

UFAW Online Animal Welfare Conference 2023



UFAW
SCIENCE IN THE SERVICE
OF ANIMAL WELFARE

UFAW Online Animal
Welfare Conference
2023

 20 - 21 June 2023

 Online

Scientific Programme

Welcome to the UFAW Online Conference 2023

We are delighted to have you join us to hear the latest developments in animal welfare science!

By holding the conference online this year, we have the opportunity to connect with a diverse global audience, and we are pleased to be joined by delegates from more than 50 countries. This approach not only encourages a broad spectrum of perspectives, but also aligns with our commitment to reducing our environmental impact.

The scientific programme features over 40 presentations and more than 90 posters covering a broad range of species and topics. To access the talks, you will need to join using the personal GoTo-Webinar link that was emailed to you. This link will work for all sessions over both days. A reminder email with this link will be sent to you 24 hours in advance of the conference. All conference sessions are being recorded and will be available to view on demand shortly after each days' sessions finishing.

We encourage you to actively engage with our presenters and ask them questions about their work. You will be able to ask questions during each live talk by posting in GoTo-Webinar. A dedicated Slack workspace for the conference has been set up through which you can ask further questions of the speakers after their presentations, and you can also post questions about posters. A link to access each poster can be found at the bottom of each poster abstract. Further information about joining the UFAW conference Slack workspace can be found below.

We would like to thank all those who are contributing to the meeting, including our speakers, poster presenters, session chairs and delegates. A special thank you also goes to our dedicated UFAW office staff (Sam Griffin, Tina Langford and Jane Moorman) for their hard work behind the scenes in ensuring a smooth registration process.

Finally, please do let us know what you think of the meeting. Please fill in the post-conference online survey, and if you have any specific comments, please email events@ufaw.org.uk.

We hope that you enjoy the conference!

Huw Golledge, Stephen Wickens, Birte Nielsen, Liz Carter and Luisa Dormer

UFAW Organising Committee

Join the conversation

To ask a question about a poster, or to ask a question of the speaker after their presentation, please use the messaging app, Slack.

1) Join the UFAW conference slack workspace:

https://join.slack.com/t/ufawconferences/shared_invite/zt-1w4bedbsw-zy7wry9ZFyO78BFbT4PHdw

2) Identify the relevant channel for the type of animal covered:

(#farm-animals, #companion-animals, #lab-animals, #captive-and-wild-animals, #general, #talks, #short-talks)

3) Post your question in the relevant channel, referencing the name of the poster's main author (eg @Stephen Wickens), as indicated at the bottom of each poster abstract

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

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UFAW
SCIENCE IN THE SERVICE
OF ANIMAL WELFARE

Scientific Programme:
Talks

Timetable and Speaker Abstracts

Timetable of event

Tuesday 20 June

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

10.15 - 10.30 **Welcome and Introduction:** Huw Golledge (*UFAW, UK*)

10.30 - 11.50 **Session One** Chair: Huw Golledge (*UFAW, UK*)

10.30 - 10.50 **A dynamic concept of animal welfare based on the animal's ability to adapt**
Vivian Goerlich, Franz Josef van der Staay and Saskia Arndt (*Utrecht University, The Netherlands*)

10.50 - 11.10 **Recognising facial expressions of negative emotional states in horses during the feeding period**
Claire Ricci-Bonot and Daniel Mills (*University of Lincoln, UK*)

11.10 - 11.30 **Sustainability in higher welfare chicken production**
Liam Hodgson and Mia Fernyhough (*The Humane League, UK*)

11.30 - 11.50 **Welfare implications of “Breed and Release” practice for hunted bird species: a case study from central Italy**
Michael Odintsov Vaintrub, Francesca Paccioco and Loris Lizzi (*Università Politecnica delle Marche, Italy*)

11.50 - 12.20 **Break**

12.20 - 13.20 **Session Two** Chair: Michael Toscano (*Universität Bern, Switzerland*)

12.20 - 12.40 **More than just a fish**
Carol Lee, Charles Tyler and Gregory Paull (*University of Exeter, UK*)

12.40 - 13.00 **How to scientifically develop a catalogue of measures and penalties against breaches of animal welfare laws and regulations in abattoirs**
Stephanie Schneidewind, Diana Meemken and Susann Langforth (*Freie Universität Berlin, Germany*)

13.00 - 13.20 **Short Talks:**
Development of a welfare assessment tool for pig farms under extensive production system in Butemba Town Council, Kyankwanzi District
Nelson Achong, Dickson Tayebwa and Samuel George Okech (*Makerere University, Uganda*)
A quantitative survey among Flemish poultry farmers on how birds fit for transport to the slaughterhouse are selected, caught, and loaded
Femke Delanglez, Anneleen Watteyn, Gunther Antonissen, Evelyne Delezie, Hilde Van Meirhaeghe, Nathalie Sleenckx and Frank Tuytens (*Research Institute for Agriculture, Fisheries and Food (ILVO), Ghent University, Vetworks, Aalter and Experimental Poultry Centre, Geel, Belgium*)

Are palatability assessments a valid measure of hedonic responses in *Equus caballus*?
Claire O'Brien, Sebastian McBride and Matt Parker (*Aberystwyth University and University of Surrey, UK*)

Dwarf goats show altruistic behaviour in a novel helping paradigm
Annkatrin Pahl, Jean-Loup Rault, Christian Nawroth, Jim McGetrick and Jan Langbein (*Research Institute for Farm Animal Biology, Germany; University of Veterinary Medicine, Vienna, Austria*)

13.20 - 14.10 **Lunch**

Tuesday 20 June

14.10 - 15.50	Session Three	Chair: Clare Andrews (<i>University of Stirling, UK</i>)
14.10 - 14.50	Keynote Speaker	
	Animal Welfare: The elephant in the room is us	Beth Ventura (<i>University of Lincoln, UK</i>)
14.50 - 15.10	Using passive infrared detectors for group and area-specific activity recording in growing pigs on farm	Esther Wurm, Naemi von Jasmund, Inga Tiemann and Wolfgang Büscher (<i>University of Bonn, Germany</i>)
15.10 - 15.30	Individual welfare in group-living species: the Livingstone's fruit bat as a case study	Christina Stanley, Morgan Edwards, Tessa Smith, Charlotte Hosie, Dominic Wormell and Eluned Price (<i>University of Chester and Durrell Wildlife Conservation Trust, UK</i>)
15.30 - 15.50	Short Talks:	
	Multidisciplinary assessment of cumulative experience in laboratory rhesus macaques	Janire Castellano Bueno, Melissa Bateson and Colline Poirier (<i>Newcastle University, UK</i>)
	Abnormal repetitive behaviours in dairy cattle: to be consistent or not to be consistent?	Isabelle McDonald-Gilmartin, Blair Downey and Cassandra Tucker (<i>University of California, Davis and University of Tennessee, USA</i>)
	Are results on a Judgement Bias Test affected by pre-session discrimination or generalisation training in dogs?	Joseph Krahn, Amin Azadian and Alexandra Protopopova (<i>University of British Columbia, Canada</i>)
	Lidocaine use in large pelagic fish research	Ghalia Abel, Alex Allison, Francesco Garzon, Lucy Hawkes, Thomas Horton, Gregory Paull, Alexander Plaster, Jessica Rudd, Lynne Sneddon and Matthew Witt (<i>University of Exeter, Red Kite Veterinary Consultants and Marine Resources & Fisheries, Jersey, UK; University of Gothenburg, Sweden</i>)
15.50 - 16.20	Break	
16.20 - 17.50	Session Four	Chair: Lisa Yon (<i>University of Nottingham, UK</i>)
16.20 - 16.30	UFAW Awards Presentations: UFAW Medal for Outstanding Contribution to Animal Welfare Science & UFAW Young Animal Welfare Scientist of the Year	
16.30 - 17.10	Play as a route to improved welfare	Per Jensen (<i>Linköping University, Sweden</i>)
17.10 - 17.30	Why does lifelong conventional housing reduce the sociability of female mice?	Lindsey Kitchenham, Basma Naza, Aimee Adcock, Emma Nip, Aileen MacLellan and Georgia Mason (<i>University of Guelph, Canada</i>)
17.30 - 17.50	Animal welfare science must look at time	Cynthia Schuck-Paim and Wladimir Alonso (<i>Center for Welfare Metrics, Sao Paulo, Brazil</i>)
17.50	End	

Wednesday 21 June

08.00 - 08.10	Introduction to meeting
08.10 - 09.30	Session Five Chair: Birte Nielsen (<i>UFAW, UK</i>)
08.10 - 08.30	An approach to wild animal welfare for the Anthropocene Jordan Hampton (<i>University of Melbourne, Australia</i>)
08.30 - 08.50	Animal welfare assurance in the 21st Century: Navigating the landscape of welfare-washing, regulatory capture, and social license to operate Mia Cobb and Samantha Gaines (<i>University of Melbourne, Australia; RSPCA, UK</i>)
08.50 - 09.10	Coming home, staying home: Adoption and return of dogs from RSPCA Queensland shelters Eileen Thumpkin, Mandy Paterson, John Morton and Nancy Pachana (<i>University of Queensland, RSPCA Queensland and Jemora Pty Ltd, Victoria, Australia</i>)
09.10 - 09.30	Short Talks: Popularity and public perceptions of companion animal content on Instagram Simone Reveentharan and Caralyn Kemp (<i>Unitec Institute of Technology, New Zealand</i>) Factors contributing to the prevalence of dairy cow lameness in milk shed areas of Bangladesh Solama Akter Shanta, Md. Aktaruzzaman, A.K.M. Anisur Rahman and M Ariful Islam (<i>Bangladesh Agricultural University, Bangladesh</i>) Assessment of pre-slaughter practices - a knowledge attitudes practices (KAP) survey of goat welfare at abattoirs of Punjab and Sindh Asfa Sakhawat, Rebecca Doyle, Muhammad Hayat Jaspal, Sher Ali, Peter Thomson and Muhammad Hassan Mushtaq (<i>University of Veterinary and Animal Sciences, Pakistan; University of Edinburgh, UK; The University of Sydney, Australia</i>) Owner belief in sentience leads to better donkey welfare in very challenging working environments Syed Saad Ul Hassan Bukhari, Alan McElligott, Sarah Rosanowski and Rebecca Parkes (<i>City University of Hong Kong and Equine Veterinary Consultants (EVC) Limited, Hong Kong SAR, China; AgResearch Limited, New Zealand</i>)
09.30 - 10.00	Break
10.00 - 11.30	Session Six Chair: Joanna Hockenhull (<i>Royal Veterinary College, UK</i>)
10.00 - 10.40	Keynote Speaker Bee Sentience and its welfare implications Lars Chittka (<i>Queen Mary, University of London, UK</i>)
10.40 - 11.00	Do lop-ear or brachycephalic skull shape conformations predispose rabbits to dental disease? Maria Jackson, Charlotte Burn, Dan O'Neill, David Brodbelt and Jo Hedley (<i>The Royal Veterinary College, UK</i>)
11.00 - 11.20	Evaluation of split calcium feeding to reduce keel bone fractures in multi-aviary housed laying hens Michael Toscano and Lukas Jasiunas (<i>Universität Bern, Switzerland; Healthier Hens, California, USA</i>)
11.20 - 11.40	What do we mean by animal welfare? Critique of the three circles model and a proposal for a new definition Steven McCulloch (<i>University of Winchester, UK</i>)
11.40 - 12.30	Lunch

Wednesday 21 June

12.30 - 13.50	Session Seven	Chair: Paul Rose (<i>University of Exeter, UK</i>)
12.30 - 12.50	Using evidence to inform policy for captive elephant management	Lisa Yon and Ellen Williams (<i>University of Nottingham and Harper Adams University, UK</i>)
12.50 - 13.10	Exploring risk factors for visually-mediated and locomotor abnormal repetitive behaviours in dogs	Olivia Edgar-Price, María Díez-León and Rowena Packer (<i>The Royal Veterinary College, UK</i>)
13.10 - 13.30	Does flight restriction explain welfare problems in captive parrots?	Emma Mellor, Georgia Mason, Mike Mendl, Yvonne van Zeeland and Innes Cuthill (<i>University of Bristol, UK; University of Guelph, Canada; Utrecht University, The Netherlands</i>)
13.30 - 13.50	Short Talks:	
	Best Practice Hens: An EU pilot project to support the transition to cage-free housing systems in the European Union	Mona Giersberg, Xavier Averos, Vera Bavinck, Roland Bronneberg, Inma Estevez, Peter van Horne, Karolien Langendries, Joanna Marchewka, Angela Morell Pérez, Thea van Niekerk, Anja Riber, Patryk Sztandarski, Frank Tuytens, Liesbeth Van Damme, Kaitlin Wurtz, Mariana Yuan Ribeiro-Couto and Bas Rodenburg (<i>Utrecht University, Fair Poultry B.V., Driebergen and Wageningen University & Research, The Netherlands; NEIKER-Basque Institute for Agricultural Research and Development and IKERBASQUE, Basque Foundation for Science and Asociación ECOVALIA, Sevilla, Spain; Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Belgium; Polish Academy of Sciences, Poland; Aarhus University, Denmark</i>)
	Adaptation of the cat stress score for use in hospitalized cats	João Pedro Silva-Monteira, Sara Alves-Gomes, Igor Moreira Lopes, Ana Magalhães and Margarida Duarte-Araújo (<i>Porto University and Hospital Veterinário do Bom Jesus, Braga, Portugal, Portugal</i>)
	Komodo Thermo Project: Improving the precision and accuracy of body temperature measurements in Komodo dragons	James Waterman, Megan Hill, Iri Gill, Gerardo Garcia and Lisa Holmes (<i>Chester Zoo and University of Liverpool, UK</i>)
	Accommodating agency: Restricted intervention social management of zoo-housed Chimpanzees (<i>Pan troglodytes</i>)	Lloyd Antrobus (<i>East Midland Zoological Society (Twycross Zoo, UK)</i>)
13.50 - 14.20	Break	
14.20 - 15.30	Session Eight	Chair: Jen Yun Chou (<i>University of Veterinary Medicine, Vienna, Austria</i>)
14.20 - 14.40	Being bored? Identifying the emotional consequences of boredom-like states in pigs	Sara Hintze (<i>University of Natural Resources and Life Sciences Vienna, Austria</i>)
14.40 - 15.00	Promotion of play behaviour as a means to improve pig welfare	Karolāna Steinerovā, Sarah Parker, Jennifer Brown and Yolande Seddon (<i>University of Saskatchewan, Canada</i>)
15.00 - 15.20	Farmed insect welfare: A case study considering black soldier flies (<i>Hermetia illucens</i>)	Meghan Barrett, Shaphan Yong Chia, Bob Fischer and Jeffery Tomberlin (<i>California State University, Texas State University, Texas A + M University, USA; Wageningen University, The Netherlands</i>)
15.20 - 15.30	Meeting Close	

A DYNAMIC CONCEPT OF ANIMAL WELFARE BASED ON THE ANIMAL'S ABILITY TO ADAPT**Vivian Goerlich¹, Franz Josef van der Staay² and Saskia Arndt²**

¹ Animal Behaviour Group, Division of Animals in Science and Society, Faculty of Veterinary Medicine, Department of Population Health Sciences, Utrecht University, Utrecht, Netherlands

² Behaviour and Welfare Group (Formerly: Emotion and Cognition Group), Faculty of Veterinary Medicine, Department of Population Health Sciences, Utrecht University, Utrecht, Netherlands

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Animal welfare is a multifaceted issue that can be approached from different viewpoints, depending on human interests, ethical assumptions, and culture. Theoretical concepts serve as guidelines and lay the basis for adequately assessing, safeguarding and promoting animal welfare. During the last decade, welfare concepts have developed from the Five Freedoms, focusing on the absence of negative states, towards the Five Domains and Quality of Life, emphasizing the presence of positive states. We built up on the existing theoretical framework, adding the dynamic nature of welfare, and propose a modified and extended version of an earlier animal welfare concept - the Dynamic Animal Welfare Concept (DAWCon). Based on the adaptive capacity of an individual, DAWCon takes the importance of positive emotional states and the dynamic nature of animal welfare into account. We propose that an individual animal is likely in a positive welfare state when it is mentally and physically capable and possesses the ability and opportunity to react adequately to sporadic or lasting appetitive and adverse internal and external stimuli, events, and conditions. Adequate reactions are elements of an animal's normal behavioural repertoire. They allow the animal to cope with and adapt to the demands of the (prevailing) environmental circumstances, enabling it to reach a state that it perceives as positive, i.e., that evokes positive emotions. We present our conceptual approach and illustrate aspects that need to be addressed when assessing welfare, emphasizing that welfare is not a snapshot measurement, but needs to be monitored over time. Behaviour is highlighted as a crucial read-out parameter, and the role of natural and normal behaviour is discussed. Examples of appetitive and adverse internal and external factors and their potential lasting and sporadic consequences for animal welfare will be given. For welfare assessment, the net effects of appetitive and adverse factors on an animal's welfare must be considered. Based on DAWCon, future research avenues may be identified to aid the understanding, assessment and promotion of animal welfare.

Ask a question: [#talks](#) @Vivian Goerlich

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RECOGNISING FACIAL EXPRESSIONS OF NEGATIVE EMOTIONAL STATES IN HORSES DURING THE FEEDING PERIOD

Claire Ricci-Bonot and Daniel Mills

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The aim of this research was to differentiate facial expressions associated with excited anticipation, frustration and disappointment in the horse around their feeding time. Negative emotional states are common in horses, but our understanding of the emotional signals used by horses is largely based on anecdotes which have not been scientifically validated. 31 horses of varying gender (20 females and 11 males) and aged 2-23 years old were tested. The positive emotional state was induced by the anticipation of a food reward (horses trained to wait 10 seconds for it) with two negative emotional states induced by delaying the food reward (frustration) and the loss of this food reward (disappointment). Testing took place in a stable where an experimental device controlling delivery of food was installed. Facial expressions of horses were video recorded and assessed using 1-0 scoring of features taken from the Horse Facial Action Coding System (EquiFACS). Across the two negative situations, frustration and disappointment, we found 9 significantly different features: 'Eye white increase' (AD1), 'ear rotator' (EAD104), 'head turn left' (AD51) and 'biting feeder' were more common in frustration; while 'blink' (AU145), 'nostril lift' (AUH13), 'tongue show' (AD19), 'chewing' (AD81) and 'licking feeder' were more common in disappointment. However, unique features relating to anticipation could not be identified. While some of the results help to characterise the emotional states other findings may be artefactual; the work also raises the question: Given the ecology of horses, is excited anticipation an unlikely state experienced in this species?

Ask a question: [#talks](#) @Claire Ricci-Bonot

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SUSTAINABILITY IN HIGHER WELFARE CHICKEN PRODUCTION**Liam Hodgson and Mia Fernyhough**

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Animal protection groups across the EU are asking corporations to sign up to the Better Chicken Commitment (BCC); a set of 6 standards criteria designed to tackle the most pressing welfare concerns in commercial chicken production (compliance with EU legislation, stocking density, enrichment, breed, CAS and third party auditing - see betterchickencommitment.com). Over 300 companies across the UK and Europe have now committed to incorporating these criteria into their entire chicken supply chains by the end of 2026, with some already meeting the BCC in a much shorter time frame.

The impact of the BCC on sustainability - in particular the requirements to use slower growing breeds of chicken and lower stocking densities - is cited by some companies as a barrier to adopting these minimum standards, as it increases the amount of feed and land required. We will present evidence to show that, rather than compromising sustainability objectives, the BCC can actually help to improve sustainability, aligning to the One Health approach. We will consider the impacts of bird mortality, antibiotic usage and muscle myopathies on human, bird and environmental health & present commercially relevant mitigations to further improve sustainability.

Lastly, we will showcase a current commercial example of how sustainable higher welfare supply is already being achieved by one company, with further ambitious emission reduction goals and a climate neutral slaughterhouse already in operation.

Ask a question: [#talks @Liam Hodgson](#)

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WELFARE IMPLICATIONS OF “BREED AND RELEASE” PRACTICE FOR HUNTED BIRD SPECIES: A CASE STUDY FROM CENTRAL ITALY

Michael Odintsov Vaintrub, Francesca Paccioco and Loris Lizzi

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In Italy, recreational hunting is an established practice, regulated by national law (n°157/1992) which allows the rearing and release of hunted bird species. In the current work, we attempted to quantify the extent of the “Breed and Release” practice in the Abruzzo region of central Italy, as well as to assess consequential animal welfare implications.

Grey Partridge (*Perdix perdix*) and Common Pheasant (*Phasianus colchicus*) are the two species released during 2015-2017 (30,000 birds and 10,000 birds respectively). However, some areas register releases on a yearly basis while others only sporadic cases. No correlation was found between hunting bags and the number of released animals. Hunting efficiency (released/ hunted) was extremely low with Grey Partridge being $0.009 < x < 0.14$ (0.04 regional average) while Common Pheasant's being $0.11 < x < 0.4$ (regional average 0.29). The repetitive numbers of released birds imply that the biggest factor is the availability of gamebirds in local farms.

Animal welfare of the “breed to release” practice can be divided into 3 distinct stages :

- **Breeding:** This process follows commercial Gambird farming regulations. The welfare conditions of the animals are in line with national standards, and while lacking an assessment protocol, they can still be considered sufficient.
- **Adaptation:** A non-defined period in which mature birds spend time before releasing in open pens. Welfare conditions in this are significantly improved, especially in regard to space per bird, and the ability of animals to exhibit more natural behavior.
- **Release:** The period in which birds are released to the wild, usually several weeks before the beginning of hunting season. The only regulation relevant in this case is hunting practices. At the closure of the hunting season, no data is collected regarding bird survivability or numbers. However, repeated releases suggest that mortality is extremely high with possible causes being exposure, lack of resources, and natural predators.

In conclusion, the “Breed to Release” practice appears to fall between two regulation sets; farming gamebirds, and hunting. While farming in Italy includes animal welfare controls, the case is not the same for hunting regulation. Local authorities are aware of the gap and try to mitigate it by introducing intermediate measures such as the “Adaptation period”. However, this aspect of hunting suffers from underreporting and a lack of consistent data. Improving this registry and traceability are initial key steps to quantify mortality rates as a baseline for future policies.

Ask a question: [#talks](#) @Michael Odintsov Vaintrub

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MORE THAN JUST A FISH**Carol Lee, Charles Tyler and Gregory Paull**

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Globally, millions of fish are used in wide-ranging biological and medical research spanning understanding genetic variation, unpicking mechanisms of diseases, studies on infection, inflammation and cancer, developing and testing new drugs, and investigating epigenetics, neurobehaviour and ecotoxicology. Considering the growing use of fish as a vertebrate model for addressing such a diverse range of scientific questions, optimising their laboratory conditions is of major importance for both welfare and improving scientific research. However, most guidelines for the care and breeding of fish for research are concerned primarily with maximising production and minimising costs. These guidelines pay little attention to the effects on welfare of the environments in which the fish are maintained, or the implications of these maintenance conditions for scientific research. Also, very few studies consider how the differences in environment between wild and captive fish may affect their physiological and wider biological responses. This talk begins with a description of attributes that make fish popular for scientific research. It will then use the zebrafish (*Danio rerio*) as an example to illustrate how the environment, diet, and behaviour of wild fish in their native environment compare and contrast with conditions experienced by many laboratory fish. The implications for differences in environment between wild and captive fish for their health and well-being will be discussed. The presentation will describe studies we have undertaken to measure the effects of laboratory housing conditions on the welfare of zebrafish. In these analyses the advantages and disadvantages of different indicators of fish welfare, including survivorship, growth, reproductive performance, levels of the stress hormone, cortisol, and alterations in normal physiology and behaviour, will be outlined, and the challenges of interpreting findings with regard to welfare discussed. In the final analysis we identify the fundamental lack of knowledge of how fish interact with many biotic and abiotic features in their natural environment, illustrate how we can optimise fish health and well-being in the laboratory, and, in turn, how this will improve the quality of scientific data produced. The talk concludes with an evidenced argument that better welfare leads to better science.

Ask a question: [#talks](#) @Carol Lee[Back](#)

HOW TO SCIENTIFICALLY DEVELOP A CATALOGUE OF MEASURES AND PENALTIES AGAINST BREACHES OF ANIMAL WELFARE LAWS AND REGULATIONS IN ABATTOIRS

Stephanie Schneidewind, Diana Meemken and Susann Langforth

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Meeting animal welfare standards during slaughter is an important ethical issue with increasing importance to consumers. However, there has been a growing number of reports of severe breaches of animal welfare laws and regulations in abattoirs in recent years. Incidents of undercover filming by activist groups within abattoirs are making welfare violations visible to the public. Furthermore, poor animal welfare reduces meat quality and leads to economic losses. This project focused on developing a catalogue which lists appropriate measures and penalties for different possible violations of the German Ordinance on the Protection of Animals in Connection with Slaughter or Killing in conjunction with Regulation (EC) No 1099/2009 and the German Animal Welfare Act. The goal of providing these guidelines to official veterinarians (OVs) is to promote a more consistent and standardised enforcement of laws and regulations, which can prevent future misconduct in abattoirs. This research project developed a catalogue utilising the following five steps: (A) Acquiring relevant judicial decisions; (B) Conducting an anonymous online survey among German OVs; (C) Conducting semi-structured interviews with OVs and (D) Conducting a virtual colloquium with OVs and (E) Consulting lawyers. Measures and penalties for specific violations (e.g., use of an instrument which administers electric shocks in contravention of Regulation (EC) No 1099/2009) were included in the first draft of the catalogue if they were evaluated as appropriate by over 50.0% of respondents in the online survey. Data on appropriate ranges for penalty fees in Euro (e.g. €350.00 to €850.00) were gathered in Part (B). Part (C), (D), and (E) were used to review the first draft, leading to the final catalogue. This project produced general guidelines for breaches of animal welfare laws and regulations and specific guidelines for 40 different possible specific violations in German abattoirs. For each individual violation, a table presents an overview of the following information: citation(s) of legal/regulatory requirements to protect animals at the time of killing/slaughter; citation(s) of relevant regulatory and criminal penalties; special measures/penalties for the first and repeated offence; Information on penalties listed in judicial decisions of past similar cases; and other relevant information. If the measures and penalties listed in this catalogue are used consistently, consequences for welfare breaches can become predictable for abattoir operators and employees. This has the potential to improve compliance with laws and regulations. In addition, we suggest that this methodology can be adapted and used to compile appropriate measures and penalties for welfare breaches in other countries and settings.

Ask a question: [#talks](#) @Stephanie Schneidewind

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DEVELOPMENT OF A WELFARE ASSESSMENT TOOL FOR PIG FARMS UNDER EXTENSIVE PRODUCTION SYSTEM IN BUTEMBA TOWN COUNCIL, KYANKWANZI DISTRICT

Nelson Achong, Dickson Tayebwa and Samuel George Okech

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Background: Extensive pig production system is practiced by 90% of the small-scale farmers in Uganda since it requires minimal investments and it is the biggest contributor of pork. However, pigs under this system either roam freely in search of food or are tethered around homesteads. The welfare of animals in this production system has received little attention - in research - than intensive husbandry system. It is assumed that animals in the open range system live a more natural life; hence, welfare issues are perceived as a minor risk. This assumption however, does not provide a basis for ruling out the existence of potential welfare challenges in this production system. Therefore, to assess the welfare of pigs in the extensive production system we require a specific tool with criteria that can be used to identify potential welfare indicators. The aim of this study was to develop a welfare assessment tool applicable in the small-scale extensive pig production system and to validate its applicability.

Methods: A pig welfare assessment tool (observation checklist) containing 17 indicators of the five welfare aspects was developed: nutrition, physical environment, health, appropriate behavior and mental state. Some indicators were assessed using a 3-point scale: 0 (good welfare), 1 (moderate welfare), and 2 (poor welfare) while others were assessed using a 2-point scale to indicate presence/absence or positive/negative for the case of behaviour. A questionnaire survey was used to collect data on key health and management practices. The descriptive summaries of frequencies were computed, and indicators identified were given weights based on interest. The tool was tested using linear regression models.

Results: Model one (individual level): Lameness, body condition score, wounds on the body, Nose ringing, social and exploratory behaviours had a negative regressing effect on welfare; R-squared was 0.9073%, and $p < 0.05$.

Model two (farm/group level): the veterinarian-client relationship, mortality, environmental conditions, castration, medical records, water supply had negative regressing effect on welfare $p < 0.05$ while panting, pumping, huddling and shivering positively regress with welfare. R-squared was 0.7503 with $p < 0.05$.

Conclusion and recommendations: This study has led to identification of indicators of bad and good welfare of pigs in the extensive production system that can be used to assess and quantify the welfare status of pigs because it indicated high R-Squared value, hence could be confidently used to assess welfare. However, further studies are required to improve it and to identify more indicators.

Ask a question: [#talks](#) @Nelson Achong

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A QUANTITATIVE SURVEY AMONG FLEMISH POULTRY FARMERS ON HOW BIRDS FIT FOR TRANSPORT TO THE SLAUGHTERHOUSE ARE SELECTED, CAUGHT, AND LOADED

Femke Delanglez^{1,2}, Anneleen Watteyn¹, Gunther Antonissen², Evelyne Delezie¹, Hilde Van Meirhaeghe³, Nathalie Sleenckx⁴ and Frank Tuytens^{1,2}

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At the end of their productive period, broilers and most spent laying hens deemed fit-for-transport are caught, loaded, and transported to the slaughterhouse. Although this pre-slaughter stage is a high-risk phase for animal welfare issues and production losses, detailed up-to-date information about commercial practices is scant. Flemish poultry farmers were surveyed about current selection, catching, and loading practices, actions taken to prevent animal welfare issues or production losses, and their opinions about these practices. An online survey was filled out by 133 of 202 and 80 of 156 Flemish broiler and layer farmers contacted, respectively. For analysis, logistic and linear regression models were used. A minority of poultry farmers performed an extra selection of chickens unfit-for-transport shortly before catching and loading (layers 25%, broilers 39%). On average, this extra selection took one hour. Common preparations before catching and loading poultry include removing feeders (78% & 96%) and water facilities (29% and 62%), changing the light schedule (73% and 81%), changing ventilation settings (33% and 69%), removing manure (layers 43%), and fences under aviary system (layers 24%) and closing laying nests (layers 57%). On a scale from 0-100%, poultry farmers indicated that animal welfare was rather well guaranteed during catching and loading (layers 86%, broilers 83%), and that catching and loading poultry is physical (layers 68%, broilers 73%), and to a lesser extent, mentally (layers 42%, broilers 42%) exhausting for the catchers. More broiler farmers believed that the type of container affects the birds' welfare compared to layer farmers (49% vs 28%, $P < 0.05$). The preference for different catching methods was shown with a score from 1-10 (1=best and 10=worst). Farmers considered catching and holding chickens with a single leg and with three chickens per hand the best method regarding cost and time efficiency (2.9) and the wellbeing of the catcher (3.4). The method that was considered best for animal welfare was holding them by both legs and with two animals per hand (3.8), followed by holding them upright was considered the best (4.7). The latter method, however, scored poorly for catcher wellbeing (7) and cost and time efficiency (7.8). Catching and holding chickens by their wings was the least preferred method: economic and time efficiency (9), wellbeing catcher (8.7), and animal welfare (8.2). In conclusion, this survey provides in-depth knowledge on how broilers and spent hens are selected, caught, and loaded in Flanders, and reveals opportunities and sensitivities for optimizing this process.

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ARE PALATABILITY ASSESSMENTS A VALID MEASURE OF HEDONIC RESPONSES IN *EQUUS CALLABUS*?**Claire O'Brien¹, Sebastian McBride¹ and Matt Parker²**¹Institute of Biological Environmental and Rural Sciences, Aberystwyth University, Wales, UK²Brain and Behaviour Lab, University of Surrey, Surrey, UK*clo7@aber.ac.uk*

Anhedonia is the inability to experience pleasure from otherwise rewarding stimuli. It is a core feature of clinical depression in humans, which is one of the leading causes of significant occupational and performance-related impairments worldwide. Anhedonia is often measured through self-report measures in human patients, but measuring hedonic states in animals typically involves the use of palatability assessments using sucrose-based tastants. Methods have been validated in several animals such as in rodents, primates, dogs and pigs, with (1) choice of tastant and (2) technique for analysing consumption patterns being adapted across species. Subsequently, palatability assessments can be used to measure the influence of environmental factors on the hedonic value of reward and identify animals displaying anhedonic symptoms, highlighting various ethical and welfare issues related to certain captive/domesticated settings.

Recent research has suggested the use of palatability assessments for investigating anhedonia in horses, but currently no method has first been validated as a measure of hedonic responses within the normal equine population. Due to post-ingestive factors such as satiety, fatigue of the mastication muscles, etc., simple consumption of daily dietary components alone is not a direct measure of food palatability in horses. Certain consumption patterns may instead reflect hedonic reactions more accurately, especially with sucrose-based tastants, but techniques used to measure hedonic responses can vary widely across species. For instance, licking microstructure is a valuable method of measuring hedonic responses to sucrose-based solutions in rodents, but is not feasible in pigs and is replaced with consumption time per approach (CT/A). Measuring the relationship between orofacial responses to tastants can also bear little resemblance between species, most likely due to differences in the underlying facial anatomy. This study therefore aimed to evaluate the palatability responses to different sucrose concentrations using lick blocks to ascertain whether this methodology would be a valid measure of hedonic responses in horses.

Across five days, horses were video recorded in their stables while exposed to different sucrose concentrations in the form of custom-made UniBlock® licks (20, 25, 30, 35, 40%), counterbalanced for order, over five consecutive 10-minute tests. Palatability was estimated through consumption patterns (consumption time per approach, CT/A), facial expressions (EquiFACS) and consumption during a 2-minute period. Here we present the findings of the study and discuss whether this methodological approach validates the use of palatability assessments in order to identify the consummatory component of anhedonia in the horse.

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DWARF GOATS SHOW ALTRUISTIC BEHAVIOUR IN A NOVEL HELPING PARADIGM**Annkatrin Pahl¹, Jean-Loup Rault², Christian Nawroth¹, Jim McGetrick² and Jan Langbein¹**

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Altruism can have a strong impact on social dynamics in a group, by strengthening bonds and potentially decreasing stress. Although it is important to understand the social needs of animals under human care, we do not know much about altruistic behaviour in farm animals. Many paradigms have been designed for primates and are not suitable for use with farm animals. Here, to test altruism in goats, we developed a novel helping paradigm based on their natural climbing behaviour. Our apparatus consisted of a pedestal and a food dispenser both attached to a swivel arm. By climbing onto the pedestal, the dispenser with a food reward was brought within reach of the conspecific (receiver) while the goat on the pedestal (donor) had no access to the reward. Prior to testing, subjects underwent a training phase in which they learned how to operate the apparatus. 12 female non-lactating dwarf goats (housed in 2 groups) were tested in dyads. Each dyad underwent three sessions of 30 min: two test sessions with a functional apparatus and one control session in which no food was available; this was carried out to assess the influence of a food reward on the goats' motivation to interact with the pedestal. We also defined the behaviour from a donor goat as being more or less egoistically motivated according to whether they entered a defined zone around the food dispenser within the first five seconds after leaving the pedestal (egoistic) or not (egoistic). We found that the animals interacted more often with the pedestal when food was involved in the task compared to when no feed was available (test1 vs. control: $p < 0.001$; $z = 7.678$; test2 vs. control: $p < 0.001$; $z = 6.065$). In addition, goats that stood on the pedestal for longer were less likely to directly approach the dispenser ($p < 0.001$; $DF = 1$; $F = 35.228$), indicating a relationship between the duration of standing on the pedestal and whether the pushing event was egoistic or not. Our results show that this paradigm could be easily operated by the goats, indicating its biologically relevant nature. It can therefore be used as foundation for future research on altruistic behaviour in goats. By increasing our knowledge on the dynamics of social groups in farm animals, husbandry practices can be better adapted to the animals' social needs.

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ANIMAL WELFARE: THE ELEPHANT IN THE ROOM IS US**Beth Ventura**

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Animal welfare is a socially mandated field of science, borne out of ethical concern about animals. As such our research seeks not just to identify what animals need for a good life but also how to apply that knowledge to achieve welfare improvements. It is this second objective that I will explore in this talk, focusing on *how to improve the likelihood that discoveries about animal welfare are actually implemented?* Committing to this second objective as much as we do the first will ensure our field is best positioned to address growing demands facing the animal sectors to become more sustainable and more humane. Taking a One Welfare approach (i.e., recognizing the links between animal, environmental, and human welfare) is likely to be one helpful strategy, but understanding these links will require that we consider and incorporate the views of humans affected by animal care practices. Indeed, I argue that approaches from the social sciences are equally important to those from the natural sciences in identifying sustainable welfare improvements that will result in improved quality of life for the animals under human care. I will review some of the diverse approaches from social science research focused on animal welfare, for example, methods to understand how critical stakeholders within value chains - including farmers, veterinarians, and advisors- approach decisions about animal welfare on farms. Such knowledge is critical if biological research identifying welfare improvements is to be adopted. Concurrently, if scientists pursue solutions that fail to align with the values and concerns held by these stakeholders and by the general public, we risk wasting time and resources on solutions that will ultimately be rejected by society. Drawing on examples from research primarily within the livestock sectors, I will highlight the work of others applying multi- and transdisciplinary approaches and share what I have learned on my own journey to better understand the people who affect, and are affected by, the welfare of animals.

