animal welfare science update

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

RSPCA Australia – Issue 23 – January 2009

book reviews

The Future of Animal Farming

We have seen, over the last few decades that, despite increasing awareness of animal welfare and even increased vegetarianism, that the global meat-eating population is expanding at an ever faster rate. More and more sows are in farrowing crates and more and more chickens are in battery cages. As climate change looms ahead of us, will future farming practices improve animal welfare or will we adapt at the further expense of their freedom? This book looks at the issues surrounding current farming methods, particularly factory farming and explores the role of animal welfare in the future of farming. Editors Roland Bonney and Marian Stamp Dawkins highlight the trend away from extensive farming techniques towards intensive farming as our growing global population is increasingly able to afford a meat-rich diet. They emphasise both the animal welfare and ecological costs of this trend and ask 'does animal welfare have a place in sustainable farming?' In doing so they consult an engaging list of contributors; the authors come from industry, academia, philosophy, animal science medicine, farming and animal welfare organisations.

The book is loosely divided into two sections; part one demonstrates the necessity for changes to current farming practices. Some authors argue that we must change because farm animals matter and because current farming practices unacceptably harm animals. Others conclude that change is necessary because our current approach is unsustainable. They discuss not only the magnitude of the problem; the steadily increasing demands on animal production industries, the loss of habitat and biodiversity. They also discuss the risks we pose ourselves through intensive farming, such as emerging animal disease of public health significance and the development of resistant pathogens due to indiscriminate overuse of antibiotics.

Part two is concerned with the commercial realities of farming in the future. While the book emphasises that the pursuit of profit in animal farming can lead to the neglect of animal welfare it also recognises that ethical farming needs to be commercially viable to succeed. The authors in part two demonstrate current examples of profitable welfare-friendly farms from around the world and discuss the role of corporations and legislation in mediating change.

The Future of Animal Farming offers a more optimistic alternative to those that suggest the sustainability problem should be managed by moving towards increasingly intensive farming that completely neglects animal welfare. It is not overly prescriptive however; the editors and authors do not attempt to answer all questions but to challenge current ideas. *The Future of Animal Farming* is an absorbing read. The variety of expertise consulted provides for a thought-provoking study of the near future of farming and the importance of animal welfare to our health and the health of the planet.

Edited by Dawkins, M.S. & Bonney, R. (2008) The Future of Animal Farming: Renewing the Ancient Contract. Blackwell Publishing Ltd, Oxford, UK.

Welfare of Pigs: From Birth to Slaughter

Welfare of Pigs: From Birth to Slaughter is a comprehensive reference text, reviewing in excess of 700 animal welfare science papers to present a coherent assessment of conventional pig husbandry and the associated welfare issues. Although several chapters focus singularly on pig welfare, the editors aim to provide a thorough science-based summary of the industry from birth to slaughter.

The book opens with the basic concepts in animal welfare, introducing the reader to the definition of welfare and discussing the various behavioural and physiological parameters for assessing welfare in pigs. Chapters three to eight, as promised by the title, each examine a different stage of pig life. Beginning with pregnant and lactating sows and moving through piglets, growing-finishing pigs, welfare during transport, preslaughter stress and welfare during stunning and slaughter. The welfare consequences of conventional husbandry

techniques become apparent as each chapter describes the physiological characteristics of each life stage and how husbandry techniques are designed to address these. For example, chapter three describes the specific dietary requirements and social behaviours of gestating sows. Although gestation stalls were designed to control feed intake and bullying they profoundly compromise sow welfare. The authors review the literature concerning the physiological and behavioural effects of confinement in sow stalls, summarising the associated welfare issues and providing alternatives based on science.

Chapter nine turns its attention to improving welfare through better breeding. Selective breeding in animal production generally aims to improve production traits, sometimes at the expense of welfare. Porcine Stress Syndrome (PSS) became prevalent due to breeding practices aimed at producing lean pigs. The authors propose that producers breed for traits that improve piglet survival, leg strength and disease resistance and reduce aggressive behaviour and fear of humans. Chapter ten discusses the importance on the human-pig relationship in pig welfare and how stockperson attitude, technical ability, knowledge and job motivation can limit pig welfare. The concluding chapter delivers a broad description of animal welfare science and how scientific developments have affected pig husbandry. The author discusses science-based welfare assurance programs and the practical application of animal welfare science.

