



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

The Future of Animal Law Conference

RSPCA Australia is pleased to announce it will be partnering with Macquarie University's Centre for Legal Governance to host a one-day conference on the future of animal law. Animal law is a new and emerging field of legal scholarship concerned with the way the law recognises, and impacts upon, the interests of animals. The field has experienced considerable growth in recent years and is likely to play an increasing role in the future development of animal welfare policy and law in Australia. *The Future of Animal Law* will bring together leading animal law academics and practitioners, and representatives from animal industries and government, to explore the latest developments concerning animals and the law.

Program and registration information will be available on the RSPCA Australia website www.rspca.org.au shortly.

Date: Thursday, 18 October 2012

Place: The Mint, 10 Macquarie Street, Sydney NSW



The Future of Animal Law is sponsored by the Australian Academy of Law.

COMPANION ANIMALS

Misperception of Brachycephalic dogs as normal

Selection for brachycephalic (short/flat muzzle length) in dogs is a major risk factor for brachycephalic obstructive airway syndrome (BOAS). Clinical signs of BOAS include respiratory distress, exercise intolerance, upper respiratory noise and collapse. Recognition of the clinical signs of disease by companion animal owners is an important initial step in the process of perceiving a 'problem', and deciding to seek veterinary attention.



BOAS affected dogs are reported to be in chronic respiratory distress, thermal and physical discomfort, and experience behavioural restriction due to their impaired physical capabilities. Protection from pain, suffering, injury and disease potentially conflicts with practices employed in the breeding of companion animals, whereby selection for extreme morphological characteristics to conform to breed standards has led to a variety of associated disorders. The aim of this study was to quantify owner recognition of clinical signs of BOAS, and to investigate whether the owners of dogs exhibiting these signs perceive them as a 'problem'. A questionnaire-based study was carried out on the owners of dogs referred to an animal hospital. Owners reported the frequency of respiratory difficulty and characteristics of respiratory noise in their dogs in four contexts (at rest, gently walking, activity/exercising and sleeping), summarised as an 'owner-reported breathing' (ORB) score. Owners then reported whether their dog currently has or has had a history of 'breathing problems'. The study involved dogs from 68 breeds including Pugs, French bulldogs and Bulldogs.

There was a disparity in recognition and perception, with well over half (58%) of affected dog owners reporting a high frequency and severity of clinical signs in their dogs, without perceiving them as a problem.

Without appreciation of the welfare implications of BOAS, affected undiagnosed dogs may be negatively affected for the rest of their lives through lack of treatment and affected dogs may continue to be selected in breeding programmes, perpetuating this serious disorder. Raising awareness of the potential problems associated with such breeds and conformations may play an important role to ensure informed decisions are made when selecting puppies; encouraging selection to be based upon health and not solely on aesthetics. Breeders of brachycephalic dogs intended for the show ring are motivated to select animals to maintain breed standards; however, some standards are inherently putting dogs at risk of BOAS.