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USING PASSIVE INFRARED DETECTORS FOR GROUP AND AREA-SPECIFIC ACTIVITY RECORDING IN GROWING PIGS ON FARM

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In pig farming, the daily assessment of animal welfare and housing conditions is required by law and part of the farm's visual inspection. Due to the increasing number of animals per farm, during the visual assessment of animal behaviour and welfare only a snapshot can be taken by the farmer instead of an adequate monitoring. Continuous and objective measurements by low-cost sensor systems can assist the farmer. One method to assess the welfare of pigs is to measure and evaluate animal activity, as it is influenced by e.g., stocking density, illness, feeding, barn climate and the supply of enrichment material. In this regard, passive infrared detectors (PIDs) are a cost-effective and easy-to-use sensor technology to measure animal activity on a pen-level. The study's objective was to evaluate the use of PIDs to record general group activity as well as activity in the feeding and exploration areas in focus pens under practical conditions on seven pig farms. To validate the PID data, the behaviour was recorded by video cameras for visual scan sampling. To compare the PID outcome with the recorded behaviours, an ethogram was used categorizing active (standing, sitting, eating and playing) and inactive (lying) behaviours. Subsequently, single frames were used for scan sampling to evaluate the number of animals showing the defined behaviours in the corresponding focus areas of the pen. High correlations up to $r = 0.90$ ($n = 436$; $p \leq 0.001$) were found between the group activity measured by PIDs and the visual assessment. Based on the activity data measured by PIDs, a typical diurnal, biphasic activity pattern for pigs could be shown. The activity data in the feeding areas showed also high correlations between visual assessment and PIDs ($n = 327$; $r = 0.65$; $p \leq 0.001$). In contrast, moderate correlations ($n = 327$; $r = 0.36$; $p \leq 0.001$) were found between visual assessment and the measurement of activity by PIDs in the exploration areas. Overall, the results indicate that pig activity can be measured using PIDs on farm. This allows behavioural changes to be objectively and automatically detected at an early stage. This supports the farmer's management so that animal welfare can be optimized in the long term.

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INDIVIDUAL WELFARE IN GROUP-LIVING SPECIES: THE LIVINGSTONE'S FRUIT BAT AS A CASE STUDY

Christina Stanley¹, Morgan J Edwards¹, Tessa E Smith¹, Charlotte A Hosie¹, Dominic Wormell² and Eluned Price²

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For social animals, behavioural interactions with conspecifics are an important aspect of daily life. These can have both positive and negative implications on welfare. Monitoring welfare at the individual level in large groups is not a straight-forward task; it can often be time-consuming or invasive, especially where the animals in question are not domesticated. Social network analysis can be an invaluable tool for allowing individual-level welfare to be monitored via quantification of the social environment experienced by individuals. When coupled with simple technology and non-invasive hormonal analysis it can enable a powerful welfare assessment tool.

Here we present the results from a number of studies into the complex social experiences of individuals in the captive population of a critically endangered bat species, the Livingstone's fruit bat (*Pteropus livingstonii*). The ultimate goal of this work was to apply leading-edge, novel methodologies and technology to gain evidence-based insights into the behaviour and welfare of this species in captivity. This work has not only informed the captive management of *P. livingstonii*, but has also developed techniques that can be applied to maximise the captive welfare of a range of other social species.

Social network analysis was first used to characterise individual social experiences in the largest captive population of *P. livingstonii*, housed at Jersey Zoo. A novel method of enclosure use analysis employing principal component analysis was then applied to build on traditional enclosure use assessment methodologies, quantifying the individual spatial preferences of *P. livingstonii*. An enzyme immunoassay was then validated and applied to non-invasively quantify faecal cortisol in the *P. livingstonii* population, enabling an understanding of the relationship between cortisol titres and individual social roles and behaviour in this captive population. Finally, radio-frequency identification technology was used to autonomously collect locational data, quantifying the population foraging network and elucidating the relationship between individual bat characteristics and social foraging strategies.

In this presentation, the results of these studies will be discussed within the wider context of monitoring individual-level welfare in large groups. Whilst recommendations can be made for the management of captive bat populations, this work also highlights the importance of the individual social experience in a welfare context.

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MULTIDISCIPLINARY ASSESSMENT OF CUMULATIVE EXPERIENCE IN LABORATORY RHESUS MACAQUES**Janire Castellano Bueno, Melissa Bateson and Colline Poirier**

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Rhesus macaques are widely used in neuroscience research due to their phylogenetic proximity to humans and their ability to perform complex cognitive tasks. Optimising their welfare is essential from an ethical and scientific perspective. Neuroscience experiments can last several years and regulatory and welfare organisations have highlighted the importance of assessing macaques' cumulative experience, which is defined as the net impact of all events that affect adversely or positively the welfare of the animal over its lifetime.

To address this need, we assessed the cumulative experience of 31 socially-housed macaques involved in neuroscience experiments during a period of 3 to 8 years. In addition to alopecia, a traditional welfare indicator, we used recently validated behavioural and neuroimaging indicators. To ensure we could assess relatively small variations in cumulative experience, we first refined alopecia scoring and the behavioural indicator 'Inactive not alert' to maximise the sensitivity of both welfare indicators, while preserving their specificity.

The neuroimaging approach did not provide conclusive results. However, we found small but significant increases in alopecia scores and the frequency of Inactive not alert behaviour over the years. Subsequent analyses indicated that both increases were best explained by the number of days animals were involved in experiments, compared to other experimental and husbandry procedures.

This study provides the first evidence that being regularly involved in neuroscience experiments can induce a cumulative negative effect in laboratory macaques, despite husbandry and experimental procedures having been subjected to strict European welfare regulations. These results highlight the need to refine welfare indicators to detect impacts of small amplitude, which is crucial to retain support from the general public for animal experimentation.

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ABNORMAL REPETITIVE BEHAVIORS IN DAIRY CATTLE- TO BE CONSISTENT OR NOT TO BE CONSISTENT?**Isabelle McDonald-Gilmartin¹ , Blair Downey² and Cassandra Tucker¹**¹Animal Science Department, University of California, Davis, USA²Animal Science Department, University of Tennessee, Knoxville, USA*immcdonaldgilmartin@ucdavis.edu*

Abnormal repetitive behaviors (ARBs), performed frequently in many captive animal species, have been used as an indicator of welfare. Dairy cattle perform ARBs including tongue rolling (TR) and non-nutritive oral manipulation (NNOM), but the prevalence of these behaviors in populations is not well recorded. Furthermore, the consistency of the performance of ARBs in dairy cattle has not been measured, an important consideration when considering the validity of future studies. We set out to measure the performance of TR and NNOM in dairy cattle at the UC Davis Dairy Facility. Both behaviors were evaluated in growing heifers (n=120) and lactating cattle (n=76). Cattle were observed in 7 pens, grouped by age as per farm protocol, and observed from 06:00-20:00h. Behavior sampling was used to record the performance of TR and NNOM in 30-min intervals, for 24 intervals/d. Each pen was recorded twice, with recording days less than 48h apart. In our population, an average of 15±3, and 25±7% (mean ± SE) individuals per interval performed TR and NNOM respectively. Spearman rank correlations were performed to assess the consistency of these behaviors across days, using group as the experimental unit. Both TR and NNOM were positively correlated across days ($r \geq 0.97$, $p < 0.01$). Furthermore, the performance of TR and NNOM were positively correlated to each other on both days ($r \geq 0.90$, $p < 0.01$). These results demonstrate that the performance of ARBs in a population of dairy cattle is consistent across days, suggesting they could be measured by just a single day of sampling.

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ARE RESULTS ON A JUDGEMENT BIAS TEST AFFECTED BY PRE-SESSION DISCRIMINATION OR GENERALIZATION TRAINING IN DOGS?

Joseph Krahn, Amin Azadian and Alexandra Protopopova

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The spatial Judgement Bias Test (JBT) is a cognitive test that involves teaching dogs that a container in one location will provide a food reward and the same container in another location will not. The dog is then presented with the container in ambiguous locations and the latency to approach those locations is often used to measure expectation of reward, operationally defined as 'optimism'. Some authors suggest that greater 'optimism', as shown in a JBT, indicates higher welfare. However, performance in JBTs may be more indicative of learning history; dogs that have learned to be more discriminative likely show lower 'optimism' independently from their welfare. Therefore, we hypothesized that a dog's 'optimism' in a JBT may differ following a learning task that promotes discrimination or generalization. Pet dogs ($n=16$, data presented for 8) each completed a JBT pre-treatment, a learning task (treatment), and a JBT post-treatment. During the JBT, dogs were presented with 5 locations: 1 rewarded, 1 unrewarded, and 3 ambiguous (all unrewarded). Dogs were randomly assigned to a trial-based learning task: Discrimination ($n=8$, data for 4) or Generalization ($n=8$, data for 4). The task involved teaching the dog an arbitrary behaviour—a nose-touch to the palm of the hand. In Discrimination, an experimenter presented the dog with two hands in each trial, but the dog was only rewarded for touching one hand. In Generalization, dogs were presented with one hand per trial in alternating sequence and responses on all hands were rewarded. To control for possible frustration differences due to the presence of non-rewarded trials in Discrimination, dogs in the Generalization were yoked to dogs in the Discrimination to receive the same number of randomly distributed unrewarded trials. As a further control, owners were asked to describe the current emotional state of their dog prior to any sessions. We analyzed our preliminary data with a generalized linear model, as follows: the dependent variable was latency to approach the ambiguous locations (log transformed for normally distributed residuals); fixed effects were location, JBT (1st or 2nd), and treatment; dog was included as a random effect. We found an effect of bowl location on latency ($F_{2,37}=103.04$, $p<0.0001$), but no effect of JBT ($F_{1,37}=0.27$, $p=0.61$) or treatment ($F_{1,37}=0.01$, $p=0.94$). A larger sample size will clarify trends. If still no effect, we may conclude that performance of dogs on the JBT may not be sensitive to pre-session discrimination or generalization training.

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LIDOCAINE USE IN LARGE PELAGIC FISH RESEARCH

Ghalia Abel¹, Alex Allison², Francesco Garzon¹, Lucy Hawkes¹, Thomas Horton¹, Gregory Paull¹, Alexander Plaster³, Jessica Rudd¹, Lynne Sneddon⁴ and Matthew Witt¹

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Pain relief for wild fish undergoing tagging is often refuted due to uncertainties regarding the efficacy and practicalities of anaesthetic use in the wild and the added air exposure times associated with administration of pain relief. Biologging tags are essential tools used to record behavioural, physiological and ecological data from wild fish for population management, fisheries and conservation research. However, biologging data can be difficult to interpret for the first days to weeks post-tagging owing to potential atypical behaviours in response to capture and tagging, which may bias results. Atypical behaviours (e.g. rapid and prolonged fleeing from the location of tagging) could be linked to discomfort and temporary or prolonged pain stemming from invasive external tag attachment techniques (e.g. intramuscular darts) or internal implantation of tags. Fish possess nociceptors, nerve fibres that activate after being subjected to noxious stimuli, comparable to those in mammals. Local anaesthetics such as lidocaine can block nociception in muscle tissue subjected to invasive procedures, improving welfare and potentially reducing behavioural bias. Here, we describe the practicalities of intramuscular lidocaine use in wild Atlantic bluefin tuna (ABT) prior to tagging with two electronic tags using intramuscular darts. A lidocaine protocol was developed and used on seven ABT and compared to a further six ABT tagged without lidocaine. Doses administered to ABT ranged between 4 – 9 ml (2% lidocaine at 0.1ml/kg). Time spent on deck increased by ~30% for ABT receiving lidocaine (two doses administered one each side of the second dorsal for two biologging tag attachment sites; mean = 3 minutes 40 seconds ± 52 seconds) in comparison to fish also tagged twice, but without lidocaine (mean = 2 minutes 49 seconds ± 25 seconds). Lidocaine administration was practical and safe on deck with few additions of lightweight, clinically accessible, compact and affordable equipment. This project demonstrates that administration of lidocaine prior to darting can be achieved at low cost, with a moderate increase of aerial exposure. Where practical, pain relief should be considered further in biologging studies due to the potential for reduced bias in data collected and the added welfare benefits for the fish involved. Next steps will entail quantifying differences in fine-scale post-tagging behaviours of ABT tagged with and without lidocaine and investigating artificial gill irrigation techniques that may minimise the effects of aerial exposure.

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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 the winner of the UFAW Medal is **Professor Per Jensen** ([Linköping University, Sweden](#)).

Previous winners have been:

- [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 \(University of British Columbia, Canada\)](#)
- [2013 Professor John Webster \(University of Bristol, UK\) and Professor Peter Sandøe \(University of Copenhagen, Denmark\)](#)
- [2012 Professor Christine Nicol \(University of Bristol, UK\) and Professor Marian Stamp Dawkins \(University of Oxford, UK\)](#)

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 there are two winners of the UFAW Early Career Researcher of the Year Award - **Dr Jordan Hampton** ([University of Melbourne, Australia](#)) and **Dr Sara Hintze** ([University of Natural Resources and Life Sciences Vienna, Austria](#)).

Previous winners have been:

- [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 \(Universitat Autònoma de Barcelona, Spain\)](#)
- [2016 Dr Rowena Packer \(The Royal Veterinary College, UK\)](#)
- [2015 Dr Jasmeet Kaler \(University of Nottingham, UK\)](#)
- [2014 Dr Lisbet Pluym \(Ghent University, Belgium\)](#)
- [2013 Dr Nuno Franco \(Institute of Molecular and Cell Biology, Porto, Portugal\)](#)
- [2012 Dr Charlotte Burn \(The Royal Veterinary College, UK\)](#)

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PLAY AS A ROUTE TO IMPROVED WELFARE**Per Jensen**

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Good welfare is more than the absence of stress and suffering. It also comprises positive emotions and joy that improve short-term welfare and can have life-long effects. A strong candidate behaviour that may mediate life-long positive welfare is play, which is widespread among homeothermic animals. It has been defined as not fully functional, fractionated (in time and sequence) behaviour mainly in young individuals. It is self-rewarding and performed when there are no immediate risks to the animal's fitness. Hence, animals that are free from disease and stress play more, indicating better welfare.

It has been assumed that the ultimate function of play is to improve calibration of muscles and nervous circuits crucial for adult life. However, recently it was suggested that the function is primarily to improve cognitive abilities that can be used in a variety of contexts, for example, allowing efficient and cognitively flexible coping with environmental stress later in life.

Very few studies exist on play in chickens, and the results are relatively non-conclusive. However, extensive play in young chicks have been demonstrated in our recent research, and consists of, for example, sparring, frolicking, and food running. We have therefore developed a research program based on the working hypothesis that play behaviour in young animals is a key to both immediate and long-time welfare, and that stimulating play may be an efficient way to improve welfare in a lifetime perspective. In line with this, we recently developed a novel method to induce play in young chicks by stimulating them in enriched "play arenas". We observed 14 different types of play peaking between 25-35 days of age and being significantly more frequent in domesticated than in ancestral birds. The peak coincides with the time at which cerebellum reaches its maximum relative size during brain ontogeny, raising the possibility that this part of the brain is crucial for life-long welfare. In pilot studies, we also found that stimulating play may buffer early stress and make chicks more resilient towards later challenges. This is a research path we will follow up extensively in coming years.

These results and hypotheses open a novel and promising route towards a deeper understanding of the mechanisms and functions of play and its relationship with animal welfare in a short- and long-term perspective.

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WHY DOES LIFELONG CONVENTIONAL HOUSING REDUCE THE SOCIABILITY OF FEMALE MICE?

**Lindsey Kitchenham¹, Basma Nazal², Aimee Adcock², Emma Nip², Aileen MacLellan¹
and Georgia Mason¹**

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Compared to peers raised in 'enriched', well-resourced housing, female mice from conventional barren cages are more aggressive to cage-mates, and less sociable with familiar non-cage-mates (especially if they too are from conventional cages). But how do such effects occur? Using Social Approach Tests, and middle-aged mice with well-documented lifelong behavioural time budgets, we tested the hypotheses that conventionally-caged C57/BL6 ('C57') subjects presented with non-cage-mate 'stimulus mice' (C57 or BALB/c 'BALB') would be less sociable, less socially attractive, and more agonistic to unfamiliar conspecifics, compared to well-resourced C57 subjects. We also assessed whether any effects reflected that subject mice had, over their lifespans, been more agonistic with cage-mates, and/or spent much of their time inactive but awake ('IBA' – a depressive-like behaviour) or performing stereotypic behaviour ('SB'). C57 'subjects' (N = 15: 8 well-resourced, 7 conventionally-caged) were presented with two BALB (n = 16) or two C57 (n = 16) 'stimulus' mice: one from well-resourced housing (n = 15) and one from conventional cages (n = 15). We measured subjects' sniffing, proximity, and aggression towards each stimulus mouse while controlling for general exploration by measuring investigation of novel objects. Generalized linear mixed models then tested the hypotheses. Results replicated previous findings: conventionally-caged C57s were less sociable with non-cage-mates than were well-resourced C57s. Results also revealed that this reduced sociability was best explained by conventionally-caged subjects' agonistic interactions in their home cages. Additional, albeit less robust, roles were also played by displaying lifelong high levels of IBA and SB. Furthermore, although conventionally-caged subjects were no more aggressive than well-resourced subjects towards stimulus mice, BALB stimulus mice were much more agonistic to conventionally-caged subjects than to well-resourced ones. Housing also affected BALBs' social attractiveness: subject mice tended to prefer well-resourced BALBs over conventionally-caged BALBs. Mice can therefore discriminate between conventionally-caged and well-resourced conspecifics. Overall, lifelong poor welfare in barren housing can thus negatively impact social behaviour in middle-aged female mice. Results broadly suggest that the individuals most adversely affected by conventional cages also show the most reduced sociability. Better-resourced 'enriched' cages may therefore enhance welfare, not only by physically enabling natural behaviours, but also by promoting positive social interactions. How mice discriminate between well-resourced and conventionally-caged conspecifics now needs investigating.

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ANIMAL WELFARE SCIENCE MUST LOOK AT TIME**Cynthia Schuck-Paim and Wladimir Alonso**

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Time is at the heart of how conscious organisms experience life. Affective states, positive or negative, matter more or less depending on their intensity and, critically, their duration. Time-based measures of well-being and health have been widely used in human research to measure the impact of diseases and other adverse events. For example, disease burden in human populations is often measured and compared based on the number of years of healthy life lost due to ill-health. Although time-based metrics of well-being are biologically meaningful and comparable, with a few exceptions the temporal dimension of welfare outcomes has been greatly overlooked in animal welfare research. Little attention has been paid to understanding when different welfare challenges emerge, how long they last, or how quickly they progress. Here we report on specific areas where attention to time is missing in poultry welfare research. In broiler research, few studies examined patterns of onset and progression of gait-impairing conditions, or how long individuals typically spend under each gait score. Likewise, little is known on the extent to which the onset of different welfare challenges is delayed in slower-growing breeds, hence whether they experience ailments for a longer time given their longer lifespan. In egg-laying hens, data is scant on the temporal evolution of egg peritonitis, the leading cause of mortality and major source of pain. Likewise, little is known about the duration of the pain associated with keel bone fractures, the time course of vent pecking events, fatal cannibalistic attacks or how the time spent in motivated behaviors changes over the production cycle. In poultry in general, there seems to be no studies on the clinical evolution of sepsis, a painful condition and often the main cause of carcass condemnation. Animal welfare science must look at time if we are to improve our understanding of the impact of different practices, interventions and production conditions on the time animals spend in different affective states, hence ultimately their welfare.

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AN APPROACH TO WILD ANIMAL WELFARE FOR THE ANTHROPOCENE**Jordan Hampton^{1,2}**¹ Faculty of Science, University of Melbourne, Australia² Harry Butler Institute, Murdoch University, Australia*jordan.hampton@unimelb.edu.au*

The rapidly escalating and compounding challenges presented by the Anthropocene are changing all aspects of life. The ubiquity of anthropogenic changes to our world have forced profound changes to fields such as medicine, leading to the rise of ideas such as One Health, which recognise the connectedness of all life on Earth. Such realisations have happened more slowly in the field of animal welfare science. Rooted in a history focused on deliberate cruelty in intensive animals use industries, animal welfare science ideas have only relatively recently begun to filter into the realm of ecosystems. When applied to wildlife, animal welfare ideas (and related legislation) continue to be anchored to ideas such as hedonistic accounts of what wild animals that are directly and intentionally harmed might experience. However, ecological processes are more complex than laboratory settings, and the majority of anthropogenic processes that harm wild animals today are not intentional. The traditional approach fails to address emerging indirect and unintentional threats such as climate change or toxic chemical in the environment. Poisons impacting wildlife have rarely been considered by animal welfare studies, beyond studies assessing welfare impacts of poisons intentionally applied to wildlife (e.g. 1080 baits for brushtail possums, *Trichosurus vulpecula*, in New Zealand). This presentation focuses on one process that I have been studying: lead (Pb) from ammunition, which can cause pain and physiological disruption in wildlife scavengers (e.g. birds of prey or 'raptors') that are secondarily poisoned by feeding on shot carcasses. The numerical scale of this processes is enormous. For example, lead exposure is likely to currently impact ~150,000 bald eagles (*Haliaeetus leucocephalus*) in the USA. When such impacts are accounted for, very different conclusions may be reached regarding the holistic animal welfare outcomes of certain wildlife management activities (such as shooting programs). This proposal builds on the idea of "animal welfare accountancy" proposed by Penny Fisher and colleagues in 2019, and is designed to provide the empirical basis for the challenge set by David Fraser in his essay "Why we need a new ethic for animals" in the same year. New ways of thinking about animal welfare are indeed needed to tackle wildlife dilemmas in the Anthropocene, and I argue that any contemporary wildlife welfare assessment that claims to be holistic needs to explicitly account for indirect and unintentional harms.

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ANIMAL WELFARE ASSURANCE IN THE 21ST CENTURY: NAVIGATING THE LANDSCAPE OF WELFARE-WASHING, REGULATORY CAPTURE, AND SOCIAL LICENSE TO OPERATE

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Community attitudes towards animal welfare are changing, putting pressure on industries dependent on animals to ensure their welfare for sustainable operations. These industries, like the mining and forestry sectors, must balance economic interests with public concerns to maintain their social license to operate. This presentation will examine key concepts such as welfare-washing, regulatory capture, social license to operate, and the role of scientific evidence in understanding and advancing animal welfare in operations dependent on animals.

Determining whether an animal welfare claim is genuine, or a form of welfare-washing can be challenging, as operators may use similar language and marketing techniques to promote both. Akin to greenwashing in the environmental sector, welfare-washing refers to the practice of presenting false or misleading information about an operator's animal welfare practices to appear more ethical and improve their public reputation. This often involves making intentionally vague, unverifiable claims instead of concrete improvements to animal care. Regulatory capture refers to when an industry influences regulators or laws responsible for protecting animal welfare, leading to lenient or biased regulations. Social license to operate refers to the trust and acceptance of society that an industry is acting ethically and responsibly. This requires aligning practices with the current evidence base, public values, and animal welfare expectations.

Animal welfare science provides critical evidence for good practice in animal welfare, by studying the lived experience of animals and effects of different environments and management practices on their well-being. This evidence can inform recommendations and underpin independent assessments of animal welfare in different industries.

This presentation will provide practical tips for evaluating animal welfare claims using representative case studies ~~Back~~ agriculture, zoos, working, companion, and racing contexts. This includes examining the validity of claims, transparency and accountability, expertise, and broader implications of animal welfare practices. The focus will be on differentiating between genuine animal welfare advancements and misleading welfare-washing.

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COMING HOME, STAYING HOME: ADOPTION AND RETURN OF DOGS FROM RSPCA QUEENSLAND SHELTERS**Eileen Thumpkin¹ , Mandy Paterson², John Morton³ and Nancy A. Pachana¹**¹ School of Psychology, University of Queensland, Brisbane Australia² RSPCA Queensland, Brisbane Australia³ Jemora Pty Ltd, East Geelong, Victoria, Australia*e.thumpkin@uqconnect.edu.au*

Not all dog adoptions are successful the first, second or third time around. A two-year retrospective study, using survival analysis investigated readmission data for dogs adopted from RSPCA Queensland shelters between January 2019 and December 2020. It was anticipated that a better understanding of temporal patterns and possible risk factors associated with readmissions may help shelters better target and tailor resources to improve retention. Approximately two-thirds of all returns occurred in the first two-week period before return rates stabilized around day 22. The overall return rate for dogs adopted in this study was just under 15%. Significant risk differences were identified between size, age, colour, breed, and time-in-foster subsets before adoption. Small toy cross dogs aged 2 to <3 months, who had been in foster care before adoption, were at a much lower risk of return. In contrast, brindle giant-breed cross dogs aged 6 to <12 months, who had not been in foster care before adoption, were much more likely to be returned after adoption. Time-in-foster before adoption appears to reduce the risk of return and may be a protective factor supporting a successful transition to the new home environment. In addition, behaviour support provided for the dogs appeared to be working to improve their outcomes. More significant development of foster capacity and capability, community outreach, as well as pre-adoption processes could enable more effective targeting of support for the different subsets, such as older or larger dogs. Complementing this analysis are the insights from interviews with adopters of dogs at higher risk of return. This work will allow shelters to understand more about the human-canine relationships in those critical first days and weeks post adoption, and how to build and strengthen that human-canine bond. Early analysis of interviews highlights the willingness of some adopter to recalibrate their expectations, the importance of capability and capacity to manage and adapt the behaviour of adopter and dog, and the need for shelters to invest more into the selection and training of the adoption staff, who are a critical interface with adopters. Perhaps there is an opportunity to provide a more experiential journey for potential adopters using digital technology, to harness the power of stories, and to share others' journeys of 'coming home and staying home'.

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POPULARITY AND PUBLIC PERCEPTIONS OF COMPANION ANIMAL CONTENT ON INSTAGRAM**Simone Reveentharan and Caralyn Kemp**

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The use of animals in social media as photo props is a concern, as these animals are often anthropomorphised. Anthropomorphism can contribute to negative welfare through a misunderstanding of an animal's behaviour and needs, leading to inappropriate handling and care. To date, the limited research on the portrayal of animals on social media has focused on wild animal. This research has found concerning trends that species were viewed as not threatened and individual animals as tame and easily kept as pets because of their representation in an anthropomorphic setting. To our knowledge, a similar evaluation has not been conducted for companion animal content on social media. This study investigated the photographic portrayal and content of companion animals, both domestic and exotic pets, and their reception, on public Instagram accounts. A systematic search of dog (*Canis lupus familiaris*), cat (*Felis catus*), rabbit (*Oryctolagus cuniculus domesticus*), guinea pig (*Cavia porcellus*), parrot (var. spp.), chinchilla (*Chinchilla lanigera*) and reptile (var. spp.) public accounts was conducted to select a pseudorandomised ten of each. Five accounts from each species were chosen for having predominantly anthropomorphised posts, with the other five showing more natural settings and behaviours. A random selection of ten posts from each account was then selected and assessed for their content (anthropomorphic or natural portrayal), popularity (number of likes/comments) and comments. Results found that overall anthropomorphic content was significantly more popular than naturalistic content, as indicated by the number of 'likes' on each post, (mean 331.01 and 234.70 'likes', respectively), although there were species-specific differences. In particular, anthropomorphic content was particularly more popular in the case of dog and, concerning, reptile accounts (mean 411.24 likes for anthropomorphic reptile content versus 201.28 likes for natural reptile content). Comments showed the same trend. Interestingly, there were similar public attitudes towards both anthropomorphic and naturalistic content, with comments being predominantly encouraging. Using animals to promote products was also more popular in anthropomorphised imagery. With exotic pet (i.e. reptiles) ownership on the rise, and knowledge of their needs and behaviour limited, the popularity and lack of awareness of anthropomorphised posts are concerning as it increases the potential for undiagnosed stress. This study suggests a need for concern regarding companion animal content on Instagram. Social media organisations must carefully manage the potentially harmful animal imagery associated with anthropomorphism, as it may impact animal welfare and behaviour.

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FACTORS CONTRIBUTING TO THE PREVALENCE OF DAIRY COW LAMENESS IN MILK SHED AREAS OF BANGLADESH**Solama Akter Shanta, Md. Aktaruzzaman, AKM Anisur Rahman and M. Ariful Islam**Animal Welfare Research House, Department of Veterinary Medicine, Bangladesh Agricultural University,
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Lameness is one of the most pressing health, production, and welfare problems on intensive dairy farms. A cross-sectional study was conducted to determine the prevalence of lameness, identify the associated risk factors and assess the impact of lameness on milk production. This study was carried out on randomly selected 643 cows from 30 dairy herds in Pabna and Sirajgonj districts. A pretested structured questionnaire and direct observation were the main tools for collecting information from respondents and determining risk factors regarding different aspects of lameness. Data were collected from farmers, with an inclusion criterion of having at least 5 cows with farming experience of more than 6 months. Animals were observed during in motion for detection of any kind of abnormalities in locomotion. Milking and pregnancy status, milk yield before and after disease, feeding, body condition score, parity, floor type, frequency of floor cleaning, bedding type, and herd size were hypothesized to be risk factors for lameness and statistically tested. Out of 643 dairy cattle examined, 107 (16.64%) showed lameness in different grades, with 58.0% mild, 29% moderate, 11% lame, and 2% severe lame. Lameness was significantly associated with floor type, concentrate feed, parity, pregnancy, and milking status ($P > 0.05$). The study revealed that lameness mainly occurred due to hoof disorders like overgrowth/lesions/crack (20.56%) and carpal/tarsal joint lesions (14.95%). Lameness was significantly higher in hind limbs (13%) than in forelimbs (3.5%). In milking dairy cows, the mean daily milk yield (av. 11.46 L/day/cow) was significantly reduced (av. 9.38 L/day/cow) after the onset of lameness. The study showed that lameness is associated with milk yield and is an economically important welfare problem in studied dairy units. Therefore, farmers should give attention to lactating cows for early detection and prevalence of lameness to minimize economic loss.

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ASSESSMENT OF PRE-SLAUGHTER PRACTICES - A KNOWLEDGE ATTITUDES PRACTICES (KAP) SURVEY OF GOAT WELFARE AT ABATTOIRS OF PUNJAB AND SINDH

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Background: With more than 82 million head in the national herd, Pakistan has the 4th largest national goat herd globally. The welfare of goats has had limited investigations at slaughterhouses in Pakistan, despite being a vital livestock sector. This study aimed to address this by (1) evaluating the knowledge and understanding of animal welfare amongst stockpersons of the mutton value chain in Punjab and Sindh provinces in Pakistan; (2) evaluating stockpersons' attitudes to changing practices to ameliorate pre-slaughter stress; and (3) welfare assessment of goats slaughtered.

Methodology: The study involved a knowledge, attitude, and practices (KAP) survey questionnaire of male stockpersons (n = 120) regarding pre-slaughter welfare including transporters, unloaders, traders, veterinarians and handler staff, mostly (n=93) having informal education, at three abattoirs in Punjab and three in Sindh. Responses were scored using a Likert scale. The live weight, health-based welfare parameters, and carcass characteristics of 500 goats were also collected slaughtered at abattoirs.

Results: Survey results demonstrate that the mean knowledge score of stockpersons was $2.94/5 \pm 0.05$ (mean \pm SE, with 5 being the highest knowledge score), while mean scores of their attitude and practices were 3.43 ± 0.02 and 3.19 ± 0.02 respectively. Binary regression of questionnaire survey suggests chain actors from Sindh hold significantly lower levels of knowledge ($p=0.001$), especially at municipal (Government run) slaughterhouses. The KAP scores found significantly ($p=0.000$) higher in Punjab persons having formal education, 10 years of experience with good understanding of slaughtering and halal acts and in vets. Of the 500 goats assessed, 82.8% slaughtered were juvenile, 61.2 % were male, >50 % were 'skinny' (43 % thin, 12 % emaciated), 14.8 % had soiled coats, 7 % with shivering legs, 4% had respiratory issues, 2% were lame at unloading. Overall, the mean dressing percentage was 46.8 and >10 % bruises were found on goat carcasses at abattoirs. Generalized linear modelling will be used to explore association between explanatory variables and KAP responses, and a similar approach will be used to assess associations between goat welfare scores and explanatory variables.

Conclusion: The scores for the parameters of animal welfare KAP were all above the median, but there is room to improve welfare, transportation, and handling practices. Preliminary analyses indicate differences between facilities, indicating that training needs to be tailored, and worker KAP is significantly associated with the stockperson's type, education, experience levels, acts understanding.

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OWNER BELIEF IN SENTIENCE LEADS TO BETTER DONKEY WELFARE IN VERY CHALLENGING WORKING ENVIRONMENTS**Syed Saad Ul Hassan Bukhari^{1,2}, Alan McElligott^{2,3}, Sarah Rosanowski^{1,2} and Rebecca Parkes⁴**

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Working donkeys (*Equus asinus*) support human living standards globally. However, there is little information on the effect of human perceptions of sentience (ability to feel pain and to have positive and negative emotions) on their welfare. We interviewed donkey owners (n = 332) in Pakistan to determine the relationship between human perspectives of donkey emotions, the ability to feel pain, and working practices that could impact welfare. The majority of owners used padding under the saddle [n=211; 63.6%; 95% CI (58.0% - 69.0 %)] and provided access to food [n=213; 64.2%; 95% CI (59.0% - 69.0%)] and water (n=195; 58.7%; 95% CI (53.0% - 64.0%)] during the working day. Two-thirds of owners reported load-associated injuries during their donkey's life (65.3% (95% CI 60.0% - 71.0%)), of which 27.7% (n=92; 95% CI 23.0% - 33.0%) were wounds, 20.5% (n=68; 95% CI 16.0% - 25.0%) were lameness, and 7.2% (n=24; 95% CI 4.0% - 10.0%) were back pain. In total, 81.3% (95% CI 77.0% - 86.0%; n=270) of owners believed that their donkeys felt pain, and 70% (95% CI 65.0% - 75.0%; n= 233) believed that their donkeys had emotions. We used Multiple correspondence analysis (MCA) to understand the relationship between owners' recognition of emotions and pain in donkeys and how they worked with the animals. The MCA factor map revealed two clusters, named positive and negative ones. The positive cluster included owner's recognition of donkey pain and emotions, the availability of food and water, use of padding under the saddle, the absence of injuries, and a reported willingness to follow potential loading guidelines. The negative cluster represented practices that did not benefit donkey welfare, such as using saddles without padding and a lack of food and water during work. The presence of injuries, owners not recognizing that donkeys feel pain and emotion along with a reported unwillingness to follow potential loading guidelines were also found in the negative cluster. We show that owners who recognized sentience in their donkeys were more likely to work in a manner that is good for welfare. The ability of owners to identify sentience, along with their willingness to follow guidelines, are very important factors for better donkey welfare even in very challenging working environments.

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BEE SENTIENCE AND ITS WELFARE IMPLICATIONS**Lars Chittka**

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Decades of research have revealed that at least some insects are remarkably intelligent. Bees for example can count, recognise human faces, solve tasks by thinking rather than trial and error, and learn simple tool use by observing skilled conspecifics. This led to the question of whether they are also sentient – i.e. whether they can also experience emotions. If the answer is yes, and if these findings generalise to other insects, then this has major implications for the welfare of farmed species such as mealworms, black soldier flies and crickets. Using the same psychological and neurobiological criteria as those used for vertebrates, we tested if bees and other insects have emotion-like states, including the capacity to feel pain. This question cannot be answered with formal certainty in any non-human animal, because of the lack of language. However, the more of the following criteria an animal fulfils, the more likely it is to experience pain: presence of nociceptors (damage-indicating sensors); neural connections between nociceptors and the brain; sensory integration of noxious stimuli with other sensory inputs in the brain; effectiveness of analgesics and self-medication when injured; learning from painful experiences; motivational tradeoffs (pitching painful experiences against rewards); protection of injured limbs. We found that bees display key indicators of sentience, including positive and negative cognitive biases (“optimism v pessimism”), play-like behaviour (indicating a capacity to enjoy activities), and a capacity to respond flexibly (not reflex-like) to noxious stimuli, indicating the capacity to feel pain. Many other insects fulfil sufficiently many criteria for pain experiences to indicate with reasonable certainty that ethical concerns for their welfare are important.

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DO LOP-EAR OR BRACHYCEPHALIC SKULL SHAPE CONFORMATIONS PREDISPOSE RABBITS TO DENTAL DISEASE?

