



RSPCA AUSTRALIA

Animal welfare science update

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This is the fourth Animal welfare science update provided by the RSPCA Australia office. The aim of the update is to keep you informed of developments in animal welfare science that relate to the work of the RSPCA. The update provides summaries of some of the recently published scientific papers that have been received by the RSPCA Australia office in the past few months.

Farm animals

1 The case against tail docking in dairy cattle

Tail docking provides no real benefits to cows or workers and increases predation by flies. Tail docking is widely included as part of the routine management of dairy herds in countries such as New Zealand and the US. Supporters of tail docking in dairy cattle argue that it provides improved udder health, milk hygiene, and comfort for dairy staff. Yet there is little evidence to support these claims. This paper presents a review of the current knowledge about the effects of tail docking on the health and welfare of dairy cattle, and the comfort and health of workers. The authors argue that available evidence suggests that tail docking by banding probably only causes mild and brief discomfort to the cows, and that local anaesthesia does not provide a welfare benefit. However, they also argue that the evidence shows that tail docking provides no benefits in terms of cleanliness, udder health, milk hygiene, or the health and safety of dairy workers, while it does increase predation on the docked cattle by flies. Overall, their conclusion is that there is no justification for the routine tail-docking of dairy cattle.

Reference: Stull CL, Payne MA, Berry SL, and Hullinger PJ (2002) Evaluation of the scientific justification for tail docking in dairy cattle. *Journal of the American Veterinary Association* **220**: 1298-1303.

2 Breeding out stress in pigs

Some pigs are genetically predisposed to suffer from higher stress levels than others. As a result they have a considerably higher probability of death during transport or lairage. These authors took samples from pigs that had died during transport or lairage and determined whether or not they carried the halothane gene. 95 % of the dead pigs carried one or more copies of the defective gene. This compares with only 58 % of pigs that survived to slaughter. The authors calculate that by using selective breeding to eliminate this gene from the population the pre-slaughter mortality rate could be reduced eleven-fold. There are several factors that may influence whether or not these results would apply in Australia. For example, pre-slaughter mortality is affected by both climatic conditions and handling procedures, while the prevalence of the gene will almost certainly vary between breeds and bloodlines. Nevertheless, it is quite possible that further research will show that a breeding program aimed at eliminating the defective halothane gene from Australian breeders will have a positive welfare outcome for pigs by reducing their susceptibility to stress.

Reference: Stull CL, Payne MA, Berry SL, and Hullinger PJ (2002) Evaluation of the scientific justification for tail docking in dairy cattle. *Journal of the American Veterinary Association* **220**: 1298-1303.

3 Characteristics of a good guard llama

Llamas that display leadership, are alert and are heavy, will make the best guardians for flocks. In recent years there has been an increased interest in the use of llamas as guard animals to protect sheep or other farm animals from dogs and foxes. This study aimed to find easily observed traits that would predict how useful any individual llama would be as a guardian. The alertness, dominance, etc of each of 20 wethered male llamas was determined when they were grouped with other llamas or with sheep. The response of each llama to a border collie was then observed. The traits that were best at predicting good guard llamas were leadership (ie being followed around by other llamas), alertness, and weight. Age was not an important factor except that older animals are also often heavier. The effectiveness of llamas or related animals as guardians may be improved by the selection of appropriate individuals according to these kinds of criteria.

Reference: Cavalcanti SMC, and Knowlton FF (1998) Evaluation of physical and behavioural traits of llamas associated with aggressiveness toward sheep-threatening canids. *Applied Animal Behaviour Science* **61**: 143-158.

4 Space requirements of meat turkeys.

The British "Codes of recommendation for the welfare of livestock: turkeys" recommend 260 cm²/kg bodyweight as the minimum acceptable floor area per broiler turkey. This is equivalent to a stocking density of 38.5 kg/m². Another British recommendation (from the Farm Animal Welfare Council "Report on the welfare of turkeys") states that maximum stocking density in kg/m² should be calculated from the live-weight of the birds using the formula $\text{weight}/(0.0459 \times \text{weight}^{2/3})$. However, no explanation is given for the way in which this formula was determined. In this study the authors used overhead photographs of turkeys to determine the floor-area covered by a male British United Turkey's body, i.e. they determined the physical space that a turkey takes up. Every two weeks from 11 weeks of age to 21 weeks of age they took measurements from 24 randomly selected turkeys. This data enabled them to reject the FAWC recommendation as unsuitable for turkeys larger than 5kg. They propose a new formula for determining the space taken up by a turkey and further discuss the welfare needs of broiler turkeys. The formula provided by this paper can be used to determine the area taken up by a single turkey but on its own cannot be used to estimate appropriate stocking density.

