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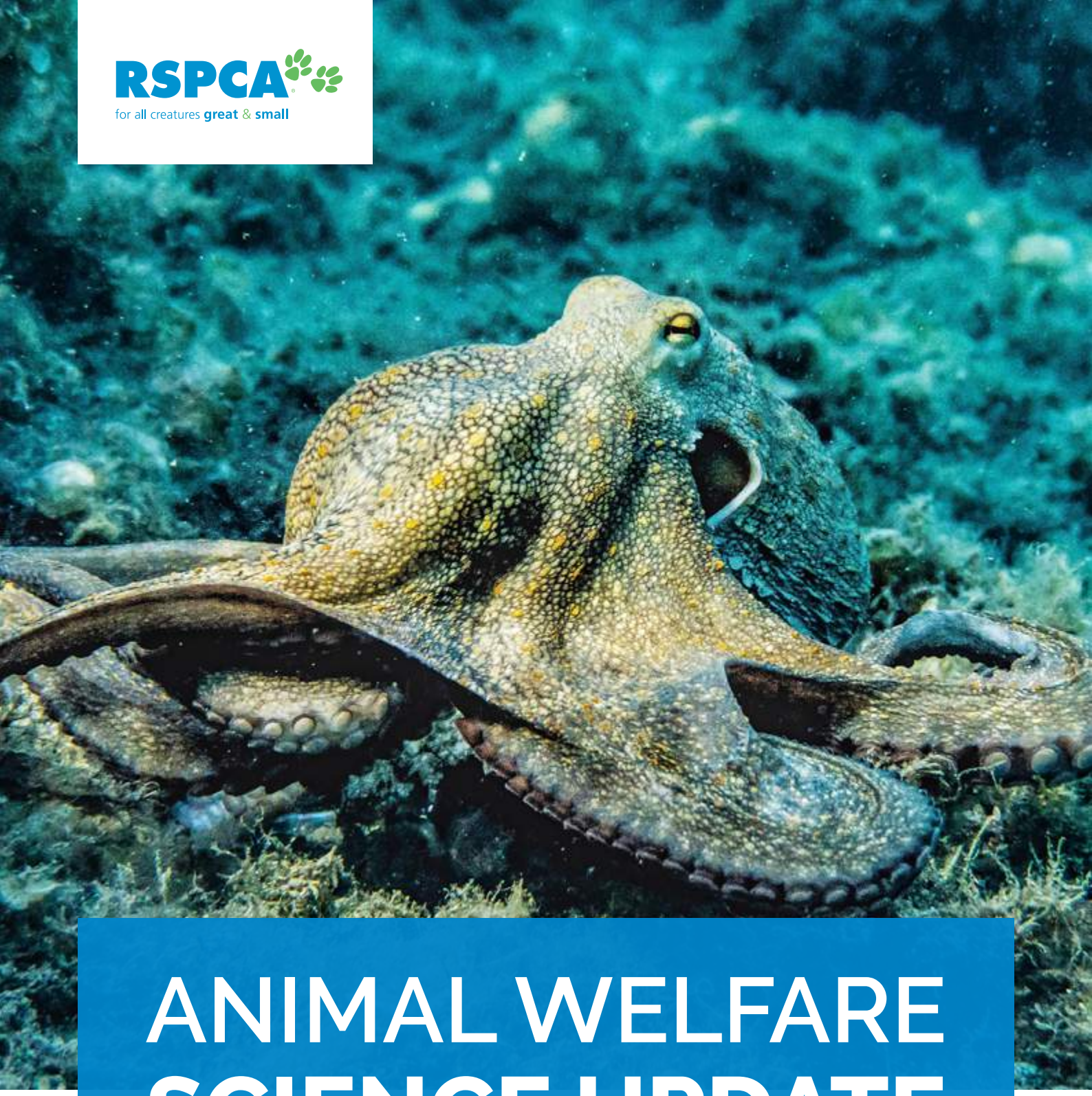

ANIMAL WELFARE SCIENCE UPDATE

Issue 84 | January 2024

The aim of the animal welfare science update is to keep you informed of developments in animal welfare science relating to the work of the RSPCA. The update provides summaries of the most relevant scientific papers and reports viewed by the RSPCA Australia office in the past quarter.

