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ANIMAL WELFARE SCIENCE UPDATE

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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 received by the RSPCA Australia office in the past quarter. **Email science@rspca.org.au to subscribe.**

ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

Educating school children can improve their behaviour at zoo enclosures

Visitors at zoos are known to have an impact on the behaviour of the animals they are viewing. This impact is usually reported to be negative, with an increase in visitor numbers and proximity often associated with more avoidance, stereotypies and aggression in zoo-housed species. The types of visitor behaviours that may contribute to this negative effect can include banging on the glass, staring, shouting and otherwise trying to elicit a response in the animals. This study investigates the effectiveness of a specific education class prior to a zoo visit on the negative visitor behaviour of children at the zoo.

This research was conducted at two locations in Ireland and with three different species: Gentoo penguins housed in an indoor enclosure at an aquarium; free-roaming lemurs in a 25-hectare enclosure at a wildlife park, and Humboldt penguins in an outdoor enclosure at the same wildlife park. In total, 49 groups of school children (average 23 children per group, 6-12 years of age) participated in the study. 24 of these groups received an intervention treatment prior to viewing the animals, which consisted of a one-hour presentation about the biology of penguins and lemurs and specific instructions about which behaviours to avoid at the enclosures. The remaining 25 groups of children acted as the control group and received no additional intervention. The behaviour of the children while viewing the penguins and lemurs was then observed, as was the behaviour of the animals while the school group was present.

The educational intervention was successful in reducing the number of negative behaviours displayed by school children when viewing all three species of animals. However, the behaviour of the animals being viewed did not differ between the treatment and control groups of children, suggesting that the reduction in negative behaviours did not impact these animals. This agrees with previous research on these animals, which shows that they rarely react to visitors. Future research could focus on zoo-housed species that are more sensitive to visitor interactions.

Collins C, Quirke T, McKeown S (2019) Zoological education: Can it change behaviour? Applied Animal Behaviour Science 220, 104587.

Stable design influences horse behaviour and the performance of stereotypies

Housing horses in individual stalls is the most commonly used housing method for sport and riding schools. Restricting movement and social contact results in stereotypic behaviour in horses, and there is some evidence that the surrounding environment can alter the type of stereotypic behaviours displayed. This study examined the effects of stall design on the expression of stereotypic behaviour in sport horses.

Two studies were conducted at two different stables. The first was conducted in France using 32 French Saddlebred geldings used for dressage. Half of the horses (17) were housed in Open Stalls, which allowed horses to put their head out over the stable gate and view the surrounding yards and activity. The other group (15) of the horses were housed in Closed Stalls, which did not provide an outdoor view but allowed visual and nose contact with at least two other horses through the bars between the stables. Horse behaviour was observed throughout the day and the type and frequency of stereotypic behaviour was recorded. The second study was conducted in Tunisia, and involved 42 Arabian broodmares. These mares were housed in a paddock during the day, but housed individually in stables at night. Every night, each mare was randomly assigned to either an Open or Closed Stall, and the frequency of stereotypic behaviour in the mares was then recorded.

The high prevalence of stereotypic behaviour in both stall types indicates that single stall housing for horses is inappropriate. However, horses that were housed in the Open Stalls displayed a greater amount of stereotypies and vigilance behaviour than those housed in Closed Stalls, who displayed more resting and positive vocalisations. This suggests that being able to see larger spaces and other horses exercising may elicit greater frustration in these horses. In addition, the behavioural changes associated with each stall type could be elicited quite quickly, with the mares exhibiting immediate behavioural change upon being placed in each type of stall, but never displaying these behaviours when in the paddock. In conclusion, there is a clear relationship between stall design and horse behaviour.

Lesimple C, Gautier E, Benhajali H et al (2019) Stall architecture influences horses' behaviour and the prevalence and type of stereotypies. Applied Animal Behaviour Science 219, 104833.

Considerations for the retirement of therapy animals

Animal-assisted therapies (AAT) are a formal therapeutic intervention between a human participant and a therapy animal that is facilitated by a health service provider. While the effect of AATs on therapy animals is a growing area of research, little attention is given to what happens to these animals when they retire from therapy. This US article reviews the effects of therapy animal retirement on all parties, including the animal, and how to recognise when an animal should be retired.

Overall, there is little evidence that therapy work is excessively stressful for the animals, however some animals that are well trained and docile could potentially be enduring stress without showing overt signs of poor welfare. Ongoing stress may be detrimental to animal welfare as well as increase the risk of health problems in the therapy animals. As animals age, they may also find therapy sessions more tiring and show less motivation to engage with the participants. Determining when a therapy animal should retire is complicated and will vary between individuals of different breeds, workload and health status. Senior animals should be monitored regularly, and any animals that show signs of stress, poor health or behavioural problems should be retired. Handlers should be given clear guidance about when to retire their therapy animal to ensure their welfare is not compromised by their work.

The impact of retirement may vary between individual animals, handlers and therapy participants. Animals who actively enjoy human interaction will need additional activities to compensate for the lack of physical and mental stimulation, whereas animals who are ill or stressed by their therapy work will benefit from a restful retirement. Human handlers who are highly motivated to continue volunteering may be able to find alternate ways to offer their services that do not impose on their animal's welfare after retirement. In conclusion, while there are many human benefits to keeping therapy animals in service for as long as possible, it is vital that handlers are advocates for the welfare of their therapy animals, and honour their service with an appropriate retirement period.

Ng ZY, Fine AH (2019) Considerations for the retirement of therapy animals. Animals 9, 1100.

Describing the use of animals in animal-assisted intervention research

Animal-assisted-intervention (AAI) research has increased significantly over the past decade, and while the focus is often on the human benefits there is increasing recognition of the potential effects on the animals being used. One method of safeguarding animal welfare during research is through the use of animal ethics committees, who evaluate and monitor animal use during research. The Institutional Care and Use Committee (IACUC) is the term used for animal ethics committees in the USA, and these committees provide an underutilised opportunity to monitor the welfare of animals used in AAI research. This study investigated the frequency of IACUC approval in published AAI research.

A review of the AAI literature was conducted using both electronic databases and a manual search through all issues of the journal Anthrozoos, the most frequent publisher of studies on AAI. A manual search was necessary due to the highly variable keywords used for AAI research over time and between research trials during the last decade. These searches resulted in 139 articles from 25 countries that were suitable for review. These articles were then analysed to determine the number that reported IACUC approval and to report the descriptions of animal use in AAI research publications.