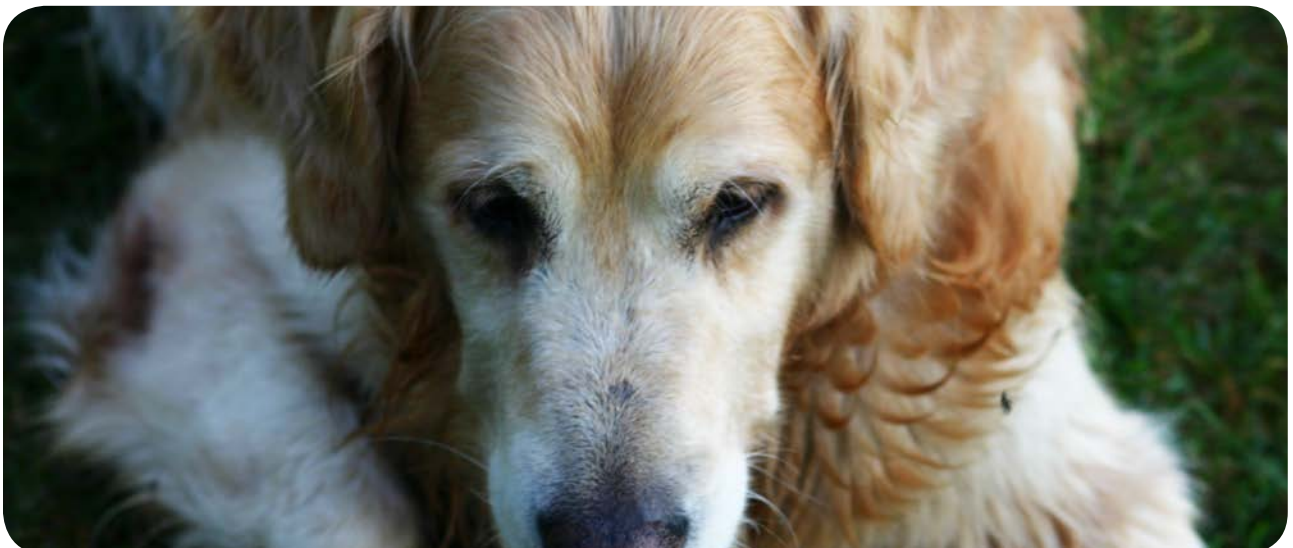
Packer, R.M.A, Hendricks, A. & Burn, C.C. (2012) Do dog owners perceive the clinical signs related to conformational inherited disorders as 'normal' for the breed? A potential constraint to improving canine welfare, *Animal Welfare*, 21(S1): 81-93

Inherited heart defects in Golden Retrievers

Three eight-week-old Golden Retriever puppy littermates were evaluated because of systolic heart murmurs and were diagnosed with primary infundibular stenosis (IS), which is an abnormal narrowing of the outflow portion of the right ventricle of the heart. Two of the three littermates had congenital lesions in addition to primary infundibular stenosis (IS). Pedigree analysis in this line was also performed to identify a mode of inheritance. It has been suggested that Golden Retrievers, Siberian Huskies, and Boxers seem to be over-represented for this anomaly. To the authors' knowledge this is the first time IS has been recognised in a family of related Golden Retrievers.

Pedigree analysis revealed that the parents of the puppies reported in this study share common ancestors of which the closest is the grandmother. Extended family studies revealed that two additional affected puppies had been previously diagnosed with IS. One of those puppies was an offspring of the same mother as the puppies described in this study from a breeding with the great-grand sire of the reported puppies. That dog was also the sire of the second puppy from a breeding to a different bitch, which was distantly related to the mother of the puppies reported here. The information provided by this pedigree suggests an autosomal recessive mode of inheritance of primary infundibular pulmonic stenosis in the Golden Retriever. It is possible that other affected puppies in this line were missed because not all had echocardiograms performed. An additional unrelated Golden Retriever was also identified with IS, however, the authors could not find a common ancestor to the family reported in this study and were therefore unable to include it in the pedigree analysis. Nonetheless, these findings are consistent with previous suggestions that this breed is predisposed to this anomaly and that the lesion is not isolated to this particular pedigree. This report also underlies the importance of serially screening patients with IS as this disease may worsen with age and is also associated with additional inherited abnormalities (complex congenital cardiac disease).

Arndt, J., Werner, P. & Sleeper, M. (2012) Primary Infundibular Stenosis and Pedigree Analysis in Three Golden Retriever Littermates, *J Am Anim Hosp Assoc*, 48: 50-53.



FARM ANIMALS

Economists and animal welfare

Supplement 1 of the journal *Animal Welfare* contains the proceedings of a symposium organised by the Universities Federation of Animal Welfare on making improvements in animal welfare through economics. Improved animal welfare has traditionally been achieved by the voluntary adoption of new methods of husbandry by farmers, or by the imposition of legislation by governments. Christensen *et al.* argue that new strategies are required to bring about further improvements in welfare – strategies that are informed by sound economic principles.

