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ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

A pressure headcollar does not improve compliance in horses during handling

Humans are relatively small compared to horses and must use aids to help them control these larger and stronger animals. One such device is the Dually headcollar, which tightens a rope around the jaws and nose of the horse when pressure is applied to the headcollar. Horses have sensitive facial structures, and devices that apply pressure in this area may cause pain and discomfort. Proponents of the Dually headcollar advocate that it rapidly increases compliance in horses during training. This study investigated whether the Dually headcollar was associated with changes in compliance, stress or discomfort during handling.

This study took place at a riding school in the UK. 20 privately owned horses were subjected to two novel handling tests wearing either a Dually headcollar or a standard headcollar. The first handling test involved walking the horse over a blue tarpaulin that was pegged to the ground, while the second test involved walking the horse through plastic streamers that were suspended from a pole overhead. Horse compliance was measured using the time taken to complete each handling task, and the number of refusals that each horse displayed. Stress was measured remotely using a thermal camera

to record changes in eye temperature, with a decrease in eye temperature indicative of a stress response. Pain and discomfort was measured using the Horse Grimace Scale, which analysed horse facial expressions for signs of pain. The compliance, stress and discomfort shown by each horse was compared between the Dually and standard headcollar configurations.

The Dually headcollar did not increase compliance or stress in the horses being tested, but was associated with increased signs of discomfort using the Horse Grimace Scale. These results suggest that there is an increased risk to horse welfare by using the Dually headcollar that is not justified by improvements in horse behaviour. Familiarising horses with the Dually headcollar prior to training sessions may improve compliance, but when used in naïve horses it was not shown to provide any benefits over a standard headcollar.

Ijichi C, Tunstall S, Putt E et al (2018) Dually noted: The effects of a pressure headcollar on compliance, discomfort and stress in horses during handling. *Applied Animal Behaviour Science* 205:68-73.

Using qualitative behavioural analysis to explore emotions in horses

During qualitative behavioural analysis (QBA), human observers use behavioural descriptions of the animal's body language to describe how they perceive the animal to be feeling (e.g. curious, aggressive). QBA has been scientifically validated, and the observers can either choose from a fixed list of behavioural descriptors, or generate their own list prior to the observations starting. In this study, a pre-determined list of behavioural descriptors for horses had been created for use in another research project. This study investigated the suitability of this list for assessing the human-animal relationship in horses.

This study took place at 40 horse farms in Italy, with a total of 355 sport and leisure horses assessed over 5 years. Three veterinarians were trained to use the QBA procedure, and each carried out QBA assessments individually at the horse farms using a list of 13 behavioural terms. During the QBA, the assessor observed the horse in its stable for 30 s, after which they entered the stall and stroked the horse on the withers for 30 s. The behaviour of the horse was then scored in terms of how much the horse was displaying each of the 13 descriptors. To assess the quality of the human-horse

relationship, the assessors then tested whether the horse avoided them as they approached the stable (avoidance test), or if the horse showed avoidance of physical contact (forced human approach test).

The fixed list of behavioural descriptors worked well in this study, as it was feasible on farm, well accepted by the horse owners, gave reliable results between assessors, and successfully related the QBA to the avoidance behaviour of the horses. The QBA produced two dimensions of horse behaviour: the first scored horses on a scale from relaxed to alarmed (affective state), and the second scored horses on a scale from curious to apathetic (arousal state). Horses that were assessed as more relaxed and curious showed less avoidance of humans, indicating a better human-horse relationship in these horses. In conclusion, the QBA is sensitive to the quality of human contact in horses.

Minero M, Dalla Costa E, Dai F et al (2018) Using qualitative behavioural assessment (QBA) to explore the emotional state of horses and its association with human-animal relationship. *Applied Animal Behaviour Science* 204:53-59.

The welfare of captive dolphins should not be compromised for human leisure activities

Humans have a right to rest and leisure, and there is substantial research showing that leisure involving nature is beneficial for human wellbeing. According to the biophilia hypothesis, humans have an innate need to seek out contact with nature and its components, including animals. One animal that is sought out by humans is the dolphin, and interactions with wild dolphins have been shown to be beneficial for humans. This review article examines whether it is justifiable to keep dolphins captive for our own biophilic benefits.

