The aim of the animal welfare science update is to keep you informed of developments in animal welfare science relating to the work of the RSPCA. The update provides summaries of the most relevant scientific papers and reports received by the RSPCA Australia office in the past quarter. Email science@rspca.org.au to subscribe.
ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

Assessing stress in horses used for therapy

Animal assisted interventions are programs that aim to improve human health and wellbeing through interactions with animals. Dogs and horses are the most popular animals used. The types of intervention vary and can be adapted to different human subjects (e.g. children vs adults), different types of conditions (e.g. mental vs physical disorders) and different settings (e.g. clinical vs at home). These interventions are being used more widely, but there is limited research of their impact on the animals used. This review summarises the different methods available for assessing stress in horses, and how they can be applied to horses used for equine assisted interventions (EAI).

Stress can be measured using physiological and behavioural parameters. Physiologically, changes in stress hormones (cortisol and adrenaline) can be measured using blood and saliva samples. Blood sampling is accurate but invasive and unpleasant for the horse, while saliva sampling is non-invasive but less accurate. Remote monitoring of heart rate and skin temperature using infrared thermography cameras can assess stress non-invasively, but require sufficient technical expertise to use. Behaviourally, signs of negative emotional state in horses can be assessed using ear, eye, head, neck and tail positions, mouth movements, body position movement and response to commands. Active and passive avoidance behaviours are good indicators of fear and anxiety. Researchers should be aware that horses can be trained to inhibit these behavioural signs of stress, so therefore the absence of these behaviours does not ensure good welfare.

The limited research examining the stress response of horses during EAI shows that these interventions are no more stressful than normal recreational riding, although these studies used small sample sizes. Future research in this area should evaluate the different types of interventions used, and include a detailed description of the horse, their history and current living conditions. Information about the handlers and riders should also be considered, as horses are very sensitive to changes in human behaviour. By recognising and reducing horse stress during EAI, both human safety and horse welfare can be improved.


The prevalence of microfractures due to bone fatigue in Thoroughbred racing horses

Palmar/plantar osteochondral disease (POD) causes damage to the knee joints of Thoroughbred racing horses, and is a common cause of lameness and poor performance. POD is the result of bone fatigue that occurs when these bone surfaces are subjected to repeated high loads, such as when galloping during training and racing. Bone fatigue injuries begin at the microscopic level, manifesting as microfractures that accumulate over time until they develop into macroscopically visible fractures (gross POD). This study examined the prevalence of microscopic bone injury in the knees of Thoroughbred racing horses, and its association with the horse’s racing and training history.

A convenience sample of racehorses that had been euthanized in Melbourne, Australia, was used to collect limbs for analysis. Due to other research requirements, only the forelimbs or the hindlimbs were analysed for each horse, not both. This resulted in 38 horses with the forelimbs assessed, and 45 horses with the hindlimbs assessed. Bone samples from the forelimbs were examined using scanning electron microscopy to determine the prevalence of microfractures, while the hindlimbs were examined histologically to determine the rate of cell death within the bones. Both methods can detect evidence of bone fatigue. The racing and training history for each horse was collected from an online database and through discussions with the horse’s trainer and veterinarian.

The prevalence of bone injury was high, with microscopic evidence of bone fatigue present in nearly all of the horses examined (97% of forelimbs and 98% of hindlimbs). The density of microfractures in the forelimbs increased with age and the number of races started, and was greater for horses that were in training compared to those being rested from training. This is consistent with ongoing bone fatigue related to accumulation of galloping distance, and suggest that the current frequency and duration of rest periods is insufficient to prevent bone damage.

Qualitative Behavioural Assessment of horses exposed to short-term emotional treatments

Determining the emotional state of animals is a key component of animal welfare assessments. Qualitative Behavioural Assessment (QBA) is one method of assessing the emotional state of animals, and relies on human observers describing the expressive body language of an animal using a pre-determined list of terms, such as relaxed, curious, agitated etc. These observer ratings are correlated with other measures of animal welfare, such as behaviour and physiology, and are now accepted as a valid method of assessing emotions in animals. This study investigated whether the QBA methodology could be used to differentiate between the behavioural expression of horses that were exposed to treatments designed to elicit positive and negative emotional responses.

16 horses from a stud farm in Switzerland were exposed to two positive and two negative treatments, and their behavioural responses were filmed for 60 seconds. The two positive treatments involved anticipating a palatable food reward (Food Anticipation) and being scratched on the withers (Grooming). The two negative treatments involved being fed last after a period of food deprivation (Food Competition), and having a plastic bag waved at the horse (Plastic Bag). All treatments occurred in the home stall. The human observers were 15 female veterinary students that were blind to the treatments. These observers watched a sample of video footage, and each generated a list of terms to describe the horses’ behavioural expression. Each observers list was then converted to a personalised scoring sheet that was used to score every horse after each treatment. These data were analysed using Generalised Procrustes Analysis to determine consensus between observers, and generate three dimensions of behaviour.

The observers could successfully differentiate between the treatments, and were consistent in describing the behaviour of the horses. Horses were consistently judged as more ‘calm/relaxed’ during grooming, while horses exposed to the plastic bag were judged as more ‘stressed/nervous’ and ‘insecure/frightened’. In the two food treatments, horses were judged as more ‘irritated/impatient/angry’, with the horses anticipating a food reward also described as more ‘curious/interested’. These results demonstrate that QBA is a promising tool to complement animal welfare assessments.

Horse-keeping practices in Australia

Horses have evolved to live in large groups, travel large distances daily, and graze on a wide range of plants. In comparison, modern horse-keeping practices often limit the movement, food sources and social contact of horses. For example, horses may be housed individually in stables, and receive concentrated diets with little forage or dietary variation. These practices are associated with poor physical and mental outcomes for horses. Understanding how horses are kept provides veterinarians with important insights into their health and welfare, and is beneficial when working with horse owners to improve horse welfare. To determine common horse-keeping practices, the Australian Horse Industry Council (AHIC) conducted its first national Horse Health and Wellbeing survey in 2012/2013. The results of that survey are presented in this article.

