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ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

An epidemiological analysis of equine welfare data

Sweden has the highest rate of horse ownership per capita in the European Union, and the welfare of these horses is monitored by official inspectors. Compliance with horse welfare legislation is assessed using a standardised list of 45 checkpoints that rate Resource, Management and Animal based indicators of welfare. The results of these inspections are stored centrally and present the opportunity for epidemiological studies of horse welfare in Sweden.

Using the database of welfare compliance inspections, the aim of this study was to use an epidemiological approach to determine the prevalence of premises housing horses in poor welfare in Sweden, and determine the Resource and Management factors (the input variables) associated with poor horse welfare (the outcome). For analysis, poor welfare was defined as having at least one horse on a property non-compliant with at least one of the four animal-based checkpoints (hoof condition, body condition, cleanliness and social contact). A total of 13,321 horse inspection checklists from a three year period were analysed.

The rate of non-compliant premises was 9.5% for normal random inspections and 22.9% for all types of inspections (including complaints, repeat inspections,

permit applications and breeding premises). Hoof condition was the most common indicator of poor welfare, and the risk factors associated with poor welfare were non-compliance with supervision, care or feeding of horses, facility design, personnel, stable hygiene, pasture and exercise area maintenance, and keeping appropriate documentation. In general, lack of knowledge or supervision were the risk factors associated with poor hoof condition, body condition and cleanliness, whereas the risk factors for poor social contact were related to lack of opportunities for these activities (i.e. no pasture or other horses on the premises). The authors suggest that an education intervention aimed at horse industry personnel that targeted equine care, nutrition and hygiene, as well as improving the facility design, would improve horse welfare. The authors also concluded that using epidemiological methods to assess welfare compliance data was an appropriate and effective method of benchmarking and monitoring welfare trends in the national horse population, and that this method could be extended to other species.

Hitchens PL, Hultgren J, Frössling J et al (2016) An epidemiological analysis of equine welfare data from regulatory inspections by the official competent authorities. *Animal*. doi:10.1017/S1751731116002512

Changes in the welfare of an injured working farm dog



The Five Domains Model is a method of assessing animal welfare that takes into account the cumulative effect of all pleasant experiences (welfare enhancement), unpleasant experiences (welfare compromise) and the interaction between the two that an animal feels. This approach uses a grading system to rate the level of welfare compromise and welfare enhancement for each of four physical/functional domains (Nutrition, Environment, Health, Behaviour). The resulting grades are then used to determine the state of a fifth domain, the animal's subjective experience (Overall affective state). The grade assigned to the fifth domain determines the welfare status of the animal. The Five Domains Model differs from other approaches to animal welfare assessment as it incorporates the effects of positive subjective experiences and how they may ameliorate unpleasant experiences for the animal.

In this paper, the authors use the fictitious account of Jess, a working farm dog in New Zealand that is badly injured and rehomed, to demonstrate the use of the Five Domains Model in welfare assessment. The model is used to evaluate changes in Jess' welfare during six sequential stages in her life: on-farm prior to the injury occurring, during the injury (severe laceration to a leg), during veterinary examination, during treatment (amputation and recovery), her recuperation in a new home, and later during her life as a pet. Each of the four physical/functional domains is assessed at each stage of the narrative to determine the overall welfare grade for Jess at each stage. The results include a grade of C1/+ during Jess' life on the farm prior to the injury (mild compromise, low-level enhancement); a grade of D2/0 during the traumatic injury (severe

compromise, no enhancement), and finally a grade of A/+++ following Jess' recovery and rehoming with a loving family (no compromise, high-level enhancement).

The Five Domains Model provides a useful method of assessing an animal's quality of life, and how that quality can change over time. The model also highlights how positive experiences can be used to improve welfare even during situations of welfare compromise.

Littlewood KE, Mellor DJ (2016) Changes in the welfare of an injured working farm dog assessed using the Five Domains Model. *Animals* 6, 58. doi:10.3390/ani6090058

Horses can learn to use symbols to communicate their preferences

Traditionally, communication between humans and horses has been unidirectional, with the horse responding to signals sent from the human. However, horses can be trained to communicate their needs to humans using behavioural signals, and this provides a useful method of determining which resources horses consider important. In this study, the authors investigated whether horses could be trained to communicate whether or not they wanted to wear a horse blanket by touching specific symbols with their nose.

Twenty three Norwegian horses were trained using reward-based operant conditioning (clicker training using carrot slices) to approach a white plastic display board and touch it with their muzzle. The horses were then exposed to display boards containing three different symbols and taught that touching each symbol resulted in a different outcome: a black vertical line resulted in the blanket being removed, a blank white board resulted in no change, and a black horizontal line resulted in the blanket being put on. The horses were then taught that when they were presented with two display boards simultaneously, they could choose which one to touch. This allowed horses to communicate their preference for having their blanket put on, taken off, or no change. The horses were then presented with the symbols during both warm (20-23 C°) and cold (6-9 C°) ambient weather conditions to determine whether blanket choice behaviour was indicative of thermal comfort.

