

# animal welfare science update

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.

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## companion animals

### RSPCA Australia Early-age Desexing Research Report

RSPCA Australia has just released a Research Report on early-age desexing (EAD). The report is available from downloads section of the RSPCA Australia Knowledgebase <http://kb.rspca.org.au/>. The report explains in detail why RSPCA shelters perform EAD, discusses the various benefits of EAD both from an individual animal and whole population perspective and explores any potential short-term or long-term risks of EAD.

The report concludes that, in shelter environments, EAD of both cats and dogs (male and female) is justified, practical and often necessary. Any potential risk posed by EAD is significantly outweighed by the various benefits and necessity of EAD within the shelter environment. For those animals that are not housed in shelters or pounds, the report recommends that the decision on whether to desex at an early age should follow the same process of weighing up the potential risks and benefits.

### Human impact on dog brains

The modern dog comes in a range of sizes and shapes, far greater than that of its evolutionary ancestor, the wolf. This great diversity of dog breeds is the result of thousands of years of selective breeding by humans. Dog skulls can therefore range from 7 to 28 cm in length, in contrast to wolves, which are exclusively long-skulled. Using a combination of magnetic resonance imaging (MRI) and skull measurements, the authors of this study investigated differences in the size and position of the brains taken from visibly very different breeds of dog.

The researchers found that in dogs with short heads, the brain was rotated downwards to a significant degree, and that the olfactory lobe, the part of the brain that processes smells, had also migrated downwards substantially. The authors suggest that such large differences in brain structure may be adaptive responses to human induced decreases to skull capacity in short-headed dogs.

T. Roberts, P. McGreevy and M. Valenzuela *et al.* (2010) Human induced rotation and reorganization of the brain of domestic dogs, *PLOS One*, 5(7): e11946.

### Belled collars on hunting cats

Domestic cats are widely acknowledged to be important predators of small urban wildlife, including native mammals, birds, lizards and frogs. Belled collars have been proposed as an effective way to reduce hunting efficiency in domestic cats, while at the same time allowing them to roam around freely. However, the effectiveness of such devices has been questioned by recent research, and it is claimed that over time, cats find new ways to hunt in spite of the collars.

As the usefulness of belled collars has to date not been tested in New Zealand, researchers from the University of Otago sought conducted a 12-week experimental study on domestic cats known to be prolific hunters. Twenty-two cats wore a belled collar for the initial 6 weeks and 23 wore the collar for the second 6 weeks. The researchers found that the predation of birds and rodents was reduced by 50% and 61%, respectively, during the time that the collar was worn. The number of rats, lizards and insects was not significantly reduced; however, these constituted a small proportion of the total catch. The authors conclude that belled collars can effectively reduce prey numbers. However, since cats control the numbers of rats, which also have the potential to harm native wildlife, the authors warn that any cat-control measures should include the monitoring of rodent populations.

J.K. Gordon, C. Matthaei and Y. van Heezik (2010) Belled collars reduce catch of domestic cats in New Zealand by half, *Wildlife Research*, 37: 372-378.

# farm animals

## British Poultry Science Volume 51 Issue 2-12 Suppl 1

An analysis of the first 50 volumes. Includes a review of articles relating to aspects of poultry behaviour and welfare, poultry housing and husbandry, as well as lighting, ventilation and temperature.

### Antibiotic use in the Danish pig industry

Antibiotics at low doses have been routinely used for decades in animal husbandry, as a means of increasing animal growth, and reducing mortality. Recently, however, due to concerns that this practice might lead to the development of antibiotic-resistant strains of microbes, and thus jeopardise human health, several governments have banned the use of such medication for non-therapeutic purposes. Denmark, the world's largest exporter of pork, is one such country that banned the use of antimicrobial growth promoters (AGP) in stages between 1994 and 2000. Similar measures were subsequently adopted by the European Union.