Of the 139 articles reviewed, only 14 (10%) reported attaining IACUC approval. The low rate of reported ethical approval may have been due to the authors obtaining approval but not reporting it, the IACUC not deeming the study to require approval, or the researchers not considering the need for approval. The majority of studies did not clearly report basic details of the animals used, such as the number, breed, or age used. There were also few details about the way the animals were used, or any health and welfare considerations imposed by the study. These details are important for other researchers when investigating the welfare impacts of AAIs on therapy animals. In conclusion, the description of animal care and use in AAI studies vary greatly and researchers should consider a more detailed description of animal use, and utilise and explicitly report IACUC approval for studies.

Ng Z, Morse L, Albright J et al (2019) Describing the use of animals in animal-assisted intervention research. Journal of Applied Animal Welfare Science 22:364-376.

HOT OFF THE PRESS!

Exploring the use of a qualitative behavioural assessment approach to assess emotional state of calves in rodeos

This paper by the University of Sydney reports on a study of still images of calves before and after being roped in rodeos. Observers comprised of two groups, an initial smaller group of 'practitioners' (n=7) who had expertise in cattle behaviour, handling and/or welfare whilst the second larger group (n=16) were of veterinary and animal science students. Four images of each calf (n=20) were captured from video footage, comprising of two still images of the calf within one second of leaving the chute (chase phase) and two still images within one second of having the ropes released (recovery phase). Each calf acted as their own control, with chase images being the treatment (the aversive stimuli associated with being chased) and recovery images being the comparative stage with the aversive stimuli no longer being applied.

All observers, who were blinded to the context of the images, scored each photograph against descriptive terms relating to the emotions the calves might be experiencing. During the chase phase, observers believed the calves were more agitated, stressed, frightened and anxious than they were in the recovery phase. During the recovery phase, most calves were scored as being calmer, contented and relieved, with some being scored as exhausted. An animal empathy survey was undertaken by the student group which showed that observers who had more empathy for animals in pain and for those used in experiments, were more empathetic towards calves in the chase phase.

The results indicate that calves being chased by a horse and rider experience more negative emotional states than they do after roping, when they are not being chased. Given that the physical impact of being roped and then forced to the ground is greater than being chased, it is likely that calves suffer more distress at this stage of rope-and-tie events than the study has revealed for the chase phase. Further research on this phase of the roping event is required to better understand the true extent of the emotional impact on calves.

Rizzuto S, Evans D, Wilson B et al (2020) Exploring the use of a qualitative behavioural assessment approach to assess emotional state of calves in rodeos. Animals 10, 113.

COMPANION ANIMALS

Previous training helps improve reporting of animal abuse behaviour by veterinarians

Animals are susceptible to abuse by humans and they are unable to directly communicate that they have suffered abuse. In this regard, frontline practitioners such as veterinarians become responsible for detecting and reporting animal abuse. Previous research has focused on the reasons behind the low levels of reporting behaviour by veterinarians, but little attention has been paid to the factors that may facilitate this reporting behaviour. One such factor is the perceived self-efficacy of veterinarians to successfully report animal abuse, and this has been successfully correlated to the rates of child abuse reporting in teachers. Perceived self-efficacy is a person's belief in their capability to achieve given accomplishments, and will influence decision making behaviour. This study investigated the role of perceived self-efficacy and training on the reporting of animal abuse by veterinarians.

An online questionnaire was distributed to veterinarians who currently work or had previously worked in the UK, using social media, news outlets and veterinary mailing lists. 176 veterinarians responded (124 female, 52 male), with the majority working in companion animal clinics. This questionnaire collected information on demographics, perceived self-efficacy, the hours of specialised training that the vet had received on detecting and reporting animal abuse, and whether they had suspected or reported any animal abuse in the previous twelve months. The relationships between perceived self-efficacy, amount of specialised training and reporting behaviour were then examined.

As expected, veterinarians that had higher perceived self-efficacy, more hours of specialised training and had more years of experience working in practice were more likely to suspect and report animal abuse cases. Nearly one-third (32%) of veterinarians had suspected animal abuse in the previous twelve months, and nearly half (46%) of these reported it. This study indicates that providing specialised training on what to do if animal abuse is suspected gives veterinarians the confidence (or self-efficacy) to report abuse to the relevant authorities.

Alleyne E, Sienauskaite O, Ford J (2019) To report, or not to report, animal abuse: the role of perceived self-efficacy in veterinarians' decision-making. Veterinary Record 185(17):538.

Observing the behaviour of shelter dogs in their kennels can help early recognition of behavioural problems

In the study shelter, the suitability of dogs for adoption is assessed using a formal set of behavioural tests that are applied after the dog has been at the shelter for five days. One criticism of formal behaviour assessments is that the behaviour of the dogs when tested under these novel circumstances may not accurately represent the way they will behave in a future home after adoption. This could result in the euthanasia of dogs when they display fear or aggression due to stressful circumstances, rather than having an inherently dangerous temperament. One alternative is to monitor dog behaviour in the familiar kennel environment for signs of behavioural problems that may influence adoption success. This study compared the behaviour of shelter dogs in their home kennel to that of their behaviour during formal behavioural assessments to determine the most accurate method of assessing adoptability.

The behaviour of 38 dogs (18 male, 20 female) was monitored for the first five days following their relinquishment to an Australian animal shelter. Dog behaviour, posture and position in the kennel was observed using overhead video cameras for one hour (7.30-8.30am) every morning for the first five days in the shelter. On the sixth day, each dog underwent the formal behavioural assessment, which assessed factors such as sociability, food guarding and interactions with children and strangers. This test took approximately 15 minutes and was conducted in a room that was unfamiliar to the dog. The results of the formal behaviour assessment were either a pass and ready for adoption, some behavioural issues that require modification, or fail due to extreme behaviour problems.

Dogs that displayed behaviours associated with fear, anxiety and arousal in their kennel also displayed these behaviours during the formal behavioural assessment and were more likely to fail the formal behavioural assessment. This study demonstrates that monitoring kennel behaviour could detect early signs of behavioural problems in dogs. This could allow earlier implementation of training modification to improve adoptability of dogs that would have been previously unadoptable.