The horses consistently indicated that they preferred to wear a blanket during cold weather, and to wear no blanket during warm weather. This strongly indicates that the horses understood the symbols and were using them to communicate their preferences to the

experimenters. Interestingly, some horses vocalised and ran toward the experimenters prior to testing, and appeared to be eager to perform the test early. When given the opportunity, these horses all indicated that they wanted their blankets removed, and were sweaty beneath them. The authors conclude that horses are able to learn to use symbols to communicate their preferences, and that the very high success rate of this training method shows the potential benefits of this method for future preference studies.

Mejdell CM, Buvik T, Jørgensen GHM et al (2016) Horses can use symbols to communicate their preferences. *Applied Animal Behaviour Science* 184:66-73.



Responses of horses to wither scratching and patting the neck when under saddle

A common behaviour used by horse riders to calm or reward horses under saddle is to pat the horse on the neck, however there is no ethological reason for this to be a rewarding stimulus for horses. Horses engage in allogrooming and prefer the partner horse to groom the withers rather than the neck as a pleasurable stimulus that facilitates comfort and bonding.

Previous research has shown that scratching a horse on the withers lowers its heart rate and induces calm behaviours, and the aim of the current study was to investigate whether horses in Australia responded differently to being patted on the neck or scratched on the withers while being ridden.

A simple obstacle course was set up in an arena and each of the 18 horses was ridden individually through the course before the rider stopped and applied one of three treatments to the horse: scratching the withers, patting the neck, or no interaction, for one minute. This sequence was repeated twice more so that each horse experienced each of the three treatments. During each one minute interaction with the rider, the

horses' heart rate and behaviour were recorded. Heart rate was measured using a monitor that was placed on the horse prior to the start of the experiment. Behaviour was recorded with video cameras and analysed for subtle behaviours that were indicative of the horse feeling agitated, relaxed or ambiguous (when it was unclear how the horse is feeling).

There was no difference in heart rate or heart rate variability between the three treatments. In terms of behavioural response, horses displayed less agitated behaviours and more relaxed behaviours when being scratched on the withers than when being patted on the neck or receiving no interaction. These results suggest that scratching the withers may be a useful method of calming a horse while under saddle, and that patting the neck was an ineffective method of calming horses.

Thorbergson ZW, Nielsen SG, Beaulieu RJ et al (2016) Physiological and behavioral responses of horses to wither scratching and patting the neck when under saddle. *Journal of Applied Animal Welfare Science* 19:245-259.

Assessing the suitability of Thoroughbred horses for equestrian sports after their racing careers

In Poland, the majority of Thoroughbreds retire after their first racing season at three years of age. Rehoming these young horses can be difficult as Thoroughbreds are generally considered dangerous and flighty, and are less popular than other breeds used for recreational riding. This reputation is supported by personality assessments showing that Thoroughbreds are more dominant, anxious and excitable than other breeds. Others, however, consider Thoroughbreds to be intelligent, easily trained, social and inquisitive. It was the purpose of this study to determine whether retired Thoroughbreds can be successfully retrained as safe horses for riding, and what measures can be used to indicate the likely success of a Thoroughbred retrained for leisure purposes.

Twenty five Thoroughbreds were retrained for use in equestrian sports for one year following their last race. Their behavioural and physiological response to various situations (human entering stable, bridling, grooming, being led, novel object test, social contact with other horses) was assessed periodically through the first three months of this training period, after which their suitability for equestrian sports was tested at twelve months (the verification test). Test results were then

examined for changes over time, and correlated with the final score assigned for suitability in equestrian sports.

The behaviour of the horses toward people improved and their heart rates decreased (indicative of improved emotional stability) during successive test periods, indicating the potential for Thoroughbred horses to be successfully retrained for recreational purposes. It took one month of retraining for horses to show marked improvements in their behaviour, and the authors state that behavioural assessments should not be carried out prior to one month of training to ensure accuracy. Both the behavioural response and heart rate response to someone entering their stable, as well as the behavioural response to a novel object, were correlated with the success of the retraining (assessed after 12 months), and these responses may be indicative of suitability for use in equestrian sports. That is, a horse that responds well to a person entering the box and one that is less neophobic may be better suited for use in equestrian sports.

Wilk I, Janczarek I, Zastrzeżyńska M (2016) Assessing the suitability of Thoroughbred horses for equestrian sports after their racing careers. *Journal of Veterinary Behavior* 15:43-49

COMPANION ANIMALS

Effect of cognitive enrichment on frustrated shelter cats

Confinement, such as in animal shelters, laboratories and the home, can cause frustration in domestic cats due to the limited opportunity to roam and hunt. Frustration can result in undesirable behavioural changes and health issues. Frustration can also cause immunosuppression by decreasing the concentration of secretory immunoglobulin A (s-IgA), making cats more susceptible to upper respiratory infections in the shelter environment. One potential method for alleviating frustration in cats is cognitive enrichment through the use of clicker training. It was the aim of this study to investigate the effects of clicker training on mood and immunocompetence in shelter cats.