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Previous evidence has suggested that rabbits with lop ears and brachycephaly have a higher prevalence of dental problems (Siriporn and Weerakhun 2014; Johnson and Burn 2019). In the current study, breed-related risk factors for dental disease were evaluated, dental disease prevalence was calculated, and welfare implications were assessed.

Electronic patient records from 161,979 rabbits in 2019 in VetCompass (holding clinical data from over 30% of all UK primary care practices) were analysed in this retrospective cross-sectional study. Morphological characteristics were derived from recorded breed information, and candidate cases were manually reviewed to identify dental disease and treatment information. Risk factor analysis was performed using multivariable binary logistic regression models.

The study included a random sample of 2,219 dental cases and 117,890 non-cases. The one-year period prevalence of dental disease was 15.4% (95% Confidence Interval [CI]: 14.8-16.0). Neither lop ear conformation (Odds Ratio [OR]: 1.12, 95% CI: 0.99-1.26) nor brachycephalic skull conformation (OR: 1.13, 95% CI: 0.97-1.31) showed significant associations with dental disease. Male rabbits had higher odds of dental disease than females (OR: 1.23, 95% CI: 1.12-1.35), and those with rex fur type had lower odds than those with standard fur (OR: 0.68, 95% CI: 0.50-0.91). As bodyweight increased, the odds of dental disease decreased but as age increased, the odds of dental disease also increased. Of the confirmed cases, the most common recorded clinical signs of all types of dental disease were reduced appetite in 25.1% of cases, reduced faecal output in 10.9%, and ocular discharge in 10.6%. Dental disease was recorded as the primary reason for death in 16.8% of all dental disease cases and recorded as a contributory factor in a further 34.4%.

Dental disease is a welfare concern in rabbits indicated by its high prevalence, detrimental clinical signs, and frequent reason for death. This information can be used to encourage earlier recognition of diseased rabbits, paying particular attention to rabbits increasing in age, that have a low bodyweight, or are male. The results indicate rabbits with erect ears or normocephalic skull shapes should not be overlooked in practice as they have as high a prevalence of dental disease as lop-eared and brachycephalic breeds.

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EVALUATION OF SPLIT CALCIUM FEEDING TO REDUCE KEEL BONE FRACTURES IN MULTI-AVIARY HOUSED LAYING HENS**Michael Toscano¹ and Lukas Jasiunas²**¹ Centre for Proper Housing of Poultry and Rabbits, VPHI Institute, Universität Bern, Switzerland² Healthier Hens, South Pasadena, USA*michael.toscano@unibe.ch*

Keel bone fractures (KBF) are one of the greatest welfare problems facing commercial egg production with estimates from multiple studies indicating upwards of 50% hens are affected by the end of lay, with fracture susceptibility increasing rapidly from 23 weeks of age (WoA) and peaking at around 50 WoA. While the causes of KBF are multifactorial and influenced by diet, age, housing, genetic line, and other factors, improved nutrition could be one strategy used to improve bone health. However, manipulations of dietary calcium have previously focused on supporting eggshell formation. In this study, hens (24-60 WoA; 225 hens/pen) kept in a commercial multi-tier aviary system (Landmeco Harmony; Globogal AG, Lenzburg, Switzerland) are fed either a conventional diet (Control, n=4 pens) or a time-dependent diet that delivers an estimated 60% of daily calcium (Ca) in the final two lighted hours (Treatment, n=4 pens). The treatment, often called split-feeding approach and developed for end of lay hens to maintain egg quality, is intended to provide animals with a better match between Ca requirements that are increased during sleep when the eggshell is actually formed. By increasing the amount of available calcium from dietary sources, greater retention of bone mineral and consequent reduced frequency and severity of KBF are anticipated. Bone parameters are also assessed to verify that the studied dietary intervention and changes in fracture incidence are linked mechanistically. Initial production data to 32 weeks of age show no difference in egg weight or productivity, with slight decreases egg quality. Commercially-relevant experimental data on the impacts of timing of calcium delivery in the diet on KBF is acquired, while also calculating the associated costs of such diets and the potential benefits to production, assessing the economic implications of the implementation of such a dietary intervention to improve hen welfare.

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WHAT DO WE MEAN BY ANIMAL WELFARE? CRITIQUE OF THE THREE CIRCLES MODEL AND A PROPOSAL FOR A NEW DEFINITION

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Fraser et al (1997) and Fraser (2013) have characterised how scientists and commentators have conceived of and defined animal welfare. [1, 2] According to Fraser et al (1997) and Fraser (2013) scientists and others characterise welfare as based on naturalness, feelings, and physical health/function. The three circles conception of welfare illustrates these overlapping but distinct elements of welfare, which in some scenarios can be in conflict. The three circles model of welfare was intended to document how scientists and commentators conceived of welfare. Indeed, Fraser et al (1997) proposed an alternative model of welfare, based on adaptation. [1] Despite this, the three circles conception has become a dominant model in research, policy, practice, and education. This research discusses conceptions of animal welfare, critiques the three circles model, and proposes a new definition of animal welfare.

There are two key problems with the three circles model. First, the model has inadequate explanatory adequacy. As Fraser et al (1997) proposed, animal welfare is related to an animals adaptation to its environment. [1] Despite this, the three circles model provides little information about the relation between naturalness, physical health/function, and feelings. Second, the three circles model leads to epistemic relativism about the concept of welfare, and therefore about judgments about particular welfare states. This leads to moral relativism related to claims about how animals should be kept. For instance, a focus on physical health and function may permit animals to be kept indoors, whilst a focus on naturalness would mandate outdoor access. Arguably, such an outcome is suboptimal for research, policy, and practice.

This research proposes that animal welfare is a state of complete physical health and mental wellbeing, where the nature of the sentient animal is in harmony with its living and non-living environment and its bodily integrity is respected. The definition includes reference to the relations between the animal and its environment, and its physical health and mental wellbeing, and therefore has superior explanatory adequacy. It is broad and holistic, therefore less likely to underdetermine welfare. [3] Furthermore, it similar to the WHO definition of health and wellbeing. [4] This is beneficial because government policy should be informed by consideration of impacts on human wellbeing and animal welfare. Definitions of welfare influence research, policy, and practice, and have major impacts on animal welfare in the real world.

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USING EVIDENCE TO INFORM POLICY FOR CAPTIVE ELEPHANT MANAGEMENT**Lisa Yon¹ and Ellen Williams²**¹ University of Nottingham, Nottingham, UK² Harper Adams University, Newport UK*lisa.yon@nottingham.ac.uk*

Guidelines on the management of zoo-housed wildlife, including for charismatic megafauna such as elephants, are increasingly coming under public scrutiny. There is an emerging interest in developing new policy and practice for captive elephant welfare, both in zoos and in other managed contexts, around the world. Across all species there is a need for evidence-based approaches to animal management, which enables provision of environments that enable animals to thrive, not just survive.

In recent years there has been development of welfare assessment tools to evaluate animals held in zoological collections. Historically, despite the recognition of the need to improve housing and husbandry for zoo-housed elephants, there was a paucity of information on how to evaluate or develop appropriate guidelines for managing captive elephants, that can be used as an evidence base for elephants in other managed contexts (e.g. animals in tourism, working animals). Such information is essential to ensure provision of appropriate environments which encourage positive welfare, and enable a good quality of life, for captive elephants in a range of settings and facilities worldwide.

We undertook a series of research projects over more than a decade, in partnership with staff at UK elephant holding zoos, with input from experts both nationally and internationally, to identify the most important aspects of their physical and social environments which encourage positive welfare in captive elephants, and identified key behavioural measures of their welfare. The identified measures were incorporated into the Elephant Behavioural Welfare Assessment Tool, which was designed to enable keepers to undertake regular assessments of elephant behaviour to evaluate their welfare over time.

In this talk I will review some of the key studies underpinning this work, and will discuss how this has been applied to shape policy in the UK, and also contributed to similar efforts in southern Africa (Zambia, Zimbabwe and South Africa), and in other international facilities both in western zoos and in range countries. I will conclude with future direction for this work.

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EXPLORING RISK FACTORS FOR VISUALLY-MEDIATED AND LOCOMOTOR ABNORMAL REPETITIVE BEHAVIOURS IN DOGS

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Dogs have been documented exhibiting a range of abnormal repetitive behaviours (ARBs) that have diverse morphologies, including locomotor (e.g., tail chasing) and visually-mediated (e.g., light/shadow chasing, 'hallucinatory' fly-snapping in the absence of flies). ARBs can cause distress to dogs and owners, increasing the risk of inappropriate punishment, relinquishment, or behavioural euthanasia. Risk factors for ARB development in dogs are not well-understood. The few available studies show conflicting findings and typically pool ARB forms for analyses, hindering preventative and treatment advice for owners. ARBs are known to develop from suboptimal housing or other poor welfare states across species. In dogs, breed predispositions to ARBs have been suggested as a result of selection pressures for breed functions (e.g., herding breeds selected for visual fixation might be prone to visually-mediated), but remain untested. This study aimed to identify risk factors for three forms of ARBs in dogs (light/shadow chasing, hallucinatory fly-snapping, and tail chasing), including breed (split into different breed groupings: Kennel Club (KC), Fédération Cynologique Internationale (FCI) and previously published genetic groupings), and previous and current environment. A cross-sectional online questionnaire was deployed including questions on the history of ARB expression, dog and owner demographics, relevant health history (e.g., neurological, and ophthalmic disease), early-life experiences (e.g., breeding environment), and current lifestyle (e.g., social environment, enrichment provision). Data were collected from owners internationally via snowball sampling through social media. The questionnaire received 2619 useable responses from owners across 51 countries, most commonly the United Kingdom (n=2262, 86.4%) and the United States (n=153, 5.8%). Following the application of inclusion criteria for each ARB form, ARBs were reported in 13.6% (n=317) of dogs (light/shadow chasing, 3.8%, n=89; hallucinatory fly-snapping, 0.9%, n=21; tail-chasing, 8.9%, n=207). Spending time crated either during the day or overnight was a risk factor for all three ARB forms (light/shadow chasing, OR=1.168, p=0.017; hallucinatory fly-snapping, OR=0.301, p=0.014; tail-chasing, OR=4.851, p<0.001). Differential risk factors for only one ARB included: living in a household with cats for light/shadow chasing (OR=1.168, p=0.017); eye problems (OR=6.676, p<0.001) and a history of seizures (OR=4.947, p=0.002) for fly-snapping; and being part of the FCI Sheepdogs and Cattle dogs group compared to the Scent Hounds group (OR=0.398, p=0.010), and being provided with fewer enrichment activities for tail-chasing (OR=0.974, p=0.018). Our results suggest treatment and prevention advice for canine ARBs should be form-specific and highlight the importance to canine welfare of identifying risk factors for different ARB forms.

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DOES FLIGHT RESTRICTION EXPLAIN WELFARE PROBLEMS IN CAPTIVE PARROTS?**Emma Mellor¹, Georgia Mason², Mike Mendl¹, Yvonne van Zeeland³ and Innes Cuthill⁴**¹ Bristol Veterinary School, University of Bristol, Langford House, Langford, Bristol, UK² Department of Integrative Biology, University of Guelph, Guelph, Canada³ Department of Companion Animal Clinical Science, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands⁴ School of Biological Sciences, University of Bristol, UK*emma.mellor@bristol.ac.uk*

Frustrating highly motivated natural behaviours can compromise welfare. For captive volant birds, flight is one potential example. We assess potential welfare effects of restricting flight in captive Psittaciformes (parrots) using two complementary methods. First, using a cross-species phylogenetic comparative approach, we tested whether species differences in flight-reliance explain species differences in welfare. We collated data on species-typical predictor variables indicative of natural flight-reliance: hand-wing index, movements (regular movement v sedentary), island endemism (yes v no), and reliance on trees for foraging. Using phylogenetic generalised least squares regressions (to control for species' non-independence because of shared ancestry), we investigated relationships between these flight-related predictors and five welfare-sensitive outcomes: prevalence of three types of stereotypic behaviour (SB) from 54 species kept as pets (self-directed feather damaging behaviour [FDB], other non-feather-related oral SBs, and whole body SBs); captive hatch rates in aviculture (142 species); and longevity of zoo-housed parrots (117 species). Our second approach involved epidemiology for the best-sampled species, to identify individual-level demographic and environmental risk factors for FDB (four species) and other SBs (three species), focussing on current- and early-life flight provision. Neither approach found support for our flight hypothesis: no flight-related predictor variable robustly explained oral SB, longevity, or hatch rates at the species level. Instead, against predictions, island-dwelling species had the most prevalent whole-body SB and FDB. Since our past work revealed that whole-body SB reflects natural intelligence (inferred from relative brain size), adaptations to unpredictability on islands may leave species bored/frustrated in captivity. For FDB, along with our previous study's finding of foraging niche predicting this behaviour, our new results help highlight a broad type of species at-risk of FDB (i.e., island-dwellers reliant on food needing extensive oral manipulation). Epidemiology revealed demographic and environmental risk factors for FDB, though flight is not one of them: species, sex, age, early life enrichment provision and, for one species, diet. For SB, we found one demographic risk factor – species. While our flight hypothesis was not supported, we cannot conclude that flight is unimportant to volant bird welfare – our comparative findings are compatible with flight restriction compromising welfare equally across all species sampled. Species- and individual-level risk factors identified here provide new ideas for improving parrot welfare in targeted ways and, by highlighting at-risk birds, inform which ones may be ill-suited for the pet trade.

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BEST PRACTICE HENS: AN EU PILOT PROJECT TO SUPPORT THE TRANSITION TO CAGE-FREE HOUSING SYSTEMS IN THE EUROPEAN UNION

Mona F Giersberg¹, Xavier Averos², Vera Bavinck³, Roland Bronneberg³, Inma Estevez^{2,4}, Peter van Horne⁵, Karolien Langendries⁶, Joanna Marchewka⁷, Angela Morell Pérez⁸, Thea van Niekerk⁹, Anja Riber¹⁰, Patryk Sztandarski⁷, Frank Tuytens⁶, Liesbeth Van Damme⁶, Kaitlin Wurtz¹⁰, Mariana Yuan Ribeiro-Couto⁸ and T Bas Rodenburg¹

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Since 2012, conventional cages for laying hens have been banned in the EU and all laying hens should be housed in either furnished cages or cage-free systems. However, even in furnished cages, laying hens have limited space and opportunities for natural behaviour. There is considerable variation in the uptake of cage-free systems among EU countries. The Best Practice Hens project aims to help EU egg producers by providing practical guidelines on how to transition to cage-free systems. The Best Practice Hens project combines input from experts from countries that already have a high percentage of cage-free systems (DK, NL, DE, FR; cage-free countries) and experts from countries that are still transitioning (ES, PT, PL, BE; target countries). Best practices for keeping pullets and laying hens in cage-free systems were developed based on the review of scientific literature, management guides and other technical information available. For the scientific review, 39 papers for pullets and 167 papers for laying hens were included after screening and were described in detail. In addition, 59 sources of technical information were found and interviews with experts from the egg industry and the government were organized in the cage-free countries. This information was used to formulate 68 best practices, 24 for pullets and 44 for laying hens, some of which are general while others apply to specific cage-free housing systems (e.g. aviaries or free-range systems). This detailed set of 68 best practices was further reorganized and summarized into 31 final best practices (15 for pullets and 16 for laying hens), which were discussed with stakeholders at EU level and from the involved countries, and finalized based on their input. This final set of 31 best practices is the basis for our dissemination activities, consisting of publication of practice abstracts, social media contributions, our website (www.bestpracticehens.eu) and dissemination meetings in the target countries and a large dissemination event in Brussels.

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ADAPTATION OF THE CAT STRESS SCORE FOR USE IN HOSPITALIZED CATS

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The domestic cat is a common companion animal in European households, and the welfare of these animals is a growing concern among their owners. Hospitalization of cats can lead to stress caused by various environmental and anthropogenic factors, which can affect their welfare and prolong their recovery time. To address this issue, assessment of feline stress is necessary, using tools such as the Cat Stress Score (CSS). However, the CSS is a complex and time-consuming scale to apply. This study aimed to modify the CSS into a more straightforward and efficient tool for the assessment of stress in hospitalized cats.

The study was conducted at Hospital Veterinário Bom Jesus and involved video recordings of hospitalized cats. The minimum time required to apply the CSS was determined by evaluating five thirty-second excerpts from ten-minute videos of ten different hospitalized cats, which showed excellent reliability (0.99). Subsequently, fifty-four recordings of hospitalized cats were evaluated using both the Feline Grimace Scale (FGS) to assess pain and the CSS to assess stress.

The results revealed a weak correlation between the FGS and the CSS, which prompted the modification of the latter. The CSS was simplified into the Modified Cat Stress Score (CSSM) by reducing the number of evaluation levels for each element, leading to a strong correlation between the original CSS and the CSSM. Furthermore, the number of elements in the CSSM was reduced through principal component analysis, resulting in a scale that comprises six elements (activity, vocalization, body, tail, head, and ears) with three levels of evaluation, which showed a strong and statistically significant correlation (0.98, Pearson correlation, $p > 0.05$) with the original CSS.

In conclusion, this study demonstrates that the simplified CSSM effectively assesses stress in hospitalized cats with the same accuracy as the original CSS, but in a more straightforward and efficient manner, making it more suitable for use in a veterinary hospital setting.

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KOMODO THERMO PROJECT: IMPROVING THE PRECISION AND ACCURACY OF BODY TEMPERATURE MEASUREMENTS IN KOMODO DRAGONS

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Because temperature determines the rate of most biochemical and physiological processes, maintaining appropriate core/internal body temperature (T_{bi}) is a key component of animal wellbeing. Unlike mammals and birds, reptiles rely on environmental conditions to regulate T_{bi}; exploiting heterogeneous thermal environments to thermoregulate. Growth, digestion, and reproduction may all be disrupted when T_{bi} deviates from an optimal range. This makes the accurate measurement of T_{bi} particularly important for the welfare and husbandry of captive reptiles.

However, the resources available to institutions usually determine the technique(s). Common methods include: (a) surgically implanted temperature-sensitive radio transmitters, (b) cloacal thermometers, (c) ingestion of temperature-sensitive data-loggers, (d) infrared thermometers, and (e) thermal-imaging cameras. Surgically implanted transmitters and cloacal probes are invasive techniques, requiring at least animal handling and at most anaesthesia and surgery. Encouraging reptiles to ingest data-loggers need not require direct contact, but it requires the introduction of a foreign object into the animal's body. The two remaining techniques in this list benefit from being entirely non-invasive: However, they differ enormously in cost, measure only external body temperature (T_{be}), and little is known about how accurately and precisely they predict T_{bi}.

Furthermore, the rate of heat transfer from surface to core is influenced by the wavelength(s) of energy emitted by a heat source, and these regularly differ between institutions also. Wild reptiles are exposed to the entire infrared spectrum (IR_A, B, and C): IR_A penetrates deeper than IR_B or IR_C, and speeds heat transfer from surface to core. However, because of the lack of direct, strong sunlight in captivity, only IR_B and IR_C are routinely available. For these reasons it is important to understand how well different ways of measuring T_{be} predict T_{bi}, under different types of heat source, and to account for these differences before basing husbandry decisions on thermal data.

Here, we compare the accuracy, precision, and usability of 3 devices used to estimate T_{bi} of 3 Komodo dragons: the Trotec® IC080LV thermal imaging camera, the FLIR-One thermal imaging camera, and a generic infra-red thermometer. We show that the Trotec® and infra-red thermometer devices performed equally well, closely matching T_{bi} recorded by ingested data-loggers. The FLIR-One performed poorly by comparison. Using these data we derived correction factors that improve the performance of all 3 devices and present a free, online interface that corrects for these differences/errors when users provide external temperature readings and the type of measuring device and heat source.

Ask a question: [#talks @Lisa Holmes](#)

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ACCOMMODATING AGENCY: RESTRICTED INTERVENTION SOCIAL MANAGEMENT OF ZOO-HOUSED CHIMPANZEES (*PAN TROGLODYTES*)**Lloyd Antrobus**

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Restricted Intervention (RI), that is; limiting human interference during the formation and/or reformation of social hierarchy, remains an abstract notion for the practical application of zoo-housed chimpanzee management and welfare. By default, RI is highly dependent upon community-specific conditions which are undoubtedly influenced by individual and institutional variables. While some zoos may have once intervened during instances of intragroup aggression or avoided accommodating large mixed-sex communities altogether; adopting nature's model of social management under the RI philosophy has proven to improve the social well-being of zoo-housed chimpanzees. However, the practice remains loosely defined, leaving those who are charged with the care and management of chimpanzees to interpret how RI can be applied to the specific community under their care.

Despite being subjected to human rearing as infants, the large mixed-sex community of chimpanzees at Twycross Zoo has adapted well to the gradual introduction of RI social management. This aging community has diverse and complex histories of intensive human interaction where their experiences have been largely defined by traditional, human-oriented management styles within smaller social groupings. Accordingly, each individual presents their own unique and often compounding, behavioural challenges under RI social management. Expecting an aging chimpanzee with a 50+ year history of intensive human-oriented management to mould perfectly to the RI method would be futile given the individual and community's established expectations from the keeper-chimpanzee interaction. Under the RI method applied at Twycross Zoo, the community of chimpanzees takes the lead. The discipline and conduct once expected of the chimpanzees to obey their keepers is abandoned, affording the chimpanzees the agency to interact freely within their community on their own terms. This hallmarked difference between traditional management and RI can sometimes lead to socially-acquired injuries (especially among males). This, however, reflects the chimpanzee's natural sociality.

The RI method requires advanced levels of positive-reinforcement training, non-invasively developing keeper-chimpanzee trust, and continuous monitoring of behavioural markers to ensure optimum physical, emotional, and social well-being at both individual and community levels. Central to the RI philosophy is adapting management routines per the unfolding sociality observed. Accordingly, this approach to chimpanzee management is dynamic; actively responding to the pace set by the community's sociality. While there is no uniform approach to RI social management, the relative success of converting social management to the RI method at Twycross Zoo represents an interesting case study for developing models of progressive chimpanzee social management and welfare.

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BEING BORED? IDENTIFYING THE EMOTIONAL CONSEQUENCES OF BOREDOM-LIKE STATES IN PIGS**Sara Hintze**

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“They must be bored” is usually one of the first responses our students give when showing them pictures of the barren environments many farmed animals live in. Boredom is mentioned quickly and without any doubt, but what do we actually know about boredom in the animal kingdom? The simple answer is: not much. However, from humans we know that boredom is aversive and associated with depression, alcoholism, gambling and suicide. Moreover, human boredom is caused by unstimulating environments with some individuals being more prone to suffer from boredom than others. Given the barren and monotonous environments of many farmed animals, including pigs, boredom-like states are potentially very prevalent yet neglected. The aim of our study was thus to shed light on this welfare concern by identifying the emotional consequences of boredom-like states in pigs. To this end we kept pigs in two batches from weaning until slaughter in either barren and monotonous (BM) or enriched and varying (EV) environments. In each batch we had eight pens with eight pigs each (64 pigs per batch) that were balanced for coping style (proactive, reactive, intermediate) as assessed in two backtests during the suckling period and sex. Aiming to cover the key characteristics of boredom based on knowledge of human boredom, we assessed if BM pigs are in a more negative mood than EV pigs in a Judgement Bias Task (JBT) and if time passes by more slowly in BM pigs compared to EV pigs in a Temporal Bisection Task (TBT). Thirty-two pigs per task were trained and tested. After a first test phase, pigs were not handled for three weeks to let vanish the potentially enriching effects of training before they were tested a second time. Following the second test phase, housing conditions were changed for half of the pigs (BM-EV, EV-BM BM-BM, EV-EV). Pigs were not handled for another three weeks and then tested a third time to assess if boredom is reversible (BM-EV) or even more severe when conditions are impoverished (EV-BM). Besides the JBT and TBT, we tested pigs’ reactions towards previously validated positive, neutral and negative stimuli aiming to differentiate between apathy, depression-like and boredom-like states and recorded their behaviour in the home pens to detect potential differences in their active but also inactive behaviour.

In my talk I will give a conceptual overview of the project and describe some of the methodological approaches.

Ask a question: [#talks](#) @Sara Hintze

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PROMOTION OF PLAY BEHAVIOUR AS A MEANS TO IMPROVE PIG WELFARE**Karolína Steinerová¹, Sarah Parker¹, Jennifer Brown² and Yolande Seddon¹**

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Public concern for the quality of life of intensively farmed pigs has increased over the years and calls for the development of pig friendly husbandry systems allowing the expression of behaviours linked to rewarding experiences. Play has been associated with positive welfare, suggesting that playing animals experience pleasurable states. Therefore, providing increased opportunities for play may be a means to enhance the welfare of pigs in intensive rearing systems. Play naturally occurs in piglets between 2-6 weeks and has been rarely reported in older pigs. This study aims to investigate if play can be promoted and sustained beyond the window of its natural expression in an intensive system. Growing pigs (n = 288, 10 weeks of age) were assigned to one of three pen-level treatments: a standard semi-slatted “home” pen (Control: CON, 1 m²/pig); play promotion stimulated in play sessions three times per week by the intermittent provision of ‘novelty’ provided either in the home pen (Novelty: NOV, 1 m²/pig), or through access to extra space in a play pen (Play pen: PLP, 2.9 m²/pig). The novelty consisted of six destructible objects rotated weekly (cardboard, straw, popcorn, rope, lumber, burlap), and olfactory stimulation to enhance novel stimuli. Frequency and duration of play were recorded on focal pigs (n = 144) during a 30-minute play session at 11, 16 and 21 weeks of age. Pigs from NOV and PLP played consistently more frequently across the weeks compared to CON, and sustained the same level of play at 16 and 21 weeks, whereas play in CON continued to decline. The frequency of play between NOV and PLP at 11, 16, and 21 weeks of age did not differ. Compared to CON, NOV and PLP played for a greater duration, and the duration of play between NOV and PLP at the observed ages did not differ. Play was successfully promoted and sustained until the late stage of the finishing period suggesting play sessions were rewarding for pigs. Play was equally expressed with and without access to extra space suggesting that the behaviour is motivating regardless of the amount of space provided. This work contributes knowledge to the development of future pig husbandry and animal care which considers for provision of positive experiences, which is a crucial concept to support improved welfare for intensively farmed pigs.

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FARMED INSECT WELFARE: A CASE STUDY CONSIDERING BLACK SOLDIER FLIES (*HERMETIA ILLUCENS*)**Meghan Barrett¹, Shaphan Yong Chia², Bob Fischer³ and Jeffery K Tomberlin⁴**¹ Department of Biology, California State University Dominguez Hills, Los Angeles, USA² Laboratory of Entomology, Wageningen University, The Netherlands³ Department of Philosophy, Texas State University, San Marcos, USA⁴ Department of Entomology, Texas A + M University, College Station, USA*mbarrett@csudh.edu*

Over two hundred billion black soldier flies (BSF, *Hermetia illucens* (Diptera: Stratiomyidae)) are reared annually across the globe, with the industry projected to grow substantially in the coming decade. Black soldier flies are being actively explored across the globe for use as livestock feed; fishmeal replacements; biodiesel; human, animal, and food waste management; and even sustainable human protein. A huge number of individual insects are reared in the industry each year, and numerous producers and academics have expressed interest in BSF welfare in farmed conditions. This talk quickly reviews the evidence for pain/sentience in larval and adult flies, covers factors that relate to BSF welfare in commercial rearing facilities, and identifies the most pressing welfare concerns for the industry. Recommendations are made for altering the conditions that give rise to welfare concerns as well as suggestions for future research directions that would lend valuable insights to BSF welfare. Finally, challenges that face the study of insect welfare in farmed conditions are discussed, alongside suggestions for how producers, entomologists, and welfare biologists could collaborate to improve animal welfare.

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Elizabeth Walsh, Lieve Meers, Lucia Bono, Ilaria Marian and Simona Normando (*Cork Pet Behaviour Centre, Ireland; BIAAT Foundation, Genk, Belgium; Parco Faunistico Cappeller, and University of Padua, Italy*)

EFFECTS OF EARLY GROUP HOUSING ON BEHAVIOR, HEMATOLOGY, AND GROWTH PERFORMANCE OF CALVES DURING TRANSITION TO LARGE GROUP PENS**Essam Abdelfattah¹ and Martin Breen²**¹ Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, Davis, USA² UC Davis Veterinary Medicine Teaching and Research Center, CA, Tulare, USA*eabdefattah@ucdavis.edu*

The objective of this study was to investigate the effects of early group housing (GH) on behavior, hematology, and the growth of calves transitioning to large group pens after weaning. A random subset of 22 heifer calves on a commercial dairy was enrolled in this study. The first group included 11 calves that were previously individually housed from one day old (IH), and a second group of 11 previously housed calves in groups of 3 calves/pen from 7 days old until moving to transition pens (GH3). All of the 22 calves moved from their original hutches at the age of 72 to a large group pen for 2 weeks. Calves were assessed for general health, and body measurements (body weight (BW), and hip height (HH)) at 2 weeks before and after moving. Leg sensors were attached to one hind leg of all calves to record the calf's activity (lying, standing, and motion index). Whole blood samples were collected from each calf via jugular venipuncture at -3, 0, and 3 days relative to the day of moving to transition pens to determine white blood cell count (WBC), neutrophil (N), lymphocyte count (L), and neutrophil to lymphocyte ratio (N/L). Statistical analysis was conducted in Stata using linear mixed models with the calf as a random effect. Preweaning housing type had no effect on the final BW ($P=0.10$) and final HH ($P=0.32$). The average daily gain was not different, GH3 calves lost -0.18 kg/d while IH calves lost -0.187 kg/d ($P=0.98$). Daily HH gain averaged 0.35 ± 0.04 cm/day in GH3, and 0.41 ± 0.03 in IH calves ($P=0.25$). On the day of moving and 2 weeks after moving, IH calves had a significantly higher motion index compared with GH calves ($P<0.01$). Neither treatment nor treatment-by-day interaction had a significant effect on total standing and lying times per day. On the day of moving, WBC was greater in GH3 calves in comparison to IH calves (16.81 ± 1.03 vs 13.23 ± 1.03 K/ μ L, $P=0.005$). The IH calves had a greater N/L ratio ($P < 0.001$) within one hour after regrouping in comparison to GH3 (1.34 ± 0.08 vs 0.92 ± 0.08). The increased N/L ratio, which is a stress indicator, in IH calves suggests that early GH could help calves to cope well with the stress of mixing. Our results showed that the previous housing system had no effect on lying and standing times, and no effect on the growth of calves but improves the calf's response to stress.

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PIONEERING EFFORTS FOR THE HUMAN ANIMAL BOND IN NIGERIA AND AFRICA**Sunday Agbonika**

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For centuries, animals have been making significant improvements in human lives, not only as companions but also as agents of healing, through the phenomenon of Human-Animal Bond or Human- Animal Interactions (HAI).

While this field of practice and its subcategories (Animal Assisted Interventions and Assistance Animals) have seen notable increase in recognition and practice globally, some parts of the world such as much of Africa are yet to fully recognise and benefit from these alternative interventions that are impacting the lives of both humans and animals.

In 2018, Dogalov Human Support Initiative conducted an assessment trial for the effectiveness of Animal Assisted Interventions through a school visitation to a special needs centre, with trained and socialised dogs. This was a landmark event in Nigeria, that recorded remarkable results and especially proved to be of breakthrough potential for two boys on the autism spectrum present.

The founder was inspired to venture into this uncharted field in his country, with the inspiration to help children like his late nephew who was autistic, live richer quality lives.

From the above-mentioned assessment trial, further school visitation programs incorporating animals; and from an annual series of conferences on HAI that began in 2021, bringing leaders in the HAI field to speak to Africans we have discovered:

1. That HAI is as beneficial to facilitating a better life and healing for humans in Africa as it is in other parts of the world.
2. That due to the peculiar nature of African cultures, beliefs and perspectives, the approach to HAI may need to be modified to suit the African reality.
3. That there is a large population of Africans who demonstrate interest for the potential to understand as well as embrace HAI and its positive impacts.
4. That the growth of HAI in Africa can help promote healthier animal welfare practices as well as better outcomes for companion animals or animals that serve in these roles in Africa.

These findings prove that investing in the growth of Human Animal Interactions in Africa can significantly result in better life outcomes for humans as well as healthier animal welfare practices in Africa; a win-win for both humans and animals.

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**RELATIONSHIP OF TISSUE DIMENSIONS AND THREE CAPTIVE BOLT PLACEMENTS ON
CADAVER HEADS FROM MATURE SWINE (*SUS SCROFA DOMESTICUS*) < 200 KG BODY WEIGHT****Karly Anderson^{1,2}, Jennifer Berger³, Arquimides Reyes¹, Ruth Woiwode²,
Perle Zhitnitskiy⁴ and Kurt Vogel¹**¹Department of Animal and Food Science, University of Wisconsin - River Falls, River Falls, USA²Department of Animal Science, University of Nebraska - Lincoln, Lincoln, USA³Abbyland Pork Pack, Curtiss, USA⁴Department of Veterinary Population Medicine, College of Veterinary Medicine, University of
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The objective of this study was to determine the tissue depth at the common frontal penetrating captive bolt (PCB) placement and alternative temporal and behind ear placements for PCB euthanasia of sows and boars weighing less than 200 kg. Cadaver heads were obtained from 30 sows and 30 boars from a regional slaughter establishment following electrical stunning and then cooled at 2-4° C for approximately 64 h. A Jarvis PAS-Type P 0.25R PCB with a Long Stunning Rod Nosepiece Assembly and 3.5 g power loads was used for all PCB applications at the following placements: FRONTAL – 3.5 cm superior to the optic orbits at midline, TEMPORAL – at the depression posterior to the lateral canthus of the eye within the plane between the lateral canthus and the base of the ear, or BEHIND EAR – directly caudal to the pinna of the ear on the same plane as the eyes and targeting the middle of the opposite eye. For sows, soft tissue thickness was less ($P < 0.05$) in the FRONTAL placement (7.30 ± 0.51 mm) than the TEMPORAL (49.30 ± 3.01 mm) and BEHIND EAR (47.80 ± 3.22 mm) placements; cranial thickness was less ($P < 0.05$) in the TEMPORAL placement (13.52 ± 2.22 mm) than the FRONTAL (42.11 ± 2.95 mm) and BEHIND EAR (39.97 ± 2.18 mm) placements. Total tissue thickness for sows differed ($P < 0.05$) between the FRONTAL (49.41 ± 2.74 mm), TEMPORAL (62.83 ± 1.83 mm), and BEHIND EAR (84.63 ± 3.67 mm) placements. For boars, soft tissue thickness was less ($P < 0.05$) in the FRONTAL placement (10.64 ± 1.12 mm) than the TEMPORAL (52.63 ± 3.55 mm) and BEHIND EAR (61.24 ± 6.20 mm) placements; cranial thickness was less ($P < 0.05$) in the TEMPORAL placement (18.09 ± 3.04 mm) than the FRONTAL placement (44.09 ± 3.60 mm) but did not differ ($P > 0.05$) between the FRONTAL and BEHIND EAR (31.57 ± 3.31 mm) placements. Total tissue thickness for boars differed ($P < 0.05$) between the FRONTAL (54.73 ± 3.23 mm), TEMPORAL (70.72 ± 3.60 mm), and BEHIND EAR (92.81 ± 5.50 mm) placements. Overall, the data suggest that the FRONTAL placement may have the greatest likelihood for successful euthanasia of sows and boars weighing less than 200 kg due to the least total tissue thickness and may present less risk for failure than the alternative TEMPORAL or BEHIND EAR PCB placements.

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CURRENT APPROACHES TO ASSESSING CAPTIVE CHIMPANZEE (*PAN TROGLODYTES*) WELFARE**Laura Angley¹, Gillian Vale¹ and Katherine Cronin²**¹ Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo, Chicago, USA² Animal Welfare Science Program, Lincoln Park Zoo, Chicago, USA*langley@lpzoo.org*

There are a variety of guidelines and scientific approaches to the assessment of animal welfare concerns across zoos, laboratories, and farms; however, there is no universally-adopted tool available to objectively assess the well-being of the most common great ape living in human care, the chimpanzee (*Pan troglodytes*). Output-based (animal-based) approaches to welfare assessments, such as longitudinal behavioral monitoring and hormone analysis, are vital in assessing the welfare of individuals, but often have logistical constraints and unsustainable time requirements. Alternatively, input (resource-based) approaches are less direct and often difficult to validate, but can be more easily implemented at many facilities. Here, we review the literature to determine which components of chimpanzee care & management have a predictive relationship to welfare and consider the challenges and opportunities present for those interested in developing a science-based, practical approach to improving the welfare of this species. Factors that influence chimpanzee welfare, such as variations in facility design, animal life histories, and social group composition are discussed, and a framework for a future welfare assessment that considers the unique physical and social needs of chimpanzees is proposed.