Clay L, Paterson M, Bennett P et al. (2019) Early recognition of behaviour problems in shelter dogs by monitoring them in their kennels after admission to a shelter. Animals 9, 875.

Humans can identify cats' emotional states from subtle facial expressions

Despite their popularity as pets, little research has investigated the ability of humans to correctly interpret facial expression in cats. The ability to interpret facial expressions is useful for understanding cat welfare needs, such as when they are in pain and, in a clinical setting, the face is often the most visible part of a cat when held in a carrier, or when wrapped. This Canadian study investigated whether humans could correctly interpret subtle facial expressions in pet cats.

Video footage of cats experiencing positive or negative emotions was obtained from Youtube, with popular and 'viral' cat videos being omitted. The inclusion criteria for each video clip was that the emotional (affective) state of the cat could be clearly determined through the cat's behaviour and surrounding environment, and a sample of 20 cats experiencing positive affect and 20 cats experiencing negative affect were selected. Cats displaying obvious signs of negative affect (e.g. open mouth hissing, flattened ears etc.) were excluded. Each clip was added to an online survey, where participants were asked to classify the cat in each video clip as feeling positive or negative. Participants were recruited through social media, special interest blogs and university mailing lists. Participants were also asked about their demographic details, their previous experience with cats, and their level of attachment to their pet cat.

This survey was very popular, and attracted 11,040 participants in just ten days, resulting in 6,329 useable surveys for analysis. The results showed that on average it is possible for humans to correctly identify affective states based on subtle cat facial expressions, but most people found this hard. Only 13% of respondents could correctly interpret cat facial expressions 75% of the time. These respondents were typically young and female, which agrees with previous research. Having veterinary experience also improved the survey score but, interestingly, owning a pet cat did not. Improving the human understanding of cat facial expressions could help both veterinary staff and cat owners to better understand their cats and provide optimal feline care.

Dawson LC, Cheal J, Niel L et al (2019) Humans can identify cats' affective states from subtle facial expressions. Animal Welfare 28:519-531.

The development of a Feline Grimace Scale to detect pain in cats

Humans often have difficulty recognising pain in cats, and cats generally receive less pain management than dogs in veterinary settings. Previously developed tools for detecting pain in cats are time consuming and have not been tested in a range of painful situations and thus their practical use is limited. An alternative option is the use of Grimace Scales, which are a simplified method of assessing facial expressions that are specifically related to pain, and have been successfully developed for a range of laboratory and farm animal species. This study developed and validated a Feline Grimace Scale (FGS) to detect acute pain in cats.

This study was conducted at a veterinary teaching hospital in Canada using 50 cats who were admitted to the emergency care unit and 20 healthy cats from the university's teaching colony. Prior to assessment, each cat was physically examined to determine pain levels. Each cat was then filmed at eye height in their cage for six minutes. Painful cats were then administered analgesics, and all cats were filmed again one hour later. From this footage, the best single image of the cat facing the camera was selected and the facial features of painful cats were compared to non-painful cats. This resulted in five action units (AU) that were considered indicative of feline pain: ear position, orbital tightening, muzzle tension, whiskers change and head position. All images were then shown to four observers who scored the presence of each AU from 0-2, with a higher score indicating a greater severity of pain. The FGS scores for painful cats were then compared to those scores of non-painful cats.

The FGS scores were higher in painful cats than control cats, and were reduced in painful cats that had received analgesic treatment. The FGS scores also correlated strongly with the results of the formal pain assessment. These results indicate that the FGS is a valid and reliable tool for assessing acute pain in cats, and can be used for decision making about when to administer pain relief.

Evangelista MC, Watanabe R, Leung VSY et al (2019) Facial expressions of pain in cats: the development and validation of a Feline Grimace Scale. Scientific Reports 9, 19128.

What is the risk from child-dog interactions to dogs' quality of life?

Dogs are commonly used as assistance animals, therapy animals or pets to support children with specific needs, such as autism spectrum disorder. There is a growing amount of research regarding the benefits of dogs for children, but the impact of this relationship on the dogs has been less well studied. Because children are often very active, unpredictable, lack perspective-taking skills and are less aware of subtle dog behaviours, there is the potential for child-dog interactions to be stressful for dogs. This scoping review from the UK examines what is known about the impacts of child-dog interactions on the quality of life for dogs.

The scientific literature was searched for articles that included the type of dog (e.g. pet dog, assistance dog, therapy dog), children up to 17 years of age (e.g. child, youth, paediatric), and quality of life (QoL) measures for the dog (defined as physical, psychological and social factors). This initial search located 204 journal articles, but only five articles were found to be specifically related to the impact of dog-child interactions on dog QoL. These articles were then scrutinised for quality in terms of their study design, outcome measures, reliability, comparators and effect measures.

The low number of research papers available on this topic confirms that that the impact of child-dog interactions on dogs is an understudied area. However, as three of the five articles were published in the last year, it appears this topic may be of growing scientific interest. Based on these five studies, the aspects of dog-child interactions that may compromise a dog's QoL included unprovoked attention from the child (e.g. being the target of a tantrum), the predictability of the interactions, and being involved in child games that may not be appropriate for dogs (e.g. dress ups). Child-dog interactions resulted in behavioural signs of stress in dogs in all five studies, although further research is required to accurately recognise, measure and reduce the impact of these interactions on dogs.

Hall SS, Finka L. Mills DS (2019) A systematic scoping review: What is the risk from child-dog interactions to dogs' quality of life? Journal of Veterinary Behavior 33:16-26.

Factors influencing the length of stay for cats in an animal shelter

While rates of euthanasia in shelters are declining, up to 40% of cats are still euthanased for reasons often related to limited shelter resources. Reducing cats length of stay (LOS) prior to adoption is thus beneficial in terms of using shelter resources more efficiently, and improving cat welfare. This study investigated factors influencing LOS for cats admitted to an urban shelter in Australia.

The study population was sourced retrospectively from shelter records and consisted of 2584 cats admitted to the shelter between January 2016 to March 2019. These cats were predominantly young cats with no identifiable owner (strays). The shelter records provide information on the cats themselves (e.g. age, breed, colour), as well as the reasons for being admitted to the shelter (e.g. owner moving houses, stray). The LOS was defined as the number of days from admission to adoption. This included any holding periods that were required, such as allowing kittens to reach 1kg prior to desexing. The relationships between cat factors, reasons for relinquishment and LOS were then examined.