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INCLUDED IN THIS UPDATE

COMPANION ANIMALS

Lack of knowledge rather than intent can impact welfare of pet reptiles

It is a common misconception that reptiles are behaviourally and cognitively simple and therefore make low maintenance pets even though research has shown them to be sentient and capable of a range of emotional states. It is not clear if these misconceptions lead to the health and welfare issues that have been identified in some pet reptiles or whether a lack of knowledge of husbandry principles, or a lack of feelings of attachment to the pet, are more important. Welfare issues can arise if owners do not think their pet experiences emotions or if they find their relationship with their pet frustrating due to a lack of behavioural feedback that is easily recognisable. The researchers aimed to compare the views of pet reptile owners to non-owners to understand their importance to pet reptile welfare.

An online questionnaire of owners (n = 334) and non-owners (n = 400) showed that owners assigned higher scores to reptile cognitive abilities such as learning and memory retention and had better understanding of the welfare needs of their pets. However, there was no significant difference between owners and non-owners' view of the emotional capabilities of reptiles, and not all owners recognised the need for enrichments such as diet variation and sensory stimulation.

The findings suggested both owners and non-owners recognise reptiles as sentient and cognitively complex, so the poor conditions experienced by some pet reptiles in captivity may be due to a lack of knowledge of correct husbandry practices. The authors concluded that it is important to find ways of effectively communicating the latest scientific knowledge about reptile cognition, welfare needs, and correct management practices to the public.

Crisante A, Burman OHP, Wilkinson A (2023) ***Does ownership impact perception of reptile cognitive abilities and welfare needs?*** *Appl Anim Behav Sci 268:106067*

Outings and temporary fostering reduce shelter stay time for dogs

Stress levels can be reduced in shelter dogs if they are taken on outings or fostered for one or two nights. The overnight fostering also increases rest time for the dog compared to that typically experienced in a shelter. Although stress levels have been shown to return to what they were before the outings, the researchers hypothesised that dogs taken on outings would subsequently be adopted more quickly than control dogs who did not experience these interventions.

The researchers established a program where dogs from 51 municipal and private animal shelters across the US (n = 1,955) were taken on outings for a few hours or stayed 1-2 nights with carers. Most carers were community volunteers rather than shelter staff. Compared to 25,946 control dogs, those that went on short outings were five times more likely to be adopted afterwards. Dogs who had overnight stays were 14.3 times more likely to be adopted. In both cases, few were adopted by the volunteers (4% for short outings and 12% for overnight stays). After their intervention, dogs waited an average of 10 days to be adopted, considerably shorter than their length of stay beforehand.

The researchers suggested that after the intervention, shelter staff would likely have more information about how a dog interacts with people and other dogs and therefore might have felt better informed and confident about recommending dogs as adoption candidates. Future studies could consider morphological and behavioural characteristics of the dogs to further understand the effects of the interventions.

Gunter LM, Blade EM, Gilchrist RJ, Nixon BJ, Reed JL, Platzer JM, Wurpts IC, Feuerbacher EN, Wynne CD (2023) ***The influence of brief outing and temporary fostering programs on shelter dog welfare.*** *Animals 13:3528*

Understanding demographics of cat semi-owners could help cat welfare

Free-roaming domestic cats, including semi-owned and unowned cats, can pose a danger to wildlife and can cause community concerns. They can also suffer from poor welfare outcomes. These cats make a significant contribution to shelter cat intake and are often unsuitable for rehoming due to lack of socialisation and may be present in shelters in such numbers that homes cannot be found for them. Semi-owners may provide food and some care for 'stray' cats (semi-owned cats) which can improve cat welfare but also complicate management efforts. Many semi-owned and unowned cats are intact and have high reproduction rates, especially if they are receiving supplemental food. The authors postulated that by understanding more about semi-owners it would be possible to direct education and management initiatives more effectively.

They conducted an online survey of people in NSW (n = 8,708) including 588 semi-owners (7%). They found that semi-owners were significantly more likely to be female, live in lower socio-economic, urban areas and rent their home. Most also owned one or more cats and owned more cats on average than the rest of the people surveyed. Semi-owners were less likely to agree that cats should be prevented from roaming than cat owners who were not semi-owners. Semi-owners may not claim ownership of the cats they care for because they don't have the resources to take them in and can't afford neutering.

The researchers concluded that domestic cat management interventions should prioritise the wellbeing of cats and semi-owners and take into consideration that there are often multiple complex barriers that prevent people from claiming ownership or neutering the cats they care for, particularly cost and lack of trust in the authorities. These people could still be helpful to management efforts (for example, by reporting 'stray' cats) if they trust that the outcomes will be positive for the cats.