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EVIDENCE-BASED WELFARE ASSESSMENT OF PETS DURING TRANSPORT – ARE WE THERE YET?**Yael Arbel, Liran Plitman and Dganit Ben-Dov**

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International transport of pets has increased over the years, causing increased concern to their welfare. In recent years the field of animal welfare developed towards measurable, accepted indicators of the animals' welfare for their various life stages. Welfare indicators are being developed for breeding and slaughter, mainly of livestock, and facilities are being audited based on these indicators. Lower scores may result in enforcement measures against such facilities and even their closure. However, the welfare of pets during transport has seen no similar development.

Considering the Five Domains Model of Animal Welfare – international transport of pets intended for trade compromise their welfare in all its aspects: lack of food and water, inability to perform natural behaviour in limited space, exposure to noise (of heavy machinery and other animals), changes in pressure, movement and light during the transport and inspection – all heavily compromise pets' welfare. Whether this pet is dog, lizard, or fish.

The legal requirements for protection of animals during transport of the COUNCIL REGULATION (EC) No 1/2005 of the European Union do not specify the standards for containers for transporting animals by air. It refers to the International Air Transport Association guidelines which aim to assure animal welfare and safety during transport by air. Taking the most common travelled pets (dogs and cats) as an example – the requirements of the container for these two species are identical despite the knowledge of the different stressors of these species and different requirements. Studies conducted in order to establish requirements of containers specifically designed for transporting cats are not available.

This situation of lack of studies regarding the varied transported animals is repeating regardless of the species reviewed. The field of welfare assessment during transport is yet to be developed and without proper studies the welfare of pets during transport will not be improved. The different authorities responsible for the welfare of animals need to actively encourage such studies as well as the different organizations and companies involved in the transport of the animals.

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SPACE USAGE AS AN INDICATOR OF ANIMAL WELFARE IN SNAKES AT A LATIN AMERICAN ZOO**Alvaro Arroyave¹, Daniela Cruz² and Jefferson Muñoz²**¹ Department of Animal Science, Ontario Agricultural College, University of Guelph, Canada² Fundación Zoológica de Cali, Zoologico de Cali, Colombia*aarroyav@uoguelph.ca*

Animal welfare must be a top priority for every zoo facility around the world, understanding that every animal develops a specific range of behavior and develop different adaptive strategies to cope with their own environment. Little is known about the welfare of ectotherms and the knowledge available related to the care and management of these kinds of animals is limited in quantity and quality. Animal care manuals in zoo facilities about ectotherm species usually indicate a specific or optimal temperature requirement and other environmental parameters. However, being able to choose within a set of opportunities to perform meaningful behaviors could be an indicator of animal welfare, including in ectotherms. After reviewing information on ectotherms in the wild, we aimed to understand the importance of having environmental variability across their habitat and how it plays an important role in the development of different behaviors. Providing these opportunities may allow individuals to select their own optimum environment. We implemented with the help of the animal care team of the Cali Zoo Colombia a series of changes in snake house environments from different species giving them opportunities to hide and providing gradients of temperature and humidity based on available literature. Changes in habitat usage were assessed through the use of heat maps measured through several observations using Zoomonitor data software. Results suggest that some species changed their habitat usage due to environmental changes and gradients. Therefore, results like changes in habitat usage and behavioral diversity after environmental changes may lead us to identify strategies to address the welfare of snakes under the care of humans.

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EXPLORING SELF-RECOGNITION IN PIGS (*SUS SCROFA*)**Rachel Baker and Catherine Douglas**School of Natural and Environmental Sciences, Newcastle University, Newcastle Upon Tyne,
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Pigs (*Sus scrofa*) are intrinsically intelligent animals that show advanced cognitive abilities and emotions. Despite this, millions of pigs are kept commercially in the UK each year with little enrichment or cognitive stimulation due to the low level of public demand for higher welfare pork.

Several animal species have been studied to explore self-recognition, which is considered an indication of self-awareness, using the 'Mirror-mark test'. Evidence of self-awareness and higher cognitive abilities in animals, can influence human perceptions of animals and as such the moral status granted to these animals, thus impacting welfare standards they are afforded.

Recent studies have shown that young pigs (4-8 weeks) are able to use mirrors instrumentally to locate food.

Our study is the first to pilot the mirror-mark test on pigs (N=10, sows aged 1-3 years), to explore self-recognition in addition to the possible use of mirrors as an enrichment tool.

Pigs were first habituated to a large mirror (1.2m x 0.9m) in their home pen for 8 days, before entering the test pen for 3 mins containing a mirror and a 'control' (a non-reflective plate). Here, mirror preference was quantified, and the mark test was performed (a further 3 mins) using a within-subject design.

Results did not provide adequate evidence to support mirror self-recognition in pigs using the mirror-mark test, as there was a lack of mark-directed behaviours. However, notable self-directed (e.g., mouth opening Fig 1) and contingent behaviours (eg, repeated movements Fig 2) were seen, providing evidence of mirror knowledge (understanding the properties of the mirror's reflection and recognising that it was not another pig). Pigs rapidly lost interest in the mirror during the 3mins control with sham mark, with a further lack of interest in the follow up 3 min mark test.

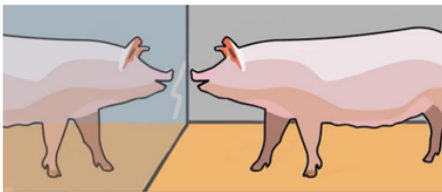


Figure 1: Schematic representation of self-directed mouth opening behaviour

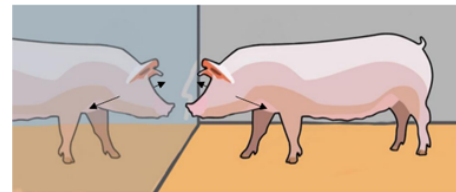


Figure 2: Schematic representation of contingent head movement

Further research is required to investigate different forms of self-awareness in pigs, such as olfactory recognition. Equally it could be argued that pigs do not need to perform well in tests that elephants and chimpanzees have been found to pass just for humans to be able to recognise a level of intelligence that humans can easily identify with.

Findings also suggest that mirrors are not found to be an appropriate source of sustained enrichment within commercial production systems, due to rapid habituation and cleaning requirements. Future research, however, may focus on their use in alternative settings, such as for individually housed laboratory pigs or domestic companion pigs.

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ASSESSING ANIMAL WELFARE INDICATORS**Louise Bell, Frankie Kerridge, Amy Brennan, Bethan Davies and Dalila Palenzuela Abreu**

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The management and assessment of captive animal arousal levels and the potential for stress lies with their human caregivers. A range of arousal measures are available including behavioural observation and physiological assessment. This study aimed to assess the efficacy and suitability of commonly used indicators for monitoring arousal using both salivary cortisol and behaviour. Saliva samples were collected from various domesticated species to determine physiological response prior to and following a range of work, transport and husbandry practices, categorised into four treatments (baseline, pre-work, work/training, post-work, post-husbandry). When practical, behavioural data, including discrete postural changes and positive and negative behaviour, were also collected. Study species included housed donkeys (*Equus asinus*), goats (*Capra aegagrus hircus*), ponies (*Equus ferus caballus*) and reindeer (*Rangifer tarandus*) and free-living pregnant ewes (*Ovis aries*). Working sheep dogs and police dogs (*Canis lupus familiaris*) were also sampled during routine working tasks. Behavioural findings suggest that significant differences ($P < 0.05$) were evident across treatments, with increased positive behaviour ($P < 0.05$) but not negative ($P > 0.05$) during lunging sessions for ponies. Donkey ear position also differed with ear position indicating positive arousal more frequently during baseline ($P > 0.05$) and indicating negative arousal more often ($P < 0.001$) during training. Despite no significant difference ($P > 0.05$) salivary cortisol results show peaks across treatments with elevated levels for pregnant ewes, donkeys and working animals. Individual differences were found for working sheep dogs and police dogs ($P < 0.05$) and across all livestock ($P < 0.01$) but not sheep ($P > 0.05$). Species differences were found in mean salivary cortisol for livestock ($P < 0.001$) suggesting changes may be influenced by individual and species arousal levels rather than the specific arousal events. It therefore, suggests that other assessments of welfare are subject to species and individual differences in 'stressor' response. This study is intended to support evidence that standard husbandry and management routines can increase arousal and thus need to be assessed.

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THE IMPACT OF HUMAN INTERACTIONS ON DOG WELFARE: A RAPID SYSTEMATIC REVIEW**Kelsey Bezaire, Leanne Blake and Lucy Asher**

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Dog welfare is influenced by interactions with humans. For example, regular contact with people may reduce symptoms of stress in shelter dogs, while harsh training methods may relate higher fear-related behaviours in working dogs. Research on dog welfare related to human interactions are primarily examined by context or dog utility; no comprehensive review exists to draw together dog welfare outcomes across disciplines. This study involves a rapid systematic review to explore research measuring some aspect of dog welfare in dog-human interactions. The review will identify the measures used to evaluate welfare and consider the strength and quality of study methodology. The study was conducted following Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines and is registered through Open Science Framework (project <https://osf.io/6d2p4/>). A search across four relevant databases yielded 4,247 non-duplicate results. The resulting titles and abstracts were screened to include only published scientific studies focusing on acute domestic dog-human interactions including a measure connected to dog welfare. A minimum of 6 dogs must be involved and studies are excluded if welfare measures are proxy, including questionnaires or qualitative records. 312 (7.3%) articles met criterion. Descriptive statistics and word relationships were conducted on title & abstract data. A subsection of the included studies consisting of all studies utilising the three most-used welfare methods are systematically evaluated for bias, reliability, and quality of results. The quality of methods reporting and lack of validated methodological quality assessments within welfare research is discussed, with recommendations for developing standardisation tools. Understanding trends and the quality of dog welfare literature will help identify research needs, whilst reviewing outcomes suggests best practices for the safety and welfare of dogs.

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ECOTOURIST PERCEPTIONS OF ANIMAL WELFARE**Emma Blundell and Kelly Howarth**

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Ecotourism is a growing strand of tourism with a diverse range of people partaking each year. It is estimated that by 2027 this area of the tourism industry will be worth 875 billion USD (Moore, 2022). It has been suggested that 75% of animal-based ecotourism has a negative effect on the animal's welfare. The aim of this study was to explore the perceptions ecotourists had of animals in ecotourist settings and projects. Photos of five species (elephant, tiger, whale, kiwi and tree frog) were presented to thirty participants of a larger survey on ecotourism. Each species was shown in three scenarios (wild, captive and with human interaction) and survey participants were asked to select the image they preferred and then explain why they made that selection. Chi-squared goodness of fit tests were used to determine which images were selected most frequently. Thematic analysis was used to identify key themes in the open answer questions, with further chi-squared being used to explore differences in the frequency of the appearance of those themes. Significantly more people selected the image of the wild animals for every species (DF 2: $P < 0.001$). Analysis of participant justification suggested that factors such as habitat, perception of freedom, health, conservation and minimal human contact appeared significantly more frequently than comments relating to aesthetics of the animal and nostalgia (DF 1: $P < 0.001$). Comments relating to the perception of a natural habitat and freedom appeared most frequently indicating that ecotourists rate these factors highly when considering an ecotourist holiday or project (DF 6: $P < 0.001$). The language used in relation to the picture choice for the tree frog was different to that for the mammals and bird in some answers. The answers for the tree frog appeared to be driven partly by aesthetics with words such as "cute" being used more frequently. Broadly, the themes identified can be split into those which could be attributable to a heightened welfare state (natural habitat, perception of freedom, health, conservation and minimal human contact) and those which are not (aesthetics and nostalgia). The study overall indicates that there is a concern for welfare among ecotourists, but a lack of understanding of what constitutes good or poor welfare may contribute to broader views being expressed relating simply to freedom versus captivity. Those factors though should not be considered sole indicators of good welfare when making decisions about investing in an ecotourist holiday or project.

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ATTITUDE TOWARD BRACHYCEPHALIC DOGS**Zsófia Bognár^{1,2} and Enikő Kubinyi^{1,2,3}**¹ MTA-ELTE Lendület "Momentum" Companion Animal Research Group, Budapest, Hungary² Department of Ethology, Eötvös Loránd University, Budapest, Hungary³ ELTE NAP Canine Brain Research Group, Hungary*bognarzsosof@gmail.com*

Brachycephalic (flat-faced) dogs' popularity is growing worldwide despite their serious health problems and researchers try to understand the owners' motivations for choosing such a breed. Previously we found that these dogs show outstanding attention toward humans, they look longer at faces, form eye contacts faster with a stranger, and follow pointing gestures more readily than their longer-headed counterparts. However, it is not known whether brachycephalic dogs' propensity to form eye contact with humans could contribute to their popularity. Frequent eye contact enhances the efficiency of communication and dog training, strengthens the bonding between dog and owner, and makes dogs look cuter and more appealing. Therefore, we hypothesised that people who love flat-faced dogs prefer these dogs' tendencies to form eye contact, and, in addition, they have lower knowledge about the associated health problems and have a specific personality profile.

In an online survey, we asked people (N=1156) about their most liked and disliked dog breeds and dog appearance. Then we showed them photo pairs of 25 dogs: in one photo, the dog looked into the camera (formed eye contact), and in the other photo, the dog looked away. Participants could choose a photo from the pair that they liked more. We also collected data about the respondents' knowledge of brachycephalic dogs' health problems, demography and personality.

In contrast to our expectations, we found that those who liked brachycephalism (23.2% of respondents) chose the eye contact photos less frequently than those who disliked brachycephalism (19.8%) or were neutral (57%). In other words, brachycephalic dog enthusiasts seem to be less sensitive to dogs' eye contact. Moreover, enthusiasts associated more health problems with flat-faced dogs, they were more often younger, were women, had children, were less educated, and had a higher level of agreeableness and dog-directed emotional empathy.

The results suggest that brachycephalic dogs' tendency to form eye contact does not contribute to their popularity, and neither high emotional empathy nor knowledge about health problems deters people from liking these dogs. Future research should examine how dog behaviours other than forming eye contact maintain the popularity of flat-faced dogs and how owners' sensitivity to fashion trends as well as not recognizing that a dog is suffering from health issues, contribute.

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EFSA'S RISK ASSESSMENTS ON ANIMAL WELFARE IN SUPPORT OF THE EUROPEAN FARM TO FORK STRATEGY REVISION

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As part of the European Green Deal, the European Commission has committed to submit proposals for the revision of existing legislation on animal welfare by the end of 2023. In 2020 and 2021, the EC submitted several risk assessment mandates to EFSA involving different livestock species. The mandates cover i) welfare of animals during transport (equids, cattle, sheep, goats, pigs, poultry and rabbits) and the on-farm welfare of ii) laying hens; iii) broilers; iv) calves; v) pigs; vi) ducks, geese and quail; and vii) dairy cows. More than 70 welfare experts were recruited to take part in working groups tasked to identify: i) major welfare consequences (WCs) for the animals, ii) animal-based measures (ABMs) to assess the WCs, iii) the hazards and iv) recommendations to prevent or correct the WCs. Outcomes were sought via literature searches and Expert Knowledge Elicitation (EKE).

During transport, results from the EKE indicated animals may experience WCs such as restriction of movement, heat stress, prolonged thirst and hunger, motion stress and resting problems.

The use of enriched cages for laying hens has inherent issues, such as restriction of movement, inability to perform exploratory, foraging and comfort behaviour, integument damage.

Broiler breeders kept in collective cages suffer from pain resulting from management procedures, pronged hunger, skin lesions, inability to perform exploratory or foraging behaviour.

In pigs, keeping farrowing and lactating sows in individual crates may cause restriction of movement, resting problems, inability to express maternal behaviour, heat stress, soft tissue lesions, group stress and inability to perform exploratory or foraging behaviour.

The confinement of calves in individual pens may lead to isolation stress, reduced locomotory activity and inability to perform play behaviour.

Improving the welfare of livestock in the EU is important, not only for ethical reasons, but also for sustainable food production. The identification of relevant WCs specific to animal categories, husbandry systems or transport scenarios allows preventive measures to be prioritised, facilitating welfare improvement.

EFSA will soon work on further risk assessments on welfare of other food-producing animals, such as beef cattle, sheep and goats, turkeys, fish (salmon, trout, carp, sea-bass, sea-bream, European eel, tuna) as well as other animal species such as minks, foxes, cats and dogs. Additional experts will be recruited to cover the expertise needed to perform these projects.

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WELFARE OF ICELANDIC HORSES DURING ELITE COMPETITION**Janne Winther Christensen and Dehlia Jensen**

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Horse sport organisations are obliged to ensure the welfare of competition horses, and most organisations state that horse welfare is a top priority. Nevertheless, behavioural signs of potential discomfort or frustration shown by horses during training and competition, such as opening of the mouth, sudden head movements, undesired gait changes or tail swishing, are often overlooked. Previous studies reported the prevalence of these types of behaviour (commonly presented jointly as ‘conflict behaviour’) in show jumping and dressage warmblood horses (14-19 conflict behaviours/min), whereas there is limited information on Icelandic horses. This study aimed to investigate the prevalence of conflict behaviour in Icelandic horses competing at elite, i.e. highest, level. Online video recordings from a competition in Iceland (MD22; Fivegait F1, n=25 horses, and Tölt T2, n=24 horses) were used to record previously described conflict behaviour, which may be a sign of discomfort and/or frustration. The recordings were viewed at slow speed (x 0.25) enabling a detailed recording of the horses’ behavioural expressions. Mouth opening - defined as separation of the teeth - was the most frequently observed behaviour, and was more prevalent (median frequency/minute [25;75%]) in ambling pace (31 [17;48]) and tölt (30 [12;46]) compared to walk (6 [2;19]), trot (12 [5;30]) and canter (20 [6;38]) in Fivegait F1 (Friedman RM ANOVA on Ranks, $\chi^2=27.0$, $P<0.001$). In T2, mouth opening was more frequent in slow tölt (25 [18;36]) than during loose-rein tölt (4 [1;7], $\chi^2=16.7$, $P<0.001$). Sudden head movements (freq. range 0-25/min), tail swishing (0-38/min) and undesired gait changes (0-16/min) occurred less frequently. In addition, an elongated upper lip was observed in 12 of the 24 participating horses in T2, but only in slow tölt. It is concluded that mouth movements (open mouth and elongated upper lip) are common behavioural expressions in Icelandic horses competing at elite level. Further studies are required to reveal the potential causes of these behaviours, such as rein tension and occurrence of oral lesions.

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ENVIRONMENTAL NOISE IN COMPETITIVE WESTERN HORSE EVENTS**Roger Clark, Maria Hötzel and Denise Leme**

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Noise pollution is a major health hazard for human and non-human animals. Continuous exposure to noise in recreational environments, such as equestrian events, may bring negative consequences for animal welfare. This study aimed to verify the intensity of the sound and describe the perception of the professionals, competitors and visitors about noise disturbance during western horse events in Brazil. We quantified the intensity of environmental sound in barrel racing and team roping, in indoor and outdoor riding arenas (3 different locations for each). We performed 240 recordings of sound intensity (decibels-dB), considering 85dB as risk of damage to health. We also applied an online survey (n=112) with questions on perceptions about the environment, noise disturbances and the effect of sound on sports performance. Data were analysed as follows: noise intensity-Kolmogorov-Smirnov; arena effect-Wilcoxon; noise difference between the events-Mann-Whitney; group differences-chi-square; relative risk (RR)-Poisson regression mathematical model). The mean intensity of sound between outdoor (63.3dB) and indoor (76.7dB) riding arenas differed ($p < 0.01$). There were 16% of indoor noise occurrences above 85dB, and no noise above 85dB in outdoor arenas ($p < 0.01$). The average intensity of sound recorded during the barrel racing was 71dB, lower than the 82dB during team roping riding ($p < 0.01$), which had more noise occurrences above 85dB (6%) than barrel racing (28%) ($p < 0.05$). The RR noise above 85dB for team roping was 6.3 higher than for barrel racing ($P < 0.01$). The average time that professionals, competitors and visitors (n=112) spend in the environment of events was <4 hours (18%), 4-8 hours (29%), 8-12 hours (25%) or >12 hours (28%). Professionals and competitors (n=71/112) answered that their horses spend <4 hours (15%), 4-8 hours (23%), 8-12 hours (17%) or >12 hours (45%) in the environment. Most professionals and competitors (74% of 71) believed that horse performance is negatively affected by environmental noises, 63% did not perform training to habituate horses to noises, and 87% preferred to compete in environments that favour animal welfare. Most (65%) respondents (n=112) considered that sound is loud both in the resting and competition locations, at an intensity that negatively affects horse performance and the well-being of the horses and humans; 88% highlighted the responsibility of organizing staff in promoting a suitable environment. We conclude that there are risks to the well-being of humans and horses in western horse competitions due to the occurrence of excessive noises for prolonged periods, which was corroborated by the survey participants' perceptions.

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A CASE STUDY ON FLAMINGO BEHAVIOURAL RESPONSES TO AN AVIAN INFLUENZA IMPOSED HOUSING ORDER**Thomas Collard¹ and Paul Rose²**¹Banham Zoological Gardens, Banham, UK²Centre for Research in Animal Behaviour, Faculty of Health & Life Sciences, University of Exeter, Exeter, UK*thomas.collard@zsea.org*

Outbreaks of highly pathogenic Avian Influenza (HPAI) have caused the containment of numerous species of zoo birds as organisations attempt to implement biosecurity and quarantine measures. An almost continual outbreak of HPAI from 2021 has resulted in prolonged confinement of birds that would otherwise have access to expansive outdoor enclosures. At Banham Zoological Gardens (BZG), the flock of 36 Chilean flamingos was brought into indoor housing and a covered yard in line with the UK Government's housing order. The flamingos typically have access to a large outdoor paddock plus lake (c2400m²) but have been confined to their house and covered yard of c130m² since the housing order was implemented in the autumn of 2022. There is little to no research on the effects of confinement on zoo bird behaviour and welfare but choice and control over space usage promotes positive welfare and naturalistic behaviour patterns. Therefore, to provide information on the flamingos' responses to a changed management system, a project was implemented to collect behavioural data on this flock overall. Beginning in December 2022 behavioural observations have been conducted on the BZG flamingo flock to collect data on the flock's responses to confinement. Instantaneous scan sampling has been used for six 20 minute observation periods per day with 60 second time intervals to collect data on state behaviours using the ZooMonitor app. Supplemental data on weather, bird plumage colour and condition, and location (indoor house/outdoor yard) were also recorded. Observations occurred in December 2022 and January 2023 and will continue over each month of confinement, until the housing order end. Comparative data will then be collected when full enclosure access resumes. Preliminary data for December 2022 have highlighted the importance of access to an outdoor space, as when shut inside with no outdoor access due to extreme cold weather conditions, 9.31% of the flock's activity budget was aggressive behaviour, compared to a mean 1.18% (SD = 10.09) when the flock were provided outdoor yard and house access. This project aims to provide information on flamingo responses to restricted housing so that BZG (and other zoos) can define and identify potential indicators of impaired welfare and amend housing or provide extra enrichment accordingly during periods of increased biosecurity. It is hoped that the findings from this research can be applicable to other bird keepers working in similar challenging conditions for a wide range of species.

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TIE STALL HOUSING IN DAIRY COW: DOES THE USE OF NYLON COLLARS REDUCE NECK SKIN ALTERATIONS?

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In the production area of Parmigiano Reggiano (Italy), dairy cows are sometimes kept in tie-stall housing system, individually tethered in separate stalls for over half a year (180 days). When kept in tie-stall housing, several studies reported possible interventions leading to a reduction of lameness, lesions, and risk of illness. However, these interventions require important structural and management changes which are not always economically feasible for the farmer. The replacement of neck chains with nylon collars could play a role in the general comfort in tie-stall housing, and it can be affordable for the farmers. The present study aimed to investigate whether the use of nylon collars can reduce skin alterations in cows in tie-stall housing. A pilot study on 2 tie-stall farms was conducted in the production area of Parmigiano Reggiano. Neck chains were replaced by nylon collars on a total of 55 animals. The skin alterations were assessed every week for 10 times: 4 before and 6 after the intervention (3 for the 1st month and 3 for the 2nd month). Skin alterations were defined as the presence of alopecia or open wounds on the neck and in the rest of the body. A generalised linear mixed model was used to assess the effect of the treatment (chains/collars), time, farm and season on the variables. The animal ID, nested within the farm and the time, nested within the treatment, was used as random effect. The models showed a significant higher probability of findings areas with alopecia in animals with nylon collars both in the neck (57% vs 28%; $p < 0.001$) and in the rest of the body (59% vs 47%; $p < 0.001$). The increase of skin alterations in the rest of the body was also found to be significantly influenced by time ($p < 0.001$), since there was a higher probability of finding alopecic areas during the 2nd month (68%), when compared with the 1st month after intervention (54%).

Considering the characteristics of the tie-stalls in the Parmigiano Reggiano production area, our preliminary findings suggest that nylon collars do not decrease the occurrence of skin alterations. Further studies are needed to identify novel adjustments of structures and management for improving welfare of dairy cows in tie-stalls housing.

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ANIMAL WELFARE CONSIDERATIONS IN REWILDING INITIATIVES**Oscar Courchaine**

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Traditionally, wildlife conservation had considered itself separate from the field of animal welfare, but now in some cases nonhuman animal populations' well-being is starting to be considered alongside more traditional measures of success. Outcomes for individual nonhuman animals also factor into how interventions are designed and implemented, though they may not always take priority. Still, continuing to incorporate concepts and measures from animal welfare will likely lead to further improvements in conservation.

Animal welfare is important to consider in traditional conservation contexts, where interventions can have unintended consequences for the species involved. But it may be especially necessary in projects involving rewilding, where conservationists design the environmental conditions that nonhuman animals will experience once introduced. Nonhuman animals in traditional conservation contexts suffer the effects of human activity via failed interventions and climate change, but the planned nature of rewilding projects requires enactors to pay special attention to the welfare outcomes of all nonhuman animals in those spaces, re-introduced or not.

One such rewilding project in the The Netherlands, Oostvaardersplassen (OVP), consists of just 56 square kilometers of forest and marshland. To keep the forest from overtaking the marshland, several species of ungulates were introduced to live freely within the reserve and eat the offending saplings. The ungulates' inability to migrate as they normally would to find fresh forage has led to a series of boom-and-bust population cycles marked by several mass starvation events. Presently, a number of ungulates are culled yearly to keep starvation minimal, but their presence in OVP remains controversial both in nearby communities and the conservation community at large. Considerations for the welfare of these ungulates, and the other species in OVP, could help inform a better design for the reserve that takes individual nonhuman animals' interests into account when determining their outcomes. Such considerations in rewilding will demonstrate how conservation initiatives in general, can benefit from integrating animal welfare outcomes into their decision-making processes and evaluative measures.

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EXAMINING THE MOTIVATION OF REPETITIVE BARRIER INTERACTION IN REPTILES**Melanie Denommé**

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Repetitive behaviours in captive animals are well-known as potential indicators of inadequate husbandry. However, the motivation behind a repetitive behaviour is rarely straightforward, frustrating efforts to diagnose their potential causes and subsequently remedy any husbandry issues. The form of a repetitive behaviour is often related to its underlying motivation; for example, bar-biting in mice is performed predominantly on bars that mice are trained to understand permit escape. In captive reptiles, repetitively interacting with the barriers of an enclosure (hereafter, IWB) has been documented in a variety of species. Like other repetitive behaviours, IWB can result in serious injuries, and tends to become more prevalent in reptiles housed in barren enclosures. Because of this, and because IWB is aimed at the barriers in an enclosure, many have assumed that it indicates a motivation to escape. However, this assumption has never been directly examined. If IWB in captive reptiles is driven by a motivation to escape, then it should be directed preferentially towards barriers that allow escape, regardless of its overall prevalence. Furthermore, IWB may correlate with other contexts that could increase a motivation to escape, such as being housed in non-preferred environments for extended periods of time and immediately prior to defecation. To examine these predictions, we observed captive bearded dragons (*Pogona vitticeps*) in their home cages periodically over one and a half years. During this time, lizards were housed in naturalistic and standard enclosures, which differed in the enrichments they provided: Naturalistic enclosures contained two hides, a loose substrate, and a propped-up piece of cork bark to facilitate climbing, whereas standard enclosures contained a single paper hide and paper substrate. Lizards were randomly assigned to one of the two enclosure styles and swapped into the opposite style after 8 months. They were observed twice, after approximately 2 and then 25 weeks in each enclosure style. To determine which enclosure style was preferred, we examined the amount of time each lizard spent in each style during a preference test (wherein both styles were freely available), and also examined the prevalence of relaxed postures when housed in either enclosure style. Throughout their time in captivity, lizards were moved in and out of their enclosures only through the front barrier, which was partially transparent; therefore, only this side should be associated with escape. These results will be used to draw conclusions about the potential underlying motivation of IWB.

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DO WELFARE ASSESSMENT FINDINGS IN EXTENSIVE GOAT FARMING REFLECT THE ADVERSE ENVIRONMENTAL CONDITIONS?

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Welfare assessment protocols are tools that, among other things, help us determine whether the animal can cope with its environment. Therefore, the aim of this study was to determine whether animal welfare assessment findings in extensive goat farming reflect the adverse environmental conditions. The study was carried out on a goat farm numbering 39 goats, kept in extensive farming conditions. Measurements were taken for meteorological and ambient conditions (temperature, humidity, and ventilation), air quality (NH₃ and CO₂ levels, dust concentration, microbiological contamination), as well as water quality measurements. The measurements of the ambient conditions were performed at three measurements points (zones A, B and C) based on the grouping of the animals on the farm. Continuous measurements were taken for a period of ten days. Water samples were taken from the drinking buckets as well as a nearby spring used as a water source. Welfare quality assessment was done on the first day of measuring using the AWIN welfare assessment protocol for goats. The results from the environmental measurements showed that the highest temperatures (15-20 °C, 53-73% rH) were measured in zone A where younger goats were kept, while the lowest temperatures (8-10 °C, 45-78% rH) were measured in zone B, the kidding pen. Higher NH₃ levels (10-17ppm) were also measured in zone A, than in the other zones, while CO₂ levels ranged from 565 to 1151 ppm on the entire farm. In addition, zone A was the least ventilated area, unlike zone B. Microbiological analyses showed high concentration of total bacteria in the air in all three zones (>103 CFU/m³) and dust concentrations ranging from 47 ± 22,3 µg/m³ to 142 µg/m³ ± 48,9 µg/m³. Water quality analysis showed satisfactory results concerning the physical and chemical parameters according to the national regulation. The results from the welfare assessment indicate that there was no queuing while feeding and drinking and no fecal soiling, abscesses, or nasal discharge. Out of the 20 goats, 2% had ocular discharge, 55% had overgrown claws and 50% of the goats were overweight. A poor and unkept hair coat was observed on two goats (10%). While it was determined that the goats, at some points, were exposed to unfavorable ambient conditions, this was not reflected on the welfare assessment findings using the welfare assessment protocol. Therefore, welfare assessment should include additional indicators to the standardized welfare assessment protocols in order to reflect the adverse environmental conditions.

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DRIVING ANIMAL WELFARE IMPROVEMENTS IN NEW ZEALAND VIA CERTIFICATION PROGRAMMES**Kelly Drake and Marie McAninch**

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The Animal Welfare Act (1999) (AWA) provides for the welfare of animals in New Zealand, placing obligations on people who own/are in charge of animals to provide for their welfare. Codes of Welfare expand on these basic obligations, set minimum standards and recommend best practice. Codes may also reference regulations issued under the AWA that impose enforceable requirements on owners/persons in charge of animals. New Zealand legally recognised animals as sentient (2015), capable of experiencing positive and negative emotions. Yet, farmed animal welfare is only regularly audited where external customers require animal welfare assurances, to meet corporate responsibilities, for quality assurance, or reactive investigations in cases of reported animal welfare concerns.

Private bodies, including industry, farmer and animal welfare groups can develop certification programmes. However, some industry-developed standards may have inherent bias and only audit to minimum standards, not high animal welfare. SPCA Certified® is an animal welfare certification programme that has been running for ~20 years. The programme is underpinned by evidence-based welfare standards derived from The Five Domains of Animal Welfare. The programme is independent, and not linked to primary industry. This drives welfare improvements by requiring farms/businesses to make welfare improvements that go beyond legal requirements, and work toward providing a good life for animals. SPCA Certified® also requires regular notified and non-notified auditing to assess standard compliance. This ensures welfare improvements are ongoing, and not just a one-off.

Over time, the number of animals and species under SPCA Certified® has increased, due in part to, meeting external customer expectations, consumers wanting humanely-produced food, lack of specific government regulation for some species (e.g. dog daycares), and a burgeoning global movement toward animals having a life worth living. Plus, improved animal welfare is good for business!

However, external pressures can limit animal welfare certification programmes. Amongst others, this includes; consistency in willingness to pay for high animal welfare, external cost pressures limiting infrastructure improvements, a limited pool of appropriately skilled stockpersons and limited support from the retail sector. Nonetheless, benefits are numerous; decreases in number and severity of non-conformances, appropriate environmental enrichment, improved engagement with stockpersons, as well as welfare knowledge extension and training for improved on-farm practices.

Science-based certification programmes, such as SPCA Certified® have an important role to play - alongside robust government standards and proactive industry bodies - in driving improvement in animal welfare in New Zealand.

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THE EFFECT OF DAILY GABAPENTIN ON BEHAVIOUR MODIFICATION PROGRESSION AND SIGNS OF STRESS IN FEARFUL SHELTER CATS RESCUED FROM HOARDING ENVIRONMENTS**Bailey Eagan¹, Karen van Haaften² and Alexandra Protopopova¹**

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Introduction: Cats housed in shelters commonly experience unmitigated fear, anxiety, and stress. Minimizing negative affective states is critical to cat health and welfare. This is especially pronounced in fearful or under-socialized cats, who are particularly at risk for poor outcomes in shelters, such as those from hoarding environments. This study aimed to evaluate the impact of daily gabapentin on behaviour modification progression and signs of stress in fearful shelter cats from hoarding environments.

Methods: 32 healthy fearful cats (*Felis catus*) were entered into group 1) gabapentin or 2) placebo upon intake. Both groups received daily standardized behaviour modification, aiming to decrease the fear of humans and increase positive human interaction. Cats received 10mg/kg of gabapentin or placebo every 12 hours. Daily measures of Cat Stress Score, latency to emerge from hiding, general in-shelter behaviour, and urine suppression were collected. Post-adoption surveys assessed cat social behaviour. A Cox proportional-hazard model was used to evaluate the effect of gabapentin on time to behaviour modification graduation. Mixed-effect modelling was conducted to assess the effect of gabapentin on the Cat Stress Score, latency to emerge, and general-in-shelter behaviour. To evaluate the impact of gabapentin on urine suppression, a Wilcoxon-signed rank test was conducted.

Primary Results: 28/32 (87.5%) cats graduated in a median of 11 days (range 4-51). Gabapentin predicted quicker behaviour modification progression (HR=4.03, 95% CI=1.31 – 12.4, p=0.015) and lower Cat Stress Score (OR=0.24, 95% CI=0.07 – 0.79, p=0.019), latency to emerge (OR=0.13, 95% CI=0.03 – 0.59, p=0.008), and urine suppression (p=0.027, r=0.54) compared to placebo. The median time to graduation was reduced by half with gabapentin. No differences were observed between groups for general in-shelter behaviour. Among limited survey respondents (n=7), despite showing unsocial behaviour in the first week and among unfamiliar people, cats showed social behaviour one-year post-adoption.

Primary Conclusions and Implications to the Field: Fearful cats from hoarding environments can be successfully treated with behaviour modification +/- daily gabapentin within an animal shelter. Daily gabapentin was beneficial in behaviour modification progress and reduced signs of stress in shelter cats.

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PAIN AFFECTS RESPONSE TO REWARD LOSS IN CALVES**Thomas Ede^{1,2}, Marina von Keyserlingk¹ and Daniel Weary¹**

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Negative emotional states are known to interact, potentially aggravating one another. In this study, we used a validated paradigm (successive negative contrast, SNC) to determine if pain influences responses to a reward downshift. Holstein calves (n = 30) were trained to approach a 0.5 L milk reward. Latency to approach, number of vocalisations and pressure applied on the bottle were recorded during training and after calves were subjected to a reward downshift reducing the milk reward to just 0.1 L. Following the downshift, calves increased their pressure, vocalisations, and within-day latency to approach, suggesting a negative state alike to frustration. To assess how pain affected this response, calves were randomly assigned (before testing) to one of three treatments. Two groups were disbudded with standard treatment intraoperative and postoperative pain, but one of these was provided supplemental analgesic before testing to better mitigate post-operative pain. The third group was sham disbudded. Pressure and vocalisations responses were similar across treatments, but calves in both of the disbudded treatments showed increased approach latency relative to the sham calves. Our results indicate that SNC is a useful paradigm for measuring negative affect in calves, and suggests that pain can extend the response to a reward downshift.