Fifteen cats at a Canadian animal shelter that were rated as being frustrated on arrival were allocated to either a Treatment or Control group. The Treatment group received individual training sessions four times a day for ten days, outside of their home cage. Each training session lasted for 10 minutes and the cats received food rewards while learning to perform a task ('high fiving' the experimenter). Control cats remained in their home cages and received no additional human interaction or food. Behaviour in the home cages was monitored using video cameras to assess the baseline emotional state of the cat (Content,

Anxious, Frustrated, Apathetic). Faecal samples were collected to assess changes in s-IgA concentrations, and the Treatment cats were rated immediately after each training session as responding either positively or negatively to the experimenter.

The clicker training treatment improved the baseline emotional state of the Treatment cats when compared to the Control cats, with a greater proportion of Treatment cats rated as Content and Control cats rated as Apathetic during the experimental period. The Treatment cats, particularly the cats that responded positively to the experimenter, also had improved immunocompetence, as indicated by greater concentrations of s-IgA and reduced rates of upper respiratory infection than the Control cats. The authors concluded that the treatments, which included time out of the cage, additional exercise, human contact, food reward and cognitive enrichment, reduced frustration and prevented the onset of apathy in shelter cats, as well as providing health benefits.

Gourkow N, Phillips CJC (2016) Effect of cognitive enrichment on behaviour, mucosal immunity and upper respiratory disease of shelter cats rated as frustrated on arrival. *Preventive Veterinary Medicine* 131:103-110.



“Who’s been a good dog?”

Obesity in pets is becoming more prevalent, with 45% of dogs in the UK currently reported as being overweight. The causes of obesity in dogs are multifactorial, with lifestyle, behaviour, diet and owner awareness all indicated as risk factors for weight gain. The feeding of treats to dogs is often also cited as a factor related to weight gain in dogs, particularly in relation to the quantity and suitability of treats given, but there is little research addressing owner attitudes and motivations toward this behaviour.

Two hundred and eighty dog owners were approached while walking their dogs and interviewed about their treat feeding attitudes and behaviours. They were then asked to rank their dog’s body condition and the perceived healthiness of their own lifestyle.

The majority of dog owners were female (72%) and aged over 46 years (70%). Almost all dog owners reported feeding their dogs treats (96%), with over two thirds feeding treats on a daily basis (69%). Despite the prevalence of treat giving, very few

owners (5%) adjusted the size of the dog’s meals in relation to the number of treats given that day. The most common treats given were dog biscuits, dog chews and a variety of ‘other human foods’, including chocolate, cheese and leftover takeaway food. Owners described both positive and negative attitudes toward treat giving. Positive views included improving the variety of the dog’s diet, making the dog ‘happy’, improving the human-dog relationship, and for use as a reward during training exercises. Negative views acknowledged that excessive treats can lead to weight gain, and that it is irresponsible to feed dogs excessive treats. There was no relationship between the owner’s ranking of their own health status and the body condition of their dog. The authors conclude that feeding treats is commonplace, and that many dog owners view treat feeding as a vital component of the human-dog relationship.

White GA, Ward L, Pink C et al (2016) “Who’s been a good dog?” – Owner perceptions and motivations for treat giving. *Preventive Veterinary Medicine* 132:14-19.

Correlations between early social exposure and reported aggression in dogs

Aggression in dogs has a number of important consequences, such as physical injury to humans and animals, reduced social contact and outings for aggressive dogs, and increased rates of surrender and euthanasia. Aggression is difficult to treat in adult dogs, and preventing its development is preferable. Socialisation of puppies is often encouraged as a means of teaching dogs to display desirable behaviours as adults, but there is conflicting advice about the age at which to do so. In addition, neither complete isolation or conversely, social exposure during puppy schools, has been linked to aggression levels in adult dogs. In light of these conflicting results, the authors hypothesise that aggressive behaviour in puppies may in fact be a reason why owners restrict their social contact, rather than restricted social contact causing the aggression.

A retrospective survey of Australian dog owners was conducted online for owners of dogs aged 1-3 years, with 783 respondents completing the survey in a useable manner. The survey collected data on five topics: dog background, early living environment, social exposure experience, current behaviour and health. Dogs were then categorised as aggressive (it had ever shown aggressive behaviour

toward an unfamiliar dog) or non-aggressive, and logistic regression modelling used to determine the predisposing factors.

Approximately half of the dogs in this survey received public social exposure prior to their last vaccination, and 34% had shown aggression at some point in their lives. Aggressive adults were more likely to have had their public social exposure restricted as puppies because they had displayed aggressive or fearful behaviour. Contrary to popular socialisation advice, delaying public social exposure was associated with a lower chance of developing aggression. For every week that the owner delayed public social exposure, the dog was 4% less likely to show aggression as an adult. Other factors associated with the development of aggression were age, breed, source of puppy and use of physical discipline. The authors conclude that unpleasant experiences occurring in public spaces while young may predispose puppies to developing aggression later in life.

