

# 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.

## Research papers

### Animals anticipate the future

Studies on the cognitive abilities of animals have begun to uncover the abilities of many species to plan for the future, even if they do not currently require the thing being planned for. Scrub jays are birds that normally cache food items in secret locations, with the intention of uncovering and consuming them at a later time. When such hidden food is experimentally 'pilfered' or degraded by researchers before the birds return, the jays eventually stop caching food, as though in anticipation of future theft. Moreover, it appears that jays that have previously stolen another bird's food are more protective of their own food stores, and are more likely to hide their food in locations that are unknown to other birds. These birds can also plan their breakfast menus under experimental conditions: they learn to store, in advance, a type of food that will not be available on a particular morning, thus ensuring that they maximize the food types available for consumption that morning.

Primate studies have shown that some species retain a particular tool for several hours in anticipation of a food item that will require that tool. Monkeys will also accept less food (e.g. fewer peanuts) in an experimental trial, when they have been taught that this will earn them far more food ten minutes later. Similarly, monkeys learn to eat less of a food item that makes them thirsty, if they know that their water bottles will be taken away for a longer time, should they eat more of that food item. Thus, the monkeys, like the scrub jays, can "*peer into the future*" and anticipate needs that they do not currently experience.

Roberts, W. (2007) Mental time travel: Animals anticipate the future *Current Biology*, 17(11): R418-420.

## COMPANION ANIMALS

### Breeding for quality of life

Many dog breeds suffer from harmful genetic disorders that result from the need to meet the strict aesthetic requirements of dog shows, as well as from the market demand for 'pure bred' individuals. The practice of 'closed studbooks', where only a few registered individuals of a breed are allowed to produce pure bred offspring, often leads to inbreeding, and to an increase in the prevalence of painful, debilitating conditions such as hip dysplasia in giant breeds and compromised airways in French bulldogs. Some breed standards and selection practices therefore lead to poor welfare, while traits that might improve animal well-being, such as good temperament, are ignored by most breeders. Given that unwelcome behaviour is the main cause of euthanasia or abandonment of pets, the author suggests that more be done to select dogs with temperaments that suit companion animal homes, rather than just the show ring. In the author's own words, "*the only temperament test show dogs have to pass is not biting the judge*".

The author then describes an Australian scheme which, with the cooperation of a diverse range of stakeholders including breeders, veterinarians, veterinary practice management, software providers and

pet insurers, aims to monitor the prevalence of inherited disorders in various breeds of dog. This project builds on the success of the Listing of Inherited Disorders in Animals (LIDA, <http://www.vetsci.usyd.edu.au/lida/>), an online database that allows users to select from the 180 recognized dog breeds in Australia and find out which are prone to the more than 500 inherited disorders on the global record. It is hoped that this information will bring market forces into play, and essentially encourage consumers to demand healthier dogs. The author also describes a University of Sydney initiative to encourage the breeding of dogs, based on temperament. Owners of dogs that have passed the Delta Society's Canine Good Citizen Test will be able to nominate their dog for the Australian Small Animal Veterinary Association Temperament Award, to be presented at dog shows.

McGreevy, P. (2007) Breeding for quality of life, *Animal Welfare*, **16(S)**: 125-128.

## Temperament testing in dogs

This study was carried out at one American animal shelter where temperament tests were carried out before dogs were put up for adoption. Temperament testing is considered important, given the rising frequency of litigations resulting from dog bites. In the test, a dog is subjected to various physical manipulations (opening the mouth, stroking, and hugging), environmental manipulations (loud noises, presence of cats in cages), social manipulations (removal of food/toys/rawhide, approach by a friendly dog), and novel stimulus presentation (toddler-sized doll). Any dog that snarled, growled, lunged, snapped, or bit in any situation other than resource guarding during the temperament test, is considered to have failed. Although temperament testing can potentially be helpful in screening for aggression, it nevertheless remains controversial, as the dog being tested may be too tired, sick, stressed, or otherwise inhibited to exhibit aggressive behaviour; the situations simulated within the test may also not be enough to stimulate a dog's triggers for aggressive behaviour.

This study therefore investigated the prevalence of aggressive behaviour in adopted dogs that had already passed the test using a modified version of Sternberg's standardised temperament testing protocol (referenced below). Owners of 67 dogs adopted within the previous 13 months were asked about their dogs' behaviour during phone interviews. The researchers found that 40.9% of dogs exhibited lunging, growling, snapping, and/or biting after adoption. When barking was included, this percentage rose to 71.2%, suggesting that some temperament tests fail to identify certain types of aggression. The authors recommend that temperament testing results be combined with shelter and/or foster behavioural evaluations, and that both pre- and post-adoption behavioural counselling be offered to owners.