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ANIMAL WELFARE IN THE WILD**Vittoria Elliott¹, Janire Bueno-Castellano² and Bonnie Flint³**¹ National Museum of Natural History, Smithsonian Institution, USA² Newcastle University, Newcastle upon Tyne, UK³ Wild Animal Initiative, USA*vittoria.elliott@wildanimalinitiative.org*

Animal welfare science has traditionally focused on companion, farmed, lab, zoo, and other animals directly under human care, with less emphasis on wild animals. A variety of approaches have been used for evaluating welfare of captive animals, with assessments slowly moving towards more holistic, whole-animal based or combination measurement frameworks that permit greater insight into subjective experiences. Many of the more promising approaches require close physical contact with the animals being assessed or intensive training (e.g., cognitive bias testing), which present particular challenges for assessing the welfare of wild animals.

In this talk, we highlight some of these challenges and consider ways that it might be possible to overcome them. Using a set of examples, we explore how welfare assessment in captive animals may be adapted for use in wildlife, and discuss the potential of non-invasive and remote-assessment methods. Through these examples, we will also highlight some of the precautions required when adapting methods to avoid misinterpreting data. Finally we invite the audience to consider whether whole-animal measures could be used to evaluate welfare in the wild.

We hope that the talk will stimulate conversation and inspire participants to explore ways to assess and ultimately improve animal welfare in the wild.

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THE EFFECT OF DIFFERENT HOUSING TYPES ON FEATHER SCORE AND TONIC IMMOBILITY IN LAYERS

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The present study was conducted to determine the effect of different housing types on their feathers and fear level in layer hens. A total of 72 AtakS breed layer hens were used in the study. Chickens were randomly distributed into 4 groups as: conventional cage, enriched cage, floor-type poultry house and free range. There were 18 chickens in each group. The condition of the feathers and the level of fear were evaluated when they were 49 weeks old. The condition of the feathers was scored both locally and in total. Those with the best feathers were given 4 points, while those with the worst condition were given 1 point. Tonic immobility test was performed to determine the level of fear in all housing conditions. For this, the chickens were placed on a table and laid on their right side. While holding the head and neck with one hand, light pressure was applied to the side with the other hand and it was kept stable for 15 seconds. The time the chicken moved its head or any part of its body for the first time after immobilization was measured as, “first movement time” and also “standing time” were recorded with a stopwatch. The results showed that the neck, back, wing and tail feathers and total feather score of free range chickens were higher than those in conventional cages (respectively $P = 0.001$, $P = 0.001$, $P = 0.003$, $P = 0.001$, $P = 0.001$). In addition, it was determined that the head feathers of the chickens housed in the enriched cage and the breast feathers of the chickens housed in the floor type poultry house were better than those in the traditional cage ($P = 0.024$, $P = 0.005$). The time to make the first move after the application of tonic immobility tended to increase in chickens housed in the floor type hen compared to other rearing types ($P = 0.053$), however the standing time was not significantly different ($P = 0.270$). Because the condition of the feathers is used as an indicator of animal welfare, the results clearly showed that the welfare level of free-range chickens is better than those housed in conventional cages. On the other hand, the tendency of increase in the fear scores in floor type poultry houses shows that there is a need for more detailed studies on the subject.

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THE EFFECTS OF FURNISHED CAGES ON THE BEHAVIOUR OF LAYING HENS IN THE POST-STRESS ADAPTATION PERIOD

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The aim of the study is to investigate whether housing laying hens in furnished cages in post-stress adaptation period causes any changes in behaviors or not. Due to the affects of animal welfare on production performance, the relationship between behavioral changes and egg production has also been studied. In the present study, 22 weeks old, 32 laying hens were used. The hens were subjected to transport. The transport procedure, including loading and unloading took 8 hours. Just after the transportation, birds were randomly divided into two groups as furnished and conventional cages; each consists of two subgroups with 8 hens. It was ensured that the hens in subgroups were unfamiliar with each other to induce social stress. On the top of each cage, a camera was fixed and continuous recording was done for 24 hours for 6 days. The behavior of animals was scored by time sampling method. Eating, drinking, resting, preening, wing flapping, tail-wagging, stretching, ground-scratching, gentle pecking, stereotyped and aggressive pecking behaviors were scored. In addition, the locations of the hens were also determined in furnished cages. Frequency of eating, drinking and ground-scratching behaviours significantly increased, but tail-wagging behaviour tended to increase in hens housed in furnished cages. On the other hand, resting, stretching and aggressive pecking behaviours significantly decreased in hens housed in furnished cages. In addition, the use of perch and nest rate in furnished cages significantly increased from the second day. In the conclusion, cage furnishing improves some comfort behaviour such as ground-scratching and tail wagging and decreasing aggressive pecking in laying hens. Therefore, it would be beneficial to keep stress-exposed hens in furnished cages in the post-stress adaptation period.

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ARE DOG OWNERS IN ISTANBUL CONSCIOUS ABOUT AGING PROCESS OF THEIR DOGS?**Songul Erhan¹ and Erdal Matur²**¹ Graduate Education Institute, Istanbul University-Cerrahpasa, Istanbul, Turkey² Department of Physiology, Faculty of Veterinary Medicine, Istanbul University-Cerrahpasa, Istanbul, Turkey*snglerhan@gmail.com*

As in the world and also in Turkey, the treatment, care and feeding conditions of companion animals have been getting better. This causes an increase in the number of dogs reaching advanced ages in our country. However, it has not been examined how much the animal owners in our country are aware of the aging process of their dogs. In this study, it was examined whether dog owners in Istanbul are aware of age-related changes in their animals. Information was obtained from veterinary clinics in Istanbul to communicate with elderly dog owners. A questionnaire containing questions to detect age-related changes in their dogs was sent online to 125 people with dogs over the age of nine. The submitted questionnaire included questions about changes in dogs' skin and coat structure, sensory characteristics, eating and drinking behaviors, physical activity, toilet habits, and cognitive functions. According to the information obtained from the veterinary clinics in Istanbul, elderly dogs constituted approximately 18.2% of the total patients. 88.7% of the participants in the survey noticed changes in the eating and drinking habits of their dogs, 76.7% in their skin and hair structure, especially in color, 74% in their ability to see and hear, 72.1% in their physical activities, especially in tiring quickly, 51.8% of them reported that they noticed a change in their cognitive functions, 47.4% in their toilet habits, especially in urination. As a result, it was observed that the owners of the patients more easily noticed the changes in the eating and drinking habits, skin and hair structure, sensory characteristics and physical activities of their older dogs. It was determined that the rate of awareness in mental activities and changes in toilet habits was relatively low. The results obtained showed that training should be given on subjects with low awareness. In addition, it was thought that the awareness of people with old dogs in Istanbul increased with the survey study, and this contributed to animal welfare.

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**REFINEMENT OF THE STREPTOZOTOCIN-INDUCED MODEL OF DIABETES IN RATS:
FASTING AND ANALGESIA****Marisa Esteves-Monteiro^{1,2,3}, Daniela Menezes-Pinto³, Mariana Ferreira-Duarte^{1,3},
Manuela Morato³ and Margarida Duarte- Araújo^{1,2}**¹ LAQV-REQUIMTE, Faculty of Pharmacy, University of Porto, Portugal² Department of Immuno-Physiology and Pharmacology, Institute of Biomedical Sciences Abel Salazar, University of Porto (ICBAS-UP), Portugal³ Laboratory of Pharmacology, Department of Drug Sciences, Faculty of Pharmacy of University of Porto (FFUP), Portugal*mmem89@gmail.com*

The substantial impact of diabetes mellitus (DM) on human health continues to support the use of animal models in translational studies. Streptozotocin (STZ) has been widely accepted as the preferred agent for chemically inducing DM. However, due to its uptake into β -cells via GLUT2 transporters, it is generally recommended to administer STZ after a period of fasting to minimize competition with postprandial glucose. Protocols often restrict food intake for up to 16 hours, commonly overnight, and occasionally extend to 24 hours, which is recognized as a significant stressor for rodents. Furthermore, despite the potential for pancreatic inflammation to cause significant pain, STZ induction is frequently conducted without administering analgesia. To address these concerns, we conducted a study to assess the effectiveness of inducing DM using STZ with a shorter diurnal fasting period while also providing analgesia.

A total of 30 male Wistar rats, already assigned to another project and utilized in collaboration with other research groups (REDUCE), were employed for the study. Among them, 22 rats were induced with STZ, while the remaining 8 rats served as controls. On the day of DM induction, animals were fasted for 4 hours during the morning, with free access to water. The STZ solution (55 mg/ml in citrate buffer pH 4.5) was prepared just prior to the injection. DM was induced by a single intraperitoneal injection of STZ, under the analgesic effect of tramadol (20mg/kg, PO). Rats had ad libitum access to water and food through the remaining protocol. Animals were considered diabetic if 48h after STZ injection their blood glucose was ≥ 250 mg/dL.

Before fasting, basal glycemia of control animals and STZ-induced rats was similar (105.63 ± 6.31 mg/dL vs 99.30 ± 3.29 mg/dL, respectively, $p > 0.05$). From 22 animals that were injected with STZ 19 became diabetic, representing an average rate of induction of 86,4%. The glycemia of STZ-induced rats increased to 395.09 ± 13.80 mg/dL within 48 hours ($p < 0.05$). At d14, almost all STZ rats presented with a glycemia above 500mg/dL with ketone bodies, while control animals presented glycaemic values of 105.57 ± 4.76 mg/dL. During the protocol, diabetic animals exhibited classic DM signs, such as polyphagia, polydipsia, polyuria, and weight loss.

These results indicate that it possible to induce DM with STZ in rats with a refined protocol that includes a shorter fasting period and analgesia, thus assuring animal welfare without jeopardizing experimental results.

Acknowledgements: This work was supported by FCT (Partnership Agreement UIDB-50006/2020 and 2020.06502.BD to MEM).

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**THE EFFECT OF ENVIRONMENTAL DESIGN ON THE WELFARE OF CAPTIVE STRIPED SKUNKS
(MEPHITIS MEPHITIS)**

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Exotic wild mammals are often kept in captivity in zoological collections, for education purposes and increasingly as pets however providing for these species welfare in captivity can be challenging. Striped skunks (*Mephitis mephitis*) are increasing in popularity as pets, and in commercial activities such as petting farms and in childrens entertainment, despite having complex welfare requirements. A variety of enclosure design and enrichment choices were introduced to a captive striped skunk (N=1) to ascertain welfare positive behavioural responses, enclosure utilisation and inform best practice with regards to practical animal husbandry in captivity. Enclosure designs were divided into zones of ecological significance and the utilisation of these zones was calculated using modified spread of participation index (mSPI) to inform key considerations of enclosure design to promote positive welfare in the captive environment. Initial results suggest that zones with ecological features most representative of the natural environment elicit higher positively associated behavioural responses, and that a range of enrichment types and choices is key to promote mental stimulation, both of which should be considered in initial enclosure design for *Mephitis mephitis* to promote optimal welfare in captivity.

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HEALTH STATUS CHARACTERIZATION OF CONFISCATED *MACACA FASCICULARIS* AS AN INDICATOR OF REHABILITATION ELIGIBILITY USING ANIMAL WELFARE PRINCIPLES

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The exploitation of primates, where the species of *Macaca fascicularis* (Cynomolgus or crab-eating, macaque), is one of the most hunted and traded animals, in the animal market. Exploitation activities as a result of poaching and trading of wild animals to be used as pets and as working animals (dancing monkey), and as well as human-wildlife conflicts. These exploitation activities have risks of threats to public health, risks of zoonotic diseases, and non-compliance with the principles of animal welfare. Health examination is an indicator that can be measured and represents an evaluation of animal welfare. The purpose of this study was to characterize the health status and obtain a standard for assessing the feasibility of rehabilitation of confiscated *Macaca fascicularis* individuals during the quarantine stage, using animal welfare principles. Another purpose of the study was to see the overview of animal welfare status based on individuals origin. Based on the results of the health examination during the quarantine stage, *M. fascicularis* had a body weight ranging from 0.96 in the infant group to 8.01 in the adult group. In contrast, individual body condition score (BCS) ranged from 1.50 to 4.00. Based on physical examination and dental condition, individuals from conflict and pets were declared physically healthy, compared to the dancing monkey group, which required observation. The blood results showed that the long-tailed monkey from the dancing monkey had a healthy percentage of 85.71%. Based on the tuberculosis examination using the skin tuberculin test, all individuals of were tested negative. Based on the prevalence status, 20% of individuals were found to be positive for endoparasites. The results show a correlation between BCS and body weight with a general correlation coefficient of 0.353. Individuals from the dancing monkey group had the highest mean score in the assessment of rehabilitation feasibility, with a score of 27.14 ± 1.46 , compared from human-wildlife conflict, namely 24.80 ± 1.64 , and from ex pet, namely 25.11 ± 2.08 . In general, all individuals in this quarantine stage were declared eligible to enter the rehabilitation stage because they had an average score of 25.53 ± 2.05 .

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CONDENSED MILK OR STRAWBERRY JAM – WHICH DO RATS PREFER FOR VOLUNTARY ORAL INGESTION?

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Background and aim: Oral drug administration is very common in rodent in vivo protocols. Voluntary intake promotes animals' welfare but is poorly studied in rats. We aimed to evaluate rats' preference for condensed milk or strawberry jam, and its suitability as an easily accessible vehicle for voluntary drug intake.

Animals and methods: Competent local and national authorities approved this project (179/2017-ORBEA-ICBAS-UP and 003511/2018-DGAV). Male Wistar Han rats (already ascribed to another project - REUSE) were randomly allocated to condensed milk (CM, n=10) or strawberry jam (SJ, n=10) group. Each sweetmeat was presented as an aqueous solution in a syringe (300µL, 1:1) for a maximum of 5 min, for 4 consecutive days. Only on day 1, rats that did not voluntarily lick the syringe were restrained to taste the sweetmeat. The time to find the syringe and the time to ingest all the sweetmeat were registered. Statistical analysis was performed with a linear mixed model with repeated measures. Cage was initially considered a random effect, but it was removed since it was not statistically significant. Animal random effect was considered a repeated measure effect (4 measurement days for each animal) nested within Cage. Multiple comparisons were Tukey-Kramer adjusted. The analysis was performed with the SAS OnDemand for Academics software© (SAS Institute Inc, Cary, NC, USA) and $\alpha=0.05$.

Results: On day1, more rats voluntarily ingested CM (9/10) than SJ (4/10). All animals voluntarily ingested the CM in every day of protocol, while the SJ was voluntarily ingested by 9/10, 8/10 and 7/10 animals in day 2, day 3 and day 4, respectively. Additionally, the time to lick the syringe was lower for CM than SJ throughout the protocol. For rats that voluntarily licked the syringe, time to ingest the sweet mixtures was lower on day 3 and 4 compared to day 1, but the time to ingest CM was lower than that of SJ throughout the protocol.

Conclusion: Taken together, these data show that rats voluntarily ingest CM and prefer it over SJ, suggesting a potential application of CM as a new vehicle for voluntary oral administration of drugs in protocols involving rats.

Acknowledgements: This work was supported by FCT (Partnership Agreement UIDB-50006/2020 and SFRH/D/145654/2019 to MFD).

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EFFECTS OF SOCIAL INTERACTIONS ON THE EMOTIONAL STATE OF THE HORSE**Anna Flamand¹, Amazone Raskin¹, Clémence Helleu¹, Cheyenne Zellenka¹, Sophie Boyer²
and Odile Petit¹**¹ Physiologie de la Reproduction et des Comportements, INRAE, Centre INRAE Val de Loire, Nouzilly,
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The ability to establish relationships with congeners is a prerequisite for the welfare of social species. However, some of them, such as the domestic horse (*Equus caballus*), are kept in social isolation, which is a stressful situation for the animal. The negative consequences of individual housing on the welfare and health of equids are now widely known and may also have effects on emotions and cognition. The aim of this study was to assess the impact of socialisation on the emotional state of the horse. We studied 24 adult horses housed in individual stalls. The population was separated into two experimental conditions: horses with no opportunity for social interaction (isolated condition) and horses with the opportunity to interact with a conspecific temporarily (social condition). During 4 months, the latter met in pairs for 1 hour/day in a meeting box allowing social interactions. At the end of the 4 months, all the horses were tested for cognitive bias. Indeed, the living conditions of an animal can change the way it perceives its environment and lead to a cognitive bias, also known as a judgement bias. The cognitive bias test estimates whether the horse perceives the information in its environment as positive, i.e. in an optimistic way, or negative, i.e. in a pessimistic way. Concretely, the subject is trained to learn that there are two positions for a bucket: a positive and a negative position. Then the bucket is placed in ambiguous positions, between the positive and the negative position (without prior learning) and the approach speed of the horse is recorded. Horses in the social condition approached the ambiguous negative position faster than horses in the isolated condition (GLMM, $p < 0.05$). This means that they showed an optimistic bias that was not found in horses in the isolated condition. These results suggest a more positive perception of the environment for horses that were allowed to have social interactions compared to those housed in social isolation. Therefore, it appears that maintaining daily social contacts has a positive effect on some cognitive processes and improves the overall welfare of the horses.

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USING SCENT TO ENHANCE WELFARE AND REPRODUCTIVE BEHAVIOUR IN ZOO-HOUSED ENDANGERED LEMURS

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The Alaotran gentle lemur (*Haplemur alaotrensis*) is one of the 25 most endangered primates in the world and also shows low success rate in captive breeding programmes. It is therefore vital to further understand its reproductive biology. We conducted the first detailed chemical analysis of anogenital odour secretions in female gentle lemurs to identify the chemical signature conveying information about female fertility. We studied a breeding female in a troop (n=5) hosted at Jersey Zoo, Channel Islands. We collected behavioural data (n=318 hours) using all occurrences of some behaviours and *ad libitum* sampling methods, and faecal (n=54) and vaginal odour (n=35) samples via positive reinforcement training. We measured sex hormone levels using enzyme immunoassay technique and investigated the volatile component of odour signals using solid-phase microextraction coupled with gas chromatography-mass spectrometry. We then resynthesized the fertile odour mixture and tested it as a scent enrichment in four non-breeding pairs (n=8) hosted at Jersey, Birmingham, London (UK) and Mulhouse (France) zoos. We evaluated the effects of this newly designed enrichment on well-being status and mating behaviour combining behavioural observations (n=515 hours) with faecal endocrinology (cortisol and testosterone measurements) (n=180). We found that the breeding female performed anogenital scent-marking significantly more frequently during the fertile period, suggesting that anogenital scent-marking may signal female reproductive status. The volatile chemical profile changed over the study, with four compounds (2-Heptanone, 3-Heptanone, 3-Octanone, 4-Methyl 3-Hexanone) distinguishing the fertile window during the breeding period. With regards to the effects of the enrichment, we found a significant increase of both male and female olfactory behaviours during and after the enrichment at Birmingham, and of the female during the enrichment at London. Moreover, both male and female sexual behaviours increased significantly during and after the enrichment at Birmingham. Also, we did not find any significant change in male testosterone levels. However, cortisol levels significantly lowered in the female during and after the enrichment at Birmingham and in both male and female after the enrichment at Mulhouse, while rose in the female during the enrichment at London. Despite some degree of individual variability in response to the enrichment, our findings suggest that this scent-based enrichment has potential to enhance both olfactory and sexual behaviours in zoo-housed gentle lemurs.

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**SOCIAL RELATIONSHIP BETWEEN SOCIALIZED MINIATURE PIGS AND THEIR OWNERS:
IS THERE AN ATTACHMENT BOND?****Anna Gábor, Paula Pérez Fraga, Márta Gácsi, Linda Gerencsér and Attila Andics**

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Attachment plays an important role in infant-mother relationships: it enhances the attached individual's chance for survival and learning through keeping it in the proximity of the attachment figure. Family dogs' human-analogue attachment behaviour towards their owners, who they use as a secure base/safe haven, is claimed to be a unique interspecific bond. Using a modified version of the Strange Situation Test (SST), we aimed to reveal whether young miniature pigs (N=11) living in human families show similar attachment to their owners. Based on the observed behaviour patterns, three major factors were formed and analysed; Attachment to the owner, Anxiety in the strange situation, Acceptance of the stranger. According to the preliminary results (1) pigs did not show specific patterns of Attachment behaviours towards the owner in the SST context, (2) Attachment scores positively correlated with Anxiety scores, and (3) pigs showed relatively high Acceptance of the stranger. Our results suggest that in young companion pigs, the intense exposure to human social stimuli during domestication and ontogeny has not triggered the development of human-analogue attachment towards the owner. Dogs' unique attachment towards the owner can be thus facilitated by either some species-specific predisposition or dogs' artificial selection for dependence on and cooperating with humans. Learning about the nature of the social relationship between humans and their companion animals contributes to a better understanding of animals' needs and thus it serves their welfare.

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UK PUBLIC'S PERCEPTIONS ON ANIMAL WELFARE IN THE UK**Amelia Garcia-Ara¹, Lauren Crouch¹, Marnie Brennan¹ and Rodrigo Nova²**¹School of Veterinary Medicine and Science, University of Nottingham, UK²School of Biodiversity, One Health and Veterinary Medicine, University of Glasgow, UK*amelia.garcia-ara@nottingham.ac.uk*

Despite the important role animals play in our lives, there is limited research about the public's perception of animal welfare in the UK. This study aimed to investigate the UK public's opinion about animal welfare, and to determine any major concerns held about welfare for pets, horses, zoo and food-producing animals.

A questionnaire was distributed via e-mail, Facebook, and Twitter, and made available between the 27th September 2019 and 28th October 2019. The questionnaire asked respondents to rate the UK animal welfare standards for cats, dogs, horses, sheep, dairy cattle, beef cattle, broiler chickens, layer hens, pigs, zoo animals, and exotic animals. Respondents provided their personal definition of excellent welfare, and which welfare concerns, if any, they had for each species. Animal welfare concerns raised by respondents in free text open boxes were classified into different categories and arranged into themes.

While no animals were scored as having very poor or very good welfare, the 535 respondents regarded dogs and cats as having good welfare overall. Conversely, laying hens and broiler chickens scored the lowest, with moderately poor welfare nominated. Over 40% (n=210/497) of respondents expressed welfare concerns for dogs and identified more specific welfare concerns for dogs and cats such as "neglect/abuse", "obesity", "brachycephaly related conditions" or "irresponsible breeding", than for any other species. "Owner's lack of knowledge" was the main perceived welfare concern for horses and exotic pets. The concerns raised for food-producing animals were categorised into the five freedoms themes, and mainly related to "freedom from discomfort" and "freedom to express natural behaviours"; for hens and sheep, "freedom from pain and disease" was the most commonly mentioned. Extreme terminology was sometimes employed by respondents, for example, one respondent wrote "having their babies stolen" when raising concerns over dairy cattle.

Despite the high percentage of respondents who were highly educated (57.86%, n=311/534 had some form of tertiary education), this study highlights some perceived concerns that parts of the UK population have about animal welfare standards in the UK. The results of this study suggest the need for further investigation into these perceptions and into what information sources the general public are using, and how they are accessing information on animal welfare.

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HUMAN-HORSE INTERACTIONS, BUT NOT HOUSING CONDITIONS, INFLUENCE FEARFULNESS IN LIPPIZAN HORSES

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Little is known about how social interactions influence equine behavior and welfare. We investigated whether housing conditions and everyday human-horse interactions, such as caretaking, training, or work, play a role in fearfulness in horses. We recruited 21 adult Lippizan horses (11 mares and 10 geldings), aged 5 to 26 years at six different locations. At the location and from owners, we obtained information on horse demographics, housing conditions (number of boxes, access to pasture), type of training, working conditions (type of work, participation in riding schools and/or equine-assisted activities), daily contact with humans (number of caretakers or trainers) and injury history.

Fearfulness was assessed using a battery of four behavioral tests performed sequentially, with each subsequent test representing a more fear-inducing experience for the horse. In the passive human test, an unfamiliar handler held the horse on a relaxed leash and allowed the horse to initiate any type of interaction. In the umbrella test, the same handler led the horse through a passage formed by two identical colorful umbrellas. In the rolling ball test, a large blue and yellow ball was released from the ramp and rolled past the horse. In the last test, the bag test, a whip to which a blue plastic bag was attached, was swung in front of the horse. For each horse, the tests were performed twice on two different days. After both repetitions, a fear score (sum of the four test scores) was assigned to based on a 5-point scale. In the analysis, the average of the first and the second fear score was used.

The main results showed that horses with a lower number of caretakers or trainers, and horses involved in equine-assisted activities, had a higher fear score. It appears that daily interaction with a smaller number of people and participation in tactile activities with strangers have an effect on occurrence of fearfulness, while housing conditions have none. These results shine a new light on specific work and management practices that may play a role in horses' behavior in novel situations and potentially affect horses' welfare.

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USE OF STANDARDIZED OPERATING PROCEDURES (SOP'S) FOR PERIOPERATIVE CARE IN CATTLE AND HORSES USED IN TEACHING AT THE SCHOOL OF VETERINARY MEDICINE AND SURGERY SAINT FRANCIS OF ASSISI

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Although the concept of the 3Rs is mostly associated with conventional laboratory animals, it does not imply that it does not apply to farm animals used in teaching. As mentioned in the Guide for the Care and Use of Agricultural Animals in Research and Teaching (2020) The establishment of standard operating procedures is encouraged to ensure uniform and high-quality management in animal care. The Standardized Operating Procedures (SOPs) are guidelines that seek consistency in carrying out activities, also the implementation of SOPs allows to ensure the welfare of animals by fulfilling their freedoms, constituting a tool in the refinement in the use of animals.

The objective of these SOPs is to ensure adequate recovery, animal welfare and pain management for bovines and horses used in teaching at the School of Veterinary Medicine and Surgery Saint Francis of Assisi

Materials and methods: Pilot SOPs were created for bovine and equine surgery practices, to complement perioperative care (analgesia) in bovines and equines used in teaching; These SOPs were provided to the final year students of the veterinary medicine and surgery career at the San Francisco de Asís School of Veterinary Medicine and Surgery.

Results: The implementation of 5 SOPs was given to be used by students and other personnel in charge of the care and management of animals: One on pre-operative preparation in ruminants, and four on post-operative care in abdominal surgery in bovines, bovine male surgery, equine castration, and equine surgery.

Conclusions: It is concluded that the implementation of SOPs, in addition to offering a tool that allows the consistent performance of the activities, also provides a didactic tool for veterinary medicine students, promotes a culture of care by actively involving students in the recovery process. of animals and that also favours refinement in the use of animals.

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EVALUATION OF TISSUE DEPTHS OF CADAVER HEADS FROM PHYSICALLY CASTRATED MARKET BARROWS AND IMMUNOCASTRATED BOARS

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Penetrating captive bolt (PCB) is a common method of euthanasia for grow-finish and breeding swine. Immunocastrated (IC) Boars have become more common in US swine production because a painful procedure (physical castration) is eliminated. IC Boars typically display greater average daily gain than Physically Castrated (PC) Market Barrows, which may result in greater final weight and possible differences in head morphology that could affect outcomes of PCB application. Effective PCB application results in instantaneous insensibility which prevents suffering at the time of death. Heads were separated from their carcasses and frozen before shipment under refrigeration (1931 km) for head processing. Student's T-tests were used to determine differences between means within the MIXED procedure of SAS Enterprise Guide 7.1. Hot carcass weight was not different ($P = 0.695$) between IC Boars (117.99 ± 3.49 kg) and PC Market Barrows (116.46 ± 3.57 kg). Heads were split at the midline using a bandsaw before tissue measurements were collected. Soft tissue thickness and cranial thickness were measured using a digital caliper. Soft tissue thickness was not different ($P = 0.704$) between IC Boars (9.06 ± 0.28 mm) and PC Market Barrows (8.91 ± 0.28 mm). Cranial thickness was not different ($P = 0.868$) between IC Boars (22.91 ± 0.83 mm) and PC Market Barrows (23.11 ± 0.83 mm). Total tissue thickness was not different ($P = 0.973$) between IC Boars (31.98 ± 0.97 mm) and PC Market Barrows (32.02 ± 0.97 mm). Maximum deflection distance (the maximum distance from a straight edge that was placed from the tip of the snout to the poll of the head) was not different ($P = 0.104$) between IC Boars (3.08 ± 0.10 cm) and PC Market Barrows (3.31 ± 0.10 cm). Overall, the data suggest that tissue profiles of IC Boars and PC Market Barrows may not differ at the frontal PCB placement site. As such, the mechanical tools that are used effectively for PC Market Barrows should also effectively render IC Boars insensible.

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**BEHAVIORAL RESPONSES OF SOWS TO TWO RESTRAINT METHODS AND A THEORETICAL
FRONTAL PENETRATING CAPTIVE BOLT PLACEMENT: A PRELIMINARY REPORT****Emma Hamilton¹, Karly Anderson^{1,2}, Barbara Dittrich¹, Megan Seehusen¹, Katherine Creutzinger¹,
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During euthanasia, effective restraint at stunning is essential to protecting pig and caretaker welfare. Two common methods of restraint include snaring (SNARE) and confinement with sorting boards (BOARD). The objectives of this study were to determine if SNARE and BOARD restraint methods differed in 1) time to effective restraint and time to effective penetrating captive bolt (PCB) placement and 2) determine if there are body and head motion differences in behavioral responses. Twelve group-housed sows (mean parity: 2; range: 0-5) were assigned to two restraint treatments (SNARE, BOARD) in a crossover study design; sows in one pen (n=6) received the BOARD treatment followed by the SNARE treatment, while sows in another pen (n=6) received the SNARE treatment followed by the BOARD treatment. The first application of each treatment within each pen was applied to the closest sow, that order was recorded and followed during application of the second treatment within the same pen. In the BOARD treatment, sows were restrained by two individuals with sort-boards. In the SNARE treatment, sows were restrained by one individual controlling the snare. For both restraint treatments, the mock frontal PCB application was made by an additional person. All data were collected during post-hoc continuous video analysis. Time to restraint was not different ($P=0.97$) between SNARE (18.09 ± 5.85 s) and BOARD treatments (18.46 ± 5.85 s). Total time to mock PCB placement was not different ($P=0.54$) between SNARE (20.29 ± 5.76 s) and BOARD treatments (26.42 ± 5.76 s). The time between successful restraint and mock PCB placement was greater ($P=0.01$) for sows restrained with a BOARD (9.83 ± 1.36 s) than those restrained with a SNARE (2.58 ± 1.36 s). Occurrence of head movement was assessed on a yes/no basis. Cumulative occurrence of head movement did not differ ($P=0.07$) between BOARD and SNARE treatments (OR: 13.48; 95% CI: 0.73-250.58). Horizontal head movement did not differ ($P=0.12$) between BOARD and SNARE treatments (OR: 6.41; 95% CI: 0.57-71.63); however, sows restrained with a BOARD were more likely ($P=0.03$) to move their head vertically than sows restrained with a SNARE (OR: 27.68; 95% CI: 1.48-517.2). Backward movement once restrained did not differ ($P=0.2367$) between BOARD and SNARE treatments (OR: 0.187; 95% CI: 0.009-3.730). Overall, the data suggest that using SNARE to restrain sows for PCB euthanasia may be more efficient than using BOARD; however, additional research is needed to understand the stressfulness of either restraint method.

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RUFFLED MINDS? CHARACTERISING RESTLESSNESS IN BULLS KEPT ON FULLY SLATTED FLOORS**Sara Hintze, Florian Krottenthaler and Christoph Winckler**

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In humans, restlessness has been described as a symptom of negative states like boredom and depression. More recently, it has also been proposed as a potential indicator of chronic boredom in non-human animals. Restless behaviour has been described in many species, but never in detail. Here we suggest that restlessness is not one behaviour, but operationally define it as the frequency of transitions between different behaviours in a given time. We applied this definition to study restlessness in bulls kept on fully slatted floors in barren and monotonous environments, which are characteristic of conditions causing boredom in humans. To this end, we visited eight farms with Austrian Fleckvieh bulls (farm size: 54 – 160 bulls, six to 10 bulls per pen). On each farm, we chose two pens per weight category (400, 500 and 600 kg) and continuously observed six animals per pen for 10 minutes each (8 farms x 3 weight categories x 2 pens x 6 animals = 288 animals). During these 10-minute observations, we applied an ethogram including 35 behaviours that could be summarised in eight behavioural categories: movements, vocalisations, nutrition, comfort, social, abnormal, sexual and explorative behaviour. Number of transitions between behaviours was used as an outcome measure. On average bulls switched behaviours every 15 sec, with an average of 48 ± 14 transitions within 10 minutes (range from 15 to 92). The number of transitions was significantly affected by the interaction between farm and weight category (generalised linear mixed-effect model: $X_{12}=45.3$, $p<0.001$), but graphical display of the data revealed no obvious pattern. A sequence analysis revealed four different types of restlessness, demonstrating that restlessness cannot only be differentiated by transition number, but also by the sequence of these transitions. These four types were mainly characterised by differences in standing, feeding, social and comfort behaviour. This is a first study operationally defining and describing restlessness in bulls, aiming to shed first light on a highly prevalent, but yet understudied behavioural phenomenon. However, this study does not reveal the welfare consequences of restlessness, for example if it reflects boredom, depression or results from the intensive feeding of these animals. We thus plead for future studies replicating our findings, extending the study of restlessness to different husbandry systems and finally investigating what restlessness means for bull welfare.

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ANIMAL-BASED METHODS OF ASSESSING HEAT STRESS IN FARM ANIMALS: A CASE OF THE 3R'S

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With the predicted increase in frequency, duration, and intensity of heat associated with global warming, the welfare of farm animals is in danger of being compromised globally, especially in tropical regions of the world. Since there is a global increase in awareness about animal welfare, this review is timely as it gives stakeholders the opportunity to weigh the cost of whatever technique is adopted. Based on the definition of animal welfare as "the state of an animal regarding its attempts to cope with its environment," it implies that the best measure of welfare should be animal-based, as this indicates whether the animals are coping or not. In this review, we identified four major animal-based methods of assessing heat stress in farm animals: core body temperature, surface body temperature, respiratory rate, and behavior. This review therefore focuses on animal-based measures of heat stress in different farm animal species in the light of addressing one of the 3R's of animal welfare, which is "refinement" in tropical regions of the world. Since there is a global increase in awareness about animal welfare, this review is timely as it gives stakeholders the opportunity to weigh the cost of whatever technique is adopted. Based on the definition of animal welfare as "the state of an animal regarding its attempts to cope with its environment," it implies that the best measure of welfare should be animal-based, as this indicates whether the animals are coping or not. In this review, we identified four major animal-based methods of assessing heat stress in farm animals: core body temperature, surface body temperature, respiratory rate, and behavior. This review therefore focuses on animal-based measures of heat stress in different farm animal species in the light of addressing one of the 3R's of animal welfare, which is "refinement." In this review, we have categorized the existing methods for assessing heat stress in farm animals as invasive, minimally invasive, and non-invasive. We recommend the use of and development of other minimal or non-invasive methods of assessment that would not aggravate the conditions of the animals.

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ANIMAL WELFARE AWARENESS AMONG CAGE-FREE FARMERS: DOES IN-PERSON TRAINING HELP?**Lukas Jasiunas¹, Kikiope Oluwarore¹, Faisal Qureshi² and Isaac Esparza¹**¹ Healthier Hens, South Pasadena, USA² Healthier Hens Kenya, Nairobi - Kenya*lukas@healthierhens.com*

Animal farming industry stakeholders of the global North are becoming more and more aware of the importance of welfare issues, both in terms of ethics and economics. While familiar with the fact that proper care and management of animals can lead to more productive farmed animals, the significance of welfare has not yet gotten a foothold in many other regions of the world. To investigate this issue, we carried out two 2-day training workshops, where Kenyan cage-free egg farmers were sensitized about the importance of hen welfare. The participants were provided with the knowledge necessary to properly care for the animals by experienced instructors. Internationally acquired, up-to-date knowledge on pressing welfare challenges was provided. The farmers were recruited in two counties: Murang'a (n=18) and Nakuru (n=18), with the help of the staff at county-level Livestock Offices. The program consisted of multi-presenter classroom instruction with visual and hand-out aids, covering topics such as the basics of welfare, hen welfare specifics, good practices, the importance of adequate nutrition, bone health issues, and open discussions. The program was evaluated using voluntary pre-, post-, and three-month post-surveys. Less than half of the participants were familiar with animal welfare initially despite most believing that hens can feel pain and experience suffering. High farming input costs and space availability were often cited limitations for improving on-farm welfare, but >95% of respondents expressed willingness to improve. Hen welfare awareness and knowledge were effectively increased, with effects remaining three months after the workshops. Two-thirds of respondents claimed to have implemented on-farm improvements and >90% expressed willingness to continue learning. This work provides insight into welfare gaps and discusses if workshops are appropriate means to raise awareness among cage-free farmers. The methods shall be studied further and could be used by hen welfare stakeholders in other regions.