Ma GC, McLeod LJ, Zito SJ (2023) ***Characteristics of cat semi-owners****. J Feline Med Surg. https://doi.org/10.1177/1098612x231194225 [authors Ma GC and Zito SJ are from RSPCA NSW and RSPCA Australia respectively]*

FARM ANIMALS

Access to perches reduces fear and anxiety in laying hens

Perch provision is important for the welfare of laying hens so that they can fulfil natural perching and roosting behaviours, and it can improve their musculoskeletal health. The timing of access to perches for hens is important, so this study assessed the impact of age and perch provision on fear and anxiety responses in hens.

Day-old Hy-Line chicks (n = 728) were housed in the Morgan Poultry Center, South Carolina, in pens that either: had perches continuously for 37 weeks, had perches until 17 weeks, only had perches after 17 weeks, or never had perches. Anxiety was measured for a subset of hens in each group (n = 84/ week) using an attention bias test at weeks 21 (onset of lay) and 37 (peak lay). Fearfulness was measured by tonic immobility tests (n = 128) at 20, 25 and 37 weeks. Hens without perches showed higher anxiety and fearfulness than the other treatment groups. Adding or removing perches caused increased anxiety and fear temporarily, but the effects disappeared by week 37. Hens with perches introduced at week 17 took around 16 weeks to adapt to their presence, with the anxiety and fear shown at week 20 subsiding by week 37.

The researchers concluded that perch provision even when added or removed at 17 weeks can decreases fearfulness and anxiousness in hens and is thus beneficial for hen welfare. Their research also indicated that hens may take up to 16 weeks to adapt to a new environment.

Anderson MG, Johnson AM, Jacobs L, Ali AB (2023) ***Influence of perch-provision timing on anxiety and fearfulness in laying hens****. Animals 13:3003*

Long photoperiod regime reduces meat chicken performance

The recommended amount of light per day (photoperiod) that meat (broiler) chickens are subject to in indoor housing varies in different countries. Photoperiod can affect production, activity, and stress levels in chickens, particularly if the hours of darkness are short. This study investigated the effects of four lighting regimes on body weight, health, and welfare with the aim of identifying an optimal lighting regime for broiler chickens.

One-day-old Ross 308 broiler chicks (n = 432) at the Purdue poultry farm in the US were allocated to one of four treatments starting at 15 days of age: 12L:12D, 16L:8D, 18L:6D, or 20L:4D per 24-hours. The light intensity during light periods ranged from 5 to 10 lux. At day 35 and 43, after 20 and 28 days of the treatment respectively, six birds from each treatment group were weighed and then euthanased before blood and bone samples were collected. At day 43, six birds from each treatment group were tested for stress responses using tonic immobility tests. Birds subject to 12L:12D and 16L:8D hours of light had better production performance, leg bone health, final body weight, and average daily weight gain than the other lighting regimes with shorter dark periods. They also demonstrated a shorter latency time during the tonic immobility tests.

The researchers concluded that supplying broilers with 12 to 16 hours of light and 8 to 12 hours of dark per 24-hours can improve performance and health and decrease stress in chickens.

Jiang S, Fu Y, Cheng H (2023) ***Daylight exposure and circadian clocks in broilers: Part I—photoperiod effect on broiler behavior, skeletal health, and fear response.*** *Poultry Sci 102:103162*

Technology could help overcome challenges of stall-free pig production

Globally, pigs are still routinely housed in individual stalls or crates. Some countries are now moving to reduce or eliminate the confinement of pigs in stalls and crates due to inherent welfare concerns. Pigs confined in stalls and crates are unable to move freely and turn around, thermoregulate properly, and interact with conspecifics. The authors conducted a literature review to assess the feasibility of reducing and eventually eliminating the use of stalls and crates.

Previous research highlights that crates used at farrowing can reduce piglet mortality by preventing sows from rolling and crushing their piglets, particularly in the first few days of the piglets' life. Research, however, also shows that optimal sized free farrowing spaces, combined with experienced handlers, can have equivalent piglet mortality rates to crates or even reduce piglet mortality. Research into group housing identifies weaning of piglets, as well as oestrus and mating, can be particularly high-risk periods for sows and handlers. Sow aggression can initially be high after piglets are weaned and the sows are returned to group housing until a social hierarchy is determined. At oestrus, the natural riding and mounting behaviour of sows can also be dangerous for other sows and handlers.