Wormald D, Lawrence AJ, Carter G et al (2016) Analysis of correlations between early social exposure and reported aggression in the dog. *Journal of Veterinary Behavior* 15:31-36.

FARM ANIMALS

Affective beliefs influence the experience of eating meat

There are many examples of how our eating experiences are influenced by subjective factors. For example, wine is perceived to taste better if the person believes it was expensive. Beliefs about how food was produced can also influence the eating experience, but to-date no studies have investigated how this phenomenon influences the experience of eating meat. The aim of this study was to investigate whether beliefs about how animals were raised (either on a 'humane farm' or a 'factory farm') would influence the experience of eating meat.

Three similar experiments were conducted in the USA. Participants were given identical samples of meat to eat, with each sample accompanied by a description of how the meat was produced ('humane' or 'factory farm'). Participants were asked to rate their eating experiences in terms of overall enjoyment, taste, sensory properties, their willingness to pay more for the product or eat it again. The amount of meat consumed by each participant was also measured.

Participants consistently rated the factory farmed meat as less enjoyable in all three experiments, despite it

being exactly the same as the meat presented in the control and humane farming samples. When the description of the meat described factory farming in a positive light (emphasising the efficiency of this method instead of the suffering experienced by the animals), enjoyment of the meat increased slightly but was not significantly greater than the negative factory farming description. Participants consumed less of the factory farmed meat, were less willing to eat it again in the future, and would pay less to purchase it when compared to the samples described as humanely farmed or controls. When asked to rate the taste properties of the meat, participants rated the factory farmed meat as more salty, more greasy, and less fresh than the humanely farmed meat. The authors conclude that affective beliefs about animal welfare influence the experience of eating meat.

Anderson EC, Barrett LF (2016) Affective beliefs influence the experience of eating meat. *PLoS One* 11(8). doi:10.1371/journal.pone.0160424



Resilience in farm animals

Animals sense stressors in a variety of ways and respond appropriately, using behavioural, physiological and immunological means. The way that an animal responds can be influenced by factors such as temperament, coping style, affective state, social effects and immune type. Performing these responses comes at a cost to the animal, and if the animal can learn to predict stressors then the appropriate response can be anticipated and its cost reduced.

Resilience is the capacity of animals to be minimally affected by short-term (< 3wks) perturbations in their environment, or return rapidly to their pre-challenge status. Robustness is the capacity to maintain productivity in a wide range of environments (> 3wks) without compromising reproduction, health and wellbeing. Resilience relies particularly on the reaction of the animal to stressors, whereas robustness is influenced by the capacity of the animal to adapt (acclimatise) to persistent characteristics of its environment.

Resilience in farm animals can be increased through management factors and genetic selection. Improving resilience through management can involve providing the animal with a comfortable, non-threatening life

with cognitive and emotional enrichment. Exposing an animal to situations that provide stress inoculation and help it learn to control its environment is also likely to improve resilience. When selecting for resilience, the authors propose that selection be based on a summary of the characteristics of responses to stressors, rather than many individual and variable measures. These responses should only be measured under the intrinsic husbandry conditions for that species, rather than in a laboratory, and the challenges should include a novelty, social and human-animal-relationship component. General disease resistance and group performance should also be selected for to improve resilience. However, selecting animals for improved resilience is no substitute for good management and husbandry. Good animal welfare includes nurturing the capacity of the animal to cope with challenges that are intrinsic to its life history and that cannot be eliminated by other aspects of good housing, good breeding, good husbandry, good disease control and good climatic environment.

Colditz IG, Hine BC (2016) Resilience in farm animals: biology, management, breeding and implications for animal welfare. *Animal Production Science* 56:1961-1983.

The public's level of concern for farm animal welfare in food production

The increasing global population has resulted in intensification of the farming industries, with over 70 billion animals used annually for food production. Concern for animal welfare has increased during recent decades, and this article reviews the literature to determine what is known about the public's level of concern for farm animal welfare, as well as examining the level of concern felt by veterinarians and farmers.

The science of animal welfare evolves as our knowledge base broadens. It is widely recognised that vertebrates are sentient, but this is less so for fish and invertebrates. Veterinarians may attribute greater sentience to companion animals than farm animals, and often do not administer sufficient pain treatments for animals in their care. The reasons for this are multifactorial, but include factors such as time, cost, concerns for food safety and a lack of perception of animal pain. Farmers tend to view the welfare of farm animals as more satisfactory than the general public do, and consider physical health and productivity as more indicative of good welfare rather than whether the behavioural and social needs of the animals are met.

The public generally had poor knowledge of animal farming practices, although interest in acquiring

knowledge and concern for animal welfare appears to be increasing. Approximately 70% of consumers consider animal welfare to be important, with those that are younger, female, or having past experience and familiarity with animals being more concerned. Being religious, a meat-eater, or from a rural background was associated with less concern for animal welfare. Animals that were perceived to be phylogenetically closer to humans, and to have greater mental capacities, received greater levels of concern.