Overall, the two main factors that influenced the LOS were the reason for admission to the shelter, and coat colour. Stray cats took longer to adopt than cats that had been relinquished by their owner, irrespective of the reason for relinquishment. In contrast to the widely held view that black cats stay in shelters longer than white cats, white cats had a significantly longer LOS than black cats. A potential reason is that white cats are susceptible to skin cancer under Australian conditions and may be perceived as having higher care requirements than black cats. Also in contrast to previous research, the LOS decreased with age, with adult cats being adopted up to 53% faster than kittens. This may have been due to the longer holding period for kittens. These results indicate that using shelter records to target the factors influencing adoption, such as encouraging people to adopt strays, may reduce LOS for shelter cats.

Miller H, Ward M, Beatty JA (2019) Population characteristics of cats adopted from an urban cat shelter and the influence of physical traits and reason for surrender on length of stay. Animals 9, 940.

Cats respond negatively to full body restraint, scruffing and clips

Cats must often be restrained during veterinary visits, and scruffing has historically been a commonly used method of restraint. Scruffing involves grasping the skin and fur at the back of the cat's neck in one hand to induce an immobilisation response. Scruffing clips can be applied to the back of the cat's neck to induce a similar response, although their use is not universally recommended. Previous research has demonstrated that full body restraint, where the cat is held flat against a table using two hands, is highly aversive and stressful for cats. This study compared the response of cats during restraint using scruffing, clips and full body restraint to determine the aversiveness of these procedures.

This study used 52 shelter cats housed at an animal shelter in Canada. Each cat was restrained using two different methods: a passive restraint technique that used gentle handling and the least amount of restraint possible (control) and one of the more restrictive restraint methods (scruffing, clips or full body restraint). The two restraint methods were administered in random order. The first restraint technique was administered on a table for one minute, followed by a 30-second rest period, after which the second restraint technique was administered for one minute. During each restraint period, the following observations were made using direct observations and video recordings: respiration rate, pupil dilation, lip licking, vocalisations and sideways or backward ear position. These behaviours are indicators of negative affect in cats, and the number of behaviours displayed during each restraint method were then compared for differences.

Passively restrained cats showed the least number of negative responses. Cats restrained with the full-body technique showed more negative responses than passively restrained cats. Clip-restrained cats showed similar responses to cats undergoing full-body restraint, and no significant differences were detected between the two. Scruff-restrained cats showed fewer negative responses than those subjected to clips or full body restraint but more than the passively restrained cats. This suggests that restraining cats with full-body restraint, clips and to a lesser degree scruffing, is negatively perceived by cats. The authors recommend that full-body and clip restraints are not used, and scruffing is only used when absolutely necessary.

Moody CM, Mason GJ, Dewey CE et al (in press) Getting a grip: cats respond negatively to scruffing and clips. Veterinary Record.

Progress in trap-neuter-vaccinate-return programs for the management of feral cat populations

(This article refers to TNVR programs for urban free-roaming unowned cats. Please note that, internationally, the word *feral* is often used to describe all free-roaming unowned cats, including cats that in some countries, such as Australia and New Zealand, are called unowned, semi-owned or 'stray' cats rather than feral cats. In Australia and New Zealand, *feral* is used to describe those cats who live and breed in remote areas and are completely independent of humans. Please see the RSPCA Australia report on identifying best practice cat management in Australia for more detail on the definitions and categorisation of cats and on cat management).

Trap-neuter-vaccinate-return (TNVR) programs are a non-lethal method of feral cat management, whereby cat populations are managed through sterilisation. The aim is for the cat population to remain stable or decrease over time by reducing kitten production and the immigration that occurs following other lethal control methods. TNVR can also improve cat welfare by reducing disease and competition for resources. While the concept of TNVR programs has been around since the 1950s, this management method was not fully implemented in the US on a large scale until 2008. This coincided with the publication of a review article titled "A review of feral cat control" in 2008 by Robertson, in which the potential for TNVR to be a feasible method of managing feral cat populations was acknowledged. The current editorial article reviews some of the progress that has been made in implementing and monitoring the effectiveness of TNVR programs around the world since 2008.

The latest research on TNVR programs from around the world was compiled, and three recurring research themes emerged: human attitudes and beliefs regarding the management of free-roaming cats; the effectiveness of TNVR as a management tool, and the behaviour and welfare of free-roaming cats.

Changing human attitudes, beliefs and ethical views are associated with an increasing acceptance of TNVR as a preferred method of managing feral cats, although fully engaging the community and managing stakeholder conflicts requires careful research and legislative changes. In terms of the effectiveness of TNVR, several studies have demonstrated a reduction in cat colony size or shelter intakes following a prolonged TNVR effort. The behaviour and welfare of free-roaming cats was found to be similar between pet cats and strays in one study, while another study documented predation and risky behaviours in free-roaming pet cats.

The body of literature regarding TNVR has expanded considerably over the last decade, and this editorial concludes that TNVR has been demonstrated to have value as a tool for managing free-roaming cat populations.

Schaffner JE, Wandesforde-Smith G, Wolf PJ et al (2019) Editorial: Sustaining innovation in compassionate free-roaming cat management across the globe: A decadal reappraisal of the practice and promise of trap-neuter-vaccinate-return (TNVR). Frontiers in Veterinary Science 6, 365.

FARM ANIMALS

Genetic selection of broilers and welfare consequences: a review

"The genetic selection of broilers over the past 60 years has focused narrowly and intensely on production traits, namely growth rate and feed efficiency. This has led to significant welfare problems in birds grown for meat, including leg disorders, cardiovascular diseases, and resulting high mortality rates, while the breeder birds are subjected to severe feed restriction. Bone problems such as bacterial chondronecrosis and tibia dyschondroplasia are prevalent, and recent studies have reported the prevalence of birds with moderate to severe gait impairment to be between 5.5 and 48.8%. Worldwide, over 66 billion broilers are slaughtered annually. This huge scale of meat chicken production means that welfare problems are widespread and are likely to increase in severity due to the increasing global human population, increasing demand for meat, and a continued focus on efficiency of production in the agricultural sector. The commercial broiler industry therefore represents some of the most serious animal welfare issues in agriculture. There is an urgent need to address these problems by making welfare traits high priorities in breeding programmes and integrating these with other breeding goals. Many studies recommend the use of slower-growing breeds that do not have the same welfare problems. Addressing these welfare issues is essential to improve bird welfare and for social acceptability and sustainability of the broiler industry worldwide."