Technological advances such as electronic sow feeders facilitate group housing while being able to maintain individual feeding programs. Accelerometer tags, global positioning systems and computer vision have been used to detect the increase in activity levels of sows on heat so that manual detection techniques can be avoided in a group housing setting. The widespread uptake of free farrowing and group housing systems will require more research efforts to address the current obstacles as they relate to productivity. The author also highlighted that experienced and good stockpersons will play an important role in the elimination of stalls and crates in commercial pig production.

Plush KJ, Hewitt RJ, D'Souza DN, van Barneveld RJ (in press) ***Review: Towards truly stall-free pork production?*** *Animal https://doi.org/10.1016/j.animal.2023.101002*

Multiple factors influence daily milk allowance given to calves on Swedish farms

The daily allowance of milk or milk substitute fed to dairy calves ranges from around four litres per day to more biologically normal allowances of over 10 litres per day, and is typically given over two feeding events. Low milk allowances have been associated with signs of hunger and poorer health in calves. The benefits of biologically normal allowances have been increasingly recognised but not widely implemented on Swedish dairy farms. The authors of this interview-based study aimed to find out why.

Several meetings were arranged with subsets of 40 participants including farm owners, managers, and calf-care workers. Information was gathered verbally in response to specific pre-defined questions, and farm and demographic data was collected for each participant. The researchers found that participants were aware of research on the benefits of biologically normal milk allowances but that decisions for the feeding protocols used were based on four main themes: Life beyond work (social sustainability e.g. desire to limit working hours), farm facilities and equipment, care of the calves, and profitability and production. Most farmers did not think it was feasible to manually feed calves more than twice a day.

The researchers suggested that while biologically normal amounts of milk (10 or more litres per day) should ideally be fed to calves, one barrier to doing this was the logistics of increasing calf feeding frequency. However, they found that some farmers that fed their calves twice daily were still able to feed them eight litres a day, so feeding amounts closer to a biologically normal allowance may be achievable even for those not wanting to increase their feeding frequency. They also proposed that if prices for surplus calves were set by kilogram rather than per calf, farmers might be motivated to supply more milk to calves. A more holistic perspective should be used when advising farmers about milk allowances, they suggested, particularly emphasising caring for the calves and social sustainability.

Svensson C, Hegrestad A-L, Lindblom J (2023) ***Dairy farmer and farm staff attitudes and perceptions regarding daily milk allowance to calves****. J Dairy Sci 106:7220–7239*

Environmental enrichment promotes stronger bones in finishing pigs

Finishing pigs are susceptible to lameness, leg and hoof problems, and fractures, which can lower feed intake and result in early culling. Housing pigs in barren environments without environmental enrichment can also lead to welfare issues such as fighting and tail biting. Environmental enrichment could provide welfare benefits to pigs by strengthening bones and therefore reducing fractures that may occur during pre-slaughter handling and transport to slaughterhouses. This study aimed to specifically address the lack of research into the mechanical resistance (compression, tension and bending) of leg bones.

The researchers evaluated bone biomechanics by comparing groups of Hampshire pigs (n = 432) at a facility in Brazil who were provided with branched chain, branched rope, or no enrichment. Separate housing of males and females enabled assessment of gender-related differences. The pigs were slaughtered at approximately 190 days of age and biomechanical analysis performed on their femur bones. The bones of females without enrichment showed the lowest breaking stress, indicating greater fragility. There was no significant difference between females provided with rope or chain. The results for males were less distinct but tended to indicate that enrichment increased flexion strength.

The researchers concluded that environmental enrichment increased breaking resistance in the femurs of females. Males had greater bone strength than females, and the enrichment did not appear to significantly improve bone strength. The researchers suggested the benefits of chain and rope enrichment to female pigs was likely related to greater movement and interaction with enrichment items.

Tavares MC, Silveira RM, Arno A, de Lara IA, Salvador ML, de Freitas SM, da Silva IJ (2023) ***Environmental enrichment in finishing pigs: Does it promote any changes in bone biomechanics?*** *Trop Anim Health Pro. 55:408*

ANIMALS IN SPORT, ENTERTAINMENT, PERFORMANCE, RECREATION AND WORK

PTSD-assistance dogs experience comparatively low stress levels

Dogs used to assist people with post-traumatic stress disorder (PTSD) can provide companionship, and a sense of safety that can help them enter the community and develop social relationships more easily. There is limited research on these benefits and assistance dog welfare, although some working dogs with special tasks have been shown to have higher salivary cortisol levels, indicating higher stress levels than companion animals. The aim of this study was to evaluate these issues based on assessment of a group of handlers and dogs in Austria and Germany.