Cetaceans have been kept captive since the 1850s, and there is high demand to see them. People seeking contact with captive dolphins may be anticipating a 'natural' leisure experience that reconnects with nature, but are likely to remain unfulfilled due to the contrived and artificial nature of the encounter. It is also known that keeping dolphins captive has negative effects on their welfare, such as boredom, poor health, stress, and abnormal behaviours. The justification for keeping dolphins captive is then explored from the following three perspectives: animal rights, animal welfare, and environmental ethics.

Using an animal rights perspective, captive life impinges on many dolphin rights. It denies their right to freedom, and their right to health and wellbeing. If we apply the biophilia concept to animals, dolphins have a right to nature as a fundamental requirement to ensure their wellbeing. There is some evidence that captive animals are negatively affected by nature deficit. Using an animal welfare perspective, keeping dolphins cannot be justified as there are only limited benefits to education and conservation, combined with poor welfare outcomes for captive dolphins. The environmental ethics position considers the health and integrity of the ecosystem as paramount, and challenges the view of humans being dominant over all other life. In conclusion, a potential balance between the human right to leisure and the consideration of nature and animal ethics could be possible in an authentic, responsible, managed wildlife tourist operation. This will encourage connectedness with nature, learning and conservation behaviours in people, as well as encouraging them to see the intrinsic value of the animals.

Yerbury R, Boyd W, Lloyd D et al (2018) Right to leisure? Refocusing on the dolphin. *Annals of Leisure Research* 20:368-385.



COMPANION ANIMALS

Normal feline behaviour, and why problem behaviours develop

The majority of feline behavioural problems occur in the home and can originate from the following three causes: perceived threats to security (usually due to other cats), inadequate exposure to crucial stimuli during development, and normal behaviour that is deemed inappropriate by owners.

This review examines what is known about feline behavioural problems and how they develop. Cats are descended from a solitary, territorial ancestor, and their domestication was based around vermin control, which did not require cats to develop social bonds with humans to be successful. In fact, cats place more reliance on the security of their territory than on psychological attachments to people or other cats. Many feline behaviours stem from perceived threats to security, often due to conflict with other cats. In addition, cat food was of poor quality until the 1970s. This means that the selection pressure for hunting ability has only been lifted in the last 40 years, and cats are still strongly motivated to hunt and defend their territory. This has important implications for their behaviour and wellbeing as pets.

Cats that are not exposed to humans during the important socialisation period between 2-9 weeks of

age are likely to avoid humans, and limited exposure to other cats during this period can result in nervousness, aggression and neophobia. Feline behavioural problems may also develop from stimuli that we as humans are oblivious to, and disturbances to the olfactory environment make a significant contribution to many behavioural problems for cats. In addition, an owner's lack of understanding of normal cat behaviour may lead to errors in managing undesirable behaviours, such as punishing house soiling rather than altering the toileting environment, leading to anxiety and exacerbating the problem. Cats will try to overcome distress through increased aggression, fear, or attempts to manipulate the olfactory environment by changing the location of scent marking and toileting. Chronic distress can also cause problems such as vomiting, anorexia, feigning sleep and over- or under-grooming. Improved owner knowledge of cat behaviour will help reduce the incidence of behavioural problems in cats.

Bradshaw J (2018) Normal feline behaviour...and why problem behaviours develop. *Journal of Feline Medicine and Surgery* 20:411-421.



Electronic collars should not be used as training devices for dogs

It is now clear that training techniques that are aversive to dogs can be counterproductive and can be associated with increased stress or aggression in dogs. One controversial dog training tool is the electronic collar (e-collar), which can deliver electric shocks to a dog's neck in response to the dog's behaviour. There are three types of e-collar: anti-bark collars, electronic boundary fence collars, and remote-controlled collars. This article reviews the pros and cons of e-collar use in dog training.

The proponents of e-collars state that e-collars are more effective than standard training techniques, and give rapid results. However, the literature does not support this popular belief, and indicates that the use of e-collars may in fact be counter-productive. For example, no studies have found e-collars to be more successful in changing behaviour when compared to positive reinforcement training. Also, dogs have thinner skin than humans, and are thus more sensitive to pain from electric shocks. During e-collar training, dogs show a range of behavioural and physiological signs that indicate pain, stress, and negative emotional states. The use of e-collars by untrained lay persons has great potential for dogs to receive poorly timed shocks that not only confuse the dog, but also lead

to fear, stress and aggression. There is also the risk of owners to use the e-collar excessively if frustrated by a dog that is 'misbehaving'.