Christensen, E. *et al.* (2007) Aggressive behavior in adopted dogs that passed a temperament test, *Applied Animal Behaviour Science*, **106**: 85-95.

Sternberg, S. (2003) *Successful Dog Adoption*. Wiley Publishing, Inc., Indianapolis, IN, pp. 99-137.

## Puppy emotional development

The social environment that a newly-born animal is exposed to can have a lasting impact on its general behaviour, and its ability to deal with novel or stressful situations. For example, daily contact with humans can substantially alter the behaviour of 5-week-old puppies: handled puppies become more active, explorative, sociable towards people and confident during play with other puppies. Moreover, they show a greater emotional stability in behavioural tests, as well as better problem-solving ability.

In this study, 43 puppies from seven litters were divided into four experimental groups: two groups were kept in a breeding kennel, while the other two groups were raised in a family home. Within each location, one group of puppies was gently handled for five minutes each day per puppy, while the other group was not handled by humans. Each puppy was tested for behavioural responses in a novel location and with a novel human. The researchers found higher emotional stability in puppies that had been regularly handled: when isolated in a novel location, these puppies took longer to start yelping, were more confident, and also yelped less, at least in the breeding kennel group. The authors conclude that the deliberate inclusion of gentling (handling) during early puppyhood would be advantageous to the emotional development and welfare of puppies.

Gazzano, A. *et al.* (2007) Effects of early gentling and early environment on emotional development of puppies, *Applied Animal Behaviour Science* (in press).

### Farm animal welfare legislation

Public awareness of farm animal welfare issues has grown considerably in the last few decades, and has led governments in many countries to pass legislation to regulate farming practices. In this review article, the authors discuss the impact of ethics and science in policy decisions, and how governments have used scientific knowledge in drafting animal welfare legislation. The authors first describe how attitudes towards animals and their use by humans differ widely with religious or cultural traditions. Scientists tackling welfare issues therefore need to be aware that “*there is no gold standard for ethical behaviour and decisions about how animals should be treated*”. Similarly, policy makers should not expect clear-cut facts from welfare scientists, the scientific technique only allows hypotheses to be supported or rejected, but never confirmed.

Countries vary in the level of legal protection afforded to farm animals; Switzerland, for instance, has some of the oldest and most stringent animal protection laws, while in Canada, animal protection is discussed under the property section of the Canadian Criminal Code. Significantly, the European response to animal protection makes use of the precautionary principle, which means that measures should still be taken to safeguard animal welfare, if there is a risk of possible harm, even where scientific information is insufficient, inconclusive or uncertain. Swedish law enshrines specific husbandry criteria according to the behavioural requirements of individual species. The United States government has, however, resisted any move towards regulating farm animal welfare, largely due to an insistence by US policymakers that decisions about farm animal welfare must be primarily scientifically driven. The authors suggest that an effective way forward might be the facilitation of the voluntary implementation of animal welfare measures by primary producers, as has been the case with some companies in the US and the UK.

[Croney, C. and Millman, S. \(2007\) The ethical and behavioural bases for farm animal welfare legislation, \*Journal of Animal Science\*, \*\*85\*\*: 556-565.](#)

### Maternal deprivation and stereotypic behaviour

Captive and commercially-reared animals are routinely removed from their mothers (weaned) at an earlier age than under natural conditions. Dairy calves may be weaned when just a few hours old, while poultry eggs are sent to hatcheries, giving the chicks no contact whatsoever with their mother. Even when not physically removed from their mothers, captive animals may receive improper or insufficient maternal care, due to altered behaviour in the adults, or due to the constraints imposed by the animal enclosure.

Several primate studies, as well as studies on institutionalized human children have confirmed the increased prevalence of stereotypic behaviours in individuals taken away from their mothers at an early age. These behaviours include rocking and bouncing, and self-directed stereotypic behaviours, such as self-clasping and digit-sucking in monkeys, and self-injurious behaviours, such as head-banging and eye-poking in children. Several studies have shown that wild-caught animals, that have had normal early socialization periods, are less likely to develop stereotypic behaviours than captive-bred animals, and there is also evidence that the rearing of captive animals by their own mothers is preferable to hand-rearing by humans. The effects of early maternal deprivation can be altered by a couple of important factors: older animals cope better with weaning than do younger ones, while high levels of environmental enrichment also mitigate the effects of early weaning.