The authors of this study examined data voluntarily submitted to a central database by a selection of pig farms between the years 1992 and 2008, in order to determine the effects of the above legislation on the industry. The researchers found that overall, the amount of antibiotics used per kilogram of pork produced declined by over 50% over the years investigated. However, while the level of AGP used declined sharply, there was an increase in the use of therapeutic antibiotics, due to two disease outbreaks between 1998 and 2006. The authors note that a sharp decline in antibiotic prices over this period may also have made these drugs more accessible to pig farmers. Overall, production in Denmark increased from 18.4 million pigs in 1992 to 27.1 million in 2008, and the authors conclude that the AGP ban did not have a negative impact on the pig industry.

Aarestrup, F. *et al.* (2010) Changes in the use of antimicrobials and the effects on productivity of swine farms in Denmark, *American Journal of Veterinary Research*, 71: 726-733.

### Lighting for broiler chickens

Chickens are often raised under continuous, 24-hour light conditions, in order to increase their feeding behavior, and thereby encourage growth. A number of welfare concerns have been raised with respect to this practice, as continuous light may induce abnormal behavioural patterns, along with chronic stress and fear in young animals. Moreover, the potential for energy savings has generated interest in trialling new light regimes that include periods of uninterrupted darkness.

In this experimental study, the researchers exposed two groups of newborn chicks to two very different lighting conditions: continuous light (24L) versus 16 hours of light and 8 hours of darkness (16L), over a period of six weeks. In addition to measuring the birds' growth rate, the researchers also subjected randomly chosen chicks to behavioural tests to gauge their fearfulness and sociability. It was found that although the 16L birds had a lower growth rate at the beginning of the experiment, their final weight was the same as that of the 24L birds. A reduced initial growth rate is thought to be beneficial, as it reduces the development of physical and metabolic defects later in life. 16L birds were found to be less fearful and more social, and their behavioural patterns were more natural and synchronized than those of the 24L birds. The authors conclude that the 16L birds had better welfare than the 24L birds, without any reduction in productivity.

Bayram, A. & Ozkan, S. (2010) Effects of a 16-hour light, 8-hour dark lighting schedule on behavioural traits and performance in male broiler chickens, *Applied Poultry Research*, 19:263-273.

### Alternatives to electric prods for moving pigs

Although electric prods are considered to be detrimental to an animal's welfare, they are nevertheless used on farms, as they make it easier to load animals onto transports prior to slaughter. In the hands of untrained personnel, electric prods may be overused, causing stress and injury to animals, and also resulting in damage to the resulting carcass. Alternatives to such devices include board, paddle and flag to move animals along farm alleys, and compressed air prods.

The authors of this paper compared the effectiveness of electric prods (EP), compressed air prods (CAP) and board and rattle paddle (BRP) while moving pigs from their pens into a truck via a walkway and a ramp. The researchers found that while the EP was the fastest and most effective way to make animals move, it also produced the most distress, as evidenced by increased vocalisation, and more frequent signs

of fatigue, such as open-mouth breathing. EP pigs slipped and fell more, but made fewer attempts to turn or stop than the other pigs. EP caused pigs to have higher heart rates during the loading and transport procedure, and also reduced meat quality, as the carcasses of these pigs exhibited more visible blood clots. The authors call for more research aimed at making alternative loading procedures more efficient.

Correa, J. *et al.* (2010) Effects of different moving devices at loading on stress response and meat quality in pigs, *Journal of Animal Science*, doi:10.2527/jas.2010-2833

## The environmental impact of meat

The global consumption of meat has increased about fourfold in the period between 1961 and 2006, and is currently estimated to be over 270 million metric tonnes a year. Farm animals are responsible for a large proportion of total greenhouse gas emissions, and environmentalists recommend a significant reduction in per capita meat consumption, particularly in developed countries. The author of this paper largely supports this view, but warns that greenhouse gas emissions alone provide an incomplete picture of the global impact of consuming meat. She proposes the concept of 'global health impacts' (GHI), which encapsulates the impacts of human actions on the well-being of all other humans and non-humans living on the planet. The author also cites a UK study, aimed at determining the impact of an average UK citizen's diet on the environment, which she sees as an improvement on previous research. This study is more comprehensive, it is argued, because it takes into account not only greenhouse gas emissions, but also the costs associated with the use of pesticides and chemical fertilizers, soil erosion, the appearance of new pathogens, biodiversity and wildlife losses, etc. Only by factoring these and other relevant impacts, can we get a true understanding of the costs associated with consuming farmed animal products.