Using e-collars to suppress dog behaviour rather than addressing the underlying cause of the behaviour can exacerbate other behavioural problems. Dogs may respond aggressively during training sessions, or show fearful behaviour toward the owner even outside training sessions, reducing the attachment between dog and owner. There is also the potential for e-collars to malfunction, and long-term use of anti-barking collars or boundary fence collars may cause tissue damage to the neck. In conclusion, there is no credible scientific evidence to justify e-collar use for dogs. Better training options exist, with proven efficacy and lower risks to dog welfare, and the authors strongly oppose the use of e-collars in dog training.

Masson S, de la Vega S, Gazzano A et al (2018) Electronic training devices: Discussion of the pros and cons of their use in dogs as a basis for the position statement of the European Society of Veterinary Clinical Ethology. *Journal of Veterinary Behavior* 25:71-75.

Carrier training cats reduces stress on transport to a veterinary practice

Cats often find transport and visits to veterinary clinics stressful, which can lead to behaviours such as aggression, escape attempts, or freezing. Handling a fearful cat increases the risk of injury to the owner and veterinary staff, and the subsequent stress response may interfere with the interpretation of clinical signs of disease. Positive reinforcement training has successfully reduced the stress response to veterinary examinations in a wide variety of species. This study examined the effectiveness of carrier training in reducing the stress response of cats to a simulated visit to a veterinary clinic.

This study took place at a university in Vienna, using 22 cats that were housed on-site as part of a research population. To assess the cats' initial stress response to transport and veterinary examination, a simulated visit to a veterinary clinic was performed for each cat. The behaviour of the cat during car transport and veterinary examination was recorded, and measurements of ear and rectal temperature were used to indicate the stress response. Half of the cats were then allocated to the training group, and received positive reinforcement training to reduce their fear of the cat carrier crate. This training consisted

of giving the cat treats as it showed signs of reduced fearfulness when entering the crate, being confined in the crate, being carried and being transported in a car. The remaining cats acted as the control group and received no additional training. After six weeks, both groups of cats were exposed to the simulated veterinary examination and their stress response recorded.

The carrier training successfully reduced the behavioural signs of stress in cats undergoing car transport. In addition, while all cats showed an increase in ear temperature during car transport, the cats that received carrier training showed less change than the control group, indicating a lower stress response. Carrier training also reduced the amount of time needed to perform a veterinary examination. In conclusion, cat owners should be encouraged to carrier train their cats and veterinarians should be encouraged to use low-stress handling techniques to reduce stress in cats around veterinary visits.

Pratsch L, Mohr N, Palme R et al (2018) Carrier training cats reduces stress on transport to a veterinary practice. *Applied Animal Behaviour Science* 206:64-74.

Exotic pet suitability and informing potential owners to aid animal welfare

Exotic pets are commonly considered to be animals that are either non-native to a region or are non-domesticated. While it is difficult to gain accurate figures, it is estimated that billions of wild animals are traded annually as pets, with over 13,000 species across all major animal classes involved. It is also estimated that up to 25% of the global exotic pet trade is illegal. The trade in and keeping of exotic pets has been frequently criticised for the commonly inhumane and harmful practices that are associated with the commercial supply of animals, as well as the poor husbandry these animals receive as pets. Other concerns include threats to species conservation and ecology due to overharvesting, and the potential for disease transmission to humans from exotic pets.

The lack of information regarding the natural histories and biological needs of wild pet species contributes to poor welfare in these animals. Many species are kept in barren, cramped conditions, and premature mortality rates can be as high as 70% across all classes, including 75% for reptiles and 90% for aquarium fish. Efforts to educate exotic pet owners regarding the correct husbandry of these animals has

had little success, as exotic pet ownership appears to be motivated more by status factors and social recognition than actual care and respect for the animal's welfare.

The authors of this review propose the development of a labelling system for exotic pets that will inform potential owners of how difficult the animal is to keep, using a modified traffic light system. This labelling system will present information about any disease risks that the animals may pose, as well as the origin of the animal. This information may help decision making for potential owners. The authors also propose the development of 'positive lists', which list the exotic pets for which a good deal is already known about their husbandry requirements. This could help determine which species are suitable for trading and keeping as pets, and combined with the labelling system could promote greater responsibility in the pet industry.

Warwick C, Steedman C, Jessop M et al (2018) Exotic pet suitability: Understanding some problems and using a labelling system to aid animal welfare, environment, and consumer protection. *Journal of Veterinary Behaviour* 26:17-26.