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MEASURING MOTIVATIONS AND PREFERENCES IN DAIRY CATTLE: A SCOPING REVIEW**Emma Jensen¹, Margit Jensen¹, Heather Neave¹ and Melissa Bateson²**¹ Department of Animal and Veterinary Science, Aarhus University, Tjele, Denmark² Biosciences Institute, Newcastle University, Newcastle upon Tyne, UK*emma.hvidtfeldt@anivet.au.dk*

Measures of motivation and preference guide design of housing and management that accommodate the behavioural needs of farm animals. However, motivation and preference can be difficult to assess. Dairy cattle are most commonly housed indoors, and research has increasingly assessed the preferences and motivations of this species. Therefore, the scoping question of this review was “Which types of motivations and preferences in dairy cattle have been assessed so far, and which methodological approaches have been used?”. A search for literature using specific search criteria on Web of Science’s Core Collection resulted in 5222 papers, of which 345 were included after the screening process. Some papers covered multiple measures of motivation or preference; to simplify the analysis, each measure was analysed as its own entry, resulting in a total of 567 data entries. Most of the studies (78%) were done on female cattle, and just over half of the studies (55%) were conducted on mature animals. The majority of preference studies concerned either feed preference (40%) or preference for the structural environment (31%; e.g., stall design or walking surface), while the most commonly assessed motivation (41%) was fear of humans or novel objects. Fewer studies concerned the animals’ social preferences and motivations (8% for both categories). The methods used differed between types of preferences and motivations. For preferences, simple choice tests were most common (80%), while motivations were mostly assessed through measures of consumption of a given resource (47%), or by using approach/avoidance measures (45%; likely due to fear being the most commonly assessed motivation type). Few studies (1% of preference assessments and 5% of motivation assessments) utilised consumer/demand approaches (e.g., elasticity of demand or maximum price paid) to quantify motivation or preference, and these methods utilised on average a lower sample size than other methods. This scoping review reveals some research gaps, e.g., in the preferences and motivations of adult male animals, in preferences related to aspects other than feeding and housing, and in motivations other than fear. For instance, given the increasing interest in positive welfare, understanding the preferences and motivations of cattle for resources expected to promote positive emotional states would be welcome (e.g. social and maternal motivations; preferences for enrichment items, environmental complexity). Using consumer/demand approaches could aid in the quantitative and qualitative understanding of animal needs; however, these studies often have a smaller sample size due to their complexity.

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SOWS AS PROTECTIVE MOTHERS; MATERNAL STRESS DOES NOT AFFECT MATERNAL CARE IN THE LONG TERM**Cathinka Celine Jørgensen, Liza Rose Moscovice and Ulrike Gimsa**Research Institute for Farm Animal Biology (FBN), Institute of Behavioural Physiology, Dummerstorf,
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It is widely known that conventional housing conditions for pigs are not satisfactory in terms of providing a stress-buffering and enriched environment. Piglet mortality is a problem during lactation. Maternal stress during lactation may alter sow behavior towards her piglets, resulting in early-life stress on the offspring, and later short and long-term changes in piglet development. The aim of this research was to identify how maternal stress during lactation can influence maternal care. To investigate this, sow and mother-offspring interactive behaviors were measured during control conditions and during a reunion event following a single 4-h maternal separation on lactation day 19 or 20. Prior to the maternal separation, sows were treated with either an injection of adrenocorticotrophic hormone (ACTH; n=7) or a saline solution (n=7) from day 2 to day 15 post-farrowing, to simulate a high- and low-stress condition. Sow behaviors (aggression) and sow-piglet interactions (nursing events; i.e. over 50% of the piglets being in proximity to the teat area with or without milk letdown) were measured by analyzing video recordings with the Noldus® Observer XT 15 software (Noldus Information Technology, The Netherlands). Behaviors were analyzed for an overall effect of treatment on control days (3h observations), and the effect of maternal separation comparing data from a 1h reunion observation with a matched control observation. There was no significant difference in the rate of aggression toward piglets or in the duration and frequency of nursing events between the saline- and ACTH-treated sows on control days, nor was there a significant effect of maternal separation on these behaviors. Overall results show no effects of the ACTH treatment, indicating that sows do not appear to allow stress to affect their maternal care. Even the additional stressor of a maternal separation did not reveal any effects of the treatment. However, there might be physiological changes in milk content that could influence the piglets in the long-term. These effects need to be investigated to confirm that the dampened stress transmission to offspring occurs not only at the behavioral level, but also at the physiological level.

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FARM ANIMAL WELFARE GOVERNANCE IN POLAND**Adrianna Kapek-Goodridge**

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In recent years, farm animal welfare (FAW) has become a central feature of debates at European level. Therefore, various outcomes of action can be observed, particularly within the interpretation and implementation of the EU Directives among member states. As a result of social concerns about the lack of appropriate national FAW legislation, an increasing number of NGOs have gradually found their way into public debates. This development can be illustrated by governance, a shift from the delivery-only government to more autonomous societies.

Therefore, by examining differences in NGO contributions to changes in national legislation and – particularly – in market differentiation in the UK and Poland, this presentation argues that NGO activity, consumer attitudes, and supermarket policy are interdependent and influence each other. Consequently, they illustrate FAW governance, a development unique for each EU member state, but one left unexplored in states such as Poland.

Its uniqueness stems from the level of NGO engagement with various stakeholders, which is in turn interdependent with citizen attitudes towards farm animal welfare. An examination of the European attitudes reveals significant differences between long-time and short-time members, particularly in the case of the United Kingdom and Poland. Therefore, these states form two case studies of FAW governance, providing an excellent platform for exploring differences in NGO activity in the so-called ‘new’ and ‘old’ EU member states.

EU Directives lack species-specific regulations and as a result, one farmed animal is severely omitted – fish. Consequently, my research focuses on how British and Polish NGOs improve fish welfare. Data collection for this project is ongoing; therefore, this presentation will reveal up-to-date findings gathered from NGO interviews, consumer questionnaires, photos, and field observations, in an attempt to answer the main question of how ‘new’ EU member states – such as Poland – improve farmed fish welfare.

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BEHAVIOURAL REPERTOIRES IN THE WILD AND THE ZOO- A WORRY FOR WELFARE?**Robert Kelly¹ and Paul Rose^{1,2}**¹ Centre for Research in Animal Behaviour, Psychology, University of Exeter, Exeter, UK² WWT, Slimbridge Wetland Centre, Gloucestershire, UK*rk.528@exeter.ac.uk*

Performance of “natural behaviour” has traditionally been utilised as a measure of welfare states and may be defined as behaviour that animals have a tendency to exhibit under natural conditions. It has also been argued that an animals’ behaviour can be used to identify its physical health and ascertain whether its needs are being met. Furthermore, behavioural repertoires may be used to inform decisions regarding the environment provided for captive animals to improve welfare states. Indeed, studies suggest that when captive animals are accommodated within environments that enable the performance of species-specific behaviours, this positively influences their welfare. However, there is currently little research to indicate which behaviours are deemed important, or indeed not important in terms of promoting welfare in a range of taxa within the zoo environment. Thus, a synthesis of existing literature of wild animals will be conducted in order to identify general trends and indicate how the wild environment influences behavioural repertoires. Using activity budgets or recorded time spent on behaviours for zoo animals and their wild counterparts, a meta-analysis will be performed in R Studio to compare behavioural differences in species using a multinomial regression model. Then, based on the findings of the literature review, species will be categorised as follows: behaviourally inflexible- welfare will be poor if the behavioural repertoire is different in the zoo from that of the same species in the wild; partially behaviourally flexible- some key activities must be provided for, however if some behaviours are different in the zoo than the wild, welfare is not negatively impacted; fully behaviourally flexible- despite not performing all natural behaviours and with a change in behavioural repertoire, the species still experiences good welfare. Specifically, the findings aim to determine (i) if animals can cope in zoo environments when their behavioural repertoire does not reflect that of wild counterparts and (ii) which behaviours zoos should be encouraging animals to perform or provide the freedom to be able to perform.

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DO HOUSING-INDUCED CHANGES IN BRAIN ACTIVITY CAUSE STEREOTYPIC BEHAVIOURS IN MICE?**Lindsey Kitchenham¹, Aileen MacLellan¹, Pietro Paletta², Ashutosh Patel³, Elena Choleris² and Georgia Mason¹**¹ Integrative Biology Dept., University of Guelph, Guelph, ON, Canada² Psychology Dept., University of Guelph, Guelph, ON, Canada³ Biomedical Sciences Dept., University of Guelph, Guelph, ON, Canada*lkitchen@uoguelph.ca*

Stereotypic behaviours (SBs: e.g. pacing, body-rocking) are common in animals living in barren housing. Some forms may reflect brain dysfunction akin to changes implicated in humans with Obsessive-Compulsive Disorder or Autism. Using mice, we therefore tested two sets of hypotheses: that SBs are caused by housing-induced changes in I) cortical circuits responsible for motor, cognitive and motivational aspects of behavioural control, and/or II) activity of basal ganglia pathways thought to be behaviourally inhibitory or excitatory. This hypothesis predicts that any neural cause of SB should i) correlate with SB at the individual level (either positively or negatively), and ii) be altered in a consistent way by barren housing (i.e. increased by barren housing if shown to be a positive correlate of SB, or decreased by it if shown to be a negative correlate of SB). Subjects were 35 females from DBA/2 (DBA: n = 17) or C57/BL/6J (C57: n = 18) strains, kept in barren 'shoebox' cages (n = 21) or large well-resourced cages containing preferred 'enrichments' (n = 14) for 17 months. SBs -- largely route-tracing or bar-mouthing -- were recorded monthly, quantified as proportions of total visible observations, to calculate lifetime averages. As expected, barren-housed mice were more stereotypic than well-resourced mice. DBAs were more stereotypic than C57s. After humane killing, brains were extracted, sectioned, and stained with cytochrome oxidase histochemistry to index local oxidative metabolism reflecting long-term neuronal activity. Optical density per unit area was measured for 19 brain sub-regions. Generalized linear mixed models then tested the hypotheses. Bar-mouthing was associated with decreased inhibitory activity in the basal ganglia for barren-housed C57 mice. Route-tracing was associated with increased motivational cortical circuit activity in barren-housed DBA mice. However, barren housing itself had no effect on basal ganglia, and significantly decreased activity in cortical circuits. Thus, overall, our results do not identify how barren housing induces SB. However, they show that for mice, several brain regions unaffected by housing still covary with SBs, suggesting individual-level risk factors; and that route-tracing and bar-mouthing have different neurological correlates, showing that SBs are heterogeneous.

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THE EVERYDAY WORK OF ONE WELFARE IN ANIMAL SHELTERING AND PROTECTION**Katherine Koralesky¹, Janet Rankin² and David Fraser¹**

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In animal sheltering and protection, One Welfare initiatives include supporting people who have difficulty providing for their animals because of limitations in their physical or mental health, income or housing. However, little research has focused on the actual work that such initiatives involve for animal shelter staff and animal protection officers, as well as how this work organizes what happens to the animals involved. We used institutional ethnography to explore how such work activities occur in frontline practices, identify what is difficult and challenging in these work activities – for both people and animals – and understand how this work is coordinated. Methods included ethnographic observation of animal protection officers and animal shelter staff, document analysis, plus focus groups and interviews with staff, officers and managers. In cases where an animal's care was deficient but did not meet the standard for legal intervention, officers provided people with supplies for their animals, referred them to low-cost or free veterinary care, and provided emergency animal boarding. This work was time-consuming and was sometimes done repeatedly without lasting effect. It was often constrained by animal owners' limited housing, cognitive decline, mental health and other factors. Hence, improving the animal's welfare in these ways was often difficult and uncertain. Although officers and animal shelter staff are increasingly expected to provide and record supports given to vulnerable owners, standard procedures and criteria for intervention have not yet evolved; hence the work is largely left to the judgment and ingenuity of personnel. In addition, the necessary collaboration between animal welfare workers and human social services staff (eg social workers, supportive-housing staff) is made difficult by the different expectations and different institutional processes governing such activities. Further work is needed to assess how meeting the needs of both animals and people could be strengthened in challenging situations. This might include sharing best practices among officers and further ethnographic analysis of animal protection services, how they interact with other services, and how One Welfare initiatives actually affect animal care and welfare. Institutional ethnography provides a way to study the organizational processes that shape and constrain care for animals, and its explicit focus on actual work processes provides insights that may be missed by other approaches.

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AN EVOLUTIONARY APPROACH TO PET OWNERSHIP: EXPLORING THE IMPACT OF KEEPING DOGS AS FAMILY MEMBERS ON HUMANS AND DOGS

Eniko Kubinyi

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Pet keeping is a vast domain of human life and economy, which affects even non-pet keepers, and is deeply rooted in human culture. Yet, the scientific study of humans' relationships with pets kept as family members is uncharted territory. Whether and how pets make people happier and healthier, in terms of the strength of social networks, level of entertainment, and contribution to physical and mental health, is contradictory and unclear. The pet keeping runaway theory offers a cultural evolutionary framework for understanding the role of pets in modern societies and how this role might impact both the human and pet populations. The theory assumes that pets, especially dogs and cats, likely appeal to humans' biological attachment, proximity seeking and nurturing system that underlies the bond between caregivers and offspring. In post-industrialised societies, in the (relative) lack of kin, the preference for nurturing kin "ran away" and shifted to pets which are regarded as kin and increasingly selected for fulfilling the "baby schema". Current culture reinforces this behaviour. Due to economic prosperity, there are no financial or other limits to this behaviour. After presenting the theory, this study shows recent data from a representative survey in Hungary (N=1023). 87% of the respondents do not care for a child under 6, which is a relatively novel development in human history. 30% of the sample keep dogs and 19% cats, 1% other pets. Marked on a five-point scale, 12% of dog owners and 13% of cat owners claimed that their pet is clearly (point 5) or rather (point 4) more important to them than any human, even when they have a child. 16% consider their dog and 20% their cat as a "furry baby". 65% of the respondents view their dog, and 73.1% their cat, as completely or rather a family member. Studies about pet keeping are usually based on convenience data, thus on a sample highly devoted to their animals. However, our recent data suggest that even in the average population, a considerable number of people are more dedicated to animals than their offspring. An often overlooked feature of this phenomenon is that animals might pay a high price. Artificial selection for infant-like traits such as brachycephalism and caring for a pet as a "surrogate child" can be associated with severe health and behaviour problems. I will also present the most frequent problems based on a convenience dataset (N=1750).

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APPLICATION OF BEHAVIOURAL OBSERVATIONS TO EVALUATE THE WELFARE THROUGHOUT THE INTRODUCTION AND SOCIALISATION PROCESS OF SINGLY HOUSED GREY PARROTS (*PSITTACUS ERITHACUS*) INTO A LARGER GROUP AT THE ALAMEDA WILDLIFE CONSERVATION PARK (AWCP), GIBRALTAR

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The Alameda Wildlife Conservation Park (AWCP) has accepted a variety of exotic animals over the years; unwanted pets or confiscations from Gibraltar Customs. Among these original animals were the grey parrots (*Psittacus erithacus*). Grey parrots are popular pets due to their ability to talk and mimic sounds, but their long life expectancy and complex social needs, mean they often end up in rescue centres or sanctuaries. The exotic pet trade has significantly contributed to the decline of the grey parrot, to the extent that they are now endangered in the wild. The persistence of the exotic pet trade and the number of grey parrots offered to the AWCP each year is still a concerning issue in Gibraltar and nearby Spain.

The aim of the project was to create a larger, socially cohesive group of grey parrots who were previously part of the exotic pet trade; either wild-caught, illegal trade animals, or unwanted pets. Most of the unwanted pet birds have been previously housed singly, with only humans for company.

We used behavioural data to evaluate the feasibility of the process and to assess the welfare outcomes. For nine months, over ninety hours of data were collected by ten minutes continuous focal sampling to identify general behaviour patterns and their relationship with animal welfare, housing, and social aspects.

Overall, the grey parrots recorded during the study period spent most part of their days resting (57.4%), grooming (16.9%), feeding (12.1%) and in locomotion (6.2%). Nonetheless, daily budgets varied significantly between individual birds and over different phases of the introduction process, as expected.

Despite differing backgrounds, the introduction process was successful. All of the grey parrots are now housed successfully together. Behavioural data collection was a reliable, low-cost method to evaluate the introduction process and can be used effectively to monitor animals in zoological collections. Further development of this study has shown the overall improvement in welfare for these birds, progressing from singularly kept birds, to a larger social group. Additionally, we aim to highlight the negative impacts of solitary living on parrots, especially the highly intelligent and social grey parrot. We hope for this work to positively influence legislation at a local government level, with regards to keeping certain parrot species as pets.

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FLOATING COOL ACTIVITIES FOR SPOTTED SEALS**Hing Lam Leung¹, Eszter Mátrai^{1,2}, Shaw Ting Kwok¹ and Paolo Martelli¹**¹Research Department of Ocean Park, Hong Kong²Department of Ethology, Eötvös Loránd University, Hungary*samanthaleung109@gmail.com*

Phoca largha, commonly known as the spotted seals, naturally inhabit the inshore regions of North Pacific Ocean and the Arctic Ocean and is commonly kept in zoos and aquariums. Enrichment programmes play an important role in the care of animals in modern facilities with adequate welfare standards, and continuous efforts are made to design more engaging and stimulating enrichments. Appropriate enrichments for seals provide opportunities for exhibiting their natural behaviours, such as swimming, hauling-out, balancing, gliding breath holding, and foraging. In this study we investigated the behavioural impact of an ice-float as a potential enrichment with two sub-adult spotted seals, ultimately contributing to the underwhelming body of knowledge on the design and testing of environmental enrichments for pinnipeds.

Two spotted seals (two-year-old females) were provided with a 70-litre ice-float (55.5cm x 42.5cm x 30cm) weekly, with a total of 16 sessions conducted. The sessions lasted from the introduction to the complete melting of the ice block (average 43.5 minutes). The frequency and the duration of the seals' ice-related behaviours (investigation, interaction, haul out, observation, and foraging) were analysed post-session.

Ice-related behaviours were recorded on every session. The seals maintained their interest over the 16 sessions (four months) of testing. Out of all ice-float-related behaviours, interaction was the most frequently observed (618 events) and the seals also spent the most time interacting with the ice-float (155 min). There were 115 haul-out events, from which the seals succeeded to haul-out >50% of their bodies on 41 occasions. These successful events lasted for 6.18 seconds per event on average. Furthermore, 8% ($\pm 1\%$) of the ice-float-related events expressed by one of the seals were accompanied by observation by the other seal.

These preliminary results show the value of ice-float enrichments and provide a baseline for further investigations. With only two seals and a relatively small size ice-float we documented seven natural behaviours that were not observed in any other parts of their habitat at any other time. Thus, the ice-float significantly contributed towards enriching the well-being of these two seals, supporting the value of this type of enrichment. Following the encouraging outcomes following the introduction of the ice-float we aim to manufacture bigger ice-floats, to extend the recorded natural, ice-related behaviours, involve a bigger group of seals and allow more time for the seals to discover more activities.

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THE PRIVATE KEEPING OF DANGEROUS WILD ANIMALS IN GREAT BRITAIN**Chris Lewis¹, Chris Draper², Frankie Osuch¹ and Stephanie Jayson¹**¹ Born Free Foundation, Frazer House, Horsham, West Sussex, UK² Performing Animal Welfare Society, PO Box 849, Galt, CA, USA*clewis@bornfree.org.uk*

Licences issued by British local government authorities under the Dangerous Wild Animals Act 1976, which regulates the private keeping of wild animals categorised as “dangerous”, were analysed to assess the scale and scope of private keeping of dangerous wild animals in Great Britain.

Results are compared with historical data from England and Wales, showing that there has been an overall decrease both in the total population of dangerous wild animals privately kept under licence and the number of licences, resulting primarily from a decrease in the farming of wild boar and ostrich, and from certain other species no longer requiring a licence to be kept. Nonetheless, private keeping of dangerous wild animals remains prevalent, with a total population of 3950 animals kept under licence, and at least one-third of local authorities in Britain containing one or more such animals. The population of non-farmed dangerous taxa has increased by 59% in 20 years, with notable increases in crocodylians (198%), venomous snakes (94%), and wild cats (57%).

We present evidence that the average cost of a licence to keep dangerous wild animals has fallen over time, and that there is a negative association between cost and licensing.

The current schedule of species categorised as dangerous is compared to a formally-recognised list of species kept in zoos assessed by risk to the public. Problems with the legislation, enforcement of the licensing system, and animal welfare for privately-kept dangerous wild animals are identified and discussed.

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**THE INFLUENCE OF DEFLIGHTING ON THE WELFARE OF WHITE STORKS (*CICONIA CICONIA*)
EVALUATED BY FEATHER CORTICOSTERONE AND BEHAVIORAL DATA**

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The white stork (*Ciconia ciconia*) is one of the bird species which is kept deflighted in open outdoor enclosures in many zoological institutions due to their predominantly ground-based behavior. Because both, the methods of flight incapacity and the husbandry of these animals in relation to their welfare have increasingly met with public criticism, the Tierärztliche Vereinigung für Tierschutz e.V. (German based Veterinary Association for Animal Welfare) responded in 2015 with a statement calling for scientific investigation of this issue. In this study, we compare the stress levels on the basis of physiological and behavioral welfare parameters of four different study groups. We studied deflighted storks housed in zoos, wild storks which were unable to fly due to injury, and juvenile storks from nests in rural landscapes and juvenile storks from urban regions. Based on results of previous studies on the same discourse, we expect that not the flight incapacity of the birds, but other factors (husbandry, rearing near cities, etc.) have significant influence on their welfare and behavior. Corticosterone levels from feather samples will be correlated with behavioral data (scan samples) acquired with camera recordings over three consecutive days from the study groups. Video footage will be analyzed with deep learning-based methods such as DeepLabCut. Additionally, data from questionnaires provide information of the given housing and management situation of the animals and may support the identification of other potential stressors. The results of the study may provide data for an evidence-based decision on deflighting procedures, moreover it may lead to a rethinking and replanning of enclosures for this species and possible socialization with other animals while also improving their husbandry in terms of animal welfare. Likewise, the data could serve as a decision-making basis for dealing with injured wild storks, i.e., whether it is better for them to live de-winged in human care or to be redeemed. Furthermore, they could also provide ground breaking information for wild bird conservation.

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PREDICTORS OF SUCCESSFUL DIVERSION OF CATS AND DOGS AWAY FROM ANIMAL SHELTER INTAKE: ANALYSIS OF DATA FROM A SELF-REHOMING WEBSITE**Lexis Ly and Alexandra Protopopova**

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As animals experience distress in animal shelters, leaders call for increased efforts to divert intake of companion animals away from shelters. One novel intake diversion strategy is supported self-rehoming, where owners find new homes for their animals without surrendering to a physical shelter. This study aimed to identify predictors of successful diversion of animals through the AdoptaPet.com 'Rehome' online platform. Data for dogs (n = 100,342) and cats (n=48,484) listed on 'Rehome' from January 1, 2017, until May 21, 2021, were analyzed through logistic regression to assess the association between both animal-related (e.g., age, breed, behavioural tendencies) and owner-related (deadline for rehoming, reason for rehoming) factors and diversion versus relinquishment to a shelter. Overall, 87.1% of dogs and 85.7% of cats were successfully diverted from animal shelters, out of which, 37.8% of dogs and 35.3% of cats were kept by their original owner. Multiple animal-related factors predicted increased odds of diversion (e.g., younger, smaller). Dog and cat owners who set a longer rehoming deadline (i.e., > 8 weeks) were over twice as likely to keep or adopt out their animal. Dog owners who surrendered for owner-related reasons had increased odds of diversion in comparison to animal behaviour issues. We conclude that online supported self-rehoming platforms provide pet owners with an alternative to relinquishment that may reduce the intake of animals to shelters; however, owners with animals that are not preferred by adopters may have to decide whether to keep their animal or relinquish their animal to a shelter or rescue. These results provide guidance for animal shelter professionals on the likelihood of successful diversion programs given certain animal and owner characteristics.

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CASE STUDY OF USING THE ANIMAL WELFARE ASSESSMENT GRID AS EVIDENCE IN ANIMAL CRUELTY PROSECUTIONS

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Quality of life in dogs with chronic anxiety has not been studied in depth, nor has the impact of treatment been monitored using a valid and reliable tool such as the Animal Welfare Assessment Grid (AWAG) for dogs. This case study aims to demonstrate how the AWAG can be applied to assess and monitor the welfare of dogs and how it can be used to provide evidence in animal cruelty prosecutions.

This case describes a dog that presented with signs of severe fear and anxiety. The dog was a breeding bitch in a high-volume breeding establishment. She was housed in an enclosure that failed to meet her welfare needs such as:

- No escape from heat resulting in risk of thermal stress.
- Insufficient size to urinate and defecate outside the resting or nest area.
- No area to retreat, hide, or allow normal nursing position for pups.
- No opportunity to exercise choice or control.

Upon assessment, the dog displayed extreme signs of anxiety including trembling and avoidance with minimal recovery. The dog was exposed to constant stressors with no escape, choice or control in her environment.

The mean scores for each parameter were (one is the best welfare possible and ten the worst):

Physical – 3.67

Psychological – 6

Environmental – 7.67

Procedural – 8

The Cumulative Welfare Assessment Score (CWAS) was 79.38 (possible maximum 200). The average healthy dog has a score of 4.8 (range 2.9 – 15). Demonstrating that this dog has remarkably poorer welfare than the average healthy dog.

The dog was subsequently placed into foster care and her environmental deprivation addressed. Roughly six weeks after the initial assessment, the CWAS had reduced to 15.7. The dog's body condition had improved, she recovered quickly when exposed to a stressor and encountered stressors less frequently. The dog had opportunity for social interactions that facilitated play with caregivers, had good choice and control in her environment with walks, toys, and feeding complexity. The scores reflect a reduction in fearful and anxious responses.

This case demonstrates that the AWAG was an effective tool to quantify welfare, assess the impact of interventions, and reveal where welfare is poor and changes need to be made, providing an objective tool for use in prosecution cases.

There is a scarcity in the literature discussing how the dog's environment impacts fear and anxiety. From the AWAG scores, there may be an association between the dog's response to stressors and lack of an adequate environment; however, further data are necessary to examine this link further.

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COGNITIVE ENRICHMENTS TO LIFT THE POD SPIRIT!**Eszter Matrai^{1,2}, Rick Sui Ho Lui¹, Kathy Lee¹, Tsung Man Kwong¹, Ákos Pogány¹ and Paolo Martelli¹**¹ Research Department of Ocean Park, Hong Kong² Department of Ethology, Eötvös Loránd University, Hungary*eszter.matrai@oceanpark.com.hk*

Over the past two decades environmental enrichments have become essential part of contemporary animal management. Enrichment programmes in zoos and aquarium utilise them for providing daily stimulation, assessing welfare and the most wanted items are also offered as star rewards during training. While all enrichment types have been reported with successful use, a novel group of enrichment items, cognitive enrichments have gained special attention in the past few years. Besides reducing boredom and promoting activity, cognitive enrichments also provide specialised problem-solving opportunities, such as retention-recall, planning, or cooperation. In our earlier publications we demonstrated the positive, long-term impact of cognitive enrichments with male bottlenose dolphins. In this study we focus on the short-term, direct impact of the cognitive enrichments, with special interest in changes in social behaviours.

Two cognitive enrichment devices, designed to test the dolphins' ability of cooperative problem-solving were introduced to a group of five male and a group of seven female bottlenose dolphins. The devices were made of PVC pipes, caps and rope handles, allowing simultaneous interactions for three and four dolphins. Each group was tested over 12 sessions with each device (24 sessions/group). Pre- and post-sessions the dolphins were provided with regular enrichments and observed for 2 min. The dolphins' behaviour was coded during video analysis and compared between pre- and post-session conditions.

Both groups engaged with the novel enrichment on all 24 sessions, however, the males were more successful in opening the devices in cooperation (83% vs 25%). The males also spent 67% of the testing time playing cooperatively with the devices, which behaviour was never observed in females. When the dolphins' behaviour were compared pre- vs post-session, no difference was recorded in the female group. In males, the frequency and the time spent with social actions increased post-session (from 37 to 133 occurrences and from 7 to 12 minutes respectively).

The cognitive enrichments provided opportunities for the dolphins to practice and strengthens their alliances, which is known to be stronger in males than females, hence the recorded inter-sexual difference in the session performance. Consequently, the males continued to engage in affiliative interactions post-session, which not only increased in frequency and time but also in the number of participants involved. Our results further support the welfare value of the cooperative enrichments with an emphasis on the species and sex appropriate design for maximising welfare impact.

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DOG OWNERS PRE-ACQUISITION BEHAVIOUR AND PREVENTATIVE CARE IN DIFFERENT BREEDS BASED ON SKULL SHAPE

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Dog ownership in the UK is at an all-time high with a specific increase in the popularity of brachycephalic dogs. Many factors contribute to the acquisition of a dog, including pre-and planned post-acquisition behaviours.

This study investigated multiple aspects of pre-and post-acquisition behaviours of dog owners with the use of 2020 PDSA Animal Wellbeing (PAW) Report data. The PAW survey is a UK-wide nationally representative anonymised survey conducted by YouGov. The study specifically concentrated on the differences in pre-and post-acquisition behaviours between owners of dogs with specific skull shapes (i.e., brachycephalic, mesocephalic, dolichocephalic). Skull shape was determined through pedigree identification by owners, then categorised into skull shapes based on published research. A chi-square test was used to test for associations between owners of dogs with different skull shapes and pre-and post-acquisition behaviour.

A total of 1,133 dog owners were included in the sample. These included owners that owned brachycephalic (22.8%), mesocephalic (71.9%) and dolichocephalic (5.3%) dog breeds.

Regarding pre-acquisition advice, 18% of all participants did not seek any form of pre-acquisition advice. However, owners of dogs with brachycephaly were more likely (22%) to not seek any advice prior to acquiring their dog in comparison to mesocephalic (17%) and dolichocephalic owners (5%). There was also an association between skull shape and advertisement source, as brachycephalic breeds were more likely to be advertised on puppy-selling websites (17%), whereas dolichocephalic breeds were more likely to be advertised on a breeder's website (21%). Furthermore, brachycephalic breeds were more likely to be sourced from friends and family (17%), whereas dolichocephalic breeds were more likely to be acquired from a rescue centre (32%). Regarding preventative procedures, a lower percentage of brachycephalic dogs were neutered (67%) and insured (53%) compared to mesocephalic and dolichocephalic breeds.

Education could be improved prior to acquisition by targeting popular channels from where owners seek advice such as the internet (used by 37% of owners) and social media (9%). One major area for improvement is to increase education regarding recognising safe sources of pet acquisition and advertisement, as a large percentage of pets were advertised on classified advertising websites (17%), purchased from family/friends/neighbours (13%) and private sellers (19%).

This information is important for understanding the acquisition behaviour of pet owners, which could inform the development of welfare-promoting interventions for companion dogs.

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SCOTTISH SPCA'S PET AID SERVICE - KEEPING PEOPLE AND PETS TOGETHER AND PROTECTING THAT HUMAN-ANIMAL BOND**Gilly Mendes Ferreira**

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72% of UK pet owners are saying they think the cost of living will impact their animals, 28% of pet owners are worried about being able to care for their pets and 19% are worried about feeding their pets. We have also found that 75% of tenants state they had a pet for emotional (77%) and mental health (83%) support; 37% of tenants have had to choose between a pet and a roof over their head; 28% of tenants stated it took them 12 months to find pet friendly accommodation and 69% of tenants said they would risk becoming homeless if it meant they could stay with their pets. We are now on the brink of an animal welfare crisis. In 2022, calls to the Scottish SPCA's animal helpline from those struggling with the cost of caring for an animal trebled compared to 2021. We have seen an 18% increase in people citing financial issues, such as paying for food, insurance or vet bills. On top of this we have seen a 77% increase in people calling to rehome an animal, an 84% increase in the number of people looking for advice and a 24% increase in people who have required physical support from the Society. The Scottish SPCA's Pet Aid service has been launched to support the challenges that pet owners currently face so that unintentional neglect can be tackled at an early stage and ultimately prevented, enabling people and animals to be kept together where possible. Providing a dedicated Pet Aid service can make a real difference and enables the Society to support animal welfare on doorsteps, in the heart of communities instead of picking up the pieces when things have gone wrong and an animal and person has suffered. Join us and share your experiences as we work together to tackle this emerging issue.

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INTERACTIVE MULTIMEDIA TRAINING PROGRAM FOR TIMELY ON-FARM EUTHANASIA IN DAIRY CATTLE; IMPLEMENTATION AND PERCEIVED RESPONDENT KNOWLEDGE CHANGE**Victoria Merenda¹, Eduardo Oliveira², Magdiel Lopez-Soriano¹, Andréia Arruda³, Ashley Robbins⁴ and Monique Pairis-Garcia¹**¹ Department of Population Health and Pathobiology, North Carolina State University, Raleigh, USA² Department of Population Health and Reproduction, UC Davis, Tulare, USA³ Department of Veterinary Preventive Medicine, The Ohio State University, Columbus, USA⁴ National Dairy FARM Program, Arlington, USA*vrmerend@ncsu.edu*

Euthanasia is the practice of ending the life of an animal who has no prospect of improvement. When performed on-farm, euthanasia is a multi-step process that involves the identification of compromised cattle, recognition of appropriate euthanasia endpoints and use of appropriate euthanasia methods based on recommendations of The American Veterinary Medical Association (AVMA). However, currently available information is deficient for training employees on timely and humane euthanasia decisions that are standard across the dairy industry. Therefore, the objective of this study was to develop and evaluate the efficacy of an interactive training program on timely euthanasia for caretakers and producers on dairy farms. This aim was achieved by using a survey instrument to capture attitudes and perceived knowledge of euthanasia practices before and after the program. Training material encompassed euthanasia information over two production stages (calves and cows/heifers) and material was primarily delivered in a case scenario format (14 cases). Participants (n = 81) were required to complete a survey pre-training, complete the training materials from one production stage and complete a survey post-training. Surveys contained eight statements regarding participants' perceived knowledge of, and attitudes about, euthanasia practices. The questions were answered on a 5-point scale. Multivariable mixed-effects logistic regression models were created for each question to investigate the effect of age, sex, dairy experience, farm size, role at the farm, ethnicity, previous experience with euthanasia, veterinarian degree and production stage in the score change, defined by the presence or absence of an increase in the 5-point scale score. Upon completion of the training, respondents were more confident in identifying compromised animals, determining when an animal should be euthanized, and understanding the importance of timely euthanasia. Demographic characteristics influenced the respondents' perceived knowledge; suggesting that younger, less experienced caretakers on-farm should be prioritized to receive training. Ensuring that farm owners and veterinarians have access to this program is a critical next step to promoting and supporting the training program at a national level. A new and effective euthanasia training is immensely valuable to the dairy industry stakeholders as it provides a means to improve dairy welfare.

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HUMAN ABILITY TO CLASSIFY HORSE AFFECTIVE STATES DEPICTED IN MEDIA VIA AN ONLINE SURVEY

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Horses display physical behaviours to communicate the valence of their current affective state whether it be positive or negative. Human recognition of these behaviours is imperative to fostering positive horse-human interactions and promotion of horse welfare. This study investigated human ability to classify the valence of horse-human interactions from the horses' point of view and to determine if their interpretations related to personal levels of emotional awareness. Using an online survey, participants (n=534) were asked to classify 31 video clips and photos as depicting a positive, likely positive, neutral, likely negative, or negative scenario. Participants then answered two open-ended questions to describe what characteristics they used to classify the scenarios and completed a self-reflecting questionnaire (MAIA-2) to assess their level of emotional awareness. Demographic information was also collected (i.e., age, gender, education, level of experience with horses). Chi-squared analyses compared expert classifications (considered 100% correct) to participant classifications and a mixed model determined the effect of the fixed factors on classifications and MAIA scores. Qualitative analyses were applied to the open-ended comments using a priori themes. Overall, participants did not match expert classifications any better than chance (52.5%; $p < 0.0001$). However, participants were better at identifying clearly positive (65%) and negative (64%) horse-human interaction scenarios relative to subtle positive (38%), and subtle negative (42%) scenarios. Increased levels of education were associated with higher scores in classifying subtle positive scenarios ($p > .03$), and greater experience with horses was associated with higher scores in classifying clearly positive ($p > .03$) and negative ($p > .002$) scenarios. Women outperformed men in matching expert classifications of overt positive ($p = .0223$) scenarios. While body parts of the horse were noted as clues to characterize the valence of both positive and negative scenarios (i.e. ears, head position, eyes), how the horse interacted with the human was also very important (engaging, avoiding). There was a trend for participants with higher scores only on the MAIA-2 noticing scale to better match expert classifications ($p = .0852$). In general, humans were unable to determine the valence of horses' affective states in various positive and negative horse-human interaction scenarios compared to expert classifications. Human emotional awareness did not appear to influence how humans interpreted a scenario, but gender, education and experience with horses did. Improved recognition of behavioural indicators of affect, particularly subtle cues, is imperative for improving horse welfare through promoting reoccurrence of positive behaviours and avoiding the occurrence of negative behaviours.