Summary from: Hartcher KM, Lum HK (2019) Genetic selection of broilers and welfare consequences: a review. World's Poultry Science Journal doi:10.1080/00439339.2019.1680025.

Balancing animal welfare with other sustainability concerns

A human activity is considered sustainable if it is acceptable now and if its expected future effects are acceptable, particularly in relation to resource availability, consequences of functioning and morality of action. This includes not just animal welfare but also human welfare, biodiversity, worker satisfaction, land use, water use, the price consumers will pay, greenhouse gas production and harmful accumulation of pollutants. If the general public find any effect of a system unacceptable then that system is considered unsustainable. This UK article reviews some of the complexities involved in balancing animal welfare concerns with overall sustainability concerns.

Some actions that improve animal welfare may also be beneficial for the environment. For example, burning crop stubble in Asia produces 379 million tonnes of CO_2 every year. If that straw were provided as enrichment for farmed pigs and then composted with their manure, both pig welfare and CO_2 emissions would be improved. However, the relationship between animal welfare and sustainability is not always easy to balance, and often there are trade-offs. For example, if all farm animals that were currently housed intensively were placed into extensive systems then animal welfare would be improved but there would be a massive reduction in the amount of natural habitat left. Similarly, organic farming standards that prohibit the use of proven medical treatments for sick animals may reduce antibiotic use, but could also constitute animal cruelty.

When a system is being evaluated, each of the many components of sustainability should be measured precisely. Conducting a life cycle analysis of the impacts of all inputs and outputs generated by a human activity can help to quantity the sustainability of that activity. For example, producing pork sausages will not only involve the welfare of farmed pigs but also the production of plastic packaging and the disposal of human waste. Decision-making may involve developing units for comparison for each positive and negative consequence, while also considering any negative that is so great that no counter-balancing would ever be acceptable to the public. Considering only one aspect of sustainability, such as animal welfare, may not result in the best solution.

Broom DM (2019) Animal welfare complementing or conflicting with other sustainability issues. Applied Animal Behaviour Science 219, 104829.

Pasture access improves behavioural indicators of wellbeing in dairy cows

Dairy cattle can be housed intensively or extensively, depending on their location. As the dairy industry grows and intensifies, a larger proportion of dairy cows in Europe and North America are being housed indoors without access to pasture. Full-time housing indoors raises welfare concerns by exposing cows to hard and slippery surfaces, restricted movement and a limited behavioural repertoire. Dairy cows often have poorer health, reduced lying and walking, and show less synchronised herd behaviours when housed indoors, all of which are indicators of poor welfare. This study compared the effects of providing cows with night time pasture access to full time indoor housing.

This study was conducted at a research institute in Northern Ireland using 32 dairy cows. The dairy cows were housed indoors in two groups of 16, and had activity trackers fitted to their legs to monitor walking and lying behaviour. One group of cows remained continuously indoors for 18 days, while the second group of cows were given overnight access to an outdoor pasture for 18 hrs per day (4pm – 10am) during the same period. At the end of the 18-day period, the treatments were swapped and the first group of cows was given nightly pasture access while the second group remained indoors for a further 18 days. The walking and lying behaviour of the cows was then compared between the two housing conditions.

Dairy cows that had access to the outdoor pasture showed longer lying durations and showed greater herd synchrony when outdoors, suggesting that pasture was a more comfortable lying surface and that cows could all lie down together with no competition for lying space. In addition, cows at pasture also walked further, with potential benefits for their physical health and psychological wellbeing. These results suggest that pasture access improves dairy cow welfare by increasing comfort, reducing competition and boredom, and facilitating motivated behaviour such as lying and walking.

Crump A, Jenkins K, Bethell EJ et al (2019) Pasture access affects behavioural indicators of wellbeing in dairy cows. Animals 9, 902.

Identifying welfare issues in turkey flocks using the transect walk method

The transect walk is a method that has been utilised to inspect the welfare of large flocks of birds, during which an observer methodically walks in a line (transect) back and forth through the shed inspecting the birds. It has been previously used to assess the welfare of meat chickens and can be readily adapted to other intensively housed species such as turkeys. The welfare of farmed turkeys is receiving increased attention and includes issues associated with high stocking density and wet litter, such as feather pecking, aggression and contact dermatitis. Currently, most information on the welfare of commercial turkey flocks is based on their condition at slaughter, and little information about their on-farm welfare conditions are available. This study investigated the on-farm health and welfare issues experienced by commercial turkey flocks.

The study took place on 16 commercial turkey farms in Norway using 20 flocks of turkeys at 11 weeks of age. All farms followed the same husbandry procedures, with the hens and toms separated by a partition that ran the length of the shed. The welfare of each flock was assessed by two researchers who walked slowly along transects between the feed and drinker lines. Depending on the shed design, this involved 6 or 8 transects. During each transect walk, the researchers counted the total number of birds per transect that were immobile, lame, injured, small, featherless, dirty, sick or dead. Litter quality and light intensity were also assessed.

The most commonly observed welfare challenges were dirty and featherless birds, and birds with injured tails and wings. Flocks that had poor litter quality or high stocking densities had more birds with head wounds, suggesting that these factors were associated with increased aggression in the flocks. Some differences between sexes were found with toms having more tail wounds, undersized and terminally ill birds than the hens. The high number of welfare indicators that were similar between the two sexes suggests that there were similar underlying causes in the environment that affected turkey welfare.

Marchewka J, Vasdal G, Moe RO (2019) Identifying welfare issues in turkey hen and tom flocks applying the transect walk method. Poultry Science 98:3391-3399.

Allowing sows to move freely during labour benefits both sow and piglet welfare

On commercial farms, sows are traditionally confined in farrowing crates prior to farrowing (giving birth) to minimise the risk of them crushing their piglets when they lie down. While this has benefits for the piglets, the crate environment restricts the performance of almost all pre-farrowing behaviours which can result in frustration and stress for the sow. This can then negatively impact the amount of colostrum and maternal care that the sow provides to the piglets and result in poor piglet vitality and survival. This study investigated the impact of confinement during parturition on sow and piglet welfare.