In conclusion, there were high levels of concern for farm animal welfare in the general public, despite a widespread knowledge gap. There is a greater need than ever before for public education on the animal welfare impacts of all production systems. Increasing awareness of farming methods and farm animal welfare will improve public knowledge and be a driver of change through consumer purchasing power. This has the capacity to change the social acceptability of current farming methods and improve the lives of billions of animals.

Cornish A, Raubenheimer D, McGreevy P (2016) What we know about the public's level of concern for farm animal welfare in food production in developed countries. *Animals* 6, 74. doi:10.3390/ani6110074

Animal welfare and efficient farming: is conflict inevitable?

Farmers are under increasing pressure to improve the efficiency of their farms while simultaneously ensuring that animal welfare, food safety and sustainability standards are high. Increasing the efficiency of a farm (such as by increasing the stocking density) is often viewed as being at odds with good animal welfare, however the author proposes that placing a monetary value on animal welfare will help producers to place greater value on welfare. Valuing animal welfare is difficult due to its multifactorial nature and the rapid rate of change in the farming industries, largely through developments in genetics and technology.

In this review, good animal welfare is defined as 'the animal is healthy and has what it wants'. The benefits of good welfare include reductions in mortality and risk of disease, and improvements in health, product quality, food safety and farmer satisfaction. These factors can all translate into improved economic benefits for producers, however there will still be situations where providing good animal welfare comes at the cost of high efficiency. The author states that

it should be the goal of future research to address these conflicts, providing a solution that improves both welfare and farm efficiency. The following topics are raised as areas requiring further research: to place a monetary figure on good animal welfare so that its true value can be recognised by all members of society; to investigate the potential improvements allowed by animal genetics and farm technology; and ensuring that improvements to the housing and husbandry of farm animals actually result in better welfare, rather than just perceived improvements by the general public.

In conclusion, there are both economic and moral incentives to improve farm animal welfare. Conflicts that arise between profits and welfare are likely to be resolved if a sufficient effort is made to find solutions. Good animal welfare is a necessary component of sustainable food production for the future.

Dawkins MS (2017) Animal welfare and efficient farming: is conflict inevitable? *Animal Production Science* 57:201-208.

The contribution of qualitative behavioural assessment to appraisal of livestock welfare

Qualitative Behavioural Assessment (QBA) is a method of assessing the body language of animals using the quality of behaviours, rather than the quantity of behaviours, to gauge welfare. For example, a farmer can rapidly detect a sick sheep in the flock based on its body language. QBA can detect subtle changes in animal behaviour that may be missed if only certain behaviours or body parts are being observed, and is useful for assessing both positive and negative affective states. This review describes current QBA studies and their application in the Australian livestock industries.

During QBA, observers score animals using a list of descriptive terms e.g. anxious, nervous, alert, curious. These scores can be applied to individuals or groups, and be recorded live or while watching video footage. QBA scores correlate well with more traditional measures of farm animal welfare, such as stress physiology and quantifiable behavioural measurements (e.g. distance walked), and subsequently QBA has been incorporated into European welfare monitoring schemes (e.g. Welfare Quality).

Some of the potential issues with QBA are discussed. Observers don't need prior experience with the species

being observed, but do need to be willing to complete the observations carefully. Observers can unconsciously change their scoring over time, or if they are aware of the experimental treatments and thus the expected results. This observer bias is also evident in quantitative studies of behaviour, and careful experimental design can address this effect. Using fixed lists of descriptive terms to score animals, rather than relying on observers to choose their own descriptive terms, improves the consistency and accuracy of results.

QBA is considered reliable between observers, versatile in the field, and sensitive enough to detect subtle differences in behaviour between experimental treatments. It can even be applied to the humans handling farm animals. QBA has been validated for use under Australian livestock industry conditions, and in the future may provide farmers with a tool to both assess and monitor the welfare of their animals.

Fleming PA, Clarke T, Wickham SL et al (2016) The contribution of qualitative behavioural assessment to appraisal of livestock welfare. *Animal Production Science* 56:1569-1578.

Ramps and genetic effects on keel bone and foot pad disorders in modified aviaries for laying hens

Aviaries are indoor, non-cage systems used to house commercial laying hens. They can include features such as perches, additional space, and litter to allow the performance of natural behaviours. However, perches are associated with a high prevalence of keel bone and foot disorders. Keel fractures occur due to collisions with perches, whereas deviations occur due to the shape of the perch. Perch design, wet litter, and genetics can contribute to the prevalence of foot pad disorders in non-cage systems. The aim of this study was to investigate whether providing ramps between perches would reduce the number of keel bone disorders and foot pad disorders in an aviary system. The effects of the ramps were also compared between brown and white genetic strains.

Four hundred hens (half white and half brown strains) were housed in pens with or without ramps from 17 – 52 weeks of age in a facility in Belgium. The ramps were constructed of wire mesh. The hens were inspected for keel bone disorders and foot pad disorders every five weeks, and their egg production data was recorded.