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THE DROWNING DOGS OF MUMBAI**Tarusha Mishra**

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Joining the league of countries like Costa Rica and Mexico, India has recently taken its very first step towards managing animals during the times of disasters. The Department of Animal Husbandry, Dairying and Fisheries presented the first disaster management plan for the livestock, poultry and aquaculture. However, it leaves behind a very important category of animals, i.e. the stray animals. This study argues that the exclusion of stray animal management in disasters is problematic on the basis of two factors i.e. i) Right to the city: the city space is inhabited by the humans as much as by the animals, hence they should be provided support, and ii) the humans remain at equal risk of catching diseases as these animals can be agents of various diseases that can be fatal to both humans and non-humans animals. The study aims at understanding non-human ecologies in the city space during a natural disaster, namely floods. It explores the changing human-animal relationships during the times of floods, using vulnerability analysis of stray dogs of Mumbai to re-establish the fact that how crucial it is to manage the stray animals during floods. It also throws light on the human-animal conflicts that arise along with exploring the role of the state and civil society in case of managing these animals in disasters.

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HUMBOLDT PENGUINS (*SPHENISCUS HUMBOLDTI*) LIVING IN SANTO INÁCIO ZOO: EFFECTS OF VISITORS' ACTIVITY ON PENGUINS' BEHAVIOUR

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Zoos play an important role in the conservation of all animals in captivity, where it is imperative to guarantee that they have the best welfare possible. The presence of visitors is one of many elements that animals in captivity are daily exposed to, that may have an influence on their welfare. This influence can be seen as a negative influence, since it can cause stress to the animal, and lead to the performance of stereotyped behaviours; it can be seen as a positive influence, since it can be considered a type of environmental enrichment, promoting an increase in behavioural diversity; or it may not have any influence at all. Thus, conducting animal behaviour studies in Zoos is crucial to understand the influence that visitors will have on the animals, to ensure their welfare.

The Humboldt penguins (*Spheniscus humboldti*), inhabitants of Santo Inácio Zoo, are the target of this study. Considered one of the main attractions of the Zoo, feeding sessions are held every day, usually attracting a high number of visitors. In this context, this project aimed to study the behavioural responses of Humboldt penguins to several visitor activities, such as proximity, levels of excitement and attempts to interact with the animals. For this purpose, an ethogram of the Humboldt penguins was elaborated, as well as a visitor behaviour scale (the levels of interest displayed by visitors when observing the penguins, a scale of 1 - 5 from passively observing to actively attempting to gain the animals' attention). Observations of the penguin's behaviour were made in the presence and absence of visitors and at the time of the feeding sessions. The penguins' behaviour was recorded using a video camera while the visitors' behaviour was registered on-site. Observational sessions with visitors were performed when more than 2 visitors were near the penguin enclosure. An instantaneous scan sampling of the penguin group was done once every 30 seconds and the zone of the enclosure used was also registered, using the Boris software. Results seem to indicate that several factors such as the nature and intensity of the visitor interactions, enclosure location influence the penguin's response to visitors. Comprehending the importance of these factors allows us to work out which visitors' behaviours have a negative or positive impact on the penguins-visitor interactions. This type of information can be applied to refine the management of visitor-penguin interactions in zoos.

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CHARACTERIZING WISCONSIN DAIRY FARMERS' STRATEGIES FOR TRAINING PERSONNEL IN ANIMAL HANDLING

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Dairy cattle are often intensively managed with multiple handling events per day, yet knowledge regarding the factors that influence the use of handling training by dairies is limited. The most recent version of the National Dairy FARM program requires that all personnel in handling roles document annual continuing education. A training program can be vital to the overall success of a dairy as workers who are well trained in handling techniques can have a positive impact on the welfare of the animals in their care. The objective of this study was to determine factors that affected if and how dairy farms used handling training. Surveys were mailed to 1,095 of 7,255 registered dairy farms in Wisconsin using random sampling. Questions included number of hired and/or family employees and the types of training provided for new employees, family members and refresher trainings. After initial screening for completeness, surveys from 313 Wisconsin dairy producers were included in the analysis.

Independent variables were screened at the univariate level and were included in multivariable analysis if $P < 0.20$. Multivariable models were built using backwards stepwise elimination. Variables were retained if $P < 0.05$ and were used to determine factors associated with the presence of a training program. Of the 313 respondents, 154 had hired workers and 109 of those provided at least one form of training. Farms with 1-5 or 6+ hired employees were more likely to provide training than those farms without hired employees (OR: 1.89 ± 0.46 , $P < 0.0001$; 3.14 ± 1.02 , $P < 0.0022$; respectively). Of the 313 respondents, 297 farms had family employees. Farms with 6+ family employees were more likely to provide training than those farms without family employees (OR: 1.81 ± 0.91 , $P = 0.0462$) but not different (OR: 1.00 ± 0.75 , $P = 0.1820$) than farms with 5 or fewer family employees. The likelihood of providing training did not differ between farms with 1-5 family employees and farms without family employees (OR: $.81 \pm 0.56$, $P = 0.1496$). These results suggest that the provision of training is dependent on the number of employees and employee status as family or hired. Understanding the factors affecting whether farms use handling training programs can help in future extension-outreach efforts to increase the adoption of training programs on dairy farms.

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IMPACT OF UV AND LED LIGHT ON CHILEAN ROSE TARANTULA (*GRAMMOSTOLA ROSEA*) BEHAVIOUR**Tegan O'Neill, James Brereton and Alex Theodorou**

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At present there is a distinct lack of research into the behaviour of tarantulas in general, such as the Chilean rose tarantula (*Grammostola rosea*). As a popular tarantula species within the pet and zoological industry, there is a necessity to understand welfare needs and behavioural indicators. This lack of research means there is a lot of guess work involved in their husbandry with many books stating that certain practices, such as using additional lighting, are not necessary or even detrimental, but there is little published literature to endorse this claim. Some collections are beginning to introduce additional lighting, yet research is necessary to investigate the potential effects of this. Using instantaneous focal sampling at 10 minute intervals in combination with continuous event sampling, data were collected from 10 *G. rosea* across two English collections. A Solarmeter and a LUX-meter were used to measure UV and light levels within the enclosures. The study investigated tarantula behaviour under three different conditions: No additional lighting (NAL), light emitting diode (LED) and ultraviolet (UV) lighting. The enclosure was divided into zones in order to determine which parts of their enclosures are utilised the most under each type of lighting. Preliminary observations suggest light type did not affect enclosure use however, it may have affected behaviour. While under LED and UV lighting possible basking behaviour was observed. There needs to be more research on this topic with *G. rosea* in order to advance the welfare of this species.

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COGNITIVE TESTS IN RAMS (*OVIS ARIES*) REARED UNDER AN INTENSIVE FARMING SYSTEM**Kallirroi Papadaki, George Laliotis, Panagiota Koutsouli and Iosif Bizelis**

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Affective states are longer lasting mood states such as anxiety or depression which are the result of an accumulation of experiences and are not triggered by a single stimulus. They can be measured through cognitive tests like attention bias and novel object test. The knowledge of animals' affective state can play a crucial role in preserving and/or increasing their welfare. The aim of this study was to recognize the affective state of 13 adult rams (*Ovis aries*), reared under an intensive system, through an attention bias test and two novel object tests and to further associate their affective state with their maintenance and social behaviour. The animals were observed for two months using three sampling methods. Ad libitum sampling was used to score social interactions, scan sampling was used to register social proximity and focal sampling to score maintenance behaviours. Furthermore, they also participated in three cognitive tests. The first was an attention bias test with food as the positive stimulus and an unfamiliar dog as a negative stimulus. They were also exposed to a novel object test individually (using a basketball) and as a group (using a white plastic chair). The results indicated a scaling of negative affective states based on the animals response to the cognitive test and more specifically the frequency of vigilance behaviour after the appearance of the dog and their latency to approach the novel object. Individuals with negative affective states performed reduced head hanging ($r = -0.660$, $p = 0.014$), reduced agonistic behaviour ($r = -0.592$, $p = 0.033$), increased social proximity ($r = 0.687$, $p = 0.009$) and reduced reception of affiliative behaviours ($r = -0.712$, $p = 0.006$). Such behavioural cues that are easily identifiable could be used for the early recognition of the affective state of sheep and, therefore, to further establish and implement proper management practices that may secure animal's welfare and productivity.

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A CASE STUDY OF A COMMUNITY-BASED FRAMEWORK TO IMPROVE THE CONSERVATION AND WELFARE OF URBAN NON-HUMAN PRIMATES

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Long-tailed macaques (LTM) (*Macaca fascicularis*) living in urban spaces have a different life experience than their wild counterparts. Interaction between macaques and humans is much greater in urban areas, driven by the fascination in human-like characteristics. Tourists fuel interaction by provisioning as part of the wildlife experience or a photo opportunity. Provisioning wildlife is linked to disease transmission, imbalance nutrition, wildlife obesity and an increase in complaints by local communities. Despite this, limited research goes into reducing negative perceptions of LTM macaques in Malaysia, IUCN listed as Endangered in 2022. Macaques have a reputation for causing 'conflict' mainly because of their opportunistic and adaptive personalities, driven to survive in large families. Natural macaque behaviour to forage for food in bins is termed 'bin raiding', carrying a negative connotation implying the monkeys have intent. This case study will present a framework to mitigate conflict that was implemented in Malaysia from 2019-2022. Behaviour analysis was used to assess human perception and to drive behaviour change within local communities. An effective international strategic framework would avoid poorly executed mitigation strategies that impact animal welfare such as mass culling. Additionally, this approach will conserve the LTM population that is dwindling.

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RISK ASSESSMENT OF THE SARS-COV-2 SPREADING AMONG LIVESTOCK AND THE EMERGENCE OF ANIMAL RESERVOIRS OF COVID-19**Mykyta Peka¹ and Viktor Balatsky²**

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More than three years since the identification of SARS-CoV-2 and the beginning of the COVID-19 pandemic, measures have been taken to prevent the circulation of the virus in the environment. However, potential risks of the SARS-CoV-2 spreading among animals and the emergence of new animal reservoirs of COVID-19 remain. The high mutational capacity of SARS-CoV-2 increases concerns because one of the following virus variants may overcome the interspecies barriers and acquire the ability to infect a wide range of animals. In this study, we assessed the potential of SARS-CoV-2 transmission to livestock species that are most at risk through close human contact. For this, an approach based on bioinformatic methods of analysis was used. The study's main focus was the assessment of interactions between the receptor-binding domain (RBD) of SARS-CoV-2 and its receptor, angiotensin-converting enzyme 2 (ACE2), as an important link in disease development. The study's objects were ACE2 receptors of livestock species: mammals (*Bos taurus*, *Bos indicus*, *Bubalus bubalis*, *Ovis aries*, *Capra hircus*, *Sus scrofa domesticus*, *Camelus dromedarius*, *Camelus bactrianus*, *Lama glama*, *Vicugna pacos*, *Equus caballus*, *Equus asinus*, *Oryctolagus cuniculus*, *Mustela putorius furo*, *Neovison vison*) and birds (*Gallus gallus*, *Anas platyrhynchos*, *Struthio camelus*). Phylogenetic analysis and calculations of similarities of ACE2 amino acid sequences showed the greatest similarity of *Equus caballus*, *Equus asinus* and *Oryctolagus cuniculus* ACE2s to the human one. A comparison of amino acid residues in 21 positions critical for SARS-CoV-2 binding showed that Ruminantia species (*Bos taurus*, *Bos indicus*, *Bubalus bubalis*, *Ovis aries*, *Capra hircus*) had the least differences compared to human ACE2. Gibbs binding free energy (ΔG) calculations were carried out using the MM/GBSA method for RBD-ACE2 complexes formed by ACE2s of livestock species with RBDs of SARS-CoV-2 variants (wild-type, Alpha, Beta, Gamma, Delta, Omicron). Calculations of the ΔG made it possible to conclude about the stability of RBD-ACE2 complexes: ACE2s of *Mustela putorius furo* and *Neovison vison* were found to form more stable complexes with RBDs of most SARS-CoV-2 variants than human ACE2; and the complex of *Equus caballus* ACE2 with the RBD of Omicron variant also had high stability. The obtained results indicate that the risks of SARS-CoV-2 transmission to animals persist. The developed methodological approach based on bioinformatics can be used to monitor further the potential emergence of new reservoirs of COVID-19 among animals.

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ATTITUDES OF UKRAINIANS TOWARDS LABELING AND WILLINGNESS TO PAY FOR PRODUCTS FROM COWS WITH A HIGH LEVEL OF WELFARE

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In recent years, society has become more and more interested in the conditions of keeping, feeding and farm animal welfare. In Ukraine, the science of farm animal welfare is quite new, so until now there was no information about the perception of Ukrainian consumers about the welfare of animals on dairy farms. The purpose of our study was to examine the level of consumer perception of dairy product labeling in relation to the level of welfare and to assess the willingness of Ukrainian consumers to pay more for products from cows with a high level of welfare.

The survey lasted 4 weeks. The questionnaire was created using Google Forms and distributed via the Internet. 2358 respondents participated in the survey. 13 questionnaires were withdrawn due to incomplete answers. So, we received 2345 questionnaires. For further statistical analysis of the questionnaires, we used Microsoft Excel and SPSS Statistics.

61.1% of respondents did not notice information about animal welfare in the mass media, and 95.2% of respondents believe that consumers do not receive enough information about animal welfare. 82% of respondents want to receive more information about welfare on dairy farms.

87% of respondents have not come across products with animal welfare labels. In fact, this percentage can be much higher, as currently in Ukraine there is no labeling of dairy products regarding the level of animal welfare. In our opinion, consumers could get confused with "eco" or "organic", but this is not about cow welfare. When asked whether they would trust the label "from animals with a high level of welfare" 49% of respondents chose the option "Difficult to answer", 38% would trust and 13% would not trust the label for a high level of cow welfare.

Regarding the willingness of Ukrainian consumers to pay more for products from animals with a high level of welfare, 32% of respondents are ready to pay 5% more than the cost of the product, 29% are ready to pay 6-11% more, 16% are ready to pay 11-20% more than the cost of the product, 7% of consumers are willing to pay more than 20% for products from animals with a high level of welfare, while 13% are not willing to pay more.

Therefore, according to our research, the majority of respondents believe that consumers are not sufficiently informed about the level of cow welfare and want to receive more of this information. It is important to develop labeling of dairy products with a level of welfare that consumers can trust.

Despite the war, the economic situation, inflation and the level of earnings, 84% of respondents would pay more for products from cows with a high welfare level.

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INTERNATIONAL LEGAL IMPLICATIONS ON HOW RUSSIA'S INVASION OF UKRAINE AFFECTED NON-HUMAN ANIMALS

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Since Russia's full-scale war against Ukraine, there have been thousands of facts of civilian casualties. In addition to these fatalities, the war in Ukraine also accounted for non-human tolls too, namely the destruction of animals or damage to their habitats.

Multiple reports indicate that animals suffered in different occurrences: Companion animals were abandoned; shelters for rescue animals ran out of food causing the death of thousands of stray animals; and farm animals have been exterminated due to shutting down production in conflict zones; zoos in various cities were targeted during attacks living hundreds of captive animals killed or escaped and unaccounted for; civilians in the besieged city of Mariupol resorted to animal-hunting due to shortage of food; thousands of dolphins have died *en masse* in the Black Sea, putting the entire ecosystem now at risk and more recently destruction of Kakhovka dam resulted in killing of thousands of animals (zoo animals, stray animals, wildlife).

While the anthropocentric nature of International Humanitarian Law (IHL) primarily brings human victims into the focus of protection, animals can also be seen as collateral victims of the devastating consequences of war. Although IHL does not explicitly protect animals, sometimes safeguarding animal lives or health is tightly linked to human survival and in this way, it provides guarantees for animal protection as well.

The primary objective of this presentation is to study two patterns of animal suffering in Russia's war against Ukraine:

(i) Targeting zoos - the research discusses whether wildlife animals living in zoos can be qualified as components of the natural environment for the purpose of protection granted under IHL, or should they be considered as public or private property and thus availing different types of protection under applicable IHL.

(ii) The massive death of Black Sea dolphin populations will be discussed in light of the potential long-term, systematic, and severe damage to the natural environment and biodiversity in the Black Sea.

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WHAT WE (DON'T) KNOW ABOUT PARROT WELFARE: A SYSTEMATIC LITERATURE REVIEW**Andrea Piseddu¹, Jean-Loup Rault¹ and Yvonne van Zeeland²**¹Institute of Animal Welfare Science, University of Veterinary Medicine Vienna, Vienna, Austria²Department of Companion Animal Clinical Science, Utrecht University, The Netherlands*andrea.piseddu@vetmeduni.ac.at*

In the last decades, parrots became common household companions, appreciated for their intelligence, beauty, and vocal mimicry abilities. Despite their popularity and the amount of serious welfare issues when kept as companions, there is no science-based tool to assess parrot welfare. The aim of this systematic review was to screen the scientific peer-reviewed literature and identify potentially valid and feasible parrot welfare indicators. From 1675 studies retrieved, 155 were related to the welfare of captive parrots, of which 98 met our inclusion and exclusion criteria. We recorded the species and types of indicators investigated, and whether data were collected from companion parrots specifically. For each welfare outcome measure, validity was assessed based on the statistical significance reported by the authors as too few other validity parameters were provided. Only outcome measures that could be readily performed without any equipment or requiring only the use of commonly available equipment (e.g. weight scale) or the use of minimally invasive, routine handling techniques were classified as feasible. Of 1512 outcome measures extracted from the studies, 572 had a p-value < 0.05 and were considered feasible, which we therefore regarded as potential welfare indicators. Six distinct welfare dimensions, including behaviour and physical measurements, were represented by a similar number of indicators. The most recurrent indicators were plumage score, stereotypies, preening, and behaviours related to parrot-human interaction. Social isolation, inappropriate diet and cage dimension emerged as common risk factors of poor welfare. Indicators were identified for 13 different taxa, most of them related to the genera *Amazona* and *Melopsittacus*, and mainly collected on parrots kept for studies in laboratories. Only 68 indicators were available from companion parrots: 47% were from multi-species studies (typically surveys), 53% from only 3 genera (*Psittacus*, *Cacatua*, *Agapornis*), and 75% of those were related to feather damaging behaviour. A high risk of bias made it difficult to ascertain the internal validity of the outcome measures. Unable to achieve our goal, we collected potential welfare indicators, that require validation. We found a good variety of welfare indicators; however, their external validity was jeopardized by a strong taxonomic bias, a predominance of parrots kept in laboratories and an underrepresentation of companion parrots. Overall, these preliminary results highlight and emphasize the importance of validating welfare indicators in parrots.

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HAIR AND SALIVARY CORTISOL AND DEHYDROEPIANDROSTERONE (DHEA) CONCENTRATIONS AS BIOMARKERS OF WELFARE IN SWINE

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There is a need for objective and quantifiable indicators of welfare in pigs, specifically, biomarkers able to inform on long-term welfare. Identifying biomarkers of welfare would provide the ability to objectively inform on how different management practices influence welfare, on individual welfare, and it may serve as a tool for genetic selection of more resilient pigs. Hormones deposited in hair, in addition to the circadian rhythm of hormones may offer a measure for chronic stress in swine. However, what factors influence hormone concentrations needs to be understood. Increased levels of cortisol has been suggested to be a biomarker of chronic stress, whereas higher levels of dehydroepiandrosterone (DHEA) is suggested to relate to improved physical and mental well-being. This experiment determined whether rearing environment influenced the circadian rhythm of cortisol and DHEA, and the hair hormone concentrations. Pigs were raised in either barren environments or with daily straw provisions (8 pens/treatment over 2 batches, 12 pigs/pen) from birth to slaughter. At 12 and 20 weeks of age hair and saliva was collected, with saliva collection occurring over 12 hours to assess circadian rhythm. Pigs reared with straw had more pronounced circadian rhythms with higher salivary cortisol concentrations at 11:00am, 3:00 and 5:00pm at 12 weeks of age and at 1:00 and 5:00pm at 20 weeks of age. Salivary DHEA was higher in the straw group at 3:00 and 5:00pm at 12 weeks of age and at 9:00am, 1:00 and 5:00pm at 20 weeks of age. Hair hormone concentrations did not differ between treatments, but pigs reared in batch 1 (those born in spring) had higher hair cortisol concentrations at both ages suggesting a possible seasonal effect. Further studies are required to understand how the contribution of factors such as season, and genetics to determine the sensitivity of hair cortisol and DHEA as a biomarker of welfare in swine.

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BEHAVIOUR, ENCLOSURE UTILISATION, AND OPTIMAL ENVIRONMENTAL DESIGN FOR TREE FROG SPECIES, *HYLIDAE***Emily Potter and Laura Bamford**

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Tree frog species from the family *Hylidae*, are commonly kept as pet animals, in educational collections, for animal research and for display however available research on best practice for husbandry is limited. It is widely accepted that *Hylidae* require vertical space due to their natural history, however some enclosure designs prioritise horizontal floor space for display or ease of keeping over optimal vertical space that mimics the natural environment. Understanding how individuals utilise captive enclosures, and behave within them, can inform husbandry best practice and therefore promote welfare. Red Eyed Tree Frogs, *Agalychnis callidryas* (N=4) and Gray's Tree Frogs, *Dryophytes versicolor* (N=2) were subject to two environmental designs; Arboreal and Terrestrial, both with foliage enrichment mimicking the natural environment and climbing opportunities to ascertain optimal enclosure design for *Hylidae*. Behavioural sampling was conducted in the form of continuous scan sampling in active periods. Each environmental design was divided into six resource zones and modified spread of participation (mSPI) was used to assess the animals utilisation of each environmental design. Initial results suggest vertical space with ecologically significant resources is most utilised by species within the *Hylidae* family and that these characteristics should take priority when considering enclosure design and husbandry.

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EFFECTS OF LOADING AND TRANSPORT ON THE HEART RATE AND BEHAVIOUR OF HORSES**Vytautas Ribikauskas, Ieva Stankeviciute and Jurate Kucinskiene**

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The aim of this study was to describe the behaviour and heart rates of horses during loading, unloading and transport. Therefore, the behaviour and heart rates of horses were measured in the box, during loading, confinement in a moving vehicle and unloading. Results of this study inform how transport of horses effect their welfare.

The study involved 21 horses from 8 different breeds. Mean heart rates during loading (43.2 bpm), transport (45.3 bpm) and unloading (48.8 bpm) were significantly ($p < 0.05$) elevated in all horses compared to heart rates in the box (34.3 bpm). Horse breed had no effect on heart rate during transport. The horse age had a small positive effect ($R = 0.32$, $p < 0.05$) on the heart rate at the time of loading into the vehicle. Sex had an effect on heart rate during unloading of horses – mares had higher heart rate (55.0 bpm) than stallions (46.0 bpm, $p < 0.05$). During the study it was found that unloading of horses from the vehicle had the most effect on heart rate.

Most frequent behaviours were cautiousness during unloading (81 %), looking around (76 %), exploratory behaviours (sniffing, pawing, snorting – 38 %), ear flickering (33 %), stopping before loading (29 %), anxiety (24 %), yawning, rushing during unloading and avoidance during loading (19%), kicking (10%).

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THE INFLUENCE OF ENVIRONMENT CHANGE ON THE BEHAVIOUR OF DOMESTIC KENNELLED DOGS**Elizabeth Robson, Rebecca Sweet and Laura Bamford**

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Domestic canines are routinely housed in a variety of kennel environments such as rescue shelters, racing kennels, boarding facilities, service industries such as security, breeding facilities and educational establishments. Kennelling facilities are primarily designed for ease of maintaining hygiene, husbandry, and to maximise stocking densities as priorities rather than the welfare needs of the animals housed, resulting in barren and unstimulating environments which may compromise welfare. Domestic dogs (n=6) housed in single barrack block kennels were exposed to three different environmental designs; barren, natural and comfort, with continuous focal behavioural sampling using a standard ethogram to determine the effect on behaviour and welfare. Barren environments included provisions for the basic welfare needs of the animal such as water and plastic bed boxes, natural environments included items in environments where dogs would normally be exercised such as grass turf and leaf enrichment, and comfort environments included items normally found in a home setting such as textile filled bedding and blankets. Initial results show an increase in welfare positive associated behaviours in both natural and comfort environments suggesting a need for improved welfare conscious kennel designs for domestic canines in working environments.

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**NON-AVERSIVE HANDLING LESSENS THE IMPACT OF LAPAROTOMY IN MICE:
CAGE-SIDE VERSUS RETROSPECTIVE APPLICATION OF THE MOUSE GRIMACE SCALE****Johnny Roughan and Joshua Grimes**

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Although the analgesic requirements of rats are well-documented, we and many others have failed to identify an effective treatment for mice undergoing routine surgery such as laparotomy. Whereas meloxicam at 1mg/kg is effective for laparotomy in rats, even 10-20 mg/kg appears to be ineffective in mice. This study aimed to determine whether pain control might be improved using a synergistic analgesia protocol, combining the NSAID meloxicam with the opioid tramadol. Because anxiety can amplify pain, we also aimed to establish whether post-surgical pain control might be improved by initially preventing or minimising it using non-aversive handling (NAH) for different periods of time before surgery.

Due to uncertainty about whether the MGS is more effective for pain detection when score retrospectively (i.e., from photographs) or at the cage-side (live), in this study both methods were used.

36 Male BALB/c mice were handled for 1 min once daily for 7, 14, 21 or 28 days using NAH or standard tail-handling. They then received Saline, tramadol (20mg/kg) or meloxicam (10mg/kg), or both (20/10mg/kg) s/c before laparotomy. Body weight, pain-specific behaviour and rearing and grooming were scored 1 day before surgery (Baseline) and at 1, 24 and 48h. The MGS was applied live post-surgically (1h), and using photographs taken at Baseline and 1, 24 and 48h.

Analysis of body weight, MGS and behaviour changes showed no evidence of any analgesic effects of meloxicam or tramadol, and there was also no evidence of any benefit from using the multi-modal (synergistic) approach. However, mice in the NAH group were generally more active post-operatively. Also, as handling frequency increased, pain scores and live MGS scores were lower and declined to a greater extent in mice in the NAH compared to tail-handled mice. Non-aversive handling, when applied intensively, may represent a complimentary non-pharmacological approach to refining post-surgical welfare in mice. The MGS may be more effective when scored live rather than retrospectively.

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ANIMAL WELFARE IN SCIENTIFIC RESEARCH - A REVIEW OF INTERNATIONAL REGULATION AND LEGISLATION COMPARED TO THE CASE OF NORTH MACEDONIA

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This paper focuses on animal welfare in scientific research, with special emphasis on its regulation, relevant international legislation, and institutions related to the usage of animals in scientific research. Ethical aspects of animal use in experiments and scientific research are also a part of the analysis.

Attention will be paid to the welfare of experimental animals, by offering insight for improving the legislative framework and contributing to the improvement of regulation that regulates the conditions under which the experiments on animals are being conducted. The aim is to ensure that the appropriate regulation exists to provide that all the procedures are done in the best possible manner to relieve the animals from suffering and make their position more human and bearable.

Also, the usage of contemporary disruptive technologies for animal replacement in the processes of animal research is one of the key issues that require special attention, so the alternative sources of experimental subjects of non-animal origin will be considered from this perspective as well.

Furthermore, attention will be paid to some national perspectives in this context, especially the North Macedonian case, and a comparative analysis of the legislative framework related to animal welfare in scientific research will be performed in order to identify potential areas of improvement in the relevant legislation, and the need of harmonizing it in accordance with contemporary international trends in regulation of animal welfare in more developed societal systems.

The research will be performed by using the latest reliable sources of data and research studies related to animal welfare legislation, standards, regulations, etc.

The objectives of this research are to explore a variety of perspectives and offer some recommendations to less developed societies in terms of undertaking necessary policy steps to bring closer animal welfare standards to the contemporary international standards, and therefore contribute to the creation of a legislative framework for constantly increasing the animal welfare level worldwide.

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**INVESTIGATING NON-INVASIVE METHODS OF GASTRIC ULCER DETECTION IN SOWS:
ORAL BEHAVIOUR AND METABOLOMIC ANALYSIS OF SALIVA****Laura Salazar¹, Marianne Farish¹, Emma Baxter¹, Alistair Lawrence^{1,2}, Tessa Moses³,
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Gastric ulcers are highly prevalent in the pig industry and might affect pigs at all production stages. Ulcers are of animal welfare concern as they likely cause pain. However, there are no validated, easy, cheap and non-invasive methods to diagnose gastric ulcers in living pigs. This study investigated two potential diagnostic approaches: re-directed oral behaviours and saliva metabolic composition. Due to repopulation management of the farm thirty-eight primi- and multi-parous sows (Large White × Landrace) were designated for cull at weaning and therefore utilised for this trial. Oral behaviours (self-, resource- and penmate-directed) were scored live using intervals of continuous 5-min observation by behaviour sampling during the last three weeks of gestation and during lactation (120 and 50 min overall/sow, respectively; n = 38). A subset of these sows were sampled for saliva before they were moved into the farrowing facility (day 110; n = 16) and then prior to euthanasia on the last day of lactation (day 27 or 28; n = 26). Only 16 sows were sampled both during gestation and lactation. At weaning, sows were humanely euthanized by an experienced technician on site with stomachs immediately dissected post-mortem. Global metabolomics and pathway enrichment analysis were performed on saliva to measure metabolites (at EdinOmics, University of Edinburgh). Gastro-oesophageal ulceration was assessed using an overall stomach score, and we developed separate scores to describe presence and extension of keratinization, erosion, ulcer and/or healing tissue (n = 38). All sows had some level of change in the mucosa, and 67.57% of the sows had at least one ulcer. Behaviours during gestation and lactation were not correlated with the overall stomach score (Spearman's correlation). Behaviours during gestation and lactation were independent of the type of lesion present (Mann-Whitney U test). Saliva metabolome analysis showed differences between both stages, and features that significantly increased or decreased (p < 0.05) with the severity of the pathological lesion were identified. Pathway enrichment analysis during lactation showed an increase in lipoxin A4 (anti-inflammatory molecule, p-value = 0.0001) with severity of keratinization, and thromboxane B3 (inflammatory mediator, p-value = 0.006) with severity of erosion. No feature increased with the severity of ulcer extension. Additionally, some metabolites related to feed ingredients were also identified in the saliva of gestating and lactating sows. The process of ulceration was related to specific changes in saliva composition pointing to the potential for these to be used as salivary biomarkers of ulceration.

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VALIDATION OF ACTIVITY METERS FOR PROSPECTIVE USE AS WELFARE ASSESSMENT TOOL IN HORSES, *EQUUS CABALLUS*

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In recent years there has been increasing interest in the welfare of leisure and sport horses with a particular focus on the way they are managed. However, in order to understand whether certain types of management are harmful, it is important to have methods and tools appropriate to the species and situation in order to measure welfare. It has been proposed that time budgets (with specific focus on time spent resting, foraging and moving) may be an indicator of welfare status. Activity meters can be an accurate way of measuring activity time budgets if they are properly validated, avoiding the need for continuous behaviour recording. However, little research has been done on equine species, so it was important to assess their viability prior to field data collection.

Therefore, this study aimed to validate the AX3 against live behavioural observations of a group of horses (*Equus caballus*) (n=10) as well as investigate the impact of wearing equipment (on the head, body and legs) on behaviour and welfare. Generalized Linear Mixed Models (GLMM) analysis was conducted to assess the impact of wearing equipment upon horse behaviour.

Results showed that when horses wore a full-kit (on the head, body and legs) there was greater frequency of the following behaviours than during baseline observations (Walking (F(4,93)=26.01, $p < 0.001$), Rolling (F(4,93)=9.25, $p < 0.001$), Standing (F(4,93)=834.02, $p < 0.001$), Total grooming (F(4,93)=127.37, $p < 0.001$)). Thus, suggesting potential behavioural alterations when horses were wearing equipment in contrast to their behaviours when not partially or fully equipped. Finally, Kruskal-Wallis and Mann-Whitney U tests were used to investigate whether AX3 values could differentiate between specific behaviours. Using the AX3 attached to the head or leg alone, it was also able to distinguish between 'Locomotion' ($p=0.000$), 'Grooming' ($p=0.000$) and 'Grazing' ($p=0.000$) behaviours whilst also able to differentiate between 'Rolling' ($p<0.05$), 'Head-toss' ($p=0.000$), and 'Pastern-wraps' exclusively distinguished 'Lifting-hindlimb' ($p<0.05$). Therefore, this study suggests that AX3 are valid equipment to measure movement and behaviour in horses, although more research is required to look at long term use impacts on welfare. These results provide further evidence that accelerometers are valid equipment, acknowledging the demand to explore their use in real-life situations as welfare assessment tools.

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BELIEFS, KNOWLEDGE AND ATTITUDES OF EQUINE PRACTITIONERS AND ENTHUSIASTS ABOUT ANTICIPATORY BEHAVIOR AND EMOTIONS IN HORSES**Leticia Santos Maurício, Denise Pereira Leme and Maria José Hötzel**

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Stabled horses receive few meals/day, which is contrary to their behavioral and physiological needs. This can lead them to express anticipatory behavior, in the form of an increase in activity before food delivery. There is no scientific consensus about the valence of emotional state that horses and other animals experience when expressing anticipatory behavior to a food reward. This study aimed to investigate the knowledge, beliefs, and attitudes of equine practitioners and enthusiasts about behaviors and emotions related to anticipatory behavior to provision of food in stabled horses and how this influences their management decisions. We interviewed 31 equine practitioners and enthusiasts through face-to-face interviews. Data were transcribed and submitted to thematic analysis. Three main themes capture participants' knowledge and views on anticipatory behavior. In theme 1, "valence of anticipatory behavior", participants described that the provision of highly palatable food with excess energy is usually followed by an increase in vocalizations, agitation, aggressive and stereotypic behaviors, and emotions of negative valence, such as frustration and anxiety. Only few participants associated anticipatory behavior with a positive valence emotion, e.g., a sign of play, appetite, or joy for receiving food. Theme 2, "horse factors influence anticipatory behavior": in the participants' perception, horses that are socially dominant or anxious express more anticipatory behavior. Theme 3, "management influences anticipatory behavior": participants discussed how the strict feeding routine triggers the anticipatory behavior. Yet, most also believed that maintaining the feeding routine is necessary or beneficial or needed for horses' welfare, for example helping prevent colics. Participants could cite several measures that could minimize the expression of anticipatory behavior: feeding first the horse that is more agitated; providing food at shorter intervals, as well as roughage or green "feeds" between meals, or roughage before the concentrate; alternating the time of supply of food; leaving horses loose and with social contact for longer periods of time; and increasing working/exercising time. The most frequent behaviors cited by participants regarding anticipatory behavior consisted of stereotypic behaviors, vocalizations, agitation, and aggressive behaviors. In conclusion, the opinion of experienced equine practitioners and enthusiasts supports the hypothesis that anticipatory behavior to a food reward triggers negative valence emotions in stabled horses. However, most participants maintained and defended the food management that triggers such emotions in the equines. Further studies need to investigate what leads those responsible for the care of horses to use practices that they themselves perceive as negative, e.g., lack of space, pasture and commercially produced pasture and roughage, or uncritical repetition of established knowledge.

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ASSESSMENT OF BROILER WELFARE AT THE SLAUGHTERHOUSE**Sónia Saraiva^{1,2,3}, Cristina Saraiva^{1,2,3}, Alexandra Esteves^{1,2,3} and George Stilwell⁴**¹ Animal and Veterinary Research Centre (CECAV), UTAD, Vila Real, Portugal² Department of Veterinary Sciences, School of Agricultural and Veterinary Sciences, University of Trás-os-Montes e Alto Douro (UTAD), Quinta de Prados, Vila Real, Portugal³ Associate Laboratory for Animal and Veterinary Science (AL4Animals), Portugal⁴ Animal Behaviour and Welfare Laboratory, Center of Interdisciplinary Investigation in Animal Health, Faculty of Veterinary Medicine, University of Lisbon, Alto da Ajuda, Portugal*soniasaraiva@utad.pt*

The objective of this study was to assess the welfare of commercially reared broilers applying 2 or 3-points rating scales for different welfare indicators at the slaughterhouse. Data was collected in 64 flocks with different backgrounds in 327,066 broilers. The welfare indicators assessed were emaciation, dirty feathers (DF), foot pad dermatitis (FPD), hock burn (HB), breast burn, breast blister, breast ulcers, ascites, dehydration, septicaemia signs, pericarditis, hepatitis and cellulitis. The principle of welfare “good feeding” was evaluated by percentage of emaciated birds in each flock; “good housing” was assessed by dirty feathers measure and “good health” principle by the presence of injuries and diseases. Finally, an overall assessment was carried out to assign each farm to one of the following welfare categories: (1) excellent (animal welfare was very high), (2) enhanced (animal welfare was good), (3) acceptable (animal welfare was above or met the minimum requirements) and (4) unacceptable (animal welfare was poor). Ten (15.6%) farms were classified as excellent, 22 (34.4%) farms were considered enhanced, 27 (42.2%) were acceptable and 3 (4.69%) farms had a negative welfare evaluation. Good feeding was the principle which contributed most positively to the assignment of the best categories of welfare and good housing had the most negative scores. FPD allowed for the distinction between flocks with better welfare assessment categories (1, 2) and flocks in the other welfare categories (3, 4). The difference between categories 3 and 4 was mainly due to DF grade with category 4 showing the highest scores for this measure. On opposite, excellent farms presented the absence of DF. Presences of HB lesions were more frequent in category 3, but no significant differences from other categories were observed.