The authors point out that in spite of the high level of willingness among consumers to pay for better welfare meat products, for instance (as indicated by the results of surveys), in practice this remains a niche market. Farmers may also be unwilling to implement new procedures to improve the welfare of their animals because of the high costs involved. The authors suggest that given the limited resources available to both governments and farmers, it is essential to prioritise the different aspects of animal welfare. Importantly, the assumptions underlying the process of prioritisation should be made explicit at the outset, and the process of decision-making should be transparent. As an example, they mentioned a decision made by the Danish Animal Protection Council to recommend legislation which mandated improving indoor housing conditions for dairy cattle, even though public opinion would have preferred a legislation that required outdoor grazing. The council took into account the relative benefits and costs of both measures in making their decision. The authors of this paper suggest that in addition to prioritising the interests of different stakeholders – animals, farmers and consumers – governments should also be prepared to provide suitable incentives to cover the costs of welfare-enhancing measures.

Other articles of interest in this issue include a 20-year international perspective on animal welfare as a public policy issue, the design of welfare policies, and the commodification of animal welfare.

Christensen, T., Lawrence, A., Lund, M. *et al.* (2012) How can economists help to improve animal welfare? *Animal Welfare*, 21(S1): 1-10.

Science and the ethical food movement

Public awareness of the welfare issues involved in farm animal husbandry has grown in recent years, and national governments have responded by passing legislation to ensure minimum standards of animal welfare. While it is generally agreed that any new policy should be based on objective scientific findings, the authors of this paper argue that people involved in all sides of the animal welfare debate can resort to using scientific evidence in a biased, selective manner, in order to forward their own beliefs and agendas. As a result some policies can be based on emotional arguments or incorrect scientific conclusions that may end up resulting in either poor welfare, adverse environmental impacts or financial loss to producers.

Performing scientific research and communicating scientific findings can, in itself, be highly value-laden, and scientists who become involved in advocacy must be careful to distinguish between arguments which they believe to be sound and valid, versus arguments that merely align with their own belief system. Still, scientific input in the policy making process needs to be ensured, but not at the expense of input from other stakeholders. In addition, scientists and policy makers should both strive to be maximally transparent when

explaining to the public the basis for their decisions and conclusions. The authors cite numerous examples to demonstrate that the debate around animal welfare is a highly complex and ideologically-charged one. The use of antibiotics in food production is one such example, where the potential dangers of antibiotic misuse have – at least in public debate – been given greater weight than the negative consequences of stopping this practice on animal health and food production efficiency.

Croney, C.C., Apley, M., Capper, J.L. *et al.* (2012) Bioethics symposium: The ethical food movement: What does it mean for the role of science and scientists in current debates about animal agriculture? *Journal of Animal Science*, 90(5): 1570-1582.



Breeding chickens for better welfare

It is frequently stated that the fast growth rate of meat chickens is responsible for their poor welfare, as this leads to physiological disorders, growth and bone deformities, lameness and inability to engage in natural behaviours. This has given rise to a general acceptance of the fact that the economic forces that drive the chicken meat industry (which prefer large, rapidly-growing birds) are essentially incompatible with the requirements of animal welfare.

In this paper, the authors argue against such a view, and suggest instead that it is possible to breed chicken varieties that fulfil both economic and welfare needs. In particular, they strongly encourage attempts to breed broiler chickens that: (i) have high welfare; (ii) do not need for feed restriction (in the case of broiler breeders); (iii) can be grown in an economically profitable way; (iv) have low disease levels without routine use of antibiotics; (v) yield meat that is healthy and good for humans to eat; and (vi) thrive in systems that are environmentally sustainable. The authors suggest that natural selection in wild populations tends to simultaneously select for multiple traits, and that it is possible, in theory, to breed chicken strains that not only grow fast, but also exhibit no lameness. Similarly, it is possible to breed strains that grow fast when the birds are young, but much slower as adults. Meat quality could thus be improved (by reducing fat content), while also increasing the welfare of adult birds.

Dawkins, M.S. & Layton, R. (2012) Breeding for better welfare: genetic goals for broiler chickens and their parents, *Animal Welfare*, 21: 147-155.



Image courtesy of Australian Chicken Meat Federation.

Environmental enrichment and pig optimism

Human psychological studies have shown that a person's emotional state can affect their perception of the world. Thus, people who are experiencing positive emotional states tend to judge new information in a more positive way, when compared to people who may be thinking negative thoughts. In the case of farm animals, a positive emotional state can be an indicator of good welfare, but in practice, it is very difficult to make an accurate and objective assessment of how animals might be feeling.