Providing ramps for the hens was very effective in reducing the prevalence of all keel bone disorders, all foot pad disorders, and the incidence of floor eggs. The improvement in foot health may have been due to the mesh ramps scraping manure from the feet and thus improving both foot and perch hygiene. The ramps provided a greater benefit for the foot health of the white hens than the brown hens. Keel bone and foot pad disorders are related to genetic predisposition, and in this study, brown hens were more susceptible to keel bone fractures, possibly due to their greater bodyweight. In conclusion, providing ramps and genetic selection may be effective methods to improve the health and welfare of laying hens in non-cage systems.

Heerkens JLT, Delezie E, Ampe B et al (2016) Ramps and hybrid effects on keel bone and foot pad disorders in modified aviaries for laying hens. *Poultry Science* 95: 2479-2488.

Behavioral preference for different enrichment objects in a commercial sow herd

Housing sows in group pens rather than individual stalls increases their freedom of movement, but also increases the amount of aggression they display while a hierarchy is established. Providing sows with environmental enrichment decreases their aggression levels, but this is not common practice in the USA. Enrichment objects that satisfy the sows' motivation to dig and chew are likely to be the most successful in reducing aggression, as the sows are restrictively fed and thus highly motivated to perform foraging behaviours. This experiment investigated the effect of three different types of enrichment on the behaviour and aggression in commercial group-housed sows.

Following mating, 1350 gestating sows were housed in groups of 75 per pen and provided with one of the three types of enrichment: rope, rubber chew sticks, or a block of wood. Live behavioural observations occurred on days 1, 3, 5 and 14 to record the proportion of sows using the enrichment item, the proportion of time that the item was used, and the activity levels of the sows. The number and severity of skin lesions were scored on Days 0 and 14 as an indicator of aggression levels in each pen.

The proportion of observation time spent interacting with the enrichment object was greater for pens containing rope enrichment, indicating that this was the preferred enrichment item. This is likely to be due

to the rope promoting foraging behaviour and having enjoyable qualities for pigs, such as being deformable, chewable, ingestible and destructible, compared to the rubber sticks and the wooden block. Despite these qualities, while sows interacted with the rope 62% of the time, only approximately 5% of the sows used the rope enrichment at any one time, which was unexpected. The lesion scores and activity levels did not vary between enrichment treatments, and it was concluded that these enrichments did not reduce aggression in the sows post-mixing. Further studies are required to understand enrichment preferences in sows.

Horback KM, Pierdon MK, Parsons TD (2016) Behavioral preference for different enrichment objects in a commercial sow herd. *Applied Animal Behaviour Science* 184:7-15.



The use of perches and platforms by broiler chickens

Providing perches to poultry is considered important for satisfying behavioural needs and improving leg strength. Laying hens will readily use perches when available, but broilers do not make good use of them. Considering the prevalence of leg health issues in broilers, encouraging physical activity and time off litter is desirable. There is a need to investigate elevated structures which are better utilised by meat chickens. This study compared the use of raised platforms and perches and their effects on activity levels in broilers.

A broiler farm in Finland provided broiler flocks with either perches or platforms, which could hold approximately 10% of the flock simultaneously. The 30 cm high platforms were constructed of plastic mesh, and the 30 and 10 cm high perch structures constructed of wood. The use of these structures was monitored using video cameras on Days 11, 19 and 32 after the birds had arrived on-farm.

The use of the platforms exceeded the use of the perches by a factor of ten; on average there were 0.4 birds using the perches during the observation periods, compared to 48 birds using the platform. The broilers did not use the platforms for roosting, and platforms did not increase the overall activity levels on the floor. In general, the use of both perches and platforms

decreased with age, with broilers preferring to use the lower perches at 32 days of age. This is consistent with the increase in size and reduced activity levels seen in broilers as they age. The platforms may have been more attractive because they allowed the birds to become elevated and reduce their stocking density without requiring the locomotor skills needed for perching. The authors conclude that providing platforms may be a more effective method of allowing the birds to satisfy their motivation to become elevated than perches, and while they did not increase general activity, they show good potential as environmental stimuli for broilers.

Norring M, Kaukonen E, Valros A (2016) The use of perches and platforms by broiler chickens. *Applied Animal Behaviour Science* 184:91-96.



Can changes in nasal temperature be used as an indicator of emotional state in cows?

Core body temperature can change with emotional stress, and provides an objective method of measuring changes in the affective states of animals. Due to the potentially stressful nature of measuring body temperature, methods of assessing these changes without handling the animals must be devised. These include remotely measuring the changes in blood flow that occur on the external surfaces of the animal, such as in the eyes or nasal cavities, using infrared thermometers. A drop in the temperature of these peripheral surfaces is often associated with a negative emotional experience. This study investigated the use of nasal temperature as an indicator of emotional valence in dairy cows on a UK farm.

To elicit predictable changes in emotional state, the cows were first trained to associate the sound of a bell with access to the standard type of feed they regularly received on farm. To elicit a positive emotional state, the researchers then provided the cow with concentrated feed (a highly palatable food) when it was expecting standard feed. This type of positive contrast has been successfully used in other species

to elicit excitement. To elicit a negative emotional state, the researchers provided the cow with inedible wood chips when it was expecting feed. This negative contrast is used to elicit frustration. During these treatments, the temperature of the external surface of the nose was measured using an infrared thermometer at regular intervals. Heart rate measurements were also recorded using ECG equipment.

Interestingly, both the positive and negative feed contrasts resulted in decreased nasal temperature and increased heart rate. This suggests that decreases in nasal temperature are more indicative of changes in emotional valence rather than reflecting the positive or negative nature of that experience. It appears that nasal temperature may be a useful method of non-invasively assessing affective state in cattle, but it requires further research before its applications can be fully realised.

Proctor H, Carder G (2016) Can changes in nasal temperature be used as an indicator of emotional state in cows? *Applied Animal Behaviour Science* 184:1-6.

Use of space and its impact on the welfare of laying hens in a commercial free-range system

Providing poultry with access to an outdoor area has many benefits for their welfare, such as allowing the performance of natural behaviour patterns and increasing activity levels. However, not all hens in free-range systems will use the outdoor area, and many of those that do venture outside choose to remain close to the laying house rather than fully use the range. The purpose of this study was to investigate the factors that influence the use of space in free-range hens, the characteristics of space use, and how this impacts on welfare.

Flocks of free-range hens were studied on three commercial Spanish egg farms. One hundred and fifty hens in each flock were tagged to allow easy identification, and observed for one day each fortnight throughout their productive life. During observations, the researcher walked through the indoor and outdoor areas and recorded the locations of the tagged birds. The proportion of birds that were outdoors, their distance from the laying house, and the areas in which there was the highest activity were calculated. To assess

hen welfare, the tagged hens were weighed and scored for foot health, comb pecks and plumage condition.

Surprisingly, almost 50% of hens were never observed outside the laying house, which is much higher than the results from previous studies (e.g. 8-12%). This may be due to the observations only occurring fortnightly, and thus hens that only used the outdoor range irregularly were missed and counted as never using the range. Use of the outdoor range when young was correlated with outdoor use when older; hens that didn't go outside when young were less likely to do so with age. Hens that made more use of the outdoor area showed improvements in plumage condition and foot health. The authors conclude that large variation exists between individuals in the use of the outdoor range, and that early experience with the range is important in determining future outdoor use.

Rodriguez-Aurrekoetxea A, Estevez I, (2016) Use of space and its impact on the welfare of laying hens in a commercial free-range system. *Poultry Science* 95:2503-2513.

HUMANE KILLING

Effects of light on responses to low atmospheric pressure stunning in broilers

Low Atmospheric Pressure Stunning (LAPS) is a method of irreversibly stunning broiler chickens by placing them in a chamber and subjecting them to decompression. The reduction in oxygen levels causes a gradual loss of consciousness over 60 seconds. Previous research investigating the welfare implications of LAPS has measured brain activity (EEG), cardiac activity (ECG) and behaviour in broilers during decompression. The EEG results showed slow-wave activity (indicative of sleep) while the broilers still appeared conscious, and the authors attributed this to the LAPS chamber being dark. This US study aimed to investigate the effect of illumination on the EEG response of broilers undergoing LAPS, as well as to quantify the response of broilers to the chamber without decompression occurring (i.e. a control).

Forty male broilers received surgical EEG implants to measure brain activity and were fitted with ECG instruments to measure cardiac activity. Each broiler was paired with another broiler that had no EEG or ECG equipment fitted, and placed into the LAPS chamber in pairs. The pair then received either LAPS

or no LAPS (control), under either light or dark conditions, for 280 seconds. The behaviour of both birds was recorded using a video camera.

During the sham-treatment, illumination increased activity levels and darkness regularly induced sleep. This finding confirms that the slow-wave patterns observed in previous research were due to illumination levels and not decompression. For birds undergoing the LAPS treatment there was little behavioural change due to light levels, although illumination did increase the amount of time taken to lose consciousness by 15 seconds. It is therefore recommended that LAPS continues to be performed in total darkness, as is current industry practice. The results add to a growing body of evidence that the behavioural and EEG responses to LAPS are consistent, and largely equivalent to controlled atmosphere stunning with anoxic gases.

Martin JE, Christensen K, Vizzier-Thaxton Y et al (2016) Effects of light on responses to low atmospheric pressure stunning in broilers. *British Poultry Science* 57:585-600.

MISCELLANEOUS

One Welfare – A platform for improving human and animal welfare

This article reviews the concept of One Welfare, a strategy that recognises the interrelated nature of human and animal well-being and encourages interdisciplinary collaborations between the fields of human health and animal welfare. One Welfare is based closely on the concept of One Health, a recent worldwide initiative that encourages global collaboration between the fields of human medicine, veterinary medicine, public health and environmental sciences to “promote, improve, and defend the health and well-being of all species”. In this article, the authors promote the idea that One Welfare could easily be incorporated into One Health to improve animal welfare globally.