An online survey was developed that included 37 closed and open-ended questions across nine key areas of horse husbandry. Australian horse owners were recruited opportunistically through the AHIC website, newsletters and social media. A total of 505 surveys were completed, and each respondent completed the survey in relation to one representative horse in their care. If they owned another horse that they cared for in a substantially different way, they were invited to complete an additional survey for that horse.

The sample size of 505 represents approximately 0.13% of the estimated 400,000 horse owners in Australia, but showed good geographical distribution. The majority of horses were Thoroughbreds (24%), male (64%), and living along the eastern coast of Australia (71%). Most horses (83%) were kept in paddocks, which contrasts with Europe where most horses are housed individually in stables. Areas of potential concern were stabled horses that were exercised less than once per day (25%), incorrect owner knowledge about the recommended space allowance in stables (7%), and horses that were housed alone (26%). The most common feeding regimen was combined daily supplementary feeding and grazing, and most horses had access to an automatic water refill device. This survey has provided an indicative profile of horse-keeping practices in Australia, and will assist with the public communication of horse-keeping guidelines.

Effects of brachycephaly and body condition on heat stress in dogs

When faced with hot weather, dogs must pant to cool themselves down. This mechanism works by evaporating water from the moist surfaces of the respiratory tract, and the rate of panting increases with the amount of heat to be dissipated. Brachycephalic dogs, such as Pugs, are at high risk of heat stress due to their compressed facial features. Airflow in the upper respiratory tract is restricted, reducing evaporation and requiring greater physical effort to pant, which in turn increases heat production. An exacerbating factor is excess body fat, which insulates the body from heat loss. This American study compared the thermoregulation of brachycephalic and non-brachycephalic dogs when faced with a heat challenge.

The respiratory pattern of 52 brachycephalic dogs and 53 non-brachycephalic dogs were compared using a sealed whole-body plethysmograph. This device measures changes in the volume of the dog’s body to calculate breath volume and respiration rate. The respiratory pattern and body temperature of the dogs were measured individually during 10 min of exposure to a cool treatment (22°C) followed by 10 min of exposure to a hot treatment (33°C), one hour later. All dogs were body condition scored to assess body fat, and any dogs that showed signs of respiratory distress were removed from the treatment.

The body condition score of the dogs had the greatest effect on their respiratory response to heat stress, with greater body fat associated with a higher body temperature under both hot and cool treatments, and reduced breath volume. The brachycephalic dogs showed a greater increase in respiration rate than non-brachycephalic dogs. These results indicate that brachycephalic dogs have a decreased capacity for thermoregulation than non-brachycephalic dogs, but body condition score has the greatest impact on body temperature. In conclusion, both brachycephaly and body condition should be considered risk factors when assessing whether a dog may be susceptible to heat stress.


Thoroughbred fatality and associated jockey falls and injuries in horse races

Race day horse fatalities are a major concern for the racing industry due to the detrimental publicity, emotional and financial cost, and the increased risk of injury to other horses and jockeys. The majority of racehorse fatalities and jockey falls are attributable to musculoskeletal injuries that require euthanasia. By monitoring horse fatalities and jockey falls on Australian racetracks, the industry will be able to benchmark current risks to horses and jockeys against those of other countries, and assess future intervention strategies. This study describes the incidence of and reasons for horse fatalities during flat races, as well as the jockey falls and injuries associated with these fatalities.

In Australia, all race day horse fatalities must be reported to Racing Australia within 24 hrs of the horse’s death. The resulting database was used to collect data relating to race day horse fatalities between 2009-2014 in NSW and the ACT. The quality of the data was variable, but largely allowed the researchers to record the following horse-related variables: sex, age, type of death (euthanised or spontaneous). Reasons for horse fatality were categorised as musculoskeletal, internal, or unspecified. Data relating to the jockey was also collected for all horse fatalities, including information on whether the jockey fell, any injuries that occurred and demographic data.

A total of 167 horse fatalities were recorded over the five racing seasons, with an incidence rate of 0.59/1000 starts. The most common cause of death was euthanasia due to musculoskeletal injuries (86%), and the majority of musculoskeletal injuries were fractures to the forelimbs. Forelimb injuries were also a common cause of jockey falls and injuries, with jockeys injured in 19% of horse fatalities, and 64% of falls. The most common injury experienced by jockeys was injury to the upper limbs. The prevention of catastrophic forelimb injuries in racehorses presents an opportunity to mitigate jockey injuries and racehorse fatalities. In conclusion, the incidence of racehorse fatalities and jockey injuries was comparable to previous studies. Standardisation of record keeping would allow more detailed examination of the data, and international comparisons to be made.

Lizard owners may struggle to meet the welfare needs of their pets

Lizards are a popular pet in Australia, however little is known about how they are cared for by their owners. This may have important implications for lizard welfare, as pet lizards are predominantly caged animals and are thus totally dependent on their owners to have their needs met. These needs include appropriate heating, lighting, shelter, and limiting social contact with humans and other lizards. The fact that lizards do not behave like mammals exacerbates the likelihood that owners will not recognise their behavioural indicators of poor welfare. To assist lizard owners in caring for their pets, the Victorian Code of Practice for the Private Keeping of Reptiles has been developed. This Code provides basic information on how to manage a captive lizard. The aim of this study was to examine the extent to which lizard owners were compliant with the standards set out in the Code of Practice.

A sample of licensed lizard owners in Victoria were asked to complete an online survey about their demographics and lizard management practices. Specifically, the survey collected information about the environment, behaviour, social contact, diet, exercise and veterinary attention provided to pet lizards in Victoria. A total of 316 lizard owners completed the survey.

The survey results suggest that many owners were not complying with the Code of Practice. For example, nearly half of all owners did not meet the recommended space requirements for their pet’s enclosure, or seasonally vary the conditions within the enclosure. Many owners reported that their lizard required more care and expense than they had anticipated, and educating potential owners prior to purchase may be beneficial. It was difficult to determine whether an appropriate diet was being provided, however 90% of owners self-reported that their lizard was in ideal body condition, so diet may not be adversely affecting lizard welfare. Nearly one third of owners handled their lizard daily, which may be too often for some lizards. In conclusion, it is likely that many lizards experience captivity-related stress due to inadequate enclosures, and research is needed to elucidate the specific needs of pet lizards to improve their welfare.