Each widely referenced chapter of the *Welfare of Pigs* begins with an abstract that neatly summarises the information to follow, making the book an easily comprehensible reference for students. However the scope of the book makes it an important source of information for those in academia, industry, government and anyone with an interest in the welfare of pigs raised on farms.

Edited by Faucitano, L. & Schaefer, A.L. (2008) Welfare of Pigs: From Birth to Slaughter. Wageningen Academic Publishers, Wageningen, The Netherlands and Éditions Quæ, Versailles, France. (2008 – 316 pages – hardback – ISBN: 978-90-8686-066-1 – € 85 – US$ 127; for table of contents see: www.WageningenAcademic.com/welfareofpigs).

companion animals

Risk factors for feline obesity

Feline obesity is a common condition in Australian domestic cats. Previous studies have variously reported the prevalence of obesity in cats to be as high as 40% in some cities around the world. Obesity is a risk factor for other serious medical conditions such as cardiovascular, dental, urinary tract and musculoskeletal disease. Preventing obesity, therefore has important implications for feline well-being. The authors of this Australian study identified some of the risk factors for feline obesity by asking vets to answer a short survey in which they categorised their feline patients according to a standardised weight guide and identified variables such as sex, breed, age and neutering. Of the 428 veterinary clinics that originally responded to the survey, 248 estimated that more than 20% of the cats they saw were overweight. In this study the authors analysed 973 cat reports from 48 veterinary clinics and found that in fact 33% of the study cat population were categorised as overweight or obese by veterinarians. They identified a trend of increasing weight through feline middle age with a decrease in obesity after 10 years of age. Domestic cat breeds were more likely to be overweight than exotic breeds, potentially because a high proportion of exotics in this study were lithe breeds such as Siamese and Burmese. The authors also suggest difference in physiology or eating behaviour between domestic and exotic breeds or different feeding behaviour of owners of exotic breeds. Consistent with previous studies, male cats were found more likely to be overweight than female cats and neutered cats were more likely to be categorised as overweight or obese compared with undesexed cats. Contrary to expectations, the authors determined that cats living in rural areas were more likely to be reported as overweight than their urban counterparts. These results have consequences for owner education and the development of weight control programs for overweight cats. As there are no reliable means of increasing exercise in cats, the authors suggest that pet food companies might take a greater responsibility in educating cat owners by standardising package labelling.

McGreevy *et al* (2008) Overweight or obese cats presented to Australian veterinary practices: Risk factors and prevalence. *Australian Veterinary Practitioner* **38**(3):98-107

Behavioural characteristics of aggressive English cocker spaniels

The process of selectively breeding companion animals over successive generations has produced breeds with behavioural or physical traits specialised for either aesthetic or functional (e.g. herding) purposes. Any breed of dog has the potential to be aggressive or even dangerous; however, behavioural traits have been shown to be highly heritable.

English cocker spaniels (ECS) are known to exhibit certain behavioural traits with aggressive behaviour being more pronounced in some breeding lines than others. Studies have shown that aggression is more pronounced in solid-coloured ECS than those with patchy coats. Behavioural problems are a significant cause of relinquishment or euthanasia of companion animals. The authors of this study therefore aimed to describe some of the behavioural characteristics of ECS as defined by their owners. The owners of 122 ECS, 57 aggressive dogs and 65 controls, were asked to answer questionnaires. Dogs were classified as aggressive based on a history of biting and growling at humans. The study found that a high proportion of aggressive ECS were found to repeatedly growl and inflict skin-penetrating bites. 80% of aggressive dogs were found to snap frequently and 73% were found to bite frequently compared with 0% of control dogs. The authors investigated the motivation for aggressive behaviour by questioning owners about rough play and fear. They found that rough play episodes were uncommon and therefore an unlikely trigger of aggression. There was also no indication that there was a relationship between growling, snapping or biting directed at family members and fear. The authors were not able to identify any triggering factors and classified the observed behaviour as a form of dominance aggression. The authors noted that a potential problem with their study methods is the different expectations owners have of their dogs and their tolerance for their dog's behaviour. Nevertheless, nearly half of the aggressive dogs in the study were subsequently euthanased because of their unacceptable behaviour. This paper describes the behaviours characteristic of aggressive ECS, as identified by their owners. As behavioural traits are known to be highly heritable, prospective ECS owners may wish to observe ESC kennels for signature behaviours before purchasing a puppy.

