare of dairy cows and sheep. In the current academic year, curricula and two manuals on Animal Welfare have been prepared in Kazakh and Russian languages, preparatory work is underway to create MOOCs in English. To conceptually familiarize specialists with this approach of livestock management, a webinar on the welfare of dairy cattle was held with participation of specialists and farmers under the auspices of the Ministry of Agriculture, National Agrarian Research and Educational Center, and S. Seifullin Kazakh Agro Technical Research University. At the end of the academic year, it is planned to hold a seminar on animal welfare with participation of students and stuff of the Faculty, highlighting the state of knowledge of the welfare problems among productive insects, fish, birds and farm animals, as well as pets in regional breeding conditions. We assume that other departments of our university related to animal sciences will be involved into the teaching of animal welfare disciplines

Go to poster
Back