Deckers, J. (2010) Should the consumption of farmed animal products be restricted, and if so, by how much? *Food Policy*, doi:10.1016/j.foodpol.2010.06.003

## Humane killing of turkeys

Turkeys often have to be euthanised on-farm due to disease or injury, and it is important to determine the most humane way in which these large birds can be killed. It is commonly accepted that cervical dislocation (breaking the animal's neck with ones hands or with an implement, such as a bovine castrator) and blunt trauma (a blow to the head) are effective ways of killing turkeys with minimal suffering. However, the authors of this paper argue that there is currently no scientific evidence to support these claims.

The researchers therefore tested the effectiveness of manual and mechanical cervical dislocation, blunt trauma, and a device known as a Zephyr (which delivers a non-penetrating captive bolt) on rendering turkeys insensitive. The Zephyr was initially developed and approved by the Ontario Ministry of Agriculture, Food and Rural Affairs for stunning rabbits in abattoirs. The researchers noted key physiological and behavioural parameters such as the time taken for the blink response and convulsions to disappear. They found that the Zephyr and blunt trauma consistently induced immediate insensibility leading to death, whereas all birds showed signs of sensibility after manual and mechanical cervical dislocation.

Erasmus, M. *et al.* (2010) Using time to insensibility and estimated time of death to evaluate a nonpenetrating captive bolt, cervical dislocation, and blunt trauma for on-farm killing of turkeys, *Poultry Science*, 89: 1345-1354.

## Ring castration of Holstein calves with anaesthesia

Male calves are often castrated to reduce sexual and aggressive behavior, and to improve meat quality. Although there are several methods for castrating bulls, the welfare impact of ring castration has been questioned, as this technique produces a visibly abnormal posture in the animal. The authors of this study investigated the effects of ring castration on 24 three-month-old male Holstein calves, and recorded a range of behavioural, physiological and physical parameters. The calves undergoing castration were also treated with the local anaesthetic lidocaine, in combination with another painkiller. The researchers found that over a period of 49 days, the castrated calves had reduced growth. These calves also showed abnormal posture and increased head-turns, indicating distress, during the first 14 days after the castration rings were applied. However, as physiological welfare indicators, such as blood cortisol, were unaffected, the authors conclude that ring castration with anaesthetic might be a suitable method.

Marti, S. *et al.* (2010) Effects of ring castration with local anesthesia and analgesia in Holstein calves at 3 months of age on welfare indicators, *Journal of Animal Science*, 88: 2789-2796

## Increasing weaning age of piglets

Weaning normally occurs gradually in piglets at around 17 weeks of age. In modern pig husbandry, however, weaning occurs abruptly at a much younger age of 7 to 35 days (the official guideline in the EU being 28 days). This abrupt separation from the sow, combined with a change in diet, physical location and social environment can lead to high levels of stress in the piglets. This can, in turn, lead to reduced feeding and growth, as well as improper intestinal function. As a weaning age of 6 or 7 weeks is routinely implemented in organic pig husbandry, the authors of this study compared the stress and growth levels of piglets weaned at 4 weeks to those weaned at 7 weeks.

When offered creep feed, piglets weaned at 7 days showed a higher growth rate than (a) piglets that were weaned at 4 weeks, and (b) piglets not offered creep feed. Plasma cortisol, an indicator of stress, was lower in piglets weaned at 7 weeks. Creep feeding, but not the age of weaning, resulted in slight improvements in intestinal function in all piglets.

Van der Meulen, J. *et al.* (2010) Increasing weaning age of piglets from 4 to 7 weeks reduces stress, increases post-weaning feed intake but does not improve intestinal functionality, *Animal*, 4(10): 1653-1661.