Reference: Ellerbrock S, and Knierim U (2002) Static space requirements of male meat turkeys. *Veterinary Record* **151**: 54-57.

Animal Research and Experimentation

5 Simplified method for producing transgenic animals

This paper describes a simple new method for producing transgenic (genetically modified) animals. Previous techniques for producing transgenic animals have been complicated, requiring specialist equipment and training. Some of these methods have been effective for mice but not other types of animals. Using this technique, semen is washed and dried then combined with DNA. The DNA is taken up by the sperm and becomes part of the genome. This modified sperm is then used to artificially inseminate a healthy female. The authors successfully used this technique to create a population of transgenic pigs producing a protein that would make them more appropriate for use in xenotransplantation experiments than standard pigs.

If this technique is as simple and effective as claimed, it is likely to lead to a boom in experimentation using genetically modified animals, as well as accelerating research into xenotransplantation. There are also some potential animal welfare benefits from this new technology. Because it does not rely on cloning technologies, or the physical manipulation of cells, the chance that the resulting offspring will not survive, or will survive with serious health problems or deformities is low in comparison to other techniques. In addition, the authors claim that the insertion of new genetic material into the genome is non-random, reducing the risk of cancer.

Reference: Lavitrano M, Bacci ML, Forni M, Lazzereschi D, Di Stephano C, Fioretti D, Giancotti P, Marfe G, Pucci L, Renzi L, Wang H, Stoppacciaro A, Stassi G, Sargiacomo M, Sinibaldi P, Turchi V, Giovannoni R, Della Casa G, Seren E, and Rossi G (2002) Efficient production by sperm-mediated gene transfer of human decay accelerating factor (hDAF) transgenic pigs for xenotransplantation. *Proceedings of the National Academy of Science* **99**: 14230-14235.

6 What do rats want in a cage?

Laboratory rats should be housed in small groups rather than alone. Several different approaches are used to try to improve the welfare of caged rats. These include group housing (typically with 3 to 6 rats housed together), bigger cages, cages with furniture, and cages with interesting objects that can be used as toys. This study tried to find out which of these cage systems rats want most. It did this by making the rats work to get into the cages (by pressing a lever) and finding out which type of cage they were willing to work hardest for. In general rats were prepared to work hardest for a cage containing other rats. In other words the rats preferred group housing to larger or “enriched” cages. It is possible that improvements to the shape of the large cages or the type of enrichment used would make them more attractive to the rats. Furthermore there is no reason why groups of rats should not also be provided with larger cages or some form of environmental enrichment as well. This method provides a useful tool for determining what is most desirable to the rats themselves.

Reference: Patterson-Kane EG, Hunt M, and Harper D (2002) Rats demand social contact. *Animal Welfare* 11: 327-332.

Animal Welfare and the Environment

7 Counting feral horses

Estimates of the number of horses in wild populations are often made by helicopter counts. Unfortunately the presence of the helicopter may make horses bolt, making it difficult to count them accurately. This study carried out in New Zealand shows that there are large errors in helicopter counted estimates of horse populations. 136 horses belonging to 17 groups of wild horses were individually marked and known to observers monitoring the helicopter counting procedure. One-tenth of marked horses were not counted and one-quarter were counted twice. A further seventeen percent may have been counted twice, but discrepancies between the records of the observers and counters meant that this could not be confirmed. Overall the helicopter count over-estimated the marked subpopulation by at least 15 % and possibly by as much as 32 %. To avoid these types of miscounting the authors suggest that helicopter flight paths should not be too close (greater than 300 m apart) and should not be symmetrical, as this may effectively herd the horses ahead of the helicopter. Low flying is also likely to cause increased problems by aggravating the escape response of the horses, especially if they have had previous negative experiences with helicopters such as helicopter mustering.

Reference: Linklater WL, and Cameron EZ (2002) Escape behaviour of feral horses during a helicopter count. *Wildlife Research* 29: 221-224.