There is evidence to suggest that stereotypic behaviours develop in captive animals when their attempts to suckle or perform normal adult behaviours are hindered; some stereotypies may also represent the animal's attempts to escape from its current situation. Such behaviours can remain hidden until young adulthood, or persist for a long time, even after the animal's living conditions have been improved. In early-weaned primates, almost every type of social interaction, including grooming, aggression and avoidance, mating and communication becomes abnormal, reproductive behaviour may be reduced, and animals may display increased fearfulness and anxiety.

[Latham, N. and Mason, G. \(2007\) Maternal deprivation and the development of stereotypic behaviour, \*Applied Animal Behaviour Science\* \(in press\).](#)

## The weaning of piglets

As discussed above, the early termination of contact with an animal's mother can bring about stress-related negative behaviours that persist into adulthood. It has been suggested that one possible mechanism for such changes might be the reprogramming of the Hypothalamus-Pituitary-Adrenal (HPA) axis, which normally modulates behavioural responses to fear and stress-inducing stimuli. In this study, piglets were weaned at three different ages: 12 days, which is the normal weaning age in North America, 21 days, which was the minimum age allowed in Europe at the time of the study, and 42 days, which corresponds to organic production recommendations in the UK.

The authors found that pigs weaned at 12 and 21 days performed more belly-nosing of littermates and indulged in more aggressive behaviours than those weaned at 42 days. The higher incidence of belly-nosing was temporary, however, and all three groups showed similar levels by day 56. Contrary to expectations, the 42-day piglets also started showing belly-nosing behaviour as early as day 28; the authors suggest that this might be a natural response to the withholding of milk by the sow at around this time. The growth of the 12- and 21-day piglets also decreased after weaning, but this too was transient. Although there were no differences in the levels of cortisol or ACTH in the blood (both chemicals indicative of HPA axis function), there was a surprising decrease in salivary cortisol (a hormonal indicator of stress) levels *after* weaning in all groups. The authors suggest that early weaning causes transient negative behavioural changes in piglets, in spite of the absence of a long-term change in the functioning of the HPA axis.

Jarvis, S. *et al.* (2007) Effects of weaning age on the behavioural and neuroendocrine development of piglets, *Applied Animal Behaviour Science* (in press).

## Effect of solar radiation on dairy cattle

Cows will often use shade structures provided to them during hot summer months. It has been established that the provision of shade has many beneficial effects on the physiology and productivity of cattle: for instance, cattle that use shade have lower respiration rates and core body temperature than cows with no shade. Moreover, shade also mitigates the negative effects of hot and humid conditions on milk production and weight gain. Some studies have, in the past, compared the efficiency of various types of shade structures in terms of materials used and overall design. This study, on the other hand, investigated the effect of one component of shade, namely the level of protection from solar radiation, on the physiology and behaviour of dairy cattle, under a range of environmental conditions.

Thirty six Holstein Friesian cows were grazed in 12 groups of three at a research farm near Hamilton, New Zealand. These cows were milked twice daily (06:00 and 14:15). The researchers ensured that each group contained 1 black, 1 black and white and 1 white cow, and assigned individual groups to one of four conditions: (1) no shade, (2) 25% solar radiation blocked, (3) 50% of solar radiation blocked and (4) 99% of solar radiation blocked. The researchers found that cows spent more time using shade that blocked a greater percentage of solar radiation during day-time, particularly during times of high solar radiation (i.e. during mid afternoon or on sunny days). Cows with more protection from solar radiation had lower minimum body temperature. Contrary to expectations, however, cows with dark coats spent less time in the shade than cows with lighter coats. This could be due to the fact that black cows both gain *and* lose heat faster than white cows. Black cows could therefore be using the shade more often, but for shorter periods of time. The authors conclude that protection from solar radiation is an important design feature of shade.

Tucker, C. *et al.* (2007) Effect of solar radiation on dairy cattle behaviour, use of shade and body temperature in a pasture-based system, *Applied Animal Behaviour Science* (in press).

## ANIMALS USED FOR SPORT AND ENTERTAINMENT

### Stereotypic behaviours in horses

Stereotypic behaviours such as crib-biting/wind sucking, weaving, box-walking and wood chewing can be signs of chronic stress in horses, and can cause a range of problems such as gastric ulceration, colic, tooth wear, weight loss and weakness. Previous studies have shown that breed type, feeding regime,

housing and management conditions have a strong effect on the development of stereotypic behaviours. Moreover, there is anecdotal evidence that exposure to other horses that perform stereotypic behaviour is a risk factor for developing similar habits.