## Barrier perches and broiler leg health

Modern broiler chickens have been bred to grow unnaturally rapidly and at high densities, which often leads to skeletal deformities, general leg weakness and lameness. A commonly observed condition is fluctuating asymmetry (FA) of the tibial bones, where the right and left legs are of unequal length. This study investigated whether the provision of barrier perches to one-day old broiler chicks could improve leg health, especially at high stocking densities.

The researchers found that birds housed at high stocking densities (18 birds/m<sup>2</sup>) had poorer footpad and hock lesion scores than birds reared at lower densities (8 and 13 birds/m<sup>2</sup>). FA was also greater at the highest density. The provision of simple barrier perches also had a tendency to improve footpad condition. Complex barriers appeared to have a positive effect on tibial FA, suggesting that they may aid broilers in maintaining developmental stability to a certain degree.

Ventura *et al.* (2010) Effects of barrier perches and density on broiler leg health, fear, and performance, *Poultry Science*, 89(8): 1574-1583.

# animals used for sport, entertainment, recreation and work

Abstracts from the **5th International Conference of the International Society for Equitation Science (ISES)** are available in *Journal of Veterinary Behavior: Clinical Applications and Research* Volume 5, Issue 4 - selected pp. A1-A2, 167-220 (July-August 2010)

## A cost-benefit approach to ethical equitation

Apart from a few exceptions such as police horse work, horses nowadays are used exclusively in activities that can only be said to have entertainment value for their human onlookers. Given that the vast majority of horses in Australia are used for 'fun', and that there are no restrictions on experience, age, or training for recreational horse ownership, the potential for poor welfare as a result of ignorance or neglect is huge. The authors of this paper, who are researchers from RSPCA Australia and the University of Sydney, argue that both the public and equestrian agencies need to seriously reconsider the way in which the 'acceptable' treatment of horses is defined, especially when the only justification for exposing horses to practices that reduce welfare is the entertainment value that the animals provide.

While the death or injury of a horse on the race track may cause widespread public concern, the authors note that many less visible welfare issues go completely unnoticed; these include training and riding techniques that involve punishment, repeated, long-distance transport and inappropriate housing. A combination of factors, such as international competition rules that run contrary to horse welfare, a public that wishes to see animals pushed to their limit during races, animal welfare legislation which, in practice, allows anything that is not banned outright, and attitudes along the lines of "that's how it has always been done" lead to a situation where whipping a thoroughbred up to 30 times in the closing stages of a race is considered legally reasonable. To address such issues, the authors propose a cost-benefit analysis approach as one way to test the acceptability of our impacts on horses. This requires that welfare costs associated with an activity be reliably estimated and balanced against the potential benefits of the

activity to both humans and horses. Objective comparisons of the relative impact of different activities can be made through 'impact scales' that allow us to reduce or avoid activities with high impacts and instead adopt methods with lower impacts.

B. Jones and P. McGreevy (2010) Ethical equitation: applying a cost-benefit approach, *Journal of Veterinary Behavior*, 5: 196-202.

### **Equine Appeasing Hormone to reduce anxiety in horses**

Horses are routinely subjected to a variety of stressors in the course of interactions with humans. Although horses can be habituated to some stressful events sometimes it is not possible to completely avoid stress. This study investigated the effect of using synthetic Equine Appeasing hormone (EAP) on two such stressful events, namely a temporary separation of a foal from a dam, and routine clipping. Half the horses in the two experimental groups were treated with EAP prior to the stressor being applied - the dams and foals were subjected to separation on three consecutive days (five, ten, twenty minutes), while in the clipping test, the horses were confronted with the sound and sight of a clipper on five consecutive days. The researchers found a significant decrease in the frequency of restless behaviors in the foals treated with EAP in the weaning study, and a significant decrease in duration of restless behaviors in the horses of the high reactive treated group in the "clipping" study. The treatment effect of EAP was still apparent after six weeks. This study suggested that EAP is a potentially promising substance for facilitating habituation to acute stressors or to stressful situations.

A. Van Sommeren and M. Van Dierendonck (2010) The use of equine appeasing pheromone to reduce ethological and physiological stress symptoms in horses, *Journal of Veterinary Behavior*, 5(4): 213-214.

## research animals

### **Taming anxiety in laboratory mice**

Laboratory mice are routinely captured and picked up by the tail prior to handling, inspection or experimentation. This method is even specified by many standardized laboratory protocols. Naturally, mice captured and handled in this way seek to avoid capture and restraint, and by inducing fear and anxiety, this technique may not only compromise the animals' welfare, but also the validity of the scientific findings arising from such animals.

In this experimental study, the authors sought to compare the standard method to two alternative methods of handling mice - mice handled by 'tunnel' walked into a clear acrylic home cage tunnel brought toward them and were lifted without direct contact, while mice that handlers 'cupped' were scooped up and allowed to walk freely over the handler's open gloved hands without direct physical restraint. As mice unfamiliar with this technique immediately jump away, handlers closed their hands loosely around the mouse for up to 30 seconds on first experience, until the mouse's attempts to escape declined. The researchers found that mice handled by the alternative methods were less anxious, and spent more time voluntarily in contact with the researcher. Mice handled by the tail showed brief and cautious approaches, and also showed greater urination and defecation during handling. Mice that had grown used to the alternative methods showed less anxiety even after being subjected to rougher procedures, such as being restrained by the scruff of the neck.

Hurst, J. and West, R. (2010) Taming anxiety in laboratory mice, *Nature Methods*, doi:10.1038/nmeth.1500.

## wildlife

### **Translocating 'problem' animals**

The translocation of animals that harm humans and destroy property is often portrayed as a humane and effective means of resolving human-animal conflict. However, the authors of this review article argue that this is a misconception that has arisen from the selective reporting of only the successful translocation programs, as well as the omission of key information relating to the true costs of such programs. The costs in question arise from the effects of translocation on the animals being moved, on those in the recipient population at the new site, as well as on any human populations at the new site that may be adversely affected by the move. The costs also include the direct and indirect monetary expense of carrying out a successful translocation.



Animals moved to new habitats often suffer from very high mortality, and individuals of some species may even be successful in returning to their original habitat. Both these phenomena defeat the very purpose of translocation. Animals may persist in their problem behaviours at the new site, or may be harmed during sedation, handling and transport. The inappropriate selection of release site or release method may also result in high animal losses. Ideally, a 'soft release' should be carried out, where the animals are provided with acclimatization pens, nests and food at the new site, and populations are monitored following release - this however, greatly increases the monetary cost of the translocation. Finally, translocated animals can also introduce new diseases and parasites into disease-free populations. The authors suggest that when translocation is put forward to manage problem animals, the following questions should be considered: (1) is translocation expected to resolve the conflict for an acceptable length of time; (2) are (most) animals expected to remain in the release area and are animals unlikely to resume their nuisance behaviour; and (3) is the welfare impact on the animals during capture, transport, holding and after release expected to be acceptable?

G. Massei, R.J. Quay, J. Gurney *et al.* (2010) Can translocations be used to mitigate human-wildlife conflicts? *Wildlife Research*, 37: 428-439.

### **Stereotypies in captive wombats**

Like other captive wild animals, wombats are known to perform stereotypic behavior when stressed, bored, or when their normal behavioural needs are not met. For instance, it has been found that captive wombats only spend 7-10% of their daily budget foraging, compared to 19-29% for wombats living in the wild. This can result in the development of stereotypies such as 'straight-line pacing', repetitive walking to and fro in a straight line; 'boundary pacing', repeated walking along the entire perimeter of the enclosure; 'figure-8 pacing', repetitive walking along a track shaped like the number 8; and 'wall-climbing', repeated attempts to climb up a wall.

In this study, 12 wombats were divided into two groups, one of which was housed in regular artificial dens, while the other received enrichment items such as eucalyptus branches, buried food and scented logs. The researchers found that although enrichment did not reduce stereotypic behavior, the wombats' welfare was nevertheless improved as they spent more time performing normal behaviours, such as exploring, digging and stripping bark off logs. Enrichment may have been unsuccessful at reducing stereotypic behaviour in the captive wombats because the wrong type of enrichment was provided (i.e. the underlying problem motivating this behaviour may not have been addressed) or because the expression of this behaviour had become resistant to change.

L. A. Hogan, S.D. Johnston, A. Lisle *et al.* (2010) Stereotypies and environmental enrichment in captive southern hairy-nosed wombats, *Lasiorhinus latifrons*, *Applied Animal Behaviour Science*, 126: 85-95.

## humane killing

### **Stunning and killing edible crabs**

While vertebrates can be easily killed by decapitation and bleeding out, it is a much more difficult matter to quickly dispatch large crustaceans, such as edible crabs and lobsters. Part of the problem is that crabs do not have a single brain, but a pair of nerve centres, called ganglia, that must both be destroyed with precision to effectively stun the animal. Live animals dropped into boiling water remain conscious for over a minute, while other techniques such as thermal shocks (heat and cold), salt brines (NaCl and KCl) and gas (CO<sub>2</sub>) - all of which are commercially used techniques - have yet to be compared systematically. The authors of this study subjected crabs to a variety of such techniques, along with the new technique of electric shocks, and noted the time needed for crabs to stop displaying any signs of life. They found that all failed to a certain extent to stun the animal, causing either stress or failing completely. It was noticed that the crabs' eye stalks, mouthparts and legs became paralysed long before any reasonable change in the crabs' internal condition, thereby giving a false indication of loss of consciousness. Electrical stunning, on the other hand, turned out to be the most efficient stunning method for edible crabs. With sufficient electrical current (400 V/m and above) the animal could be rendered unconscious within 1 second. The authors recommend the use of electric stunning in commercial operations, as well as piercing of the ganglia, as long as the latter is carried out by experienced practitioners.

B. Roth and S. Oines (2010) Stunning and killing edible crabs (*Cancer pagurus*), *Animal Welfare*, 19: 287-294.

## Is sodium fluoroacetate (1080) a humane poison?

Sodium fluoroacetate (1080) is a poison commonly used in Australia and New Zealand for the control of vertebrate pests such as dogs and foxes. 1080 acts by blocking physiological processes in several body tissues, leading to symptoms that may include nausea, muscle convulsions, vomiting, involuntary vocalisation, disorientation, non-responsiveness to stimuli, hyper-excitability and finally death. Recently, the use of 1080 has been criticised because of the long period of time taken for an animal to die after ingesting the poison, and because it is also toxic to humans and a range of native wildlife.

This review paper responds to a 2007 paper by RSPCA Australia Scientific Officer Miranda Sherley, which concluded that 1080 should not be considered a humane poison. The authors of this paper disagree with the conclusion that 1080 is not humane on the basis that, even though animals may take many hours to die from 1080, there is a significant lag time before signs of poisoning occur and animals are unconscious in the final stages of poisoning. Moreover, 1080 acts on brain chemicals to block pain signals, which, they argue, makes it difficult to accurately assess the poisoned animal's ability to perceive pain. The authors point out that 1080 has a number of benefits over other poisons in that it is readily broken down by bacteria, and does not accumulate in the environment, and since it occurs naturally in Australian plants, many native animals already have a high tolerance to it. They conclude that while there are still questions to be answered over the effects of 1080 on some target species, that the use of 1080 can be considered ethical, given the absence of viable alternatives for wide-scale pest control and the urgent need to reduce the detrimental impacts of pest species.

L.E. Twigg and R.W. Parker (2010) Is sodium fluoroacetate (1080) a humane poison? The influence of mode of action, physiological effects, and target specificity, *Animal Welfare*, 19: 249-263.

## other articles and publications of interest

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