Våge, J. *et al* (2008) Behavioral characteristics of English cocker spaniels with owner-defined aggressive behavior. *Journal of Veterinary Behavior* **3**:248-254

Pet ownership and human health

There was a popular belief in the 1980s that pet ownership positively affected human health by decreasing the incidence of asthma and heart disease, increasing psychological well-being and reducing visits to the doctor. It was thought that this was due to indirect cofactors such as the personality traits that would determine good health as well as pet ownership. This could not be shown and it was then proposed that pets act as 'social catalysts' and improve health by increasing social interaction between people. This is particularly important for those at risk of social isolation due to physical disabilities. A third theory proposes that pets have a direct effect on our health. Close relationships that provide a sense of emotional support can reduces anxiety during stressful events and are thought to shorten recovery times from serious illness. A lack of support from social relationships constitutes a risk factor for poor health. Although pets are generally thought to offer companionship rather than social support, studies have shown that support from pets can mirror some of the health benefits derived from human relationships.

Although these studies raised the profile of pet ownership, the results have not been reproducible. The authors of this short review to ask: "Do we need a broader definition of health?" They propose that the measurable physical benefits of pet ownership are less important than their contribution to quality of life. That, rather than focus on the prevalence of allergies among pet owners, we should recognise the importance of pets to the community, with many pet owners thinking of their pets as valued members of the family. This article is directed at an audience of human health practitioners and as such the authors make the point that the human-animal bond must be considered when dispensing medical advice relating to their pet. They point out that reluctance of many patients to part with a pet may contribute to non-compliance with health advice and suggest that patients would welcome recommendations on how to manage their health problems alongside their pets.

McNicholas, J. *et al* (2008) Pet ownership and human health: a brief review of evidence and issues. *British Medical Journal* **331**:1252-1254

farm animals

The impact of animal welfare on the food chain

This paper examines the various ways in which animal welfare affects the food chain. As awareness of animal welfare increases, consumers and citizens have shown a strong commitment to improving animal welfare through their purchasing habits. Good welfare practices improve food quality and safety, can reduce the cost of production and represent a business opportunity in a market that is increasingly interested in animal welfare. The authors discuss strategies to accommodate society's concerns with market demands by developing science-based on-farm systems for assessing animal welfare status. They begin with a review of

animal welfare science and its various subject areas; the animal itself, housing and management systems and input from society and governments. Research into this last area addresses the socio-economic aspects of animal welfare, such as the willingness of consumers to pay for welfare friendly products and the willingness of farmers to adapt their production methods.

The authors discuss the EU-funded Welfare Quality® (WQ) project as an example of one such on-farm welfare assessment system. The focus of this project is to gauge animal welfare using parameters derived from evidence based animal welfare science to reflect the welfare state of the animal. These measurements should include the effects of management systems (housing design, handling technique, etc.). The WQ project aims to use the assessment results to grade production facilities so that the welfare status of the animals may be conveyed to consumers unambiguously. The paper also discusses the relationship of animal welfare and food safety, providing examples of how the European Food Safety Authority has provided scientific advice on animal husbandry and welfare as it relates to food safety. For example, the effect of floor type and space on the transmission of diseases such as Foot and Mouth Disease.

Finally, the authors examine the EU's animal welfare legislation with an emphasis on the Community Action Plan on the Protection and Welfare of Animals, 2006-2010. Increasing global trade of animal products has resulted in a sharp increase in the number of animals slaughtered worldwide and the types of production systems. This, in turn, has implications for sustainability, biodiversity loss and climate change. The Community Action Plan incorporates related policy fields such as agricultural and environmental policy fields and ensures that animal welfare is addressed in all EU sectors and in relationships with other countries.