This experiment was conducted at a research piggery in Australia using 70 pregnant sows. All sows were placed into farrowing crates one week prior to farrowing. These crates could be left open, allowing the sow to move freely within the pen, or closed to restrict the sow to the crate. Half of the sows had their crates left open until they had finished giving birth, while the other half had the crates closed immediately upon entry. All crates were re-opened when the piglets were ten days old. Overhead video cameras were used to record sow behaviour during farrowing and for 18 hrs post-farrowing. Hourly blood samples were collected to assess changes in cortisol. Each piglet was assessed for signs of vigour immediately after birth and again at 24 hrs old. Piglet weight and mortality was also recorded until weaning. The sow and piglet measurements were then compared between the open and closed crate treatments.

Sows in the open crates displayed less pain behaviours and nosed the crate less frequently, suggesting greater comfort during farrowing. They also performed more posture changes, which was attributed to interacting with the piglets rather than discomfort. Surprisingly there were no treatment differences in blood cortisol concentrations. Sows in the open crates gave birth to less stillborn piglets, and their piglets consumed more colostrum and gained more weight than those from sows in closed crates. These results indicate there are welfare benefits for sows and piglets from allowing sows to move freely during farrowing.

Nowland TL, van Wettere WHEJ, Plush KJ (2019) Allowing sows to farrow unconfined has positive implications for sow and piglet welfare. Applied Animal Behaviour Science 221, 104872.

Meat chickens prefer bright light for feeding and dim light for resting

Light intensity is an important determinant of physiology and behaviour in birds. On commercial meat chicken farms, where chickens can be housed indoors without access to natural light, the light intensity of the artificial light is controlled by humans. In the EU, the indoor light intensity for meat chicken farms is required to be 20 lux at bird eye level. So far, other research investigating the light intensity that is most preferred by meat chickens has been inconclusive. This study investigated the preferred light intensity of meat chickens.

This experiment was conducted at a research facility in the USA using 30 birds. To determine which light intensity meat chickens preferred, a three-pen system was constructed to allow the birds to walk freely between three different pens with different light intensities: 5, 10 and 20 lux. Each pen was light-proofed, and contained feed and water. The three pens were connected by a corridor with dim light levels (1-2 lux) that did not contain feed or water. The chicks were placed in the housing system at 2 days old and housed until 39 days old. Overhead video cameras were used to record the number of birds in each area of the system using 30 images collected over one day at 38 days of age.

The meat chickens showed a clear preference for feeding under the higher light intensity, with a greater number of birds consistently observed in the 20 lux pen than in the 5 or 10 lux pens. However, when the birds were not feeding they tended to congregate in the dimly lit corridor. The authors suggest that meat chickens may have complex light requirements, with bright light preferred for feeding and dim light preferred for resting. The authors recommend that there should be a light intensity of at least 20 lux for the areas around the feeders on commercial farms, and also suggest that light intensity should be reduced in other areas for resting and other activities.

Raccoursier M, Thaxton YV, Christensen K et al (2019) Light intensity preferences of broiler chickens: implications for welfare. Animals 13:2857-2863.

HUMANE KILLING

Low atmospheric pressure stunning may be suitable for use during pig slaughter

There are currently 255 million pigs slaughtered in the EU every year. Prior to slaughter, these pigs are stunned using either electrical stunning or carbon dioxide stunning, both of which have welfare challenges. Stunning is possible using other gases that are less distressing, but these are not currently viable in commercial abattoirs. One potential alternative is the use of low atmospheric pressure stunning (LAPS), in which the air is vacuumed out of a chamber containing pigs, rendering them unconscious due to lack of oxygen (hypoxia). This UK article reviews the potential use of LAPS to stun pigs for slaughter on a commercial scale.

The main welfare concerns regarding the use of LAPS are the impacts of hypoxia (low oxygen) and hypobaria (low air pressure) on pigs. Much research in the aviation industry has investigated the impact of hypoxia in humans who have rapidly ascended to high altitudes with low air pressure. Exposure to these conditions is reported to not be unpleasant in humans. In terms of hypobaria, this may result in pain due to the expansion of gas-filled cavities within the body. Many cavities, such as the lungs and sinuses, are only semi-closed and would allow any expanding gas to escape. However, fully enclosed cavities with expanding gas, such as the intestines, are likely to be painful. Routine feed withdrawal prior to slaughter may reduce the impact of alimentary gas expansion during LAPS.

The practical implication of LAPS systems in commercial abattoirs is discussed. Pigs could be stunned in groups, and using a conservative rate of decompression, the total killing cycle would take 9-14 minutes. As this is longer than current killing cycles, multiple LAPS chambers would need to be used simultaneously. Further research is needed to assess and better understand the impact of LAPS on the expansion of gas-filled cavities in pigs, and to determine the optimal rate of decompression. Currently, the evidence available suggests that LAPS could be commercially viable for pig slaughter and that for most pigs it will be less stressful than current commercial slaughter methods.

Bouwsema JA, Lines JA (2019) Could low atmospheric pressure stunning (LAPS) be suitable for pig slaughter? A review of the available information. Animal Welfare 28:421-432.

MISCELLANEOUS

Animal welfare and the United Nations sustainable development goals

In 2015, the 193 member states of the United Nations adopted a set of 17 sustainable development goals (SDGs) that aimed to reduce poverty and hunger, improve health and well-being, and create sustainable production and consumption patterns. While animals play an important role in achieving many of these SDGs by providing food security, transport, employment and livelihoods, their contribution has not been recognised or made explicit. An understanding of how animal welfare is affecting the SDGs, and vice versa, is essential to formulate balanced targets that take into account animal welfare aspects. Thus, this study investigated the extent to which achieving the UN SDGs is compatible with improving animal welfare.

The information in this paper is based on a workshop held at a Swedish university, and involved 12 academics from the veterinary and agricultural sciences. During the workshop, the participants brainstormed all of the ways that each of the 17 SDGs could be linked to animal welfare, considering all wild and domesticated animals. Then each SDG was scored on a 7-point scale (-3 to +3) by each participant, using their expert opinion, to indicate whether or not they thought that achieving that sustainability goal would also result in improved animal welfare. Each participant then also scored each SDG in terms of whether they thought that improving animal welfare would help in achieving that SDG.

There was good consensus between the participants, who scored each SDG relatively similarly. The average scores for each SDG were positive, indicating that the participants considered there to be no conflict between achieving an SDG and improving animal welfare. This scoring system also indicated that achieving the SDGs was a stronger enabler for improving animal welfare than targeting the reverse relationship (i.e. improving animal welfare to help achieve the SDG). Showing the relationships between animal welfare and the SDGs helps highlight the importance of animal welfare when implementing these goals in practice.

Keeling L, Tunon H, Antillon GA et al (2019) Animal welfare and the United Nations sustainable development goals. Frontiers in Veterinary Science 6, 336.

What's so positive about positive animal welfare?

Positive animal welfare (PAW) is a developing concept in animal welfare science, in which improvements to animal welfare focus not just on removing negative aspects from an animal's life, but also on providing opportunities for positive experiences and interactions. This elevates the quality of life for an animal from simply experiencing a neutral life with no negative or positive aspects to experiencing a good life, with opportunities for positive feelings. It is claimed that positive animal welfare (PAW) has developed over the last decade in reaction to animal welfare focusing too much on avoiding negatives. However, it remains unclear what PAW adds to the animal welfare literature and to what extent its ideas are new. This UK review article examines different aspects of PAW and compared it to the traditional animal welfare literature.

The authors searched the scientific literature for published articles containing the terms 'positive welfare' and 'animal'. This search located 71 papers, of which only 10 specifically addressed PAW. These 10 papers are referred to as the core PAW literature. This literature was then analysed for similarities with the wider animal welfare literature.

While the core PAW literature was small it linked to wider areas of current research interest. The PAW literature was defined by four features: (1) positive emotions, which is arguably the most widely acknowledged aspect of PAW; (2) positive affective engagement, which serves to functionally link positive emotions to goal-directed behavior; (3) quality of life, which serves to situate PAW within the context of finding the right balance of positives over negatives; (4) happiness, which brings a full life perspective to PAW. While the two first points are already part of welfare research going back decades, the two latter points could be linked to more recent research agendas concerning aggregation and how specific events may affect the ability of animals to make the best of their lives.

Lawrence AB, Vigors B, Sandøe P (2019) What is so positive about positive animal welfare? A critical review of the literature. Animals 9, 783.

RESEARCH ANIMALS

Animals – Special Issue

"60 years of the three Rs and their impact on animal welfare"

"The field of laboratory animal science, a multidisciplinary branch of science that contributes to the quality of animal experiments and to the welfare of laboratory animals, was established in the 1950s. The growing understanding that animals are not simply "research tools", and that better welfare leads to better science, led directly to the concept of the Three Rs—replacement, reduction, and refinement—launched by Russell and Burch in 1959 in their book "The Principles of Humane Experimental Technique"."

The barriers to change for increasing the minimum cage height for laboratory rats

Approximately 1.6 million rats are used in the EU every year. While standing is beneficial for rat welfare, the Code of Practice in the UK currently allows rats to be housed in cages that are 20cm high, which is insufficient for standing. These minimum standards outlined in the Code of Practice are usually a compromise between the welfare needs of the animals, and the practical needs of the human stakeholders. Understanding the sort of evidence these human stakeholders require before they will implement a change is critical to improving animal welfare. This study investigates the barriers to implementing higher caging in animal research establishments in the UK.

The researchers visited eight different establishments that use laboratory rats, and interviewed 37 individuals who were involved in some aspect of the husbandry or decision making regarding rat care. The questions focused on the participants' experiences of the barriers and solutions to increasing cage height in their own facilities, as well as on their perceptions of rat cage height in the wider industry. The responses of the participants were then analysed to determine the main categories of obstacles that were cited.

The main factors hindering the implementation of higher caging were classified into five different groups. The first was health and safety, as higher cages were larger and bulkier to handle manually. The second was the financial cost of replacing the current cage systems. The third was animal welfare, in that many staff lacked an understanding of rat behaviour and did not perceive standing up to be an important welfare issue for rats. The fourth was scientific, where many staff were concerned about a change in housing system interfering with their research results. The final barrier was related to human behaviour and how to elicit change in staff who preferred current systems to remain unchanged. Almost all of these factors could be ameliorated. In conclusion, much of the desired evidence for moving to higher cages is already available, and therefore the focus should be on education and improving access to the existing evidence, in order to encourage facilities to resolve existing concerns.

Mazhary H, Hawkins P (2019) Applying the 3Rs: A case study on evidence and perceptions relating to rat cage height in the UK. Animals 9, 1104.

TRANSPORTATION OF ANIMALS

Lateralisation of limb use in sheep during simulated sea travel as an indicator of stress

The term 'lateralisation' refers to specialised neural processes carried out predominantly within either the left or right sides of the brain. The right hemisphere of the brain can be referred to as the 'emotional' side and responds primarily to short-term or threatening situations. The left hemisphere is often referred to as the 'logical' side, and is primarily involved in planning and abstract concepts. In addition, the brain is organised such that the left hemisphere controls the right side of the body and vice versa. Thus, movements occurring on the left or right side of the body can indicate which hemisphere of the brain is active at that point in time. A bias toward using the left limbs is considered indicative of an active right hemisphere, which is associated with negative states such as stress, pain or fear. This study investigated the lateralisation of limb use by sheep undergoing simulated transport at sea as an indicator of stress.

This experiment took place at an Australian university, using six Merino crossbred wethers. The sheep were restrained in pairs in a crate with a barrier between them so that they could not turn around. The crate was fixed to a motion platform that could be programmed to move in regular or irregular sequences to simulate sea travel. Each pair of sheep were exposed to one hour of simulated sea travel daily for 12 days, and their stepping behaviour was recorded using three video cameras.

The sheep displayed a preference for using the right hind limb as a stabiliser to maintain balance. This limb was moved less often than the limbs on the left side, which were moved frequently to maintain balance on the rocking platform. The increased use of the left limbs confirms that the stepping behaviour of sheep during simulated sea travel is lateralised, and that this motion may present a stressor to sheep. In addition, the sheep restrained on the left side of the crate appeared to prefer movements that would orient them closer to their social partner, suggesting they were experiencing more stress than the sheep on the right side.

Robins A, Berthoux G, Santurnun E (2019) Sheep quickstep while the floor rock and rolls: Visuomotor lateralization during simulated sea travel. Animals 9, 700.

The successful large-scale capture of free-ranging kangaroos for sterilisation purposes

Kangaroos often live in close proximity to urban environments, and in western Sydney, Australia, there is a large fenced property (1545ha) that houses over 4000 kangaroos in native bushland. After one third of this property was rezoned for residential development, the kangaroo population had to be reduced. To manage this population, a large-scale capture and sterilisation program was enacted over a 13-year period. However, kangaroos are easily stressed and are susceptible to injuries during capture. This article documents the methods used to safely capture and sterilise the kangaroos, and describes the main risks of this operation for the animals.

The sterilisation program was enacted from 2005-2018 within the 1545ha property. During the first two years, when the kangaroo population was highest, the kangaroos were captured on a large scale by herding them into purpose-built capture yards where they were darted with a darting rifle and surgically sterilised under anaesthetic. The kangaroos were herded by a line of people on foot rather than in vehicles to reduce panic, and the capture yards had padded fence poles and hessian barriers to minimise any injuries resulting from collisions with the yard structures. Numerous precautions were taken to ensure the health and safety of the kangaroos during the surgery and recovery period, and each sterilised kangaroo was ear tagged to avoid future recapture. After 2007, when the number of kangaroos requiring sterilisation was lower, the researchers stopped herding the kangaroos into yards and opted instead to dart them while they were free-ranging on the property.

During the 13-year operation, 3963 kangaroos were captured and sterilised, and 85% of these occurred within the first three years. There were 523 reported kangaroo deaths, of which the majority were euthanasia due to ill health (135) and capture-related injuries (116). The use of the capture yards resulted in fewer injuries than the free-range capture method, and the authors recommend this method of herding for the large-scale capture of kangaroos. The drug doses and combinations used were also demonstrated to be safe for kangaroos.

Colgan SA, Perkins NR and Green LA (2019) The large-scale capture of eastern grey kangaroos (*Macropus giganteus*) and red kangaroos (*Osphranter rufus*) and its application to a population management project. Australian Veterinary Journal 97:515-523.

Captive husbandry and veterinary care of seabirds during an oil spill response

On the 5th October 2011, a container vessel carrying heavy fuel oil ran aground on a reef in the Bay of Plenty, New Zealand. Oil spills are known to cause significant damage to coastal ecosystems, and while the successful rehabilitation of oiled seabirds has been documented, the need for a rehabilitation period following rescue is not well recognised. This article describes the captive husbandry and veterinary management of wild-caught seabirds contaminated with oil.

A total of 428 oiled seabirds were captured by hand over a four-month period. The vast majority (92%) of these birds were little penguins. On capture, they were immediately provided with fluids and had the excess oil cleaned from their eyes and mouths. They were then transported to a purpose-built facility where the birds were examined by a veterinarian and provided with warm housing and feed for at least two days to allow acclimation. When the birds were deemed ready, they were subjected to a lengthy three-stage washing procedure to remove all oil from their plumage. To help the birds restore the natural waterproofing to their feathers, the birds were provided with a supervised swimming area that encouraged both swimming and preening. Once the waterproofing had been restored, the birds were moved to an outdoor aviary, where they remained until the coastal oil spill had been cleaned and it was considered safe to release them.

Of the 428 birds rescued, 45 died, and the total survival to release rate was 87%. The most common cause of death was weakness, anaemia and hypothermia in oiled seabirds (36% of all deaths) and starvation and weakness in unoiled seabirds (31%). Seabirds that were admitted in poorer body condition had a higher mortality rate, and unoiled seabirds were more likely to die than oiled sea birds. These unoiled birds are likely to have had pre-existing conditions that were unrelated to the oil spill. Surprisingly, mortality was not related to the degree of oiling. This rescue response demonstrates that with sufficient investment of time, personnel and expertise, oiled wildlife can be rehabilitated with a good success rate, even when heavily oiled.

Gartrell BD, Battley PF, Clumpner C et al (2019) Captive husbandry and veterinary care of seabirds during the MV Rena oil spill response. Wildlife Research 46:610-621.

Survival and movements of koalas translocated from an over-abundant population

The forest of Cape Otway in southern Victoria, Australia, consists of 450ha of remnant woodland containing a high density of manna gums. This is a preferred food source of koalas, leading to very high densities of koalas in this region. Following widespread defoliation and mass starvation of koalas in 2013, a management program that involved sterilisation and translocation was implemented. Translocation has been an important component of koala management for over 90 years, and over 40,000 koalas have been translocated to over 250 sites. Despite the reliance on translocation for koala management, few studies have assessed the fate of translocated koalas after their release. This study monitored the short- to medium-term fate of koalas translocated in that program.

The 60 koalas used in this study were selected from all of the koalas captured in Cape Otway (395 koalas) based on their health status and body condition. They received a veterinary examination, a radio-collar for tracking, and females were sterilised with a hormonal implant. 36 koalas were then translocated to a new habitat that had been selected based on food availability and other ecological requirements. The remaining 24 koalas were returned to Cape Otway to act as the control group. The survival and body condition of all koalas were tracked for 4-5 months after release. GPS loggers attached to their collars were also used to investigate their movement patterns.

The survival rates of the translocated koalas did not differ from those in the control group, indicating that translocation did not increase koala mortality. In fact, while both groups of koalas lost weight following release, the body condition of the translocated koalas improved over the following 4 months while that of the control group declined. These results indicate that the translocated koalas fared better than those in the control group, despite the koala population in Cape Otway being substantially reduced. In conclusion, koalas are relatively robust to the rigors of translocation if a suitable habitat is available.

Menkhorst P, Ramsey, D, O'Brien T et al (2019) Survival and movements of koalas translocated from an over-abundant population. Wildlife Research 46:557-565.

EVENTS

Registrations are now open for the RSPCA Animal Welfare Seminar 2020: Feline Futures

Widespread humane and effective management of owned, unowned and semi-owned cats remains elusive, despite significant effort and investment of resources by some stakeholders to address the issue. Are stricter laws the best solution or can we do more collectively through better communication and collaboration? The 2020 Animal Welfare Seminar will explore the future of humane domestic cat management in Australia.

Join the conversation at FELINE FUTURES on Thursday 16 April 2020 in Melbourne!

ARTICLES OF INTEREST

ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

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