Humane Killing

8 Stunning Fish

The authors have developed a new method for testing the state of awareness of fish and thus their capacity to suffer. They argue that this will allow rapid large-scale examinations of commercial fish-killing operations to determine their standard of welfare. Their method involves observing behaviour (e.g. swimming), measuring the response to painful stimuli (e.g. a pin-prick) and measuring reflex reactions (e.g. breathing). However, it is not necessary to carry out all of the tests in all cases. Fish that do not display any reflex reactions can be assumed to be insensible. In anaesthetised fish behavioural responses are lost first, then responses to painful stimuli, and finally reflex reactions.

The authors used their method to assess the effectiveness of different methods used to stun and kill fish. All fish that were stunned/killed by percussion or electronarcosis suffered immediate profound brain failure. Therefore the authors argue that these methods of killing are humane.

Reference: Kestin SC, van de Vis JW, and Robb DHF (2002) Protocol for assessing brain function in fish and the effectiveness of methods used to stun and kill them. *Veterinary Record* 150: 302-307

9 Comparison of the humaneness of methods used for killing fish

Methods for slaughtering fish that result in a rapid loss of sensibility are generally more humane and may also result in better meat quality. The authors describe a wide range of commercial slaughter methods, compare their impact on fish welfare, and also investigate the link between the humaneness of the slaughter method and subsequent meat quality. Unfortunately, because of a lack of prior studies into fish killing some of the information included in this review is not from published scientific research. Of the methods used that do not result in an immediate loss of consciousness, the use of anaesthetics or sedatives based on eugenols (ie clove oil) appears to be the most humane and to result in improved meat quality. With the exception of the use of explosive devices (which have a very high negative impact on fish outside of the stun zone), methods of slaughter that result in immediate loss of consciousness were generally more humane than methods that do not.

Reference: Robb DHF and Kestin SC (2002) Methods used to kill fish: field observations and literature reviewed. *Animal Welfare* 11: 269-282.

10 Chicken stunners

Poultry are typically stunned prior to slaughter by shackling their legs to an electrical earth, and placing their heads in an electrified waterbath. Although individual chickens will vary in their sensitivity to the electrified waterbath, it is essential that an adequate current is maintained to effectively stun all birds. On the other hand, too high a current will affect meat quality so there needs to be a balance between finding a sufficient current to stun effectively while minimising the impact on meat quality. This paper describes an electronic device that can be used to measure the current and voltage that individual birds are exposed to during the stunning process. This will make it possible for plant operators to determine appropriate current settings, as well as aiding them to identify and fix any faults with their stunning equipment.

Reference: Berry PS, Meeks IR, Tinker DB and Frost AR (2002) Testing the performance of electrical stunning equipment for poultry. *Veterinary Record* 151: 388-390.

Companion animals

11 Music in shelters

Dogs kept in shelter kennels will spend more time than usual quietly resting when exposed to classical music, and more time barking when exposed to heavy metal music. In this study dogs kept at the National Canine Defence League in the UK were exposed to 4 hours per day of human conversation, classical music, heavy-metal music, pop music, or background noise. All dogs were exposed to all types of noise over the course of the study. The position of the dogs in the kennel, their activity level, and their level of vocalisation were recorded once every 10 minutes over each 4 hour period. No type of music affected the position of the dogs in the kennels. Human conversation and pop music were also no different from background noise in determining their activity level and vocalisations. However, classical music (The very best of the classic experience; EMI Virgin records) and heavy metal music (Metallica; Vertigo records) appeared to have opposite effects on both behaviour and vocalisation. When exposed to classical music the dogs spent more time resting quietly, when exposed to heavy metal music they spent more time standing and barking. The authors suggest that classical music may be good for the welfare of shelter dogs by providing a relaxing atmosphere.