The handlers who participated (n = 24) undertook an online survey, and some collected saliva samples from their dogs (n = 9). All dogs were similar in gender and breed with the control group comprising of either companion dogs or working diabetic-signal dogs. The survey results showed the dogs could improve the quality of life of their handlers and provide them with a sense of security. The handlers experienced increased vitality and greater autonomy, although the dogs could also present some challenges. An example cited was where a handler suffered symptoms associated with a previous night trauma as a result of taking a puppy outside at night during toilet training. Unexpectedly, dog cortisol levels were lower than the control group.

The researchers suggest that the strong and physically close bond developed between handler and dog led to lower stress levels in the dogs, although they noted some saliva sampling issues that reduced the number of samples available for analysis. The researchers concluded that a positive relationship between PTSD-assistance dogs and their handlers can reduce stress for both.

Gerwisch K, Weissenbacher K, Proyer M, Huber L (2023) ***A pilot study into the effects of PTSD-assistance dogs' work on their salivary cortisol levels and their handlers' quality of life.*** *Appl Anim Welf Sci https://doi.org/10.1080/10888705.2023.2259795*

Stress levels in horses are low during hippotherapy sessions

Hippotherapy, where patients with physical or mental disabilities ride horses, has been shown to be beneficial for the person, and previous studies have concluded that the horses do not suffer elevated stress levels based on measurement of some heart parameters and behavioural indicators. The aim of this French study was to examine additional stress indicators and to compare them to when horses are ridden by beginners not involved in hippotherapy.

Horse heart rate, and blood and saliva cortisol were measured. A stress ethogram was used to score multiple behaviours such as head carriage, tail position, and ear position. The measurements were taken for two riding sessions, hippotherapy and control beginner rider, on the same eight horses. Serum and salivary cortisol levels were significantly lower for the hippotherapy session than the beginner rider session. The other results were not significantly different between the session types.

The researchers concluded that the statistically significant decrease in cortisol that was observed indicates that hippotherapy sessions are less stressful for the horses than being ridden by beginners. There was no evidence of compromised welfare for the horses during the hippotherapy sessions. The researchers noted, though, that their sample size was small, so the results should be interpreted with caution. They also noted that the use of ethograms can involve subjective judgements and that ridden horses may be concentrating on responding to cues from the rider and therefore unable to express some pain behaviours.

Potier JF, Louzier V (2023) ***Evaluation of stress markers in horses during hippotherapy sessions in comparison to being ridden by beginners.*** *Anim Welfare https://doi.org/10.1017/awf.2023.6*

ANIMALS IN RESEARCH AND TEACHING

Common techniques for lifting laboratory rats raise welfare concerns

Studies have demonstrated increased anxiety and depression associated with lifting of laboratory mice by their tails compared to other methods. However, similar rat handling studies have not been undertaken. Handling laboratory animals has welfare implications as well as the potential to affect scientific research outcomes. This study examined methods being used to lift laboratory rats, and why, as well as what concerns the handlers had.

An international survey of laboratory rat handlers was conducted to help understand what motivated handlers to use a particular method, including whether they were familiar with the research indicating aversive reactions to tail lifting in mice. Respondents from 26 countries provided usable data (n = 249). Of the eight methods in use, shoulder saddle - a one-handed lift without ventral or plantar support - was the most common (39%), followed by chest-and bottom support (20%) and tail lifting (11%). Tail lifting was often associated with defecation (aversive) and not with hand sniffing (non-aversive) than some other methods. Users of the technique were more often motivated by speed and prior training than animal comfort compared to those using other methods. Overall, consideration about the impact on scientific validity of the respondent's preferred method was low.

The authors raised concern that tail lifting was common despite handlers reporting behaviour indicative of it being stressful for the rat. Also of concern was that the most common method, shoulder saddle, did not show significant benefit over tail lifting in any measure explored in the survey. The authors concluded that empirical research is urgently needed to determine whether shoulder saddle is an aversive lifting method and what alternatives are most humane and feasible.

Burn CC, Camacho T, Hockenhull J (2023) ***Lifting laboratory rats: A survey of methods, handlers' reasons and concerns, and rat behavioural responses.*** *Appl Anim Behav Sci 268:106077*

WILD ANIMALS

Easily observable stress indicators could advance understanding of wild octopus welfare

Octopuses are widely considered to be sentient and capable of experiencing emotional states. Metrics which have been developed to assess the welfare of octopuses in a laboratory setting, may offer insights into assessing the welfare of wild octopuses. These measures were used to explore the development of minimally invasive techniques to quantify wild octopus welfare.

Eight welfare measures were observed and recorded from photos and videos of wild octopuses (*Octopus insularis*) in Brazil (n = 57 individual octopuses). Many were obtained from fishermen, researchers, and marine photographers. The authors studied behaviour in the context of factors such as interactions with fishermen, interaction with fish and with other octopuses. They recorded characteristics including number of missing arms and skin damage and behaviours such as body pattern, chromatophore expression (body colour change) and abnormal body position. Irregular chromatophore expression was noted in half of the interactions with fishermen. The rough handling of the animals also resulted in skin damage and chromatophore failure (reduced effectiveness of camouflage). Overall, eight indicators of welfare were identified, six already reported from captive octopus research and two previously undescribed but identified from the current study: a half-and-half blotch pattern, with the blotches directed towards an approaching fish, and a white eye flash, observed in an injured octopus during foraging. Both behaviours appeared to be associated with acute stress.

This study was the first to apply welfare measures derived from captive octopuses to those in the wild, and the researchers view it as a valuable first step for further investigation of non-lethal and minimally invasive techniques to quantify the welfare of wild invertebrates. Understanding their welfare state could help predict the impact of anthropogenic stressors such as pollution, tourism, and fishing.

Andrade MP, Santos CM, De Paiva MM, Medeiros SL, O'Brien CE, Lima FD, Machado JF, Leite TS (2023) ***Assessing negative welfare measures for wild invertebrates: The case for octopuses.*** *Animals 13:3021*

Density-impact assessments could facilitate effective feral horse management

There is little research into how the density of feral horses in Australia's mountainous regions impacts the local environment. Previous work has focused on presence or absence of feral horses and has potentially been confounded by the presence of feral deer and pigs as well as human and non-feral horse impacts. For example, horse faeces is larger and easier to spot than deer faeces, and this could inflate perceptions of the relative impact of horses on vegetation loss and path formation. Total eradication of feral horses is an unpopular and difficult goal in the region, so this study aimed to help estimate a threshold population density above which environmental damage is high enough to warrant control measures.

One study site chosen had a low average horse density (0.8 horses per square kilometre) and the other a high horse density (1.72 horses per square kilometre). Density-impact functions were determined from transect observations, with the low density site showing no observed impact along 99% of the transects. In the high horse density region, 83% of transects showed no observed impact. The analysis highlighted a threshold at 250 horse faecal piles per hectare (nine feral horses per square kilometre) above which a slight increase in horse density resulted in a disproportionately large increase in impact. Below that, control measures were considered unlikely to make much difference to the already low impact, especially as the impact is contributed to by other feral species and human activity.

The researchers concluded that removing feral horses would only prevent a small proportion of the potentially damaging environmental impact occurring in the region studied. Rather, management could be most efficient and effective by targeting sites where horse impact is highest based on an evidence-based density-impact analysis.

Berman DM, Pickering J, Smith D, Allen BL (2023) ***Use of density-impact functions to inform and improve the environmental outcomes of Feral Horse Management.*** Wildlife Biol *https://doi.org/10.1002/wlb3.01107*

Best practice for wildlife provisioning after fires could help response outcomes

The distribution of food and water to help wildlife (wildlife provisioning) after Australia's Black Summer fires was largely a disjointed exercise. With more fires predicted as a result of climate change, the authors believe that the benefits and risks should be considered so that future responses can be planned and executed based on scientific evidence. At present, there is little understanding of the consequences of wildlife provisioning after broad-scale habitat destruction.

The authors evaluated how using the One Welfare framework could guide research and determine whether the benefits of wildlife provisioning outweigh the risks. These risks could include the spread of disease or invasive species, changes to predator/prey interactions, and damaging conflict among animals seeking out the provisions. The One Welfare framework recognises the interconnectedness of animal, human, and environmental welfare. In the context of wildlife provisioning after fires, it brings together research, policy, stakeholders, emerging data, and modelling from fire events to provide the foundation for the development of best practice guidelines. This could differ depending on the purpose and location of the planned provisioning.

The authors proposed that engaging with wildlife provisioners and the broader conservation community to build an evidence base for future wildlife provisioning activities would be beneficial. They also proposed experimental studies that could be undertaken in conjunction with controlled burning. Additionally, they suggested that data collection could be improved with technology such as the Wildlife Assist app. The authors concluded that the One Welfare framework has great potential to support informed policy development.