In this study, the researchers asked whether the level of environmental enrichment offered to pigs could have an impact on the way they assess new information as positive or negative. Two groups of pigs twelve weeks of age were housed in either barren or enriched environments, and trained to associate two different sound stimuli with either a reward (an apple) or a mildly negative outcome (having a plastic bag waved in front of them – the bag made a loud noise that the pigs preferred to avoid). Once the pigs were trained to behave in an appropriate manner when they heard a particular sound, they were tested individually, in either a barren or enriched environment, on a new, ambiguous sound. The researchers noted whether the pigs reacted in a positive or negative way. The results showed that both groups of pigs were more likely to respond positively to the ambiguous cue when currently

housed in the enriched environment. Pigs that started in the enriched environment were subsequently more 'pessimistic' when moved to a barren environment than pigs initially housed in the barren environment. The authors conclude that pigs have more optimistic judgement biases in enriched environments, and that this indicates a more positive emotional state. Also, pigs that have spent time in an enriched environment react more negatively to being subsequently housed in a barren environment.

Douglas, C., Bateson, M., Walsh, C. *et al.* (2012) Environmental enrichment induces optimistic cognitive biases in pigs, *Applied Animal Behaviour Science*, 139: 65-73.



Effect of farrowing system on piglet mortality

One of the stated advantages of housing lactating sows in farrowing crates is that they prevent sows from crushing young piglets. This is the most common cause of death in unweaned piglets, and can account for up to 58% of all deaths at this young age. However, the welfare concerns associated with farrowing crates are so great that they have been banned in some countries. Farrowing crates prevent the sow from moving normally, and this can lead to health problems, such as muscle atrophy and skin lesions.

The authors of this paper carried out the largest ever survey of pig-rearing facilities in the UK, to determine if there was a relationship between farrowing system and piglet death. Four types of farrowing accommodation were studied: farrowing crates, indoor loose pens, crate/loose systems (where the sow was restrained in a crate during birth and the first days of lactation before being moved to a loose pen) and outdoor farrowing in arcs in paddocks. The researchers documented a mortality rate of 55% due to crushing among live-born piglets, in line with previous studies. They also found a reduced risk of stillbirths in outdoor farrowing systems compared with crated systems. There was a significantly higher risk of farmer reported crushing of healthy live born piglets in outdoor arcs compared with piglets reared with sows in farrowing crates and a significantly reduced risk of death from causes other than crushing in piglets reared outdoors or in crate/loose systems compared with piglets reared in crated systems. Overall, therefore, farrowing crates reduced the risk of death from crushing, but piglets in this system were at increased risk of death from other causes. Consequently, crates did not reduce overall piglet mortality in comparison to other systems.

Kilbride, A.L., Mendl, M., Stathem, P. *et al.* (2012) A cohort study of preweaning piglet mortality and farrowing accommodation on 112 commercial pig farms in England, *Preventive Veterinary Medicine*, **104**: 281– 291.



Pools for Pekin ducks

Pekin ducks are increasingly being reared in indoor intensive systems, often without access to pools of water, where they might indulge in normal behaviours such as wet preening, swimming, dabbling (searching for food underwater with the beak), head dipping and wing rubbing. It is thought that these behaviours allow ducks to maintain good eye health and feather condition. However, the logistics of providing open water to ducks housed indoors is complicated, and the exact nature of the ducks' need for water-related behaviours remains to be properly determined.

In this experimental study, the researchers allowed groups of four Pekin ducklings (the entire experiment investigated the behaviour of 64 birds) to choose between pools that were either shallow (10 cm), deep (30 cm), or of intermediate (20 cm) depth. Additional clean drinking water was provided by means of two turkey bell drinkers. The researchers found no difference between the usage of 10 and 20 cm deep pools, but overall, ducks chose to use the 10 cm pools

more than the 30 cm pools. This a useful indication of duck preferences for water depth, but not a definitive measure because observations of bathing behaviour suggested that pools of different depths were used in different ways (30 cm pools were more suitable for swimming, but more dabbling was performed in the 10 cm pools than in deeper pools) and because not all groups of ducks made the same choices. It was also found that when the water was dirty, ducks spent less time inside the pools, spent less time sitting during bathing bouts and drank more from the bell drinkers. The authors conclude that while the provision of pools to ducks is undoubtedly a welfare-friendly measure, the practicalities of adopting such a strategy at a commercial scale need to be seriously considered beforehand.

Liste, G., Kirkden, R.D. & Broom, D.M. (2012) Effect of water depth on pool choice and bathing behaviour in commercial Pekin ducks, *Applied Animal Behaviour Science*, **139**: 123– 133.

Abnormal behaviours in individually housed sheep

Merino sheep that produce ultra-fine wool may be housed indoors in individual pens where they are prevented from interacting with other sheep, except through the wooden slats of their pen walls. There is anecdotal evidence that sheep housed indoors show higher levels of stereotypic behaviour (such as pacing, chewing/nosing parts of the pen) than sheep reared in pasture. This is partly due to a lack of fibre in the diets of the indoor sheep, and it is thought that this makes them redirect chewing behaviour towards other objects.

In this experimental study, the researchers observed 96 Merino sheep over a three-week period, using video cameras. Seventy-one percent of the sheep displayed one or more of the behaviours of pacing, and chewing and nosing pen fixtures for more than 10% of the day and 47% displayed one or more of these behaviours for more than 20% of the day. The authors believe that while these findings may suggest poor welfare in individually-housed sheep, further research is required before any definite conclusions can be drawn.

Lauber, M., Nash, J.A., Gatt, A. *et al.* (2012) Prevalence and incidence of abnormal behaviours in individually housed sheep, *Animals*, 2: 27-37; doi:10.3390/ani2010027.

Positive emotional states in animal welfare

Many of the early animal welfare codes tended to stress the removal of negative welfare states in animals, such as thirst, pain, fear and hunger. This focus on negative states is still prevalent in many current welfare codes, and the author of this review article argues that such an approach only succeeds in ensuring neutral (as opposed to positive) welfare for animals. In order to engender truly positive welfare, says the author, it is essential to think about the more subjective positive emotional states that animals may experience – these may include pleasure, comfort, contentment, curiosity and playfulness.

It has traditionally been held that such mental states are far too subjective to be accurately measured, and incorporated into policy and legislation. The author counters this claim by pointing out that far more is now understood about the neural correlates (changes in brain structure and function) that accompany these states, and that animal welfare researchers are now in a position to study them in their research projects. For example, the 'seeking' emotional system, which has a basis in the dopamine-based reward circuits of the brain, motivates animals to explore, want, expect and be excited, and is often observed as investigation of, and interaction with, their environment. Consequently, the daily provision of food in one or two discrete meals that are rapidly consumed by animals kept in unchanging and/or barren environments prevents the welfare enhancement that would exist when the management and environment of such animals encourage diverting, enjoyable and varied exploratory and seeking behaviours.

The author proposes that future codes include the promotion of positive welfare states in line with emerging thinking that the management of animals is about promoting a high quality of life.

Mellor, D. (2012) Animal emotions, behaviour and the promotion of positive welfare states, *New Zealand Veterinary Journal*, 60(1): 1–8.



Social environment and illness in farm animals

The prevalence of disease in farm animals can have a detrimental effect on not only the welfare of the animals, but on the productivity of the farm as well. The social environment of a farm (i.e. the number and origins of the animals, as well as the frequency with which they are allowed to interact) can have a significant impact on the spread of disease, while on the other hand, disease can also have an effect on an animal's social behaviour.

In this review article, the authors summarise current knowledge concerning the contribution of social variables towards the spread of disease in farm animals. Stress arising from negative social interactions (isolation, aggression, etc.) can lead to an increased susceptibility to disease, but the level and duration of the stress is a key factor: a one-off acute stress can actually have a beneficial effect on an animal's immune system, while long-term or intermittent stress can damage it. It is important to note that individual animals vary in their response to a stressful situation – just like humans – and that a consideration of different animal 'personalities'

may be beneficial in understanding the link between stress and disease. While calling for more research in this field, the authors point out that many of the investigations into stress and disease to date have measured variables (such as the levels of certain blood cells) which do not reliably predict the onset of disease. They recommend a more 'disease-centred' approach, which takes into account not only an animal's social history, but also its personality type.

Proudfoot, K.L., Weary, D.M. & von Keyserlingk M.A.G. (2012) Linking the social environment to illness in farm animals, *Applied Animal Behaviour Science*, **138**: 203– 215.



ANIMALS USED FOR SPORT, ENTERTAINMENT, RECREATION AND WORK

Misbehaviour in Pony Club horses: Incidence and risk factors

Misbehaviour, defined in this study as unwelcome behaviour exhibited by a horse when it is being handled or ridden, but incidence and risk factors are poorly understood. Horse misbehaviour is an important cause of poor performance in Pony Club horses, is associated with horse-related rider injuries and has been implicated as a non-specific presenting sign for musculoskeletal pain. This study aimed to describe the incidence and types of misbehaviour in a cohort of Pony Club horses and to identify risk factors for misbehaviour during riding. A prospective longitudinal study was conducted with 84 Pony Club horses in one inland region of Australia. Owners recorded misbehaviour events and kept daily records of horse housing, exercise, nutrition, healthcare and disease status, and horses received a monthly veterinary examination.

Fifty of the 84 horses (59%) exhibited owner-reported misbehaviour once or more during the study period. Over half of the misbehaviour events were regarded as dangerous, however, the daily incidence risk of misbehaviour during riding was low, and this may reflect the fact that horses that behave poorly are selected out of the Pony Club group. The low daily incidence risk may also be an underestimate because of the failure of some owners to complete diary entries and misclassification of certain misbehaviours as normal. The study concluded that horse nutrition and exercise-related factors are associated with increased risk of misbehaviour in horses during riding. It found that the risk of misbehaviour is higher in fatter horses and horses with access to pastures with greater green grass cover, in those fed supplements daily, receiving exercise less frequently and during competition (when horses are subjected to greater mental and physical challenges). No significant relationship was detected between misbehaviour and back pain however the authors caution that this may have been due to misclassification and further research is warranted. The results highlight the importance of considering horse body condition, nutrition and exercise in any investigation of horse misbehaviour. Recommendations, including exercising horses at least 3 times a week and maintaining an ideal body condition score of 3 could be used to assist owners of Pony Club horses to prevent misbehaviour.

Buckley, P., Morton, J.M., Buckley, D.J. *et al.* (2012) Misbehaviour in Pony Club horses: Incidence and risk factors, *Equine Veterinary Journal*, DOI:10.1111/j.2042-3306.2011.00541.X.

Double bridles, crank nosebands and horse welfare

Tight nosebands fitted on dressage horses have the twin effects of adversely affecting the horses' welfare, as well as leading to an incorrect assessment of the skill of a rider. This is because (a) the noseband may prevent horses from indulging in normal comfort behaviours, such as moving the tongue or the bit, and (b) it may prevent judges from picking up oral conflict behaviours (the horse's closed mouth may be incorrectly assumed to be a sign of 'submissiveness', which is considered desirable).

Current regulations state that a 'two finger' gap is required between the noseband and the head of the horse, but the authors of this paper demonstrate that this rule is far too vague to be applied consistently. Men and women have significantly different finger widths, and the position on the head where this gap is measured can result in nosebands of highly variable tightness. The researchers used infrared cameras to determine the temperature of the eyes of horses that were made to wear double bridles with and without nosebands. Eye temperature is thought to be a reliable indicator of stress, and the experimental results showed that horses made to wear tight nosebands experienced higher stress levels than controls. At the same time, the infrared cameras revealed that the nosebands also restricted blood flow to the skin of the head. This study suggests that horses wearing double bridles and tight nosebands undergo a physiological stress response and may have compromised vascular perfusion.

McGreevy, P., Warren-Smith, A. & Guisard, Y. (2012) The effect of double bridles and jaw-clamping crank nosebands on temperature of eyes and facial skin of horses, *Journal of Veterinary Behaviour*, 7: 142-148.

Ethical assessment of equine welfare

It is often stated that policies that deal with animal welfare must be based on science, as science alone can provide unbiased, objective measurements of key welfare variables, which can then be easily incorporated into regulations. The authors of this review article argue that something more than science is required when the welfare of horses is being considered, especially because the raising and training of horses for competition is considered by many to be a 'luxury' rather than a 'need'. What is required is an ethical code that imparts on users and owners of horses a moral obligation to treat the animals well.