This study investigated this latter question by conducting surveys regarding the housing conditions of over 280 horses in nine riding schools in Hungary. The survey items focused on subject variables, housing, management conditions, food regime, stereotypies, and problematic behaviour performed by the individual horse or by a horse in its visual contact. The researchers found that 16.70% of horses displayed at least one type of stereotypical behaviour.

Several factors were implicated as being highly correlated with stereotypies. Stereotypies were more common in non-competition horses compared to competition horses. Receiving concentrates more than twice a day increased the odds of wood-chewing and stereotypies in general, while having more than two riders increased the odds of weaving, but diminished the odds of box-walking. However, the main finding of this study was that the presence of an aggressive or stereotypic neighbour increased the odds of crib-biting/wind-sucking and weaving. Nevertheless, the authors insist that the isolation of stereotypic horses would be bad management, because social deprivation enhances stress and attenuates stereotypies. They instead suggest that the factors causing the stereotypies in the first place be identified and removed.

[Nagy, K. et al. \(2007\) Possible influence of neighbours on stereotypic behaviour in horses, \*Applied Animal Behaviour Science\* \(in press\).](#)

## ANIMAL RESEARCH AND EXPERIMENTATION

### Let sleeping rats lie

Standard husbandry procedures carried out on laboratory animals such as rats have been shown to induce short-term changes in a range of behavioural, physiological, and immunological stress indicators, and in the circulation of the animals. As these procedures are generally unavoidable, it is necessary to develop techniques that have the least negative impact on the welfare of the laboratory animals.

In this study, laboratory rats reared in a 12 hour:12 hour light:dark cycle were subjected to standard husbandry procedures either during daylight hours, when they were normally resting, or during the dark hours, when they were normally active. The procedures included weighing and checking for general health, cage cleaning, dye-marking on the fur and tail for individual identification and the provision of fresh food and bedding. This was done three times a week for five consecutive weeks.

At the end of the experimental period, there were clear differences between the rats of the two groups. The rats disturbed during the daylight (resting) hours slept less, had smaller thymus glands (indicative of stress), displayed higher levels of aggressive behaviour towards other rats, showed less interest in the enrichment objects provided in the cages, and self-groomed less than rats disturbed during the dark (active) hours. The authors suggest that the application of husbandry procedures in the dark (but with the presence of dim red light to allow researcher/technician visibility), rather than the light, phase of the light/dark cycle may improve the welfare of laboratory rats.

[Abou-Ismaïl, U. et al. \(2007\) Let sleeping rats lie: Does the timing of husbandry procedures affect laboratory rat behaviour, physiology and welfare? \*Applied Animal Behaviour Science\* \(in press\).](#)

### Individual rats and group welfare

Commercial practices often require the removal of one or more individuals from groups of rapidly growing weanling rats, in order to maintain stocking densities, for experiments or due to illness, or when young rats are shipped out to laboratories from breeding facilities. As social isolation, over-crowding and group composition all appear able to affect behavioural and physiological indicators of welfare in rats, it is also conceivable that changes to group composition might also have a disruptive effect on welfare.

In this study, around 350 newly-weaned male rats of the Wistar-Hannover strain were subjected to three different housing conditions, based on combinations of cage size and stocking density. Rats were removed from the group twice during the five-week experimental period, and a range of behavioural parameters was measured before and after each removal. The researchers found that several

behaviours, that could be related to stress or aggression, increased significantly among the remaining group members after the removal of rats; these included vocalizations, chewing on the bars of the cage, climbing on the roof of the cage and aggressive grooming. Normal grooming and social investigation (sniffing the body of another individual) also increased after removal, but this increase was only temporary. Agonistic behaviour, such as chasing or biting, also increased in some of the housing treatments, following the removal of individuals. Finally, the researchers found higher levels of corticosterone, an indicator of stress, in the faeces of the remaining rats after the removal of individuals. The authors speculate that group composition changes could result in social instability, with the remaining individuals trying to establish a new hierarchy. The process of removal could also in itself be a source of stress. In any case, the results suggest that the removal of rats could have a negative impact on the welfare of the remaining group members.

[Oliver, B. et al. \(2007\) Removing individual rats affects indicators of welfare in the remaining group members, \*Physiology & Behavior\* \(in press\).](#)

## WILDLIFE

### Human-animal relationships in zoos

Repeated interactions between the same animals and humans can lead to the development of a longer-term relationship between the two; the most obvious example of positive human-animal relationships (HAR) is that between humans and companion animals, while several studies have also reported HAR involving farm animals. However, as there has been little research to date on the possibility of HAR in zoos, the author of this paper has developed a model to predict the possible consequences of a range of interactions between exotic animals at zoos and human keepers and visitors.

First, the author notes an important difference between the zoo environment and the laboratory and farm: the daily presence of large numbers of zoo visitors. There is evidence that some animal species can distinguish between familiar zoo employees and unfamiliar visitors, and that positive interactions with the former can lead to improved welfare outcomes. Unfamiliar humans are treated quite differently by different animal species, with primates generally showing higher stress levels in the presence of zoo visitors (indicated by increased movement and aggression, or a decrease in grooming), and large cats not showing much behavioural change at all. The authors develop a model similar to the HAR model developed for farm animals, where the starting point in predicting an animal's behaviour is its fear of humans. Animals that can distinguish between caretakers and visitors will respond differently to positive, negative or neutral interactions with the two groups, while animals that do not distinguish are more likely to develop a more generalized response towards all humans. A history of mostly positive interactions will result in an animal with low fear of, and higher confidence with, people, one that may even be enriched by interacting with humans. A history of mostly negative interactions, on the other hand, will cause an animal to avoid human contact, due to high fear and stress levels.

[Hosey, G \(2007\) A preliminary model of human-animal relationships in the zoo, \*Applied Animal Behaviour Science\* \(in press\).](#)

### The personalities of tigers and their keepers

It is only recently that scientists have started taking an interest in the behavioural differences between individuals of the same species. There is, in fact, growing support for the assertion that animals have stable and individual personalities (also often referred to as their behavioural profile, behavioural style, individual distinctiveness, emotional tone or temperament), which can be reliably measured using modified tools borrowed from human psychology, through parameters such as extraversion, neuroticism and agreeableness.

The authors of this study investigated the personalities of seven tigers and their keepers at the Dreamworld theme park, Gold Coast, Australia. The keepers were asked to select adjectives that best described the individual tigers under their care, and to also complete a questionnaire to assess their own personalities. The researchers then observed the tigers and the keepers during the times that the exhibit was open to the public, noting in particular the interactions between the tigers and the keepers. They found that the keeper assessments of tiger personality did not match the researchers' own assessments

of the animals' behaviour, possibly because the latter were not very familiar with the animals, and because the observation period was short. However, the keepers' assessment of their own personalities correlated well with their behaviour with the tigers in the interactive sessions. Keepers that were more likely to be angry gave tigers fewer pats, more conscientious keepers spent less time playing with the tigers, and keepers that tended to be more neurotic had fewer interactions with the tigers. The authors conclude that keeper, but not tiger, personality has strong connections to the interactive behaviour between the two.

Phillips, C and Danica P (2007) The effects of personality of keepers and tigers (*Panthera tigris tigris*) on their behaviour in an interactive zoo exhibit, *Applied Animal Behaviour Science*, **106**: 244–258.

## Other articles of interest

Botreau, R. et al (2007) Definition of criteria for overall assessment of animal welfare., *Animal Welfare*, **16**: 225-228.

Bracke, M. (2007) Animal-based parameters are no panacea for on-farm monitoring of animal welfare, *Animal Welfare*, **16**: 229-231.

Brumm, H. & Slater, P. (2007) Animal communication: Timing counts, *Current Biology*, **17**:R521-523.

Courboulay, V. & Foubert, C. (2007) Testing different methods to evaluate pig welfare on farm, *Animal Welfare*, **16**: 193-196.

Dybkjær, L. (2007) Introduction to special issue on early weaning, *Applied Animal Behaviour Science* (in press).

Fukuda, Y., Whitehead, P. & Bogg, G. (2007) Broad-scale environmental influences on the abundance of saltwater crocodiles (*Crocodylus porosus*) in Australia, *Wildlife Research*, **34**:167–176.

Hegelund, L. & Sørensen, J.(2007) Measuring fearfulness of hens in commercial organic egg production, *Animal Welfare*, **16**: 169-171.

Melches, S. et al. (2007) Castration of lambs: A welfare comparison of different castration techniques in lambs over 10 weeks of age, *The Veterinary Journal*, **173**:554–563.

Meyer, I. & Ladewig, J. (2007) The relationship between number of training sessions per week and learning in dogs, *Applied Animal Behaviour Science* (in press).

Turner, J. et al. (2007) Immunocontraception in wild horses: One inoculation provides two years of infertility, *The Journal of Wildlife Management*, **71**:662-667.

Whay, H. (2007) The journey to animal welfare improvement, *Animal Welfare*, **16**: 117-122.

Yeates, J. & Main, D. (2007) Assessment of positive welfare: A review, *The Veterinary Journal* (in press).