SCIENCE UPDATE

The relationship between targeted management practices and outcomes for shelter cats

Many animal shelters struggle to manage crowded facilities, with negative consequences for cat health and the likelihood of adoption. Crowding increases the risk of infectious disease, decreases welfare, and creates an excessive workload for staff. Cats are also less likely to be adopted if they are unhappy, and a large shelter population may overwhelm adopters with so many choices. By limiting the maximum daily population of a shelter, cat welfare and housing quality can be improved, with consequent reductions in the time taken to adopt each cat. This study investigated the effects of a targeted management model (Capacity for Care) on the outcomes for cats at three Canadian animal shelters.

Each shelter received a 3-day site-visit with the authors to calculate the maximum daily population limit for each shelter. This limit was based on historic intakes and adoption rates. Housing quality was improved by adding a doorway between two enclosures, effectively doubling the space allowance per cat. This also reduced the number of cats that the shelter could accommodate. The authors then provided strategies to reduce the length of stay for each cat, such as placing friendly cats immediately into adoption and removing lengthy application processes. The shelter records for 2 years prior to the intervention were then compared to the records for 1-2 years post-intervention to determine if cat outcomes were improved.

Implementation of the Capacity for Care model resulted in improved cat outcomes for all three shelters. The average length of stay, the number of sick cats in isolation, and euthanasia rates were all reduced, while adoption rates improved. Anecdotally, the new management model also resulted in improved staff morale, reduced cleaning time, and increased time spent playing with the cats. It is likely that the improved housing helped decrease the length of stay by improving the welfare of the cats, making them a more attractive option to adopters. The three areas of management (housing, daily population, length of stay) interact to improve cat outcomes, and it could not be determined which factor had the greatest impact or whether it could be implemented as a standalone intervention.


High-volume desexing clinics experience lower mortality rates than low-volume clinics

Spay-neuter programs are an effective means of controlling overpopulation, and are responsible for decreasing the number of cats and dogs entering animal shelters in the USA from 13 million/year in 1973 to 6-8 million/year in 2017. While 83% of dogs and 91% of cats in the USA are estimated to be de-sexed, only 13% of pets in low socioeconomic areas are de-sexed due to the cost of the procedure. To address this disparity, high-volume spay-neuter clinics have proliferated. These clinics are run by non-profit organisations and offer subsidised services to high-risk pets. Due to the high volumes of patients (e.g. 25-100 cats per day), concern has been raised over the quality of care received by animals at these clinics. This study examined the mortality rates of cats and dogs undergoing desexing at a high-volume spay-neuter clinic in the USA.

Electronic records were examined retrospectively to assess perioperative mortality rates. Perioperative mortality was defined as any death that occurred within 24 hrs of the animal first receiving pre-operative sedation. Records were available for the period January 2010 – September 2016, providing surgery information for 56,075 cats and 37,415 dogs.

During the 6.5 year recording period, 34 cats (5/10,000 surgeries) and 4 dogs (0.9/10,000) died in the day following surgery. These rates are one tenth of the those reported by low-volume clinics, and are approaching the rates reported for human surgeries (1/10,000). The higher number of cat deaths may be due to many of these animals being trapped community cats. These animals are not pets, and are often anaesthetized prior to removal from the trap, which precludes accurate drug dosing and a physical examination. Despite this, mortality rates were extremely low. This is likely due to the young, healthy population of animals receiving elective surgery, and the high proficiency of a veterinary team that specialises in a small number of surgeries.

The effects of exercise and calm interactions on the behaviour of shelter dogs

Dogs in animal shelters can experience prolonged stays or euthanasia if they aren’t adopted, with dogs that display undesirable behaviours such as hyperactivity or barking considered less attractive to adopters. Exercise is often cited as a means of improving dog behaviour, but research in this area has not found a consistent relationship. The authors hypothesise that dogs may increase their activity levels when approached by a human because they associate humans with exercise and become excited. Training dogs to associate humans with calm interactions may improve their behaviour when approached by potential adopters. This study compared the effects of exercise and calm interactions on the behaviour of shelter dogs when approached by a human.

This experiment was conducted at an animal shelter in the USA. 16 dogs were divided into 2 treatment groups and received either exercise or calm interactions with a human for 15 mins per day for 2 weeks. The exercise treatment involved active toy-play with a human, and / or running on a leash. The calm interaction treatment involved being removed from the kennel and remaining on a leash while a human read out loud from a book, ignoring the dog. The behaviour of the dogs was assessed for 30s prior to and 30s just after each treatment session using a video camera.

Both types of interventions provided benefits for dog behaviour, but also resulted in some undesirable behaviours. The dogs displayed appropriate behaviours when anticipating both the exercise and calm treatments, such as standing stationary and alert at the front of the kennel. But the dogs displayed undesirable behaviours immediately after returning to the kennel, with increased activity following the exercise treatment and more asocial behaviour (facing away) following the calm treatment. The authors conclude that both interventions can be useful, but may need to be tailored to individual dogs, and should be applied after the shelter has closed to avoid exposing potential adopters to the undesirable behaviours following treatment.

Cats prefer social interactions with humans over food, toys or scent

Cats are a very popular pet, with 85 million pet cats living in the USA. Despite their popularity, cats are often thought of as independent, aloof, and untrainable, despite evidence to the contrary. The cat’s untrainable reputation may stem from a lack of knowledge of which stimuli cats find most rewarding, and are thus most willing to work for in training situations. This study compared the preferences of cats for social interactions, food, toys or scent.

25 shelter cats and 25 pet cats were recruited for this study. The shelter cats were tested in a room at the shelter and the experimenter provided the human social contact, while the pet cats were tested at home with their owners. The preference testing was conducted once for each stimulus category (social interaction, food, toy, scent), with 3 different types of stimulus presented simultaneously for each category. For example, in the food category, the cat’s preference for 3 different types of cat food (tuna, chicken, treats) was assessed by placing all three foods in a room with the cat and observing the cat’s behaviour. The cat’s favourite stimulus was determined by recording which stimulus it spent the most time interacting with during the 3-min test. The cat’s favourite item from each category was determined, and the favourite item overall was determined by comparing all four stimuli in a 4-way comparison using the same testing method.