Current welfare assessments focus on three major domains: *biological functioning* (where welfare equals lack of disease, lack of injury, and good body condition);

affective states (where welfare equals freedom from distress and mental suffering, as well as experiencing positive emotions); and the *nature of the animal* (where welfare equals the ability to perform the natural behaviours that wild individuals of the species would perform). The authors review three additional ethics-based assessment tools, namely the Ethical Matrix, the Ethics Assessment Process and the Ethics Flow Chart, which frame ethical questions in different ways, and allow users to assess the acceptability of different actions directed at an animal.

Heleski, C. & Anthony, R. (2012) Science alone is not always enough: the importance of ethical assessment for a more comprehensive view of equine welfare, *Journal of Veterinary Behaviour*, 7: 169-178.



Jockey experience and the prevalence of whipping

Recent research has suggested that the whipping of horses during the final sections of a race may have no effect on the outcome. Horses tend to run faster in the 600-400 m section before the finish, where whipping is not carried out, and although whip use increases dramatically in the final two 200 m sections, where horses are fatigued, there appears to be no clear relationship between whipping and the performance of the horse. Recent data has also questioned the justification of whip use for steering.

The aim of the study was to investigate associations between whip use and pre-race variables (including jockey experience) and involved the video recording and analysis of whip use in the last stages of five races held in Canterbury, NSW Australia. The type of whipping action (forehand or backhand) used was noted, as was the experience level of the jockeys. It was found that in the 400-200 m section of the races before the finish, apprentice jockeys whipped horses on average >3 times more than non-apprentice jockeys. Apprentices also preferred to use a backhand whipping action, whereas experienced riders preferred a forehand action. The authors suggest that rider inexperience in Thoroughbred racing influences the distribution of whippings imposed on horses as they tire in the penultimate 200 m section. They also suggest that because the preliminary report involved only small numbers of horses and jockeys, it should be viewed as a trigger for larger scale investigation of the pre-race predictors of whip use in Thoroughbred racing.

McGreevy, P. & Ralston, L. (2012) The distribution of whipping of Australian Thoroughbred racehorses in the penultimate 200 m of races is influenced by jockeys' experience, *Journal of Veterinary Behaviour*, 7: 186-190.



Training methods for young horses

The method used to train an animal to perform a certain task can have a profound impact on its ability to learn the task. Negative reinforcement is commonly used when training horses, and this involves the application of a negative stimulus (e.g. pressure through the reins and bit), which is released when the animal performs a correct action. One complication with this training method is that it is hard to know when to remove the negative stimulus. If the stimulus is maintained too briefly, or for too long, the animal may fail to make an association between the trainer's actions and the desired outcome.

In this experimental study, the researchers investigated the effects of using two training methods on young horses, to teach them to slow down from a trot to a walk. The reins were used to signal this command, but in the first method, the rider released tension as soon as the horse showed the first sign of slowing down. In the second method, rein pressure was maintained until the horse was actually walking. Analysis of video recordings showed that the second method was more likely to make horses push against the bit, which indicated a lack of learning. This method was also associated with higher average

tension in the reins, and this made the horses less likely to slow down. The authors conclude that the first method is the better one, and state that the importance of a light hand should be continuously emphasised during riding education.

Egenvall, A., Eisersio, M. & Roepstorff, L. (2012) Pilot study of behaviour responses in young riding horses using two methods of making transitions from trot to walk, *Journal of Veterinary Behaviour*, 7: 157-168.



RESEARCH ANIMALS

Enrichment for laboratory frogs

The African clawed frog, *Xenopus laevis*, is the most widely used amphibian species in biological laboratories however, there are practically no experimental data regarding optimal housing for such organisms, and often the animals are kept in bare tanks where they simply clump together, often lying one on top of the other.

In order to study the effects of enrichment on *Xenopus* welfare, the authors of this paper provided groups of the frogs with either a length of drainpipe, or an artificial plant. A third group received no enrichment. The added enrichment was found to significantly change the behaviour of the frogs, who either chose to lie beside or inside the pipe, or at the base of, or among the fronds of the plant. They spent less time clustered together, and moved away from the edge of the tank. Animals with enrichment were also less likely to get startled on experiencing a mild stressor (a knock by hand on the side of the tank). The enrichment also did not affect animal growth or egg production in any way. The authors recommend the provision of enrichment to captive *Xenopus*, as this appears to decrease their stress levels.