Puppy farming has negative impacts on dog behaviour and health



Puppy farms are known to have serious negative effects on adult dog behaviour. This is likely to be due to the increased stress experienced by both pups and their mothers, which may interfere with development and appropriate maternal care, as well as a lack of socialisation that the pups experience toward humans, other dogs and the environment. This study investigated how puppy farming influenced dog behaviour and health, and how the effects of puppy farming could be counteracted by the owner.

This study used an online questionnaire to collect data from dog owners, with most respondents from the UK and Ireland. The survey collected information on participant demographics, the participant's dog, how the participant purchased the dog, and the behaviour and health of the dog. Data was also collected on additional activities such as the frequency of walking, or enrolment in puppy school. Dogs were categorised as being from a puppy farm by asking owners whether they believed the dog was from a commercial breeding establishment. Of the 2026 respondents, 123 (7%) classified their dog as coming from a puppy farm. The data were then analysed to see if the origin of the dog or any owner behaviours were related to behavioural problems or health in the adult dogs.

Dogs raised on puppy farms had higher rates of undesirable behaviours than dogs from other breeding sources. The strongest relationship found was for fear, with dogs originating from puppy farms being twice as likely to show fear-related behaviours to strangers and other stimuli. This result is likely to be due to inadequate socialisation. Dogs from puppy farms also had poorer health, with higher rates of genetic disorders and infectious diseases than dogs from other sources. Walking the dog frequently significantly reduced the occurrence of undesirable behaviours, and training did moderate behaviour but the exact impact was unclear. In conclusion, puppy farming has long lasting negative impacts on dog behaviour and health, and more research is necessary to explore how to mitigate the effects of poor early life experience.

Wauthier LM, Williams JM (2018) Using the mini C-BARQ to investigate the effects of puppy farming on dog behaviour. *Applied Animal Behaviour Science* 206:75-86.

FARM ANIMALS

The effect of disbudding age on healing and pain sensitivity in dairy calves

The procedure of hot-iron disbudding uses a hot cautery iron to destroy the horn bud of dairy calves before it develops into a horn. This procedure is known to be painful immediately following the procedure, but little is known about how long this pain persists for or how the age of the calf at disbudding might influence pain perception. Hot-iron disbudding is commonly performed on dairy calves from 0-2 months of age, and it was hypothesised that disbudding near birth may provide some pain mitigation as the wound size would be smaller and heal more quickly. This study investigated the effect of disbudding at an early age on pain responses, and how long this pain persists for.

This study was conducted at an academic research facility in the USA using 48 female calves. The calves were allocated to either the Treatment or Control group, and were disbudded with pain relief at either 3 days or 35 days of age. The Control group experienced sham disbudding only. The progress of wound healing was monitored twice weekly, and wound temperature was measured twice weekly using thermal imaging. Pain sensitivity was assessed by applying a digital

algometer to the edges of the wound and measuring how much pressure was required to cause the calf to withdraw. This test was also performed on the calf's rump to determine any systemic changes in pain sensitivity caused by disbudding. Calf bodyweight was also measured to determine any changes in growth rate.

The disbudding wounds took 9 weeks to heal, and were sensitive to applied pressure throughout this period. The age of the calf at the time of disbudding did not influence the time needed to heal, the temperature of the wound, or the growth rates of the calves following disbudding. The pain sensitivity at the wound site did not differ between age groups, but pain sensitivity on the rump was greater for the calves disbudded at 3 days of age. This suggests that disbudding at a young age did not incur any welfare benefits, and may produce a generalised long-term increase in pain sensitivity.

Adcock SJJ, Tucker CB (2018) The effect of disbudding age on healing and pain sensitivity in dairy calves. *Journal of Dairy Science* 101:1-13.

Toward farm animal welfare and sustainability

In 2016, the United Nations published a document titled 'Proposed draft recommendations on sustainable agricultural development of food security and nutrition including the role of livestock'. One of the recommendations made in this document was to improve the welfare of farm animals. This is an important event for the field of animal welfare science, as it is the first time in the UN's 71-year history that animal welfare has been identified as a global goal of sustainable agricultural policy. This formally recognises animal welfare as a distinct component of sustainable agricultural and economic development, food security and human nutrition. This article reviews the means by which both animal welfare science and animal welfare policy should engage with the global debates over food security and sustainability.

If improved animal welfare is to become a significant and recognised component of the global drive toward more sustainable agricultural development, the authors propose that five things must happen. The first is that animal welfare must become fully integrated into sustainable food production technologies, rather than being seen as a constraint. The second is that the interrelationship between human and animal health and welfare must be articulated, which is

already occurring through the 'One Health' and 'One Welfare' agendas. The third is that the animal welfare community needs appropriate representation within the international governance structures associated with sustainable agricultural development. This is already occurring within the European Union and the World Organisation for Animal Health. The fourth is the development of robust and comparable animal welfare standards that can be applied internationally to all species of farmed animals. And finally, animal welfare science must not become complacent. It must continue to be experimental and innovative to develop solutions for future challenges in animal agriculture.

Since the inception of this field in the 1960s, animal welfare science has made considerable progress toward recognising, measuring and improving animal welfare in a wide range of species. Looking forward, animal welfare science faces many opportunities and challenges in relation to contributing to the sustainable production of safe and nutritious food for the global population.

Buller H, Blokhuis H, Jensen P (2018) Towards animal welfare and sustainability. *Animals* 8(6), 81, doi:10.3390/ani8060081.

Risk factors associated with difficult birth in ewes

Lamb mortalities during the first week of life can be substantial, often reaching 20% or more. Approximately half of these deaths can be attributed to difficult births, also known as dystocia, and this causes welfare issues for the ewes as well as the lambs. The risk factors for dystocia are high or low birthweight lambs (above or below 4.8kg), and for ewes carrying triplets. This study investigated potential indicators of dystocia in ewes prior to lambing so that high risk ewes could be identified and monitored appropriately.

The Australian sheep industry maintains a detailed database on the breeding and production values of its Information Nucleus Flock, which consists of 5000 ewes maintained at eight different sites around Australia. This study examined the lambing data for this flock over a four year period to determine relationships between the following variables: ease of lambing, cause of any lamb deaths during lambing, lamb birthweight, the number of gestating lambs detected during a pregnancy scan, and ewe bodyweight. A ewe was considered to have experienced dystocia if any lamb died during birth with physical signs of dystocia, such as oedema or haemorrhage.

Similar to previous research, dystocia was more common in high and low birthweight lambs. The causes of dystocia were thought to be different for the different sized lambs. High birthweight lambs were likely to cause dystocia due to their size, while low birthweight lambs were more likely to be part of a multiple litter, which thus increased the risk of lambing difficulties. Dystocia rates also increased with age, and ewes that were over four years of age and carrying triplets had dystocia rates of 40%. This is in comparison to a 1% dystocia rate for ewes lambing for the first time with a single lamb. For most ewes, dystocia was difficult to predict, but there was a small proportion of ewes with a very high risk of dystocia. If this high-risk group could be identified in advance they could be monitored more closely than the rest of the flock.

Horton BJ, Corkrey R, Hinch GN (2018) Estimation of risk factors associated with difficult birth in ewes. *Animal Production Science* 58:1125-1132.



An evaluation of two different broiler catching methods

Prior to slaughter, broiler chickens must be caught and loaded onto a truck for transport to the abattoir. Broilers (meat chickens) are commonly caught and carried by the legs, and multiple birds are carried in each hand before being loaded into the transport module. Catching the birds by the legs and carrying them inverted is associated with increased fear, stress, injuries and mortality. In comparison, catching the birds individually by gripping them around the wings and carrying them in an upright position is associated with lower stress. This study compared the two catching methods in terms of broiler welfare and catching efficiency.

Two commercial flocks of broilers were studied on two commercial farms in Norway. For each flock, professional broiler catchers were used to catch approximately 1000 broilers by the legs, after which they caught approximately 1000 broilers in the upright position. This led to a total sample size of 2010 birds caught by the legs and 1941 birds caught in the upright position for both flocks. These birds were transported to the abattoir and examined for injuries and mortalities prior to slaughter. Other measures of

the catching process included the total time taken to fill each transport module with birds, and the number of birds in each drawer of the module.

Catching the broilers in the upright position was a faster method, gave slightly fewer wing fractures, and gave a more consistent density of birds in the drawers, compared to catching the broilers by the legs. The upright position allowed the catchers to place the birds into the module more carefully, and keep track of the number of birds in each drawer. Difficulties grasping both legs of the bird prior to lifting may explain why the upright catching method was faster than the inverted catching method. However, the bird catchers found the upright catching position more tiring, as they were carrying fewer birds with each capture. A larger catching crew may be needed to combat this fatigue. In conclusion, catching broilers in the upright position improves some aspects of broiler welfare during depopulation.

Kittelsen KE, Granquist EG, Aunsmo AL et al (2018) An evaluation of two different broiler catching methods. *Animals* 8(8), 141, doi:10.3390/ani8080141.

Assessing the impact of new technologies on animal welfare, using virtual fencing as an example

The rapid rate of technological advancements in farming and animal management have increased the complexity of the farmed environment for animals. Robotic milking and virtual fencing are two examples of new technology in modern farming systems. For these systems to be acceptable and effective, the learning challenge they present must not exceed the learning ability of the animals, or animal welfare may suffer. This article explores a framework based on predictability and controllability that can be used to assess the welfare challenge presented by new technologies, based on the animal's ability to successfully learn to use the new technology.

The predictability and controllability of a situation are important determinants of an animal's welfare. An animal that can predict an aversive situation, such as an electric shock, will show a lower stress response than an animal that receives unpredictable shocks. Similarly, an animal that is able to exert some control over its situation, such as pulling a lever to prevent a shock, will experience less stress. Animals use learning to predict likely events in the future. Animals that cannot successfully learn a task to avoid receiving an electric shock will experience chronic stress and poor welfare.

In virtual fencing systems, cattle wear a collar that emits a warning sound when they are approaching a virtual (non-physical) fence line. If they continue to approach the virtual fence, they will receive an electric shock from the collar. To successfully adapt to this system, the cattle must learn to stop walking or reverse their direction when they hear the sound to avoid receiving a shock. If the cow is unable to learn the association between the sound, their own behaviour and the shock, they experience chronic stress and poor welfare due to low predictability and controllability. Most cattle learn this task easily, but there is a wide range in their learning abilities. Future farming technologies should be developed with the learning abilities of the animals in mind so that they are predictable and controllable, to ensure that welfare is not compromised.

Lee C, Colditz IG, Campbell DLM (2018) A framework to assess the impact of new animal management technologies on welfare: A case study of virtual fencing. *Frontiers in Veterinary Science* 5:187, doi:10.3389/fvets.2018.00187.

Genome-wide association study for bone strength in laying hens

Bone fractures are a significant cause of poor welfare in laying hens, and it has been estimated that 30% of laying hens experience a bone fracture during their laying lives. Up to 25% of hens also experience fractures during depopulation, and a further 30% experience fractures during loading and transportation to slaughter. Laying hens are particularly susceptible to bone weakness due to a combination of genetic selection for high egg production, the high calcium requirements of egg shell formation, and the reduced activity associated with confinement in cages, although the primary cause of bone weakness is believed to be genetic. This study examined the genome of laying hens for relationships with bone strength.

This study took place at a breeding company in Germany, and collected bone samples from 2000 laying hens after they were culled at the end of lay. The tibia from the right leg was removed and assessed for strength using a destructive bending test. Any birds that were not producing many eggs at the time of death were removed from the study. A sample of birds

with the highest and lowest bone strengths were then selected for genetic analysis ($n = 752$), and the two groups were compared for differences.

Bone strength was found to be highly influenced by genetics, in addition to environmental factors. Five distinct genetic regions, also known as Quantitative Trait Loci (QTL), were identified on four different chromosomes that differed between the high and low bone strength hens. These QTLs contained several genes that were associated with immunity (related to bone marrow), and bone physiology, density and strength. These results support previous studies that suggest that bone strength is highly regulated by genetics. The high heritability of bone strength found in this study suggests that selection for bone strength could be achieved relatively rapidly, resulting in improvements to the welfare of laying hens.

Raymond B, Johansson AM, McCormack HA et al (2018) Genome-wide association study for bone strength in laying hens. *Journal of Animal Science* 96:2525-2535.



Providing multiple meals for group-housed sows does not improve feed access to low-ranking sows

Floor feeding is one of the cheapest and simplest methods of feed delivery for groups of commercial gestating sows. Feed is dropped from overhead feeders onto the floor of the pen, and sows must compete with one another to access the pile of feed. This means that the most submissive sows in the group often miss out on feed to avoid conflict with dominant sows. One solution to this competition is to increase the number of feed drops through the day, rather than delivering all feed at once in a single meal. This study examined the relationship between feeding and aggression when sows were floor fed over multiple feed drops per day.

This study took place at a commercial piggery in Australia. 275 gestating sows were housed in groups of ten for their first and second pregnancies (200 sows per gestation, 126 sows observed for both gestations). The sows were floor fed and their daily ration (2.5kg/sow) was divided into four feed drops, delivered at 0730, 0930, 1100 and 1500 h. Sow feeding behaviour (20 mins) and aggression (30 mins) were observed following each feed drop on Days 2, 9 and 51 of gestation. Individual sows were classified as feeding either

directly under the feed hopper (high feed availability), in the area surrounding the feed drop (reduced feed availability), or at the back of the pen furthest from the feeder (scarce feed availability). The aggressive behaviour observed on Day 2 was used to classify each sow as dominant, subdominant or submissive.

The dominant sows spent the most time feeding directly under the feed hoppers, while the subdominant sows fed more often in the area of reduced feed availability. The submissive sows fed more often at the back of the pen, suggesting that they were avoiding the feeding area despite being motivated to feed. These relationships did not vary with the time of feed drop, the day of gestation, or the gestation number. Further research on the management and design of floor feeding systems is required, with particular emphasis on increasing accessibility to sows that avoid the feeding area.

Verdon M, Zegarra N, Acharya R et al (2018) Floor feeding sows their daily allocation over multiple feed drops per day does not result in more equitable feeding opportunities in later drops. *Animals* 8(6), doi: 10.3390/ani8060086.



Traditional breeding methods have been used for generations to improve productivity across a range of farm animal species, sometimes to the detriment of animal welfare. Focussing on a single production trait, for example, can have profound negative effects on animal health, robustness, and longevity. However, breeding technologies can also be used to improve animal welfare.

The 2019 RSPCA Animal Welfare Seminar will explore the use of genetic selection and gene technologies with application in farm animal production and their impact on animal welfare. The Seminar will aim to tackle thought-provoking questions around the use of these technologies to improve animal welfare, the ethical dilemmas we face, and whether we even need animals to produce food.

Further details, including the Seminar program, to be released in the coming weeks.

MISCELLANEOUS

Forensic use of the Five Domains model for assessing suffering in cases of animal cruelty

During prosecutions related to animal cruelty, expert witnesses are often called to determine the nature and seriousness of animal suffering that has occurred. For several decades, these statements had to be supported by evidence of physical or clinical signs of suffering, such as the presence of injuries. Any discussion of the subjective states experienced by animals were considered to be anthropomorphic speculation and discarded. This dismissal of affective states is not in line with the current state of animal welfare science, where affective states are recognised as being strong contributors to animal welfare. This article discusses the justification for using affective states as evidence of animal suffering in court cases, and provides advice for expert witnesses to present a compelling case.

During the 1980s, when animal welfare science was still a developing field, the accepted indicators of good welfare were physical health and the absence of a stress response. However, in the 1990s the importance of the animal's subjective experiences (affective states) began to be recognised. There is now wide scientific acceptance that both biological functioning

and affective states are closely intertwined, and are important determinants of animal welfare.

The authors provide examples of animal cruelty cases in which the affective states of the animal have been successfully included as evidence of animal suffering, even in the absence of physical evidence. To encourage animal welfare experts to compile accurate and compelling arguments when called on to give evidence, the authors recommend using the Five Domains model to assess the severity of the welfare challenge. The Five Domains model provides a systematic method of assessing the mental state of the animal (and thus its welfare state) based on its nutritional, environmental, health and behavioural status. By presenting a rational and well-thought out case supporting the use of affective states in animal cruelty cases, animal welfare experts will be able to assist the judicial system move away from its heavy reliance on physical and clinical indicators of suffering, and toward a more modern consideration of the effects of negative affective states.

Ledger RA, Mellor DJ (2018) Forensic use of the Five Domains Model for assessing suffering in cases of animal cruelty. *Animals* 8, 101, doi:10.3390/ani8070101.

RESEARCH ANIMALS

Virtual anatomy software complements but does not replace cadaveric dissections for vet students

A good knowledge of anatomy is an essential part of veterinary training and has traditionally been taught using the dissection of animal cadavers. The use of cadavers poses several challenges to veterinary teaching faculties, in terms of the time commitment and financial burden involved in acquiring and disposing of the cadavers, as well as the increasing public scrutiny of cadaver use. Consequently, the use of cadavers in anatomy is declining, while the use of computer-assisted learning (CAL) is increasing. CAL technology can provide students with an online interactive tool that provides detailed anatomical information about animals. This study evaluated whether CAL was beneficial for first year veterinary students.

The IVALA program is an interactive virtual three-dimensional anatomy software tool that teaches students about dog anatomy, and is available online through the Veterinary Information Network. 52% of first year veterinary students on the island of Saint Kitts and Nevis volunteered to use the IVALA program to supplement their anatomy studies, although ultimately only 31% ended up using the program. The students who did not use IVALA for study acted as the control

group, and the examination results between the two groups were compared. Students also completed questionnaires to assess their experience of CAL technology in their learning.

The IVALA program significantly increased student test scores from 71% in the control group to 77% in the intervention group. This result was considered to be due to the IVALA program rather than better students self-selecting for the intervention treatment because there was no difference between the two groups in their performance on topics not covered by IVALA. The students rated the IVALA program as enjoyable and beneficial to their knowledge, but strongly opposed the replacement of cadaver dissections with CAL technology. These results demonstrate that virtual anatomy tools provide an opportunity to support and enhance the learning of anatomy.

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WILD ANIMALS

Gunpowder-powered captive bolts provide suitable euthanasia for kangaroo pouch young

Kangaroos are often injured or killed due to contact with humans, such as through commercial harvesting for meat, vehicle collisions, entanglement in fences, dog attacks, or conservation-based culling. Due to the reproductive biology of kangaroos, adult females often carry dependent young in their pouches, and these young require euthanasia after the mother has been killed. Current codes of practice state that blunt force trauma is the preferred method for euthanasing pouch young, but this method has been vigorously opposed by some members of the community due to its perceived cruelty and emotive nature. This study investigated the use of captive bolt guns as an alternative euthanasia method to blunt force trauma for kangaroo pouch young.

A gunpowder-powered captive bolt gun was used to euthanase all furred pouch young that were orphaned during a kangaroo culling program in Australia. The study took place over three nights, and all dead adult female kangaroos were inspected for pouch young. If pouch young were found, they were killed immediately by discharging the captive bolt gun in the 'crown' position of the joey's head. The joeys were able to be euthanased without removing them from the

pouch, minimising stress. An independent veterinarian inspected all euthanasia events and recorded the time taken to euthanase the joey, any signs of sensibility following the shot, the age of the joey, and the anatomical placement of the bolt gun.

A total of 28 joeys were euthanased, and 27 of these joeys (96%) were rendered immediately insensible by an accurate shot with the bolt gun. One joey was not killed immediately due to the bolt gun being placed inaccurately on the joey's head, and this animal was rapidly euthanased with a second shot. Despite this single misplacement, the overall success rate of the gunpowder-powered captive bolt gun was comparable to the published rates of immediate insensibility following captive bolt gun use for livestock at slaughter (90-99%). This indicates that the gunpowder-powered captive bolt gun produces favourable animal welfare outcomes when compared with other euthanasia methods for furred kangaroo pouch young.

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Human-dolphin interactions generate wellbeing and reinforce a connection with nature

Connection to nature and non-human animals can significantly impact human wellbeing. This relationship can be explained by the biophilia hypothesis, which proposes that humans have an inbuilt need to connect with nature to ensure full functioning and wellbeing. Dolphins are a component of nature that has been revered by humans for thousands of years, in many different cultures. In modern times, dolphins are still revered and are often used to symbolise nature and environmentalism. Humans are attracted to dolphins, and they may seek out contact with them through ventures such as wildlife tourism. Previous research has found that close contact with dolphins has the ability to uplift people's emotional states, reduce stress, and improve conservation behaviours. This Australian study examined the phenomenon of human-wild dolphin interactions and how it contributes to human wellbeing.

Eight people who had had one or more interactions or involvements with dolphins that they considered significant were included in this study. Each participant described having a long history of contact and connection with nature prior to the dolphin interaction. Each participant was interviewed using a semi-structured interview within a phenomenological approach. The participants were asked to describe

what the experience felt like, what they thought about, how the experience was different or important compared to other life events, what the impact was on them, and whether the experience affected their connection with nature and animals. These recollections were then subjected to Interpretative Phenomenological Analysis to explore the narratives of wellbeing for each participant.

The narratives reported here described strong emotional connections between the participants and the dolphins, and a common theme of relationships and connectedness emerged. This indicates that human-dolphin experiences fulfil aspects of the human need for connectedness and relationships, and that these experiences promoted wellbeing and environmental behaviours in the participants. For most participants, the dolphin experiences were part of an already established connection with nature, suggesting that they reinforce the connection with nature rather than creating it. This study demonstrates the potential for people to establish strong emotional connections with nature.

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