Cat preferences were highly variable, but social interaction with a human was the most preferred stimulus category overall for most cats, followed by food. The next most preferred categories were toys and then scent, although these categories were much less popular. Within the categories, playing and petting were the most preferred human stimulus, tuna and chicken were the preferred food stimulus, a moving toy was the preferred toy stimulus, and catnip was the preferred scent stimulus. The strong preference for human interaction suggests that cats are more domesticated than previously thought, and both human interaction and food could act as rewards during training. Human interaction should also be considered as an enrichment in the shelter environment.

Can play be used as an indicator of good welfare?

Play is often cited as an indicator of good welfare because rates of play increase when an animal’s needs are met, and decrease when they are experiencing hardship. It is well accepted that playing has immediate positive effects on animals, and that a reduction in play is an indicator of poor welfare. However, it is not yet clear whether play can be used as an indicator of good welfare in animals: does the existence of play behaviour indicate that an animal is thriving (optimal welfare) or merely coping (relative welfare). This article reviews the literature relating to humans and animals to determine whether play can be used as an indicator of optimal or relative welfare in animals.

The research relating to play has focused largely on the changes in play behaviour that result from negative affect (unpleasant emotional states), and there is very little research examining how positive affective states influence play. Children who are sick or experiencing negative circumstances show a consistent reduction in social play. However, the total amount of time spent playing does not necessarily change, as these children show a concurrent increase in solitary and re-enactment play. Thus, it appears that negative affect changes the quality of play in children, but not the quantity.

There is much less research available relating to play in animals, and this research is limited as we cannot directly ask animals how they are feeling at the time of observations. Nevertheless, animals show a consistent reduction in play behaviour during unpleasant situations such as food restriction, social stress, pain and fear. Some studies have found counter-examples, where play actually increases under situations of poor welfare, and play may be used as a method of coping with stressors. The relationship between welfare and play is complex, and there is not enough research available to determine whether play behaviour is indicative of optimal or relative welfare in animals. However, given the changes seen in human play behaviour, future research should examine qualitative changes in play behaviour, rather than simply measuring the total amount of time spent playing.


The use of dustbathing substrate and straw bales as enrichment for broilers

Commercial broiler chickens spend most of their time sitting down, which results in poor leg health and skeletal disorders that worsen with time. Providing broilers with enrichment items that encourage movement and provide a stimulating environment are thus likely to improve welfare. Some farmers provide their broilers with straw bales to encourage foraging behaviour, but the effectiveness of these items has not been assessed under commercial conditions. Neither has there been any assessment of dustbathing enrichments in commercial broilers. This study examined the effects of providing straw bales and ground oat hulls to broilers on their leg health, behaviour and productivity.

This study was conducted on a commercial broiler farm in Northern Ireland, and each of the following treatments were applied to four flocks of chickens: Straw bales, oat hulls, both straw bales and oat hulls, and a control. The bales were plastic-wrapped with holes cut in the plastic to give birds access to the straw, and the ground oat hulls were provided in metal rings on the floor. Broiler behaviour and enrichment use was recorded weekly in different parts of the house using video cameras, and a sample of broilers were gait-scored to determine the incidence of lameness. The productivity of each flock was also recorded.

Broilers receiving oat hulls showed greater rates of foraging and dustbathing behaviours than the straw bale and control treatments. These behaviours may have provided sufficient exercise to improve leg health, as birds in the oat hull treatment also showed a significant improvement in walking ability by the end of the production cycle. In comparison, the broilers in the straw bale treatment spent more time sitting inactive next to the bales. This may have been due to the birds perceiving the bales as cover and thus a safe place to rest. The treatments had no detrimental effects on productivity or environmental conditions, and the authors conclude that both oat hulls and straw bales should be provided as enrichment to broilers as they serve different functions for broiler welfare.

Artificial meat and the future of the meat industry

The global population is estimated to reach 9 billion by 2050, but current food production methods can only feed 8 billion. The meat industry would need to increase production by 50-73% to meet this demand. The current options available for increasing the efficiency of meat production are selective breeding, sustainable farming (agroecology), animal cloning and genetic modification. An alternative option is the development of meat substitutes from plant, algal, fungal or insect proteins. Another option is the production of artificial meat using in vitro cultures, and 3D printing technologies that use meat by-products as a printing material. This article reviews the advantages and disadvantages of using these alternative sources of protein in the future.

For a protein source to be successful it must meet the consumer demands associated with market acceptability, animal welfare, environmental impacts, and health and safety. Meat is very well accepted globally, while meat substitutes and artificial meat face issues with palatability and neophobia. If these alternative products did become well accepted, they have the potential to substantially improve animal welfare by decreasing the number of animals farmed globally. Soy and insect-based meat substitutes have the lowest environmental impact. Artificial meat production would use much less land and water, and may potentially use less energy, although these estimates are still theoretical. In terms of health and safety, artificial meat is likely to require antimicrobial treatment to ensure sterility during production, with likely consequences for human health. In terms of health, current meat substitutes often contain low amounts of protein, and significant amounts of additives are used to improve the resemblance to meat. Insect protein provides a much more nutritious alternative. Meanwhile, the meat industry can address many of these consumer demands through improved farming practices and genetic selection.

For the agricultural industries to meet global demand for protein, it is likely that a combination of many new technologies will be required. While conventional production of meat from animals continues, it is likely that the low-grade meat cuts and processed meats will face increasing competition from other protein sources in the near future.


The welfare of layer hens in cage and cage-free systems

Australia has recently drafted national standards for poultry welfare, and has invited the public to comment. Unlike welfare standards in many other countries, the current draft does not propose a phase-out of conventional cage systems for laying hens. This article provides a scientific review and comparison of layer hen welfare in different housing systems in four key areas: musculoskeletal health, disease, severe feather pecking and behavioural expression.

The lack of space and environmental complexity in conventional cages severely restricts hen movement, and prevents the birds from performing many highly-motivated behaviours such as foraging, perching, nesting and dustbathing. The hens do not adjust to prolonged spatial restriction. The lack of exercise results in poor musculoskeletal health, high susceptibility to fractures during depopulation, and metabolic disorders, while the behavioural restriction results in frustration, stress and poor welfare.