Archard, G. (2012) Effect of enrichment on the behaviour and growth of juvenile *Xenopus laevis*, *Journal of Applied Animal Behaviour Science*, **139**: 264-270.



TRANSPORTATION OF ANIMALS

Effect of travel position on stress in horses

The transport of horses is becoming increasingly common, and is generally thought to be highly stressful to the animals. While the stress is mostly psychological, a number of physical factors may also be involved, such as noise, the movement of the vehicle – including acceleration and deceleration, confinement, hunger and thirst during travel, changes in temperature and humidity, and inadequate ventilation. The position in which a horse is transported is potentially important,

as the fore- and hind-legs of a horse support different amounts of weight, and inappropriate orientation can result in the horse getting injured.

Experts also disagree on the best position in which to transport a horse. Therefore, this experimental study investigated the effects of transporting horses in three positions (facing forwards, backwards and sideways in relation to the direction of travel) over a 200 km road trip. As expected, loading the horse onto a trailer was in itself a stressful procedure for all horses. Horses that travelled facing forwards made fewer movements overall, whereas horses travelling sideways lost their balance and touched the side rails less frequently. Forward-facing horses also had the highest blood levels of stress hormones, while sideways-facing horses showed some temporary muscular tension. The backward-facing horses showed the least behavioural and physiological changes, and the authors conclude that this may be the least stressful position.

Padalino, B., Maggiolino, A., Boccaccio, M. & Tateo, A. (2012) Effects of different positions during transport on physiological and behavioural changes of horses, *Journal of Veterinary Behaviour*, **7**: 135-141.



The effect of ammonia gas on sheep in transport

The transport of live sheep from Australia to the Middle East is the largest live export industry in the world, with approximately 3 million sheep exported in 2010. During the long sea voyage, the urine and faeces of the sheep are allowed to accumulate in the pens, and this can lead to a build-up of toxic ammonia gas in the air.



In cattle, such conditions have been shown to cause irritation of the air passages, coughing, nasal and eye secretions, and changes in blood cell composition.

In this experimental study, the researchers exposed groups of 48 month old Merino cross wethers to four different ammonia concentrations, namely 4, 12, 21 and 34 mg/m³ in containers designed to mimic the conditions encountered during the voyage to the Middle East (12 days). The researchers noted some inflammation in the lungs of the sheep, but there was no change in blood chemistry. This was accompanied by increased sneezing and lower activity. Both feed intake and growth rate decreased at the two highest ammonia concentrations, but all these effects disappeared after a four-week recovery period. The authors conclude that high levels of ammonia can temporarily affect the welfare of sheep in a negative way.

Phillips, C.J.C., Pines, M.K., Latter, M. *et al.* (2012) Physiological and behavioral responses of sheep to gaseous ammonia, *Journal of Animal Science*, **90**(5): 1562-1569.

HUMANE KILLING

Humane slaughter

Supplement 2 of the journal *Animal Welfare* is a special issue on the topic of humane slaughter to mark the Humane Slaughter Association's centenary year, and the holding of its first international symposium.

Great advances have been made in the field of humane slaughter of animals, and there is now sound scientific evidence concerning topics such as stunning, the determination of unconsciousness, and the design of equipment that can carry out humane slaughter. Much still needs to be done, however, and the slaughter of fish was highlighted as one area of concern. Other important topics covered in this issue include pain in crustaceans, unconsciousness in lambs slaughtered without stunning, ritual slaughter of cattle without stunning, pain perception at slaughter and a comparison of slaughter practices in EU and non-EU countries.

Kirkwood, J.K., Mason, C., Spence, J. *et al.* (2012) Foreword, *Animal Welfare*, **21**(S2): 1.



ARTICLES OF INTEREST

COMPANION ANIMALS

Boissevain, I. (2012) Can the law help us to tackle genetic diseases that affect the welfare of dogs? *Animal Welfare*, **21**(S1): 151-154.

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FARM ANIMALS

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