The majority of farms reached the minimum requirements in animal welfare, concerning the welfare principles good housing, good feeding and good health. This study also demonstrated that the assessment of broiler welfare at slaughterhouse can be applied to determine the overall assessment of animal welfare at farm level.

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GENDER BIASES IN COMPARISON BETWEEN LIVE AND RECORDED OBSERVATION IN PAIN SCORING USING UPAPS IN PIGLETS UNDERGOING SURGICAL CASTRATION

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The role of care givers on intensive pig production farms is to assess daily welfare of pigs by accurately observing and interpreting, but often perceivers may be subject to biases based on gender, which could lead to under-recognition and mistreatment of pain. The objective of this study is to determine if there is a difference in scoring of behavior between live and recorded videos using the UPAPS in castrated piglets based on gender of the perceiver.

Videos were scored by 3 male observers, one with 10+ years of experience in the swine industry and the other two with 1 year of vet school completed; 2 female observers both with 1 and 2 years of vet school completed, respectively.

The pain scale utilized evaluated five behavioral items. A numerical score was designated from “0” to “3”, with a “0” representing normal behavior (free of pain) and “3” corresponding to pronounced behavioral deviation. Individual behavioral items and total pain scores were then calculated for each piglet per timepoint.

Sixty-four male piglets were enrolled for data collection and divided into four cohorts of 16 piglets, each cohort to avoid observer fatigue. Live behavior scoring was conducted on site; however, the same piglet was recorded using a camera mounted on a tripod. These videos were masked and watched at a later time for the same observers. A multivariable model was built at the piglet level with gender and timepoint included as the fixed effects. Piglet was included as a random effect to account for repeated measurements on individual animals. Statistical significance was declared at $P \leq 0.05$ and a tendency was declared at $0.05 < P \leq 0.10$. All data were analyzed using SAS version 9.4.

In this study gender did not have an effect on total pain scores for piglets castrated without any analgesic. Timepoint did have an effect on total pain scores ($P < 0.0001$) with the timepoint immediately post-castration (Average score $19.2 \pm .2$) demonstrating significantly higher scores than -24h pre-castration ($3.9 \pm .2$) and 3hr post-castration (6.0 ± 0.2). Gender timepoint was not significant ($P > 0.05$) with the following female and male scores by timepoint: -24 hr pre-castration: Female: $2.7 \pm .3$, Male: $2.9 \pm .3$; Immediately post-castration: Female: $12.1 \pm .3$; Male $15.4 \pm .3$; 3hr post-castration: Female: $4.1 \pm .3$, Male: $4.5 \pm .3$. This study did not identify a bias towards underestimation of pain based on gender of the observer.

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PERIBULBAR ANESTHESIA DECREASES CORNEAL AND PERIOcular SENSATION AND CAN IMPROVE RAT WELFARE DURING OPHTHALMIC PROCEDURES: A COMPARISON OF TWO INJECTION APPROACHES

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Rats are commonly used as an animal model to study glaucoma, which is induced using painful procedures. Peribulbar anesthesia (PBA) provides excellent perioperative analgesia in people and domestic animals. The goal of this study was to compare the efficacy and safety of two PBA injection approaches adapted to rat anatomy. Eight ophthalmologically normal rats were used to compare dorso-medial versus medial-cantus PBA injections in a randomized, masked, crossover design. Under isoflurane anesthesia, bupivacaine 0.5% at 0.05 mL/100-gram body weight was injected using one approach and following a 2-week washout, the contralateral side was injected using the second approach. Intraocular pressure (IOP) was measured under anesthesia before and up to 10 minutes following injections. Corneal and periorbital sensitivities (dorsal, ventral, lateral, medial) were tested at baseline and up to 24 hours following injections. IOP significantly increased from baseline at 5 and 10 minutes (dorso-medial; 15.6 ± 2.8 versus 23.3 ± 7.0 , and 23.6 ± 6.3 mmHg) and at 5 minutes (medial-cantus; 15.8 ± 2.5 mmHg versus 22.0 ± 3.1 mmHg). Corneal and periorbital sensitivities were significantly decreased from baseline (dorso-medial up to 6 and 2-3.5 hours, respectively; medial-cantus up to 4 and 2-4 hours, respectively), with dorso-medial providing significantly better effect. Exophthalmos was observed in 5/8 eyes of both approaches and resolved within several hours. Dorso-medial PBA provided better and longer corneal anesthesia than medial-cantus approach, however, IOP increased following injections. Further studies should assess PBA efficacy and safety in ophthalmic surgeries in rats, and its suitability for experimental glaucoma models.

* Funding: This study was supported by the Universities Federation for Animal Welfare (Application 34-19_20).

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ANIMAL WELFARE COST FOR STRAY COMPANION ANIMALS AND ADOPTED DOG CHARACTERISTICS THAT ARE PREFERRED BY PEOPLE OF GREECE

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Three million stray dogs and cats are believed to live in the streets of Greece today. The country's stray management is carried out by municipal governments who primarily use trap, neuter/spay, and release method. As of 2021, under new legislation, Municipalities are obliged to build shelters or cooperate with local animal welfare organizations to tackle stray overpopulation and promote adoptions.

The first part of this study investigates how stray dogs and cats are cared for operationally and financially. The second part of the study looks at the traits of dogs that make them more likely to be adopted by Greek people through animal welfare organizations. 280 dog adoption statistics from an animal welfare group for the year 2021 were utilized as a case study, together with replies from 31 (20% completion rate) animal welfare organizations and municipalities to a national online survey.

The findings showed that the overall average cost of managing dogs and cats is 1,099.30 euros, and 720.93 euros, respectively per month. This includes the average cost of housing for dogs and cats, which is 463.20€, and the average cost of food provision, which is 418.07€ and 430.54€, respectively per month. According to the Cox proportional hazards model, fair-coloured dogs were more likely to be adopted faster than black-coloured dogs (white HR1.85 p<.05, sandy HR2.48 p<.01, tan HR1.85 p<.05, tricolour -fair HR2.89 p<.01) and black and white dogs (HR1.99 p<.01). Smaller dogs in weight are significantly more popular than bigger dogs, 34.95% of the adoptions were less or equal to 10 kilos, while only 1.51% equal or more than 20 kilos.

The application of the new law is crucial for addressing the overpopulation issue of stray dogs and cats in Greece. The study suggests that in order for the managing system to be sustainable, actions towards the promotion of responsible pet ownership and the promotion of stray companion animal adoptions are required.

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TIE-STALL METHANE TESTING BEHAVIOUR AND ENTERIC METHANE MEASUREMENTS IN DAIRY CATTLE**Olivia Smith¹, Nienke van Staaveren¹ and Christine Baes^{1,2}**

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Behaviour can indicate the physiological and psychological state of an animal. When unfamiliar equipment or procedures are introduced to an animal, the animal can diverge from their normal behaviour. Alterations to normal behaviour can influence the trait being measured, creating bias in the results of animal studies. Training periods or habituation are considered good practice and can decrease alterations to normal behaviour in cows that are introduced to unfamiliar equipment or procedures. The GreenFeed emission monitoring system (C-Lock Inc., Rapid City, SD, USA) (GF) measures enteric methane emissions from ruminants but there is a gap in the knowledge surrounding the period of habituation to the GF and how the behaviour expressed during testing relates to enteric methane emission measurements. A total of 202 first lactation Holstein dairy cows from the Ontario Dairy Research Centre were tested using the GF for approximately 10 minutes. Habituation occurred on the Friday before the testing week (Day 0) and animals were officially tested the following Monday through Friday (Days 1-5). Behaviour during the test was recorded using continuous focal sampling by one trained observer. The behaviours that were analyzed using a repeated measures one-way ANOVA with Bonferroni corrections included the time when the animal had their head outside of the machine and the number of leg movements. The average time with the head outside of the machine on Day 0 was almost double compared to Days 1-5 (adjusted P values < 0.01). The average number of leg movements on Days 1-5 were nearly 1.5 times greater than Day 0 (adjusted P values < 0.01). For both behaviours, there were no significant differences between Days 1-5 (adjusted P values 0.35). Further analysis on the methane emission measurements and the correlations between behavior and methane emissions during testing will be conducted. The results thus far indicate that one training day is necessary and sufficient for dairy cow habituation to the GF in terms of their behaviour.

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**OPTIMAL ENVIRONMENTAL DESIGN TO PROMOTE CAPTIVE WELFARE FOR CROCODILE NEWTS
(*TYLOTOTRITON VERRUCOSUS*)****Naia Stephenson and Laura Bamford**

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Husbandry best practice for captive amphibians is lacking with individual animals often kept in sub-optimal conditions. Amphibians from the order Urodela have unique captive requirements, including aquatic and terrestrial provision, to promote good welfare, and with a global decline in amphibian species welfare informed husbandry practice is becoming a priority need as more individuals from threatened species are kept in captivity for conservation purposes, as well as for display and private keeping. Crocodile newts, *Tylotriton verrucosus*, are classified as near threatened on the IUCN red list of threatened species with a declining population trend therefore are likely to be kept in captivity in coming years for conservation breeding. In this study three environmental designs were trialled using a group of co-habiting *T. verrucosus* (N=3) consisting of Aquatic, Terrestrial and Mixed habitats. Continuous scan sampling was used in active periods to ascertain welfare positive behaviour exhibited in each enclosure design, and modified spread of participation index (mSPI) was used to assess the animals utilisation of each design to inform best husbandry practice and promote welfare. Initial results suggest a preference for more access to aquatic provision however a choice to access terrestrial environments is key for optimal animal welfare.

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ACUPUNCTURE FOR CHRONIC PAIN TO IMPROVE RED PANDA WELFARE**Iris Ziyang Tan, Eszter Matrai, Sarah Churgin and Paolo Martelli**

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Acupuncture treatment is commonly used in human medicine, but it is still in its exploratory phase regarding veterinary practices. With the continuous dedication of care and veterinary teams as well as thanks to the advancement of veterinary science, animals under human care live longer and longer. A 14 year-old, female, Red panda (*Ailurus fulgens*), Rou Rou was diagnosed with age related spondylosis and osteoarthritis. To reduce Rou Rou's joint pain and to increase her mobility, acupuncture treatment was applied. This pilot study, aimed to evaluate the behavioural impact of the acupuncture treatment with special attention to activity pattern and habitat use.

A total of 28 baseline and 3x28 treatment observations were carried out. Acupuncture sessions were conducted weekly. To evaluate the short- and long-term impact of the acupuncture treatment Rou Rou was observed on the day of the treatment, 24hrs post-treatment and 48hrs post-treatment (Day1-3). The acupuncture included nine meridian points with the application of dry needles. Rou Rou's behaviour was coded using BORIS software with an ethogram that included 15 behaviours.

During acupuncture Rou Rou's activity increased from 29% to 56% of the total observation time. Her resting cut to half (52% to 26%), she spent 2.5 times more time on exploration (13% to 32%) and increased time of locomotion (15% to 23%). Rou Rou's habitat included three vertical levels. During the treatment Rou Rou was recorded to move between levels more frequently (5 vs 12 per session), further supporting improved habitat use. These recorded behavioural changes were maintained over the three days of the observation during the treatment.

Our finding is limited to a single subject, however the positive changes resulted in Rou Rou's behaviour show promising results for the veterinary application of acupuncture, contributing to the set of tools to improve the welfare of old animals under human care.

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DOES PLASTIC ENTANGLEMENT POSE A WELFARE RISK TO UK EUROPEAN HEDGEHOGS?**Emily Thrift and Fiona Mathews**

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The hazards posed to the European hedgehog by plastics is poorly documented. A questionnaire designed to gather evidence on plastic entanglement was therefore sent to 160 UK wildlife rehabilitation centres identified from an internet search and was also publicised on social media. Responses were received from 54 organisations and relating to 184 individual admissions owing to plastic entanglement in the European hedgehog. Death, or euthanasia because of the severity of the injuries, was the outcome for 44% (n = 81) of the reported cases. Although some reporting bias is possible, with centres with positive cases more likely to respond, the results indicate that substantial numbers of wild European hedgehog in the UK could be affected by plastic entanglement, with fatal outcomes for many. The hazards posed to the European hedgehog by plastics is poorly documented. A questionnaire designed to gather evidence on plastic entanglement was therefore sent to 160 UK wildlife rehabilitation centres identified from an internet search and was also publicised on social media. Responses were received from 54 organisations and relating to 184 individual admissions owing to plastic entanglement in the European hedgehog. Death, or euthanasia because of the severity of the injuries, was the outcome for 44% (n = 81) of the reported cases. Although some reporting bias is possible, with centres with positive cases more likely to respond, the results indicate that substantial numbers of wild European hedgehog in the UK could be affected by plastic entanglement, with fatal outcomes for many.

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A FEAR OF FIREWORKS IN DOGS, CATS AND RABBITS, AND OWNERS' VIEWS TOWARDS THEIR CONTROL AND NOISE REDUCTION

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Fireworks are widely used throughout the year and cause fear and distress in a broad range of species. However, a large scale nationally representative survey of UK owners' views on firework control, and owner perceptions of the welfare impacts of fireworks on multiple pet species, has not been conducted. The aim of this study was to ascertain the frequency of dog, cat and rabbit owners that report their pet to be fearful of fireworks and owners' views on the control of fireworks.

The PDSA Animal Wellbeing (PAW) survey has been conducted annually since 2011. It is conducted by YouGov on behalf of PDSA. The nationally representative survey explores how owners are providing for the 5 Welfare Needs of pets in the UK as well as estimating pet populations. In 2022, a total of 5,768 pet owners responded including 2,586 cat, 2,569 dog and 613 rabbit owners.

A fear of fireworks was reported in pet dogs (41%), cats (30%) and rabbits (16%). Dog owners that lived within urban areas were significantly ($p < 0.001$) more likely to report a fear of fireworks compared to owners in rural areas.

The majority of pet owners agreed with statements regarding proposed additional controls on the selling and licensing of fireworks (e.g. *"Fireworks should only be allowed on certain dates and at certain times (82%)"*, *"Fireworks should be restricted to licensed displays only" (75%)*) and the compulsory reduction in noise levels associated with fireworks (*"There should be a compulsory reduction in the noise level of fireworks to make them quieter" (71%)*). Pet owners who had owned their pet for 3 years or longer were more likely to agree with statements regarding additional controls for the selling ($p < 0.001$) and licensing ($p < 0.01$) of fireworks compared to those who had owned a pet for ≤ 2 years.

In conclusion, it is evident that fireworks are a common cause of fear in dogs, cats and rabbits and the majority of pet owners agree that stricter controls on their use are required.

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**WHAT IS THE CURRENT STATE OF WELFARE IN PET DOGS, CATS AND RABBITS?
KEY FINDINGS FROM A NATIONALLY REPRESENTATIVE PET OWNER SURVEY IN 2022**

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The PDSA Animal Wellbeing (PAW) Report provides nationally representative companion animal welfare surveillance that identifies trends and priorities, and helps to drive and monitor change. The PAW Report was initiated by PDSA in response to the introduction of the UK's Animal Welfare Acts. It set out to understand and monitor the wellbeing of the UK's pet dogs, cats, and rabbits and is framed around the 5 Welfare Needs.

An online survey of UK pet dog, cat and rabbit owners has been conducted annually since 2011 in collaboration with YouGov. This research highlights some of the key findings from the 2022 PAW Report. The survey of dog (n=2,569), cat (n=2,586) and rabbit (n=613) owners was conducted in February and March 2022. The data were analysed using Z- and t-tests.

Pet acquisition: There has been an increase in the proportion of dogs (6%), cats (5%) and rabbits (3%) acquired from abroad compared to findings from 2020 and 2021. The 2022 data also indicates that some pet owners may acquire pets from abroad to obtain dogs with cropped ears or cats that are declawed.

Behaviour: The majority of dog owners stated that they use positive training methods such as treats / food (73%) or toys (60%). However, 20% of dog owners reported using training methods considered to be aversive, such as water pistol spray, pet corrector spray, choke chain, and vibrating/citronella/prong/electric shock collars.

Diet and Obesity: The majority of dog (82%), cat (78%) and rabbit (87%) owners deemed their pet to be an ideal weight.

Environment and Companionship: Findings indicate that 19% of rabbits have an inadequate living space, for example, having a small or no exercise run and 46% of rabbits live alone.

Preventative health: 79% of dogs, 61% of cats and 52% of rabbit owners reported that their pet regularly receives booster vaccinations.

The wealth of data that the PAW Report generates is used to stimulate collaborative working, inform government research, policy and legislation. PDSA works alongside researchers and students, and makes PAW data available for studies on selected relevant topics to bring additional animal welfare benefit through further research.

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ACUPUNCTURE TO ACTIVATE THE ARCTIC FOX**Ming Hin Tse¹, Eszter Matrai^{1,2}, Sarah Churgin³ and Paolo Martelli¹**¹ Research Department, Ocean Park Aberdeen, Hong Kong² Department of Ethology, Eötvös Loránd University, Hungary³ Animal Health Department, Arizona State University, USA*adatse2002@gmail.com*

Arctic foxes (*Vulpes Lagopus*) are distributed throughout the Arctic tundra biome, however two of their subpopulations are considered endangered. Arctic foxes are not very common in zoos and aquariums but do well under human care. Ocean Park Hong Kong currently houses a family of five arctic foxes. Thanks to the skills and dedication of the animal care team, some of our animals have in fact reached record age. Gochi, an 11 years old male arctic fox and suffers from age-related arthritis, which impacts his activity and quality of life. Our study aimed to investigate the efficacy of acupuncture for pain relief and improvement of this arctic fox's welfare. Acupuncture is commonly used for pain management in human medicine, and it is gaining followers in veterinary medicine. Veterinary acupuncture is in its exploratory phase. Our study aims to rigorously measure the outcome of Gochi's response to acupuncture in the management of age-related degenerative arthritis and contribute to the body of knowledge on the welfare and care of animals under human care.

Gochi was trained to participate in his treatment under stimulus control (voluntary behaviour). He received weekly acupuncture treatments using a combination of dry needles focusing on three meridian points. Gochi's response to acupuncture was evaluated by establishing a baseline activity budget and habitat use prior to the treatment. Observations were repeated during the treatment period. Data collection was conducted using BORIS behavioural coding software. The frequency and duration of the 17 monitored behaviours were analysed before vs during the treatment period.

Our results show that in response to the acupuncture, the overall duration of active behaviours increased from 53% to 73%. In addition, resting decreased from 30% to 20%, while locomotion increased from 17.2% to 26%. Gochi's left hind leg was observed to slip occasionally during locomotion due to his geriatric condition. During acupuncture, the number of occurrences of slipping decreases from 14 to 3 times.

While this study is, by its nature, limited to a single subject, our preliminary results support the use of acupuncture and, therefore the value of investing the training effort to achieve patient voluntary compliance. Finally, our findings provide a baseline for further investigations contributing to the welfare science of arctic foxes and other geriatric animals under human care.

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UNDERSTANDING THE GAPS BETWEEN THE CONCEPT OF ANIMAL WELFARE, PROFESSIONAL TRAINING AND TECHNICAL PERFORMANCE IN FISH FARMING**Isabela Vallim¹, Alessandra Akemi Hashimoto Fragoso¹, Ana Silvia Pedrazzani¹, Murilo Quintiliano² and Carla Forte Maiolino Molento¹**¹ Animal Welfare Laboratory, Federal University of Paraná, Curitiba, Brazil² FAI Farms - FAI do Brasil, Jaboticabal – SP, Brazil*isabelavallim@ufpr.br*

Given the evidence that fish are sentient, concern for animal welfare has extended to these animals; however, information on the subject may still be scarce. Our goal was to understand how animal welfare is addressed in the training of Brazilian technical staff involved in fish farming and how they act in relation to the welfare of fish, with the hypothesis that their education regarding animal welfare is incipient. An online questionnaire, consisting of open and closed questions, was sent to 100 contacts, among technicians, cooperatives and researchers, requesting further assistance in capturing more respondents and resulting in 32 participants in a 45-day period, 14 men and 18 women. The age ranges with the highest prevalence were 25-34 years (34.4%) and 35-44 years (34.4%). Almost all (96.9%) respondents reported previous knowledge of animal welfare and all considered the welfare of fish to be important. A large part of the respondents (84.4%) stated that fish are capable of experiencing negative emotions, primarily hunger and fear; 71.9% of the respondents recognized positive emotions in fish, with satiety and pleasure being the most cited. All respondents stated that fish are capable of feeling hunger and 96.9% that they feel pain. Regarding the quality of the teaching of animal welfare in their professional training, 56.3% of the respondents rated it as satisfactory (7 or more on a scale of 10); 90.6% believed that the better the teaching quality on the subject, the better the welfare of the fish involved in production; and almost all (96.9%) believed they can directly affect fish welfare. Therefore, there is some knowledge of fish welfare, with room for improvement, and the strong conviction that professionals can directly affect the welfare of fish is a promising result.

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FEMALE BREEDING RABBITS HOUSED PART-TIME IN GROUP: EFFECTS OF ENRICHMENT AND GROUP SIZE ON SKIN INJURIES AND AGONISTIC BEHAVIOUR**Liesbeth Van Damme^{1,2}, Bart Ampe¹, Evelyne Delezie¹ and Frank Tuytens^{1,2}**¹ Animal Sciences Unit, ILVO, Melle, Belgium² Department of Veterinary and Biosciences, Faculty of Veterinary Medicine, Ghent University, Salisburylaan, Merelbeke, Belgium*liesbeth.vandamme@ilvo.vlaanderen.be*

According to common farm practice, breeding does (*Oryctolagus cuniculus*) are housed in single-litter cages. Group housing of does in larger enriched multi-litter cages allows for more natural behaviour and contact with conspecifics but maternal protective behaviour induces skin injuries and unrest. Part-time group housing has been proposed as an alternative to continuous group housing: does are transferred from single-litter to multi-litter cages for the second part of the reproductive cycle when protective behaviour has supposedly declined. Hierarchy fights among does, however, still remain a problem. We evaluated with a 2x2 factorial study design the effect of group size and the provision of additional enrichment on doe social behaviour and on kit and doe skin injuries in a part-time group housing system. Does and their 22-day-old kits were housed in multi-litter cages for 13 days for four consecutive reproduction cycles. Elevated platforms were standard in all cages. Twelve multi-litter cages were randomly assigned one of the following treatments in each cycle: group of four does with no additional enrichment, four does with additional enrichment (higher elevated platform and PVC pipes), three does with no additional enrichment and three does with additional enrichment. As pen size remained constant, a change in group size also implied a proportional change in stocking density. Doe and kit injuries were recorded 1, 3, 6, 9 and 13 days after grouping. Doe social behaviour was observed starting at the onset of grouping during a 24 hour period during the first two reproduction cycles and during an 8 hour period in the third cycle. The number and severity of doe and kit skin injuries increased significantly one day after grouping ($P < 0.001$). Compared with groups of four, does in groups of three had a lower mean skin injury severity score ($P = 0.02$). Of all observed post-grouping social behaviours, submissive behaviour was most frequently observed (41.4%), followed by aggressive behaviour (28.1%), engaging behaviour (27.6%) and friendly social contact (2.9%). When does used enrichment, the lower platforms were most frequently visited (96.5%) whereas the additional enrichments (higher platforms and pipes) were rarely used (3.5%) which may explain why none of the outcomes were affected by the additional enrichments. Although the severity of wounds was lower when group size and stocking density were reduced, the high level of aggression and of newly sustained injuries since the start of the group housing phase remains problematic, even in enriched part-time group housing systems.

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CAREGIVERS ENGAGING IN MONKEY BUSINESS: EVALUATING THE USE OF CAREGIVERS AS SOCIAL ENRICHMENT FOR CAPTIVE RHESUS AND CYNOMOLGUS MACAQUES**Rachel Van Vliet¹, Nadège Aigueperse² and Elsa Vasseur¹**¹ Department of Animal Science, McGill University, Montreal, Quebec, Canada² University of Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, Saint-Genès-Champanelle, France*rachel.vanvliet@mcgill.ca*

Enrichment recommendations for captive non-human primates prioritize group-housing to provide them with social enrichment, which is often not possible in laboratory environments, due to infrastructural and experimental constraints. Our objective was to test if caregivers could serve as effective social enrichment for captive rhesus and cynomolgus macaques and to see if there was an effect of the type of social behaviours they employed. Eight female pair-housed macaques (rhesus n=5, cynomolgus n=3) were split evenly into two treatment groups: human behaviour (HB) and monkey-like behaviour (MB). For monkeys in the HB group, caregivers would use only human behaviours while interacting with them. For those in the MB group, caregivers would attempt to replicate macaque social behaviours. Treatment occurred daily at 1pm, when the monkeys would receive fresh produce, and lasted three weeks. The caregiver would attempt to engage with each subject for 6 minutes: 2 minutes during feeding and 2 minutes before and after. Interactions were unstructured, and caregivers would gauge their behaviours based on the monkey's reactions. Our results showed that monkeys were more likely to engage in interactions before feeding. During interactions, MB monkeys interacted less with the caregivers, showing lower rates of affiliative, submissive, and abnormal behaviour than HB monkeys ($P < 0.10$). Monkeys from both groups spent most of their time oriented towards the caregivers and at the front of their cages, showed a $2.2 \pm 0.69\%$ (7.9 sec, $p = 0.058$) increase in self-grooming behaviour, and a $3.4 \pm 1.1\%$ (or 12.4 sec, $p = 0.087$) reduction in negative interactions before feeding with their cage-mates. During times when no humans were present, HB monkeys displayed higher rates of certain abnormal behaviours, monkeys from both groups showed a 3.5 ± 1.5 ($p = 0.0584$) decrease in the frequency of cage-directed abnormal behaviours and a 1.2 ± 0.53 ($p = 0.067$) decrease in the frequency of stereotypic abnormal behaviours. All monkeys further saw a $12.9 \pm 6.1\%$ (7.71 min, $p = 0.010$) increase in the proportion of time spent interacting positively with cage-mates, including a $10.6 \pm 4.78\%$ ($p = 0.077$) increase in time spent grooming. Conversely, they saw a decrease in time spent interacting negatively, and a $0.54 \pm 0.25\%$ (19.44 sec, $p = 0.090$) decrease in proportion of time interacting aggressively. This contributes to our understanding of enrichment for non-human primates and presents an alternative way of providing social enrichment to macaques in research environments.

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FERRETS DISPLAY DIFFERING DEGREES OF INCREASED BEHAVIORAL DIVERSITY AND TOLERANCE OF AN OPEN AREA WITH PROVISION OF NOVEL ENRICHMENT ITEMS**Rachel Vistein¹, Sydney Swedick², Kristina J Nielsen¹ and Lydia Hopper²**

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The domestic ferret (*Mustela putorius furo*) is a common model for infectious disease, developmental neuroscience, and other fields for decades yet details of their husbandry and enrichment requirements in research settings are understudied. Social housing and preference for thermal neutral sleeping areas have been established in prior studies, but the role of object enrichment in ferret behavior and welfare is less defined. In this study we examine the behavioral response of five ferrets to novel objects in an open arena to capture the range of interactions elicited by a set of commonly provided enrichment items. Using video, we recorded the ferrets' behavior during two acclimation sessions to the novel test arena followed by six novel enrichment test sessions. Each session was run on a different day, and the enrichment items were provided in a different random order to each ferret. Each session was a maximum of 30 minutes long and terminated early if ferrets met predetermined behavioral criteria for attempted escape/stress. Videos were scored using an ethogram which included maintenance behaviors, environmental interactions, and item interactions. The frequency with which ferrets engaged with the items, the number of interactions they made, and range of behaviors elicited was compared across conditions. When compared by Shannon's H- Index for behavioral diversity, all but one item significantly increased the diversity of behaviors ferrets displayed compared to an acclimation session. The number and range of item interactions varied significantly based on item. Provision of some items significantly increased the length of sessions ferrets tolerated in the test arena. This study suggests that ferrets benefit from provision of any enrichment item, but items vary in the amount of engagement and range of behavioral responses induced. A rotation or mixture of enrichment items is recommended to maximize ferret behavioral diversity and overcome differences of individual preference.

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EFFECTS OF SOME PUTATIVE ENVIRONMENTAL ENRICHMENTS ON LORIKEETS (*TRICHOGLOSSUS HAEMATODUS*) IN A CONTROLLED ENVIRONMENT**Elizabeth Walsh¹, Lieve Meers², Lucia Bono³, Ilaria Marian⁴ and Simona Normando⁴**¹ Cork Pet Behaviour Centre, Brigadoon Cork, Ireland² BIAAT Foundation, Genk, Belgium³ Parco Faunistico Cappeller, Cartigliano VI, Italy⁴ Department of Comparative Biomedicine and Food Science, University of Padua, Padua, Italy*simona@biaat.be*

Efficient environmental enrichment programs positively affect the behavior of animals in captivity suggestive of improvements in their quality of life and is supported empirically.

The study aimed to evaluate the effects of some putative environmental enrichments on a group of lorikeets housed in an enclosure in an Italian zoo.

Animals were observed from August-October/2021. After preliminary observations, and habituation period, the behavioural observations for the study were conducted Mondays-Thursdays; 8:30-10:30/16:00-18:00, and Fridays; 8:30-10:30/13:30-15:30, for 4/weeks. Multiple sisal ropes and water bowls were offered in weeks 1/3, fruit bowls and jingling-metal spoons tied with/onto ropes in weeks 2/4. The animals' behaviour was recorded using an instantaneous (20 second) focal animal rule for 7 minutes per recognizable individual (9 in total) per observation.

Generalised Estimated equations were run with enrichment type (2/levels, spoons+fruit vs ropes+water), day-time-period (2/levels, morning vs afternoon), cycle (1st+2nd week vs 3rd+4th week), and the interactions enrichment type *day-time-period+enrichment type* cycle included in the model and the individual animal as a random effect.

The lorikeets showed more self-maintenance ($p < 0.001$), affiliative-behaviour ($p = 0.023$), inactivity ($p = 0.039$), visibility ($p = 0.011$) and less interaction with the putative enrichment ($p = 0.010$) when exposed to spoons+fruit than to ropes+water.

Captive animals in zoos are exposed to and affected by human-animal interaction. Environmental enrichment aims to improve their welfare on many levels including; through the alleviation of boredom and stress, offering items to encourage species-specific behaviours, easily maintained by staff, and identifying which type of enrichments appeal to which animals.

In the study the lorikeets increased some behaviours demonstrating positive welfare when they had access to fruit+spoons, in preference to water+ropes, a simple species specific enrichment. They were also more visible, a benefit to the zoo. An additional benefit is that the relationship with zoo keepers can be positively enhanced, especially if new enrichments are anticipated.

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**ARE DOGS AS PROTECTED AS WE THINK? A COMPARATIVE STUDY OF LEGAL PROTECTIONS
AFFORDED TO DOGS ACROSS THE UNITED KINGDOM****Sarah Weir, Lynsey McDevitt, Sharon Kessler and Clare Andrews**

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Dogs have benefited from animal protection legislation that has improved their lives inside the home. However, dogs are subject to a wider range of legislation that controls their movements in public spaces. For example, the increasing restrictions on dogs from exercising off lead in public spaces. This potentially could result in the advance of welfare for dogs in the private sphere but a decline in the public sphere. With the rising recognition of providing animals' control over their environments to meet good welfare standards, this loss of control may be counteracting the welfare protections that dogs have gained through animal welfare legislation. Current understandings of United Kingdom (UK) legislation are siloed into separate areas of law, and so there is no unified view of how all law is impacting dogs. This study aimed to create a methodology that can measure all areas of law that impact dogs and asks whether there is a difference between private and public protections. We developed a systematic framework using content analysis that for the first time enables the comparison of law protections across law areas. Laws were identified through a systematic search on legislation.gov.uk, the official government website that holds most UK legislation that aims to make the law more accessible to the public. We categorised laws based on whether they apply to public, private or economic spheres and whether they are protecting dogs or the public. Results indicate that the public are afforded marginally more legal protection than individual dogs (53% of laws protect the public versus 46% protecting individual dogs). However, the level of protection afforded to dogs is dependent on the space dogs are occupying. Laws that are designed to manage dogs in public space are more likely to protect the public compared to dogs, with 86% of these laws protecting the public versus only 19% protecting dogs. This result is flipped when comparing legislation with the intent to prevent unnecessary animal suffering with 84% protecting dogs while only 14% protect the public. This study supports the idea that while dogs' welfare is being protected in the home, their welfare is not a priority in public spaces. These results indicate that when campaigning for animal welfare legislation, all aspects of the animal's life needs to be taken into consideration. For example, through ensuring dogs have access to suitable green spaces to exercise off lead.

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USING CHRONIC UNPREDICTABLE STRESS TO INVESTIGATE 'INACTIVE-BUT-AWAKE' BEHAVIOUR AS A WELFARE INDICATOR IN LABORATORY RATS

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Does chronic stress induce apathetic inactivity in animals, like it can in depressed humans? In mice for example, small barren cages cause animals to spend more time motionless in the active phase of their day, lying with their eyes open: a behaviour termed 'inactive-but-awake' (IBA). Here we investigated whether similar effects occur in rats already being studied at our animal facility. This allowed us to reduce animal numbers in alignment with the 3Rs. 20 single-housed female Wistar rats were undergoing 6 weeks of the Chronic Unpredictable Stress (CUS) protocol, which involved random daily administration of seven stressors, by a separate research group, to induce depression-like states. Half (Group A) were dosed with putative antidepressant dimethyl fumarate (25mg/kg daily) and housed higher on the rack: treatments possibly making them more resilient than subjects housed lower on the rack and dosed with saline (Group B). Although the drug/rack confound was accidental, predicted effects on negative affect were in the same direction. For our study, the same observer (blind to treatment and hypothesis) scanned these subjects in their homecages for IBA and a rat-specific stress indicator, chromodacryorrhea ('red tears'), for 6 consecutive days in Weeks 0, 2 and 4 of CUS. Using GLS linear models in R, we tested predictions that IBA would increase with sustained CUS, in Group B more than A, and covary with chromodacryorrhea. We also recorded stereotypic behaviour: a response to negative states that may be an alternative to IBA, and facial/postural changes, that might distinguish IBA specific to negative states from normal resting.

As predicted, IBA increased with prolonged CUS ($F_{1,54} = 32.23$, $P < 0.001$), and covaried with chromodacryorrhea (IBA*Week: $F_{1,50} = 3.47$, $P = 0.039$; pseudo $R^2 = 0.918$, $P < 0.0001$), though was no difference between Groups A and B (Week 0: Group A = 0.067 ± 0.056 , Group B = 0.073 ± 0.047 ; Week 2: Group A = 0.124 ± 0.057 , Group B = 0.075 ± 0.033 ; Week 4: Group A = 0.169 ± 0.089 , Group B = 0.186 ± 0.048). Ocular squinting increased during CUS-induced IBA, and this form of IBA was higher in Group B (0.590 ± 0.242) than A (0.449 ± 0.238). By Week 4, Group B (3.05 ± 0.109) also showed higher chromodacryorrhea scores than Group A (2.47 ± 0.109 ; $t = -3.79$, $p < 0.001$), supporting chromodacryorrhea as a sensitive, easy-to-score cage-side indicator of rat negative affect. Stereotypic behaviour, however, decreased as IBA increased (Week 2: $r = -0.45$, $P = 0.048$; Week 4: $r = -0.44$, $P = 0.05$), suggesting that this indicator can be suppressed by certain forms of stress (Group A = 0.012 ± 0.028 ; Group B = 0.034 ± 0.059). Overall, results support IBA as a new indicator of stress (and perhaps depression-like states) in rats, especially forms involving squinted eyes. Alternatively, stereotypic behaviour declined, supporting the hypothesis that IBA is an alternate hypoactive response to stress. This study is the first to investigate inactive-but-awake behaviour in laboratory rats, and link waking inactivity, a symptom of atypical human depression, and chronic stress, a known trigger of depression, in the laboratory rat species.

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