The advantages of cage systems for hen welfare are reduced rates of infectious disease, fractures which occur over their lifetimes, and a lower risk of spreading feather pecking. However, furnished cages provide hens with more space, and the opportunity to forage, perch, nest and dustbathe, although these features meet varying degrees of success. Hens may not be able to dustbathe due to insufficient space or litter, and foraging is often limited to a small area of astroturf sprinkled with feed. Hens in furnished cages thus experience greater behavioural freedom than hens in conventional cages, but may still experience frustration of some behavioural needs. In terms of health, hens in furnished cage systems experience the lowest rate of fractures, experience less metabolic disorders than conventional cages, and lower rates of infectious diseases and feather pecking than non-cage systems.

Non-cage systems allow the greatest degree of behavioural freedom, but face challenges in terms of infectious diseases, feather pecking, and bone fractures during the laying period due to collisions with objects in the shed. These challenges can be mitigated through improved management practices and genetic selection. In comparison, the challenges posed by conventional cages cannot be mitigated by improved management. Importantly, the review concludes that while science should have a prominent role in underpinning animal welfare standards, the draft poultry welfare standards do not include a scientific review or a scientific committee, and that conventional cages are permitted despite scientific literature and international trends.

Peat litter is better for broiler foot health than sawdust or ground straw

Broiler chickens spend most of their time standing or sitting on litter. Over time the litter can become damp due to manure and water spillage and the prolonged contact with wet litter burns the footpads and hocks of the broilers. This is known as contact dermatitis. The severity of contact dermatitis can range from discolouration of the footpad through to deep ulceration, and is a welfare concern for broilers. Providing broilers with perches can increase activity levels, improve leg health and provide them with an opportunity to escape wet litter, but may also interfere with air flow and further compromise the litter condition. Studies have found low use of perches by broilers, and raised platforms may be more appropriate. This study investigated the effects of different litter substrates and the provision of raised platforms on the incidence of contact dermatitis in commercial broilers.

Two experiments were conducted on Finnish broiler farms, where peat is the standard type of litter used. The first experiment compared peat, sawdust and ground straw as litter substrates, while the second experiment investigated the effects of raised platforms when used on peat litter only. In both studies, litter quality was assessed at the start and finish of the production cycle, and the severity of foot and hock lesions were scored on a sample of birds after slaughter.

The majority of broilers (>70%) had healthy footpads, which is higher than the rates reported in previous research. The rates of contact dermatitis were lowest for broilers housed on peat litter, and highest for the sawdust litter. Unexpectedly, there was no difference between the quality of the peat and sawdust litter at the end of the production cycle despite the different rates of dermatitis, indicating that the relationship between litter quality and contact dermatitis is more complex than previously thought. Providing the broilers with raised platforms had no significant effect on litter quality or the incidence of contact dermatitis. The authors conclude that peat litter is beneficial for broiler foot health in comparison to sawdust and ground straw and highlight the importance of managing litter condition, regardless of the type of litter, and that there are no negative effects of providing raised platforms on litter quality.

Re-direction of maternal behaviour in dairy cows

In the hours following birth, cows devote most of their time to licking their calf. This stimulates calf activity and dries their coat, reducing heat loss. Oxytocin plays a central role in stimulating maternal behaviour, as well as mediating milk let-down. In commercial dairy farming situations, where cows experience continued milking while simultaneously being deprived of contact with their calf, the regular oxytocin release may stimulate maternal grooming behaviour that cannot be satisfied. The cow’s urge to engage in physical contact with the calf may then be redirected to other objects in her environment. This study investigated whether dairy cows redirected their need for physical contact by increasing their use of automatic rotating brushes following parturition.

Two automatic rotating brushes were installed on a dairy farm in Israel. The brushes started rotating when a cow applied pressure to them, and data were automatically collected on which cows used the brushes, and for how long on each day. Brush usage was monitored continuously for 9 months for a herd of 160 dairy cows, and the amount of brush usage following parturition and daily milking were examined.

The cows increased their brush use following parturition, with 90% of cows using the brush on the day after birth for an average 6 minutes. The days following parturition are a period of negative energy balance, recovery from birth, and social instability as new members are introduced to the group hierarchy. The fact that cows still showed an increase in brush usage during this period suggests that this is a highly motivated behaviour. Brush use decreased over the following weeks to an average of 2 minutes per day, although 81% of cows still used the brush daily. Brush use was also higher in the hour following milking than during the hour prior to milking (12% and 8% of cows, respectively), supporting the role of oxytocin in motivating the need for tactile contact in dairy cows. These results suggest that cows may re-direct their need to engage in contact with their calf toward an external object.

Straw is a better nest-building material for sows than peat

Prior to giving birth, wild sows will construct a nest from grass and branches to protect the newborn piglets from predation and the cold. This behaviour is still highly motivated in commercial sows, despite being protected from both predators and thermal extremes. Straw is the best material for eliciting nesting behaviour in confined sows, but providing straw is often not practical as it is labour intensive and can block the effluent systems used on farms. Peat may provide an alternative that is less bulky but still able to be manipulated by the sows. This study investigated the effects of providing peat and straw on the nest-building behaviour of loose-housed sows.

54 sows were housed in individual farrowing pens at an agricultural college in Norway. Two days prior to farrowing the sows were divided into 3 groups and received one of the following treatments: 4kgs of peat, 2 kgs of straw, or no nesting material (the control group). The straw and peat were topped up daily as they were consumed or fouled, and all sows received 1.6kg of sawdust daily as litter following cleaning. Sow behaviour was recorded using overhead video cameras, and video analysis began 12 hrs prior to the first piglet birth. The total amount of time spent performing nesting behaviours, the complexity of the nest-building behaviours and the time budget was recorded.

Sows which received peat and straw showed more nesting behaviour than the control group, and sows that received straw showed a greater variety of nest-building behaviours such as pushing, carrying and arranging the nesting material. This indicates that straw stimulated more nest-building than the other materials, and allowed the sow to construct a more complex nest. Having satisfied their motivation to nest, sows in the straw treatment were calmer, less frustrated, and showed less stereotypies prior to farrowing. Older sows appeared to have a higher motivation for nest-building as they spent more time nesting, and showed greater frustration when deprived of nesting materials. In conclusion, straw is a better nest-building material than peat, and farm effluent systems should be adapted to cope with straw waste.