There are some substantial flaws with this study. The worst of these is that the people describing the dogs' behaviour can hear the music that the dogs are hearing. This may bias their results for two reasons: 1) The authors' personal biases for or against some musical genres may influence the way they perceive the dogs' behaviour and 2) Despite arguing that humans are influenced by musical types, the authors have not considered the possibility that they may themselves be subconsciously influenced by the music thus altering their perception of the dogs' behaviour. The grouping of music into categories such as "classical" and "heavy metal" also fails to consider the extensive diversity existing within these genres. It is worth considering whether the response of dogs to Gluck's "Dance of the blessed spirits" would be the same as their response to Wagner's "Ride of the Valkyries" or Holst's "The Planets". Similarly, it is worth asking if their response

to the tracks on Metallica's album "Metallica" are representative of heavy metal music as a whole. Given that a compilation album was used for classical and pop music why was the same not done for heavy metal music? Another factor to consider is how the public would respond to any music played within the shelter. If a particular style of music deters potential owners then it will be detrimental to the dogs' welfare.

Reference: Wells DL, Graham L, and Hepper PG (2002) The influence of auditory stimulation on the behaviour of dogs housed in a rescue shelter. *Animal Welfare* **11**: 385-393.

Other Recent Arrivals:

Anil L, Anil SS, and Deen J (2002) Relationship between postural behaviour and gestation stall dimensions in relation to sow size. *Applied Animal Behaviour Science* **77**: 173-181.

Bradshaw JWS, McPherson JA, Casey RA and Larter IS (2002) Aetiology of separation-related behaviour in domestic dogs. *Veterinary Record* **151**: 43-46.

Cloutier S, and Newberry RC (2002) Differences in skeletal and ornamental traits between laying hen cannibals, victims and bystanders. *Applied Animal Behaviour Science* **77**: 115-126.

Li Y, and Gonyou HW (2002) Analysis of belly nosing and associated behaviour among pigs weaned at 12-14 days of age. *Applied Animal Behaviour Science* **77**: 285-294.

Mayer JJ, Martin FD, and Brisbin IL (2002) Characteristics of wild pig farrowing nests and beds in the upper coastal plain of South Carolina. *Applied Animal Behaviour Science* **78**: 1-17.

Pedersen LJ, Jensen MB, Hansen SW, Munksgaard L, Ladewig J, and Matthews L (2002) Social isolation affects the motivation to work for food and straw in pigs as measured by operant conditioning techniques. *Applied Animal Behaviour Science* **77**: 295-309.

Riedstra B, and Groothuis TGG (2002) Early feather pecking as a form of social exploration: the effect of group stability on feather pecking and tonic immobility in domestic chicks. *Applied Animal Behaviour Science* **77**: 127-138.

Taylor AA, Weary DM, Lessard M, and Braithwaite L (2001) Behavioural Responses of piglets to castration: the effect of piglet age. *Applied Animal Behaviour Science* **73**: 35-43.

vanHierden YM, Korte SM, Reusink EW, van Reenen CG, Engel B, Koolhaas JM, and Blokhuis HJ. (2002) The development of feather pecking behaviour and targeting of pecking in chicks from a high and low feather pecking line of laying hens. *Applied Animal Behaviour Science* **77**: 183-196.

vanHierden YM, Korte SM, Reusink EW, van Reenen CG, Engel B, Korte-Bouws AH, Koolhaas JM, and Blokhuis HJ. (2002) Adrenocortical reactivity and central serotonin and dopamine turnover in young chicks from a high and low feather-pecking line of laying hens. *Physiology & Behavior* **75**: 653-659.

Webster AJF (2002) Effects of housing practices on the development of foot lesions in dairy heifers in early lactation. *Veterinary record* **151**: 9-12.

Weeks CA, McNally PW, and Warriss PD (2002) Influence of the design of facilities at auction markets and animal handling procedures on bruising in cattle. *Veterinary record* **150**: 743-748.

Whittaker X, Spoolder HAM, Edwards SA, Lawrence AB and Corning S (1998) The influence of dietary fibre and the provision of straw on the development of stereotypic behaviour in food restricted pregnant sows. *Applied Animal Behaviour Science* **61**: 89-102.

Wickens SM (Ed.) (2001) Science in the service of animal welfare: A chronicle of seventy-five years of UFAW. Universities Federation for Animal Welfare.

Postscript

This is the last science update to be prepared by RSPCA Australia Assistant Scientific Officer, Miranda Sherley. Miranda is leaving us for a position as Lecturer in Medical Microbiology at the University of Tasmania. The staff at RSPCA Australia wish her well in her new job and thank her for the great job she has done in making the Science Update such a useful publication. Future email enquiries regarding the Science Update should be sent to science@rspca.org.au