The authors conclude by reaffirming the relationship between animal welfare, animal health and food safety and the importance of incorporating these concepts into a legal framework that ensures transparency in the market, ultimately benefiting both consumers and producers.

Blokhuis, H.J. *et al* (2008) Animal welfare's impact on the food chain. *Trends in Food Science & Technology* **19**:S790S87

Classical music during piglet playtime

In intensive pig husbandry systems, weaning is an especially stressful event and is associated with weight loss, immune compromise and problem behaviours such as belly nosing, fighting causing injury. Various attempts have been made to reduce weaning stress by mixing piglets before weaning, providing piglets with a playtime and by providing environmental enrichment before or after weaning. The authors of this paper aim to trial the effect of using music as a contextual cue during playtime to enhance the effect of the management practice in reducing stress at weaning time. Two groups of piglets were treated to 15 minutes of classical music once or twice a day in the fortnight before weaning; one piece from Bach (Prelude to cello suite no 1) and two pieces from Sir Edward Elgar (Cello suite and Nimrod). While the music played, the experimental litter were allowed into a play pen. The control litter heard the music but were not released into a play pen. Upon weaning all piglets were monitored for behavioural cues during re-exposure to the music (rest, aggression, play, social manipulation, eating and drinking), as well as injuries and weight loss. The authors found no significant difference between the two groups of piglets during the first four hours after weaning. On days two, three and six post weaning, re-exposure to the classical music stimulated playing in both groups of piglets without triggering other problem behaviours but at the expense of rest. The control group of piglets demonstrated an increase in play behaviours that was significantly less than that of the experimental group (that were exposed to the music during play). The authors suggest that the control group may have nevertheless responded positively to the post-weaning music exposure because pre-weaning they would have heard the excitement of the playing piglets from the experimental group every time that the music was played.

The authors justified using play as a positive welfare indicator in this experiment as piglets are unlikely to play in the presence of adverse environmental or physical conditions, because play is rewarding in itself and because play will only occur when primary needs are fulfilled. As playtime itself is a reward, it remains to be seen whether playtime positively impacts welfare in the absence of the associated rewards present in this study (playtime) and if classical music represents a viable method of improving pig welfare in conventional production systems.

De Jonge, F.H. *et al* (2008) Music during play-time: Using context conditioning as a tool to improve welfare in piglets. *Applied Animal Behaviour Science* **115**:138-148

Pain in piglets during castration

Consumer objections to boar taint are managed on most farms by castrating piglets, despite the numerous other management factors that determine the presence of boar taint e.g. slaughter weight. In the EU, 100 million piglets are castrated annually, generally without anaesthesia, causing stress and compromising animal welfare. The EU is seeking humane alternatives and there has been interest in the viability of using anaesthetic agents to reduce stress during castration.

This paper examines the effects of Procaine analgesia during castration as determined by piglet vocalisation and defensive behaviour. To interpret vocalisations the authors used a Stress Monitor and Documentation Unit (STREMODO) developed to detect high frequency calls associated with pain and distress. Defensive behaviour was captured by video. Three groups of piglets were compared, Group One was sham-castrated (SC), Group Two was castrated without anaesthetic (C), and Group Three was treated with local anaesthesia (L) and then castrated five minutes later (LC). The combined effects of local anaesthesia and castration were determined by summing up (L+CL). All treatments were divided into two periods of roughly equal duration; a pre-treatment handling period and a treatment period. Stress vocalisation and defensive behaviour increased for the treatment period in all groups except for the (SC). Previous studies have shown that castration without anaesthesia produces stress and discomfort to piglets as indicated by a higher number of screams with higher frequencies compared with those animals treated with local anaesthetic. The authors of this paper also found that although (C) had the worst effect, STREMODO detected stress calls during both the pre-treatment and treatment periods and was therefore found to be unsuitable for differentiating vocalisation caused by stress or pain. Distress for piglets subject to (CL) was reduced compared to (C) however comparison of the pre-treatment and treatment periods showed that the injection itself (L) was a source of distress. (L+CL) produced stress call durations similar to (C) however this was due to stress caused by prolonged handling rather than pain.

In this study, handling, manipulation and castration all led to discomfort however STREMODO was not able to separate the effects of handling and castration on the piglets. As handling is a significant cause of stress, the small benefits (as observed here) of local anaesthesia may be undermined by the prolonged handling time required to both anaesthetise and castrate piglets.

Leidig, M.S. *et al* (2008) Pain and discomfort in male pigs during surgical castration with and without local anaesthesia as determined by vocalisation and defence behaviour. *Applied Animal Behaviour Science* **116**:174-178

Sex sorted semen in dairy herds

High numbers of female offspring are preferable to dairy producers wanting to replenish their herd with new heifers. Sperm sex sorting is a sophisticated technique that distinguishes sperm carrying X and Y chromosomes to enable artificial insemination (AI) with sperm of one sex. The technique reliably skews the sex ratio of offspring towards the desired sex however it is costly and technical difficulties result in reduced sperm viability and quality and is therefore of questionable benefit to producers. The authors of this study used data collected from dairy producers to compare sex ratios, conception rates, stillbirths numbers and insemination intervals between conceptions using sex sorted and conventional sperm.

The authors found that across all herds, artificial inseminations using sex sorted sperm achieved ~80% of the conception rate than those using conventional sperm. This is a comparably high result and the authors point out that their data was influenced by the non-random practices of producers. Sorting companies encourage producers to only use sorted sperm in first or second time breeders displaying obvious signs of oestrus in order to ensure that no money is wasted on animals that are less likely to conceive (such as lactating animals or those animals displaying questionable signs of oestrus). This skewed the data as the control animals in this data set (those receiving conventional, unsorted semen) were those animals that were less likely to conceive anyway. 89-90% of offspring born to sex sorted sperm were female.

Semen type did not affect stillbirth rates in female calves however there was a greater incidence of stillbirths in male calves born to sex sorted semen. The reasons for this are unknown and the authors note that in a herd using sorted semen their stillbirth rates will not exceed conventional methods as such a low number of males calves would be born. The authors examined inter-oestrus intervals to investigate whether sex sorted semen resulted in higher embryonic mortality and therefore altered intervals. They found that heifers that failed to conceive to sex sorted semen were more likely to return to oestrus in the normal interval than heifers that failed to conceive to conventional semen. This may be due to compromised sperm quality in sorted semen that causes early fertilisation failure and return to oestrus after a normal interval. Alternatively, this data may have again been confounded by the preferential use of conventional semen in heifers that were questionably in oestrus.

Sex sorting of semen has been widely adopted by the dairy industry in the US as an attractive method of skewing sex ratio offspring towards a high number of heifers. This benefits the producers and prevents the birth of unwanted male calves. The authors demonstrate high conception rates and preferable sex ratios for sorted semen. However, they note that the data has been strongly influenced by the biased use of first-service heifers displaying definitive signs of oestrus.

DeJarnette, J.M, Nebel, R.L & Marshall, C.E. (2009) Evaluating the success of sex-sorted semen in US dairy herds from on farm records. *Theriogenology* **71**:49-58

The effect of less intensive rearing on broiler chickens

As awareness of the welfare issues surrounding intensive broiler farming increase there is increased pressure to make chicken husbandry more humane, without overlooking economic factors. Large scale broiler rearing is particularly criticised for its high stocking density, unnatural day length (photoperiod) and litter conditions which encourage foot pad dermatitis (FPD), a debilitating inflammatory condition influenced by litter quality. The paper tested the effects of two rearing conditions on chicken growth, carcass and meat quality and litter quality. Treated chickens were kept in lower stocking density, given a shorter photoperiod and more litter than their control counterparts. Wheat straw and wood shavings litter were also compared. Birds were assessed for growth rate, bone fractures, skin lesions, bruises, hock burn and FPD. A subset of carcasses from each group was evaluated for meat quality. The study found that the treated group grew more rapidly and ate more that the control group. At the end of the trial, however, there was no significant difference in body weight between the two groups resulting in a lower feed conversion rate (FCR) in the treated group. Hock burn and mortality were lower in the treated group while the incidence of other injuries was not influenced by rearing conditions. Treated chickens averaged a FPD score well below that of the EU minimum and had a lower incidence of FPD than control birds. Treated birds also demonstrated a comparatively better meat quality despite the reduced FCR.

The authors expected wood shavings to be preferable to wheat straw as a litter source; they are more porous and absorbent, reducing the incidence of FPD. In this study, however, stocking density appeared to be a more important determinant of litter quality than litter type. Litter moisture, nitrogen and ammonia was higher in control groups compared with treated birds. Birds kept on wood shavings were actually found to have a higher prevalence of hock burn compared with those on straw.

This paper demonstrates that lower stocking density increases growth rate, produces better quality meat and improves broiler welfare by reducing the incidence of FPD.

Meluzzi, A. *et al* (2008) Effect of less intensive rearing conditions on litter characteristics, growth performance, carcase injuries and meat quality of broilers. *British Poultry Science* **49**(5):509-515

The importance of shade to cattle

Heat stress in cattle is not only a welfare problem but also affects productivity by reducing activity, feed intake and milk yield. The authors of this paper demonstrate the importance of providing cows with a source of shade in warm weather. Cows will readily use shade when it is provided however this paper sought to determine their motivation for seeking shade by requiring cows to choose between standing in the shade and lying down or standing in the open. Cattle typically lie down for 9-15 hours a day and are particularly motivated to lie down when lying has been withheld for 3 hours or more. The authors found that lactating dairy cows were highly motivated to seek shade in warm weather, even after 12 hours of lying deprivation; on days with high ambient air temperature they chose to stand in the shade rather than lie down. Cows that were only deprived of standing for 3 hours or not at all spent similar amounts of time in the shade at all temperatures. Cows tend to lie less during warm days, possibly in an attempt to increase heat loss by increasing surface area exposure, however the choice of shade over lying after 12 hours of lying deprivation indicates a strong preference for shade in warm weather.

Shütz, K.E., Cox, N.R. & Matthews, L.R. (2008) How important is shade to dairy cattle? Choice between shade or lying following different levels of lying deprivation. *Applied Animal Behaviour Science* **224**:307-318

wildlife

The illegal wildlife trade in Australia

Australia's diverse, unique flora and fauna are highly valued on the international wildlife black market. Illegal import and export of animals or plants into Australia places endangered native species at risk of extinction and poses a biosecurity threat; exotic species may establish themselves as pests or carry novel pathogens such as viruses and parasites. This paper assesses the extent of the wildlife trade in Australia and the types of animals targeted by examining 13 years of data on wildlife seizures from the Australian Customs Service. They also used data from the wildlife prosecutions database of the Australian Customs Service from 1994 to 2007 to determine the types of penalties incurred for illegal wildlife trading. In Australia adherence to the Convention on International Trade of Endangered Wild Fauna and Flora (CITES; an international agreement intended to ensure that the trade in wild species does not threaten their survival) is regulated under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act). Penalties for breaching the Act are fines of up to AUS$110,000 for an individual and $550,000 for a corporation and up to 10 years' imprisonment.

This paper demonstrates that customs seizures increased significantly, from 3902 in 2004-2005 to 7533 in 2006-2007, potentially due to increased baggage surveillance at airports. The majority (46%) of prosecutions were for attempting to illegally export native flora and fauna. Illegal importations accounted for 34% of prosecutions. The remaining 20% of cases were of unknown origin, primarily seizures of bird eggs, which are difficult to identify. Only 1% of total detections were considered major seizures in which those involved were interviewed or prosecutions were undertaken. Most seizures involved minor breaches, usually concerning processed wildlife products imported by people who are unaware that the products are prohibited. Reptiles (including lizards, snakes, turtles, frogs and crocodile products) were found to be the most targeted animal type with high numbers of both illegal imports and exports and accounting for 43% of prosecutions. Live birds and eggs were the second most common major seizure accounting for 26% of prosecutions. The sale of wildlife products for use as alternative medicines is also highly prevalent however the authors suggest that only a small proportion of shipments are detected each year. Over the past 13 years, the most common penalty for wildlife case prosecutions were fines, usually of a much lesser value than that of the wildlife goods on the international black market, providing little deterrent to criminals. The largest fine to date was $30,000 for the attempted export of 19 parrot eggs in 1998, despