

animal welfare science update



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The aim of the animal welfare science update is to keep you informed of developments in animal welfare science relating to the work of the RSPCA. The update provides summaries of the most relevant scientific papers and reports received by the RSPCA Australia office in the past quarter.

Reports and reviews

The humaneness of carbon dioxide for euthanasia

Carbon dioxide is one of the most commonly and widely used methods of euthanasia because it is relatively cheap, is readily available, is quick and easy to use and can be used to euthanase large numbers animals at one time. Carbon dioxide is also considered to cause less stress than physical methods of euthanasia that require more handling. Recently however, there have been some concerns raised over the humaneness of using CO₂ for euthanasia leading to considerable scientific debate on the issue. To address some of the disparities that exist in the science community regarding the humaneness of CO₂ for euthanasia, a scientific meeting was organised in Newcastle upon Tyne in the UK in February 2006 with the aim of forming an international consensus on the use of CO₂ for the euthanasia of laboratory animals. The outcome of the Newcastle meeting was a report entitled 'Newcastle Consensus Meeting on Carbon Dioxide Euthanasia of Laboratory Animals'. A concise summary of the issues that were discussed at the Newcastle meeting can be found in the ANZCCART news, Vol. 19, Issue Number 2 2006. The Newcastle report provides a comprehensive discussion of the issues that were addressed at the meeting, including the ten major points of consensus that were reached. Overall, the meeting served to highlight two very significant areas of concern relating to the use of CO₂ for euthanasia. Firstly, while there is some information on the effect of CO₂ on rodent species, there is a dearth of information about its effects in other animal species and secondly, there is almost no research being conducted into alternative and potentially more humane methods of euthanasia.

The use of CO₂ for euthanasia is a topic that is of great interest to RSPCA Australia as it is a method that is widely used in Australia for the euthanasia of wildlife (both native and pest species), production animals and laboratory animals. We are currently in the process of reviewing the small amount of literature relating to the humaneness of CO₂ in these contexts. What has become clear is that, whilst there are welfare concerns over the use of CO₂ for euthanasia, there is no better option at the present time, due to a lack of information and research in this area. This issue highlights the importance of encouraging research into developing alternative and more humane methods of euthanasia.

Hawkins, P. et al. (2006). Newcastle consensus meeting on carbon dioxide euthanasia of laboratory animals. Report of a meeting held at University of Newcastle upon Tyne, UK, from 27-28 February 2006.



How much space does an elephant need?

The impact of confinement on animal welfare

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Special Feature – Animal Sentience

The October 2006 issue of *Applied Animal Behaviour Science* is dedicated to a number of papers presented at the conference 'From Darwin to Dawkins: the science and implications of animal sentience' organised by Compassion in World Farming (CIWF) in March 2005. This special feature in the RSPCA Science Update focuses on the papers that address the issue of animal sentience and how our understanding of animal sentience can influence the way we treat them.

The animal voice should be heard

To some people, it is obvious that animals feel pleasure, pain, happiness and misery. However, from a scientific perspective, we do not know how the different connections in the brain (human or animal) give rise to these subjective experiences, so we don't really know what to look for when trying to define animal sentience. A more pragmatic approach is required, in which we use the range of methods available to ask animals what they want (e.g. preference testing, motivational testing) and apply this knowledge to the way we treat animals.

Dawkins, M.S. (2006). *Through animal eyes: What behaviour tells us. Applied animal behaviour science. 100, 4-10.*

Animal sentience over time

Animal sentience was commonly accepted among the contemporaries of Leonardo da Vinci to those of Charles Darwin. However, through much of the 20th century, 'functionalism' and 'behaviourism' saw all subjective terms relating to consciousness and feelings being wiped from scientific vocabulary. It wasn't until 1975 that a paper on animal awareness reopened the debate. Since then, science has come a long way in developing methods to ask animals how they experience certain states of suffering. Since welfare is not only about the absence of suffering, further research is required into boredom and states of pleasure.

Duncan, I.J.H. (2006). *The changing concept of animal sentience. Applied animal behaviour science. 100, 11-19.*

Can the embryo and foetus suffer before and during birth?

Sentience and consciousness are prerequisites of suffering. Given that the neural mechanisms of embryos and foetuses of farm animals do not fully develop for the first half of the pregnancy, the authors conclude that they are not sentient during this time. When the embryo-foetus brain does eventually develop, it displays a continuous state of sleep – i.e. unconsciousness – which does not change until after birth. This sleep-like state is maintained by neuroinhibitory mechanisms which only withdraw and are taken over by neuroactivators at the time of birth. In addition, foetuses do not awaken from this unconscious state during surgery, slaughter of the dam or intense stimulation. The thought-provoking conclusion drawn by the authors is that embryos and foetuses therefore cannot suffer before or during birth, i.e. suffering can only occur once the animal takes its first breath.

Mellor, D.J. & Diesch, T.J. (2006). *Onset of sentience: The potential for suffering in fetal and newborn farm animals. Applied animal behaviour science. 100, 48-57.*

How to recognise and avoid pain in animals

Common approaches for measuring pain include measures of general body functioning, measures of physiological responses and measures of behaviour. This paper focuses on behavioural measures, which can be either subjective or objective – the former being less reliable. Objective (or quantitative) behavioural measures include assessing pain-specific behaviours, assessing the decline in frequency of such behaviours and assessing preference. Techniques developed from these assessments should assist in avoiding injury and disease but also help refine painful but necessary procedures.

Weary, D.M., Niel, L., Flower, F.C. & Fraser, D. (2006). *Identifying and preventing pain in animals. Applied animal behaviour science. 100, 64-76.*

COMPANION ANIMALS

Walking your dog to a healthier lifestyle

In 2005, RSPCA Australia in conjunction with the National Heart Foundation launched a national health initiative called 'Walk the dog'. The aim of this initiative was to raise public awareness about the health benefits of walking for pets and humans alike. A recent study conducted in the United States by Ham and Epping has augmented the principles of this campaign by showing that, in the United States, dog walking plays an important role in increasing people's motivation for physical exercise, as well as increasing the amount of time that they spend exercising each day. The results indicated that dog walking can help people to reach the target of 30 minutes of daily physical activity that is recommended by health researchers. The results of this study lend further support to the idea that dog ownership can encourage a healthy lifestyle and should be used by health authorities as a promotional tool to encourage people to lead a more active and healthy life.

Ham, S. & Epping, J. (2006) Dog walking and physical activity in the United States. *Preventing Chronic Disease*. 3, 1-7.

Are temperament tests effective in identifying aggressive behaviours in dogs?

Many adoption shelters in Australia, including those of the RSPCA, and around the world use temperament tests as a means to gauge the suitability of dogs for adoption. Although the tests that are used by individual shelters can vary in nature, most temperament tests involve the assessment of a dog's reaction to certain stimuli such as the approach of a stranger or the response to a veterinary examination. If the dogs react in an aggressive manner such as by growling or biting a human then they are not considered suitable for adoption.

Unfortunately, there is little evidence to suggest that the current methods of temperament testing prevent the adoption of dogs that have aggressive or anti-social behaviour. This is a concern because behavioural problems are one of the most likely causes for dogs being surrendered to shelters in the first place. In an attempt to evaluate the effectiveness of standardised temperament tests in preventing the adoption of unsuitable dogs, Christensen et al. investigated the incidence of aggressive behaviour in dogs that had passed a temperament test and had been adopted from a shelter. To do this, the owners of dogs that had been adopted from a shelter were surveyed about different aspects of their dog's behaviour in their new home. The results of the study showed that a very large proportion (roughly 70% of 66 respondents) of surveyed owners reported incidences of aggressive behaviour in their adopted dogs in the 13 months post-adoption. Unfortunately, the results of this study have limited consequence for several reasons; firstly owner's interpretations of their dog's behaviour may not be objective (i.e. barking for attention could be confused with barking out of aggression), secondly, because it used data from only one shelter in New York State in the U.S. and finally, because the dogs that had been adopted had only been subjected to one particular standardised temperament test. However, this study does highlight some of the problems associated with a reliance on behavioural tests when deciding whether a dog is suitable for adoption and indicates the importance of taking other factors into account, such as behavioural evaluations from shelter staff.

Christensen, E. et al. (2006). Aggressive behaviour in adopted dogs that passed a temperament test. *Applied Animal Behaviour Science*. In Press.

FARM ANIMALS

Controlled atmosphere stunning in broilers: The effects of different gas mixtures

At present, broiler hens arriving for slaughter are removed from their crates, shackled and then passed through an electric waterbath for stunning. Not only is live shackling a stressful and painful procedure, the fact that some birds raise their head above the electric waterbath and could also miss the spinning blade designed to cut their neck, means that they are submerged live into the boiling waterbath that later assists in feather removal. Therefore, gas stunning birds while they are still in their crates could significantly improve bird welfare at slaughter. However, it is important that initial exposure to the gas is not aversive to the bird.

This study used chicks aged under 30 days in order to avoid the problems of leg weakness and poor fitness that birds at slaughter age tend to have. Sitting birds would be less likely to be able to exhibit a rapid withdrawal response. The birds were exposed to 10 second pulses of different gas mixtures (CO₂ in air, CO₂ in nitrogen, or argon and nitrogen). At the time of exposure, the bird was feeding and had its head close to the gas outlet. This

ensured appropriate observation of the withdrawal response. Behaviour was observed before, during and after exposure to the gas mixture.

Exposure to CO₂ resulted in birds taking deeper and longer breaths, with some birds withdrawing from the feeder. As CO₂ concentration increased, headshaking increased as well. When O₂ was added to the CO₂ + N₂ mixture, there was less headshaking but no change in respiratory disruption and withdrawal. Exposure to the nitrogen and argon mixture resulted in some head shaking as well as loss of balance/posture after exposure. In addition, birds spent time off feed trying to 'catch their breath' post exposure. The study concluded that exposure to high CO₂ concentrations has negative welfare implications which should be considered when using controlled atmosphere stunning on birds.

[McKeegan, D.E.F. et al. \(2006\). Behavioural responses of broiler chickens during acute exposure to gaseous stimulation. *Applied Animal Behaviour Science*. 99, 271-286.](#)

Religious slaughter in cattle: Is bleeding-out affected by stunning?

Both the Jewish (Shechita) and Muslim (Halal) slaughtering practice of neck cutting and bleeding out without pre-stunning is permissible in Australia on religious grounds. The main welfare issues relating to slaughter without pre-stunning relate to the pain and distress during the neck cut and the time the animal remains conscious, i.e. can feel pain, after the cut. Some countries have banned slaughter without pre-stunning while others have introduced post-stunning to render the animal unconscious immediately after the cut. Some who defend religious slaughter maintain that bleed-out is less effective when the animal is pre-stunned. This study on cattle follows on from a previous study on sheep which showed that pre-stunning neither adversely affected or improved bleed-out following a neck cut.

The experiment was conducted at an abattoir in Istanbul, Turkey, where two groups of animals were used. The first group was slaughtered by neck cutting after the animal was shackled around one hind leg and hoisted up. The second group was stunned by captive bolt, immediately followed by hoisting and neck cutting. In both cases, a large bucket was used to collect the blood from the sticking wound. The results showed that there was no significant difference between the amount of blood lost for both methods and that there was no significant difference in the rate of blood loss.

Given that these results are similar to those of the previous sheep experiment, there seems to be no scientific basis for the claim that pre-stunning adversely affects bleed-out. As Halal slaughter requires bleeding out to have started before death, pre-stunning should be acceptable. However, Shechita slaughter disallows tissue damage before bleeding out and it is therefore unlikely that Jewish slaughterers will accept existing pre-stunning methods.

[Anil, M.H. et al. \(2006\). Comparison of Halal slaughter with captive bolt stunning and neck cutting in cattle: exsanguination and quality parameters. *Animal Welfare*. 15 \(4\), 325-330.](#)

A full bed of straw is best for pigs

Providing production animals with an enriched environment is widely accepted as a means of improving animal welfare. It gives the animal an opportunity to have some control over their environment. In the case of pigs, providing enrichment allows them to express key behaviours such as foraging and exploring. Straw is generally considered suitable for pigs as it provides thermal and physical comfort, it can be eaten and it can be used for chewing and rooting activities. Pigs do not seem to get bored with straw and because of this a study was carried out to see if provision of straw would reduce harmful social behaviours such as tail biting.

The experiment used a total of 360 growing/finishing pigs with undocked tails housed in part-slatted, concrete-floored pens. Three different enrichment treatments (a substrate dispenser providing straw, a rootable feed dispenser providing flavoured feed and a chewable liquid dispenser providing flavoured water) were compared to a fully bedded straw pen and a commercial enrichment object.

The results of the experiment showed the highest incidence of tail biting in the pens containing the liquid dispenser and the commercial enrichment object. Because it is important that an animal is rewarded for its rooting behaviour, problems with the liquid dispenser and lack of reward from the commercial enrichment object could have contributed to the incidence of tail biting. The feed dispenser was used more than both the liquid dispenser and the commercial enrichment object as it satisfied both the exploratory and feeding motivation of the pig. Use of straw and the straw rack was highest and pigs manipulated the straw for longer periods than the other enrichments. Tail biting incidence was lowest in pigs in fully bedded straw pens. In addition, food intake and daily weight gain increased for the pigs housed on straw. This study would indicate that, from both a producer and an animal welfare perspective, a full bed of straw is best.

WILDLIFE

Elephant management in zoos

Recently, the issue of elephant management in zoos has been a topic of great debate both locally, with the recent importation of Asian elephants by Australian zoos, and internationally. Elephant management has also become a topic of great concern within the zoo community as more and more zoos are recognising the importance of addressing the complex psychological and behavioural needs of elephants and the difficulty of addressing these needs in a captive environment. This concern over the problems associated with the management of captive elephants has arisen from the results of recent research which demonstrate that the welfare of elephants kept in confinement is severely compromised.

In response to the debate surrounding elephant management in zoos, the journal *Zoo Biology* dedicated an entire issue to the discussion of various aspects of captive elephant management including the implications of zoo breeding programs on the genetic diversity of elephants, the assessment of body condition and the value of Indonesia's inter-country loan scheme for elephants. The articles in this issue of *Zoo Biology* provide an insight into the problems facing zoo elephant management from the perspective of zoo managers and is worthwhile reading for anyone interested in current elephant management issues in the zoo community.

Whilst we are on the topic of elephants, a fascinating study on elephant self-recognition was recently published by Plotnik, deWaal and Reiss in the Proceedings of the National Academy of Sciences. Traditionally, self-awareness was a trait that was considered to be peculiar to humans. Recent research has challenged this traditional view by showing that some higher primates and dolphins also exhibit self-awareness. The results of this study on elephant self-awareness show evidence that elephants can also demonstrate behaviours indicative of self-awareness. These results have implications not only for our understanding of cognitive development but also for our understanding of the individual and social needs of elephants.

Plotnik, J., de Waal, F. & Reiss, D. (2006) Self-recognition in an Asian elephant. *Proceedings of the National Academy of Sciences*. 103, 17053-17057.

Articles about zoo elephant management in *Zoo Biology*. 2006, 25(3).

- Hutchins, M. Variation in nature: its implications for zoo elephant management. 161-171.
- Wilson, M. et al. Nocturnal behaviour in a group of female African elephants. 173-186.
- Wemmer, C. et al. Assessment of body condition in Asian elephants (*Elephas maximus*). 187-200.
- Faust, L., Thompson, D. & Earnhardt, J. Is reversing the decline of Asian elephants in North American zoos possible? An individual-based modelling approach. 201-218.
- Hutchins, M. & Keele, M. Elephant importation from range countries: ethical and practical considerations for accredited zoos. 219-223.
- Hedges, S. et al. Why inter-country loans will not help Sumatra's elephants. 235-246.

Other articles of interest

Bracke, M.B.M. et al. (2006). Formalised review of environmental enrichment for pigs in relation to political decision making. *Applied Animal Behaviour Science*. 98 (3-4), 165-182.

Chilton, S., Burgess, D. & Hutchinson. (2006). The relative value of farm animal welfare. *Ecological Economics*. 59, 353-363.

Clubb, R. & Mason, G. (2006). Natural behavioural biology as a risk factor in carnivore welfare: How analysing species differences could help zoos improve enclosures. *Applied Animal Behaviour Science*. In Press.

Collins, L. & Sumpter, D. (2006). The feeding dynamics of broiler chickens. *Journal of the Royal Society Interface*. Published 26 September 2006. <http://www.journals.royalsoc.ac.uk/>

Nowak, B., Mueffling, T.V. & Hartung, J. (2007). Effect of different carbon dioxide concentrations and exposure times in stunning of slaughter pigs: Impact on animal welfare and meat quality. *Meat Science*. 75 (2), 290-298.

Raj, A.B.M., Sandilands, V., & Sparks, N.H.C. (2006). Review of gaseous methods of killing poultry on-farm for disease control purposes. *The Veterinary Record*. 159, 229-235.

Schmid, E. & Sinabell, F. (2006). On the choice of farm management practices after the reform of the Common Agricultural Policy in 2003. *Journal of Environmental Management*. In Press.

Scott, K., Taylor, L. Gill, B.P. & Edwards, S.A. (2006). Influence of different types of environmental enrichment on the behaviour of finishing pigs in two different housing systems. *Applied Animal Behaviour Science*. 99 (3-4), 222-229.

Smulders, D., Verbeke, G., Mormede, P. & Geers, R. (2006). Validation of a behavioral observation tool to assess pig welfare. *Physiology & Behavior*. 89 (3), 438-447.

Waiblinger, S. et al. (2006). Assessing the human-animal relationship in farmed animal species: A critical review. *Applied Animal Behaviour Science*.