Indoor-housed dairy cows prefer outdoor access to pasture rather than sand

When given the opportunity, indoor-housed dairy cattle show a strong preference for access to pasture at night time. Pasture access is beneficial for cow health and welfare, but is not always practical under commercial conditions. Potentially, providing cattle with access to a comfortable outdoor lying area rather than green pasture may be a practical option for dairy farmers. This study compared the preferences of indoor-housed dairy cows for night-time access to pasture and a yard bedded with sand, and the associated changes in cow behaviour.

This study was conducted at a dairy research centre in Canada. 96 pregnant dairy cows were housed in groups of 12 in a freestall barn, with gated access to an outdoor yard bedded with 15cm of sand (12m x 12m), and a paddock containing pasture (350m x 60m). Each group was given 2 days of access to the pasture followed by 2 days of access to the sand to allow familiarisation and a comparison of the two environments. This was followed by 3 days of free access to both environments at night. During this period the amount of time spent in each area (indoors, pasture or sand pack) as well as feeding and standing behaviour were recorded using video cameras. Lying behaviour was logged automatically using data loggers on the rear legs.

When cows had access to one area only, they spent 90% of their time on pasture, and 44% of their time on the sand pack. When given a choice between the two outdoor areas, the cows strongly preferred the pasture over the sand pack (91% vs 1% of the available time outdoors). This preference may have been due to the increased space allowance in the pasture area, as well as the opportunity to graze. The total amount of time spent eating concentrated feed was lowest when cows had access to the pasture, and they spent less time lying when on pasture, indicating that they did spend more time grazing during this treatment. The cows spent equal amounts of time lying down on pasture and sand, indicating that both surfaces were equally comfortable.


A review of animal welfare research published in the Journal of Dairy Science over the last 100 years

The Journal of Dairy Science (JDS) recently celebrated 100 years of publication (1917-2017) by commissioning a review of the animal welfare research that has been published in this journal. This review discusses the definition of animal welfare, animal welfare as a social movement, relevant research that has been published in JDS, and future directions for research.

The first article to use the term ‘animal welfare’ was published in 1983. Since then, 244 welfare-related articles have been published in JDS, with most of those published in the last 10 years of the journal’s 100-year history. The definition of animal welfare has changed during this time from a focus on health and production to a combined focus on health, affective states and natural behaviours. There has been a greater focus on health-related concerns for dairy cattle, as these issues are often associated with decreases in production. 1800 health-related articles have been published in JDS, with 118 of these specifically relating health to welfare. Articles relating to affective states started appearing from 1999, and have covered topics such as pain, fear, hunger and play. Few articles have been published on the naturalness of cow behaviour and management, despite this being the area of greatest public concern. Social science research relating to societal concerns for dairy cow welfare has been well published in JDS.

Areas of cow welfare that have been well-addressed by JDS are that of cow comfort, tail docking, pain relief during dehorning, and cross-sucking in calves. Little research has been published on other important areas, such as confinement, cow-calf separation, and the fate of surplus bull calves. Future directions for dairy cattle welfare research in the short-term (10 years) are pain management, providing calves with more milk, social housing, managing surplus calves and downer cows, and better understanding of societal concerns for dairy cows. Medium-term research (20 years) should focus on solving health issues such as lameness and disease. Long-term research (50 years) should aim to address societal expectations of providing pasture access, and cow-calf rearing. Much new research is required in these areas.

Calves will use automated brushes and hanging ropes as enrichment items

The standard method of raising commercial dairy calves requires calves to be removed from their dam and reared by the farmer. In New Zealand, calves are housed in groups, although internationally they are often housed individually. This housing typically does not provide any form of environmental enrichment, or in the case of individually housed calves, social contact. Two forms of environmental enrichment that may be beneficial for calves are rotating brushes, and rope. Rotating brushes have been successfully used as a grooming enrichment for adult dairy cattle, but their use has not yet been assessed in young calves. Rope is inexpensive and easily manipulated by the mouth, and may provide an opportunity for calves to satisfy their strong motivation for licking and suckling. This study investigated the use of rotating brushes and rope as enrichment items for dairy calves in New Zealand.

Eight pairs of calves were housed together for six days in pens that contained a wall-mounted rotating brush on one side, and a 1m length of manila rope on the other. The calves were allowed one day to acclimate to the pen environment, after which behavioural observations were conducted for 20 hours per day on Days 1, 2 and 6 using video camera footage. The frequency and duration of enrichment use was recorded for one calf in each pen.

The calves used the rotating brush almost three times as often as the rope, but spent longer using the rope at each interaction. This resulted in the calves spending equal amounts of time using each enrichment item (27 mins per day). The calves showed similar patterns in their brush use, but showed large individual variation in their use of the rope. This variation may have been due to individual preference, social facilitation or a dominant calf monopolising the resource. The specific reasons why calves use these enrichment items are not known, but they may act as a substitute for maternal grooming and suckling when fed a restricted milk diet. The authors conclude that both rope and brushes should be provided to calves in pens.

What can kinematics tell us about the affective states of animals?

Kinematics is a field of mechanics that precisely describes the movement of points on a body, and can be used to detect subtle changes in behaviour that may not be apparent to the naked eye. Because behaviour is one of the external manifestations of affective state, it can be used in conjunction with other physiological and neurobiological measures to infer how an animal is feeling. Determining how an animal is feeling is one of the key components of animal welfare assessment, and kinematics has the potential to quantify body language in such a precise way that different emotions could be detected.

Previous research has largely focused on measuring overt changes in animal behaviour, such as increases or decreases in key movements or activities. Kinematics can provide information about changes in the quality of the movement. For example, dairy cows and chickens take shorter, more irregular strides when lame, while dogs take longer strides with greater joint flexion when lame. Animals can also show characteristic facial expressions that may occur too quickly or subtly for humans to detect. Kinematics could be developed to detect the changes in overall body language, posture and facial expression that indicate the severity of negative emotional states such as pain and anxiety, or positive emotional states such as joy and curiosity. It may also help elucidate how animals communicate with one another using body language.

Kinematics requires substantial technological development and refinement before it can be used to identify different affective states in different species, as well as changes in the intensity of those affective states. However, if these obstacles can be overcome, kinematics has the potential to be developed into automated monitoring systems that could alert farmers, researchers or veterinarians to how animals are feeling, and therefore respond accordingly. For example, current automated systems for detecting lameness in dairy cows have a success rate of 83-95%. The authors encourage collaboration between animal welfare scientists, movement scientists, computer scientists and engineers to further develop the field of kinematics for animal welfare assessment.


The role of affective states in the proximate control of behaviour

The proximate control of behaviour relates to the sequence of internal events that allow an animal to prioritise a certain behaviour within a competing set of alternative behaviours, decide which behaviour to perform, and for how long to continue performing that behaviour. Affective states are internal subjective experiences that can range from pleasant to unpleasant. These states can include emotions, such as fear and curiosity, or sensations, such as hunger and satiety. In the current article, the author proposes a model of proximate behavioural control that includes the role of affective states in integrating and valuing information, prioritising this information and choosing which behaviour to perform.

Animals are constantly receiving information from internal and external sources. These stimuli elicit emotional states that result in a motivation (want) to achieve a certain outcome (goal). For example, detecting a predator (external stimuli) may result in the emotional state of fear, which will motivate the animal to run away in order to achieve the goal of avoiding predation. If the goal is achieved, the animal experiences a positive feedback emotion (liking). If the goal is not achieved, the animal experiences a negative feedback emotion (disliking) and the behaviour continues, or switches to an alternative behaviour. Here we can see that affective states are involved in both the initiation and cessation of behaviours. The value of the behavioural goal will also vary depending on the affective state of the animal. For example, foraging behaviour can vary in relation to how hungry or sated the animal feels, because the value of the behavioural goal (food) will vary with these feelings.

In summary, emotions can be viewed as internal states that serve to value behavioural options in decision-making and allow for feedback after an outcome has been evaluated in respect to an expected goal state. The author suggests that good animal welfare may not depend on the experience of positive affective states so much as the achievement of positive feedback emotions (liking) that occur from reaching behavioural goals. Thus, it may be more important for animals to reach proximate goals than to avoid negative stimuli.

A critique of Australia’s regulation of animal use in science and education

The use of animals for scientific and education purposes in Australia has increased from 5.3 million animals in 2005 to 6.99 million animals in 2014. These figures raise concerns over the effectiveness of the current regulatory framework in reducing animal use. This article provides a critical review of the current regulatory framework, and makes recommendations for improvement.

Australia’s regulatory framework for the use of animals in science and education is lagging behind international standards. Currently, the use of animals for scientific purposes is regulated through state and territory legislation. Researchers are required to hold a licence, and allow inspections of their facilities to ensure compliance with welfare legislation. In addition, all research involving animals must be reviewed by an animal ethics committee (AEC).

To provide more meaningful protection of the interests of animals, the authors propose four areas of regulatory reform for Australia: transparency, competency, national authority and greater incentives. There is currently a lack of transparency about the use of animals for research, and only 57% of the general public were aware that animals are used in experimental research in Australia. International surveys show wide agreement amongst the public that animals should not be subjected to experimental research, and greater transparency and reporting is essential for an honest and open public debate about animal use. In terms of competency, people working with animals must be ‘competent’ but there is little information available about what this constitutes. Currently, there is no requirement for a veterinarian to conduct surgical procedures for research purposes. The authors propose that the definition of competency be updated to explicitly refer to veterinary or anaesthesia training. The competency of AEC members to judge the scientific merit of animal research must also be improved. The authors propose that a national authority be established to review and approve all research proposals involving the use of animals. This authority could advise on the use of non-animal alternatives, and collect accurate statistics on animal use in Australia. The government should also provide greater incentives for researchers to develop non-animal alternatives in their research.

Captive wildlife sanctuaries: Definition, ethical considerations and public perception

In this article, the term ‘sanctuary’ encompasses captive wildlife facilities that provide lifetime care for animals that have been abused, injured, abandoned or are otherwise in need. Accredited sanctuaries must meet certain standards of care, must only obtain animals through rescue, and must not use the animals for profit or public exhibition. The author describes ‘true’ sanctuaries as ones that respect and provide for the individual needs of each animal, while simultaneously condemning the concept of captivity. In comparison, pseudo-sanctuaries profit by associating themselves with true sanctuaries, but fail to provide the standard of care and lack of exploitation that is provided by true sanctuaries.

Sanctuaries differ from zoos in that sanctuaries place the needs of the animals first, with a focus on the needs of the individual. Zoos prioritise the conservation of a species over the welfare of the individual, and derive income from the exhibition and/or breeding of captive wild species. In some zoos, many animals are injured or die, whilst some are euthanized as a matter of convenience. For zoos to move toward a sanctuary ethic, many of these practices would have to be abandoned.

Despite the utmost focus on providing captive wild animals with the best life possible, true sanctuaries still pose ethical concerns. Humans control every aspect of the animals’ lives, the animals are still subject to necessary husbandry procedures, such as health checks, and the animals are still confined. The no-breeding policy prevents animals from experiencing the raising of young, with negative welfare consequences for highly social species such as elephants. More subtle concerns relate to the inability of the animals to experience the complexity of everyday life in the wild, with its essential interactions, choices and self-determining activities. True wildlife sanctuaries greatly improve the welfare of captive wild animals, particularly where animals have been previously neglected or abused, but risk normalising captivity for the public. True sanctuaries should encourage the public to consider the ethics of keeping wild animals captive, and acknowledge their role in perpetrating the exploitation of animals.


An epidemiological analysis of circus and zoo animal welfare in Sweden

In Sweden, all zoos and circuses must be registered and inspected to ensure that they are meeting the minimum standards of animal care. These assessments rely on resource- and management-based measures, such as the space allowance and food provided, and to a lesser extent animal-based measures (ABM), such as the health and behaviour of the animals. The records from these inspections provide a means of assessing the welfare of zoo and circus animals that would not otherwise be possible due to the small numbers of each species kept at each facility. This study used the inspection records to determine: risk-factors for non-compliance with the minimum standards of care, associations between different welfare measures, and the adequacy of currently used ABMs.