Jones B, Herbert C, Finnerty S, Kennedy B, Lykins A, Martin JM, McManus P, Raubenheimer D, Shaw M, McGreevy PD (2023) ***In situ provisioning wildlife with food, water, or shelter after bushfires: Using a one welfare framework to guide responses.*** *Animals 13:3518*

Cetacean welfare assessment exercise demonstrates expert scoring is not relative

Global ship numbers are increasing as are some whale populations, so the potential for ship strike is recognised as an important cetacean welfare concern. Yet, most international wildlife law is targeted at conservation rather than welfare. Determining the welfare of wild, ocean-living animals presents logistical challenges, so the authors chose to garner expert opinion based on the Welfare Assessment Tool for Wild Cetaceans (developed within a Five Domains framework). They also aimed to evaluate whether that opinion was relative or absolute when multiple case studies were reviewed by the experts.

The researchers developed six theoretical case studies after examining literature on actual whale strikes. These case studies were explained in neutral terms, for example, saying a whale will not be able to feed rather than that it will starve to death slowly. The experts (n = 29) were unaware of the researchers' goal of determining if opinions would be given relative to the first case study offered. They were divided into two groups, the first asked to assess the least serious strike case study first and the other the most serious. The analysis indicated that whales may suffer some level of Domain 5 (affective state) harm for the rest of their lives after a ship-strike incident which would most often affect their health and behaviour.

There was no evidence that expert judgement was affected by which case study was reviewed first, indicating that it was absolute in nature rather than relative to other case studies. The researchers concluded that the Welfare Assessment Tool for Wild Cetaceans showed good potential as a decision-making tool, although they did note some enhancements that could be made to their procedure after assessing the variability of answers and participant feedback.

Rae F, Nicol C, Simmonds MP (2023) ***Expert assessment of the impact of ship-strikes on cetacean welfare using the Welfare Assessment Tool for Wild Cetaceans****. Anim Welfare https://doi.org/10.1017/awf.2023.7*

TRANSPORT

Fatigue levels in dairy calves vary with age and journey time

Few studies of surplus dairy calf behaviour during transport have been undertaken even though journeys can involve transport by truck over long distances and could adversely affect calf welfare. This Canadian study aimed to evaluate the effects that calf age and journey duration have on calf fatigue measured as lying time and the number of bouts of lying down – both on the day of travel and for three days afterwards.

Holstein and dairy-beef cross calves, both male and female, ranging from 2-19 days old were selected for the study and randomly assigned to one of three journey lengths: six hours (n = 60), 12 hours (n = 58), or 16 hours (n = 57). Their lying time and number of lying bouts were assessed the day before, on, and for three days after transport. On the day of transportation, the calves transported for 12 and 16 hours spent less time lying down and had more lying bouts compared to those transported for six hours. Lying bouts averaged 30 for the 16-hour journey, 26 for the 12-hour journey, and 22 for the six-hour journey. The day after, calves transported for 16 hours spent more time lying down than calves transported for six hours. Younger calves (2-5 days old) spent more time lying down than older calves throughout the study.

The results suggest that more time spent in transport results in fatigue during and after the journey, with younger calves becoming fatigued more easily. The number of bouts of lying down was indicative of having lying behaviour frequently disturbed during transportation. The researchers proposed that further investigation of signs of discomfort and distress in transported calves should be undertaken.

Bajus A, Renaud DL, Goetz HM, Steele M, Kelton D, Proudfoot KL, Creutzinger KC (2023) ***Effects of transportation duration on lying behavior in young surplus dairy calves.*** *J Dairy Sci 106:7932–7941*

Positive early-life contact with humans reduces stress in Pekin ducks after transport

Positive human contact early in life has led to a lower stress response to handling later on for poultry, such as broiler chickens. Some studies have indicated that positive human contact during neonatal development can have longer beneficial effects. Handling procedures at catching, loading, and transporting can cause stress and fear to poultry. This study aimed to determine whether gentle handling in the first 21 or 42 days of life could reduce crating and transport stress later in life for Pekin ducks (*Anas platyrhynchos domesticus*).

Day-old male Pekin ducklings (n = 600) from a duck breeder farm in Malaysia were assigned to one of four treatments: picked up and individually stroked gently for 30 seconds a day from day 1 to day 42, treated that way from day 1 to day 21, treated that way from day 21 to day 42, or control conditions where they received only routine husbandry. On day 42, 35 ducks from each experimental group were put in crates for three hours, and another 35 from each treatment were crated and transported by road for three hours. The tonic immobility test was used to assess fearfulness and blood samples were collected from ducks before, after crating, and after transport to measure the concentration of corticosterone. The controls and the ducks that were handled from day 21 to day 42 showed higher levels of stress and fear than the other treatment groups as indicated by corticosterone levels and tonic immobility tests conducted following crating or transport.

The researchers concluded that positive and regular human contact from days 1 to 21 or 1 to 42 appear to attenuate stress and fear levels in ducks after crating and transport. The results highlight the importance of early life positive human contact and good stockmanship to improve resilience to stress in ducks.

Mitin H, Idrus Z, Meng GY, Sazili AQ, Awad EA (2023) ***Effects of positive human contact on fear and physiological stress responses in Pekin Ducks (Anas platyrhynchos domesticus) subjected to crating and transport.*** *Appl Anim Behav Sci 269:106108*

HUMANE KILLING

Expert panel ranks rodent control and dispatch methods

Rodents are considered sentient, and population control measures such as reducing food and shelter opportunities for pest rodents are typically preferred as management practices for controlling their impact. However, control and dispatch methods are commonly used in homes and farms worldwide for the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*). These methods vary in the suffering that they cause to individual animals, and the researchers aimed to use the Sharp and Sanders welfare assessment model to rank the 14 methods currently legal in Belgium, most of which are also used elsewhere.

A panel of eight experts was assembled that included a veterinarian, pest control officer, and animal welfare expert. The methods evaluated were live capture trap, glue board trap, drowning, deprivation (of water, food or warmth), cervical dislocation, electrocution trap, snap trap, captive-bolt trap, anticoagulants, aluminium phosphide, chloralose, carbon dioxide, hydrogen cyanide, and cholecalciferol. The consensus of the panel was that captive-bolt traps, electrocution traps and cervical dislocation induced the least suffering, and anticoagulants, cholecalciferol and deprivation induced the most. The research highlighted that multiple capture live traps are likely to result in more suffering than single animal traps and that low quality traps that do not kill the trapped animal immediately can also affect the welfare outcome scores agreed by the expert panel.

The panel found that there was considerable uncertainty surrounding some methods, and the authors concluded that more research is needed into the welfare impacts of hydrogen cyanide, chloralose, and aluminium phosphide. The results of the panel study could help lay people, professionals, regulatory agencies, and legislators make informed decisions about how to control commensal rodents.

De Ruyver C, Baert K, Cartuyvels E, Beernaert LA, Tuyttens FA, Leirs H, Moons CP (2023) **Assessing animal welfare impact of fourteen control and dispatch methods for house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*).** *Anim Welfare. https://doi.org/10.1017/awf.2022.2*

MISCELLANEOUS

Agency within Behavioural Interactions (Domain 4) of the Five Domains Model of animal welfare offers opportunities for positive experiences

Animal welfare represents the overall mental experiences of an animal but cannot be directly measured. The Five Domains Model is a comprehensive and structured framework that can be used to assess animal welfare including cautiously inferring mental experiences from welfare indicators. Domain 4 of the Five Domains Model is "Behavioural Interactions". It can also be considered "the Agency domain", representing the animal's opportunity to exercise choice and control in their interactions with the environment, other animals, and humans, through voluntary, self-generated, goal-directed behaviours that they are motivated to perform (Agency). This paper provides an in-depth review of the theory of animal Agency and how it relates to positive animal welfare. The authors propose that the idea of agency provides a way to assess and identify opportunities for positive experiences in a structured, scientific way that helps overcome the uncertainty around identifying an animal's positive mental experiences. Without this, welfare responsibilities could be focused on countering negative experiences only, as positive experiences could be considered an optional luxury.

Using the case studies of sugar gliders housed in captivity and racing greyhounds living in kennels, the authors illustrate how agency can be identified through choice, control, and challenge in an animal's behavioural interactions and how this relates to their affective state. For example, assessing the interactions with other animals and people for sugar gliders involves understanding that they naturally live in groups and are nocturnal, so it is recommended that at least two are kept together, that sleeping nests are large enough to allow them to huddle together, and that people limit interactions to nighttime when the sugar gliders are naturally alert. In considering interactions with their environment for greyhounds, the paper notes they need sufficient space to move freely to enable the expression of normal canine play behaviours, which may include turning at speed or digging the ground.

The authors concluded that the concept of agency is a core concept of Behavioural Interactions (Domain 4), providing a way to further research and provision of positive animal welfare. Agency in this context allows animals to have choice and control, to develop competence and be stimulated by challenges that are attainable. Communication with regulators, animal caretakers, and the general public is flagged as an area of priority so that theoretical and research findings can lead to meaningful change for animals under human care.

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