The authors describe the direct links between animal welfare and human well-being, as well as links between these topics and the environment. Improved communication between professionals working in these fields could lead to improved detection and improvement of suboptimal situations for both humans and animals. For example, the detection of animal welfare problems can act as indicators of

human welfare problems. Animal abuse may occur in situations of family violence, animal hoarding is associated with psychiatric illness, and poor welfare and productivity of farm animals may indicate poor health and well-being in the farmer. Conversely, the detection of poor human well-being can flag their animals for welfare investigation. There are also direct links between animal welfare and human health. For example, immunosuppression resulting from stress in farm animals has been associated with increased levels of *Salmonella* in animal products, causing a reduction in food safety. Human well-being has also been found to be greater in areas of higher biodiversity.

By improving communication and awareness of the relationships between human and animal welfare, the benefits of improving animal welfare to society will become increasingly recognised and human and animal welfare could be improved internationally.

García Pinillos R, Appleby MC, Manteca X et al (2016) One Welfare – A platform for improving human and animal welfare. *Veterinary Record* 179:412-413.



WILD ANIMALS

The Eastern grey kangaroo: Current management and future directions

In Australia, approximately 3 million macropods are killed annually for the purposes of commercial harvesting and population control, largely by shooting. Kangaroo population control is a controversial topic, as the kangaroo is a national icon and tourist attraction that is protected under various nature-conservation Acts, but also considered a pest for reasons such as direct competition with agriculture, creating road hazards, and the effects of overpopulation on other native species.

This paper uses the Eastern Grey Kangaroo as a focal species to review the relevant biology of kangaroos, the current management practices used to control kangaroo populations, the factors that determine the socio-political attitudes toward kangaroo management, and to highlight areas for further research that could improve kangaroo management strategies.

The authors conclude that the biology of kangaroos allows their populations to fluctuate seasonally, and that these populations may require management to avoid human-wildlife conflict. Human-wildlife conflict can occur in the form of competition with primary producers, conservation of native areas, and

threats to human health or livelihood. The welfare of the kangaroos in overpopulated areas must also be considered. Alternative methods of population control, such as contraception and deterrents, exist but shooting is still the most common and practical method of reducing kangaroo numbers. Attitudes toward kangaroo management varied with socio-political influences and generally fell into the following two categories: a utilitarian approach that supported commercial harvesting, supported by farming and conservation organisations, and a protectionist approach that was opposed to harvesting and population management, supported by animal rights groups, urban residents and tourists. The key areas identified for further research are: examination of the socio-political-demographic factors that influence stakeholder contributions to kangaroo population management; assessment of the actual versus perceived impacts of kangaroos, and determining the optimal methods for managing stakeholder conflict in regard to kangaroo population management.

Descovich K, Trive A, McDonald JJ et al (2016) The eastern grey kangaroo: Current management and future directions. *Wildlife Research* 43:576-589.



Annual and seasonal patterns in wildlife road-kill and their relationship with traffic density

Roads can create significant barriers to the movement of wildlife, and the number of animals killed on roads increases with traffic volume. Roadkill surveys provide a rapid method of monitoring trends in the distribution and abundance of wildlife populations, and previous research has demonstrated that the roadkill can reflect the relative abundance of the species in the area. It was the aim of this study to investigate population trends and seasonal variation in the incidence of roadkill for various species (hedgehog, rabbit, brushtail possum, pukeko), under conditions of high traffic volume, to improve understanding of the usefulness of roadkill surveys under New Zealand conditions.

A 62km stretch of New Zealand highway was surveyed 92 times over a six year period, while the authors travelled by car between two towns on the North Island. The carcasses were seen and identified by the driver without stopping, and this data was recorded by an assistant in the car. The section of highway being surveyed was divided into eleven sections, and the volume of traffic on each section during the study period was obtained from the New Zealand Transport

Agency. The study ceased after roadworks altered the highway from its original route.

The number of carcasses identified for each species varied annually, which the authors interpreted as indicating changes in the population densities of these species. The rabbit population experienced rapid growth during the last three years of the study, hedgehog numbers peaked and then dropped, possum numbers showed little variation and pukeko numbers fluctuated without any obvious pattern. Seasonal variation in the number of carcasses was largely related to periods of breeding and dispersal for the study species, as well as hibernation for the hedgehogs. The frequency of roadkill increased with traffic volumes, and the authors suggest that busy roads may form important barriers to dispersal for invasive species, although the impact of roads on native species requires further research.

Sadleir RMFS, Linklater WL (2016) Annual and seasonal patterns in wildlife road-kill and their relationship with traffic density. *New Zealand Journal of Zoology* 43:275-291.



Cats of Australia

Have your say! Visit the survey at <https://edinburgh.onlinesurveys.ac.uk/cats-of-australia>

The purpose of this survey is to collect information about the lifestyle and environment of pet cats in Australia. The survey contains 25 questions and will take approximately 10 -15 minutes to complete.



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