The Swedish Board of Agriculture provided the researchers with 5 years’ worth of inspection records (2010-2014) relating to zoos and circuses in Sweden. This provided data for 42 inspections of 38 circuses, and 318 inspections of 179 zoos. Each inspection record included a checklist of ABMs and resource- and management-based resources to be inspected, and each point was rated as compliant, non-compliant, not assessed or not applicable.

The two main findings of this study were the prevalence of different welfare problems in zoos and circuses, and identifying the main risk factors for these problems. The rates for non-compliance with ABMs at zoos were 14% for general animal condition, 9% for body condition and 2% for cleanliness. The social groupings used at 17% of zoos were also non-compliant. Non-compliance for ABMs at circuses were 9% for general condition, 10% for body condition and 0% for cleanliness. The most frequent non-compliant resource- and management-based measures were for space allowances, with 42% of circuses and 29% of zoos failing to provide sufficient space. 39% of circuses failed to provide sufficient exercise requirements, and 29% of zoos failed to provide sufficient enrichment. Zoos that had inadequate housing, bedding or nutrition were more likely to be non-compliant with at least one ABM. Standardising welfare inspections at zoos and circuses would allow international comparisons and provide opportunities to benchmark animal welfare.

Tooth damage in captive orcas

In the wild, orcas experience very little tooth wear as they generally eat soft prey and do not use their teeth to chew. Captive orcas, on the other hand, can experience substantial tooth wear. This is thought to be due to the performance of oral stereotypies, such as biting on hard surfaces within the tank, and to a lesser extent performing threat displays that involve snapping the jaws together. This study examined the extent and severity of dental pathologies in captive orca, and how these related to the life history of the orcas.

Tooth damage was assessed in 23 captive orcas in the USA and 6 captive orcas in the Canary Islands. All orcas were owned by the same US-based theme park. High resolution photographs of the orcas’ teeth were taken opportunistically from the viewing platform at four different theme parks, and the images were examined for signs of tooth wear, tooth fractures, missing teeth, and drill holes indicative of previous dental treatment. Orcas were identified by their individual markings, and details of their life history were collected while on-site as well as from the publicly available Marine Mammal Inventory Report.

All orcas exhibited some form of tooth damage, with 45% exhibiting moderate tooth wear and 24% exhibiting major to extreme tooth wear. Fractured teeth were observed in 13% of orcas. Tooth damage was especially prominent for teeth in the lower jaw, and even the youngest orcas (3-6 years) showed substantial dental pathology. There were no differences in dental pathologies seen between sex, source or facility. Captive orcas experience high rates of morbidity and mortality, with many of these due to infections and respiratory diseases. The authors discuss the relationship between poor dental health and the risk of other systemic disorders in humans, and encourage further research to determine whether similar relationships exist for captive orcas. They also encourage the theme park industry to make the health records of captive orcas publicly available to provide further insight into orca health in captivity.

Using foraging behaviour as a welfare assessment tool for captive zoo animals

Foraging behaviours can reveal important information about how an animal perceives its environment. Measuring the amount of food left by the animal in a food patch (The giving-up-density, GUD) provides a quantifiable metric of how safe or risky the animal considers that location to be. This approach has obvious benefits to the study of zoo animal welfare, as the GUD can be measured at different locations within the exhibit to assess how the animal perceives its enclosure. This study used GUDs and behavioural observations to assess how two zoo species perceived their enclosures and used enrichment items.

The environmental preferences of two Tamar wallabies and two Patagonian cavies were assessed by placing food patches at regular intervals around their enclosures. Each food patch consisted of 10g of species-specific pelleted food mixed with 1-2 L of topsoil and placed in a tub (cavy enclosure) or a saucer (wallaby enclosure). The wallaby enclosure received 10 food patches, and the cavy enclosure received 8. The food patches were placed in the enclosure for 8 hrs per day for 8 weeks, and the amount of food left in each patch was measured at the end of each day. More food left in a patch (i.e. a higher GUD) indicated a less preferred location. Behavioural observations were conducted to compare animal activity in the presence and absence of the food patches.

The GUDs revealed distinct areas of preference and aversion within the cavy exhibit, but not for the wallabies. The cavies foraged more in the open areas of their enclosure where they had a good view of their surroundings, while not statistically significant, the wallabies tended to forage in covered areas. These behaviours are consistent with the foraging preferences of their wild counterparts. For both species the presence of food patches increased foraging behaviours, decreased inactive behaviours, and increased movement within the exhibit, demonstrating that food patches served as an effective environmental enrichment.

This study confirms that zoo foraging ecology can inform improvements to exhibit design by measuring environmental preferences in zoo animals, and provides a promising avenue for future welfare research.


RSPCA AUSTRALIA EVENTS

RSPCA Australia Animal Welfare Seminar 2018
Thursday 22 February
Alastair Swayne Theatre, Canberra Airport

Recent advances in humane killing and slaughter have significant implications for farm animal welfare. The first event of its kind in the Southern Hemisphere, this one-day seminar will outline innovations and research in the field. Good farm animal welfare means giving animals a humane death, as well as a life worth living. REGISTER NOW!
ARTICLES OF INTEREST

ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK


COMpanion ANIMALS


FARM ANIMALS

Aquaculture


Cattle


intra-observer reliability of different methods for recording


Pigs


Poultry


Yamauchi Y, Yoshida S, Matsuyama H et al (2017) Morphologically abnormal beaks observed in chickens that were beak-trimmed at young ages. Journal of Veterinary Medical Science 79(9):1466-1471.

Sheep/goats


General


Vargas-Bello-Pérez E, Miranda-de la Lama GC, Lemos Teixeira D et al (2017) Farm animal welfare influences on markets and consumer attitudes in Latin America: The cases of Mexico, Chile and Brazil. Journal of Agricultural and Environmental Ethics 30(5):


HUMANE KILLING


MISCELLANEOUS


TRANSPORTATION OF ANIMALS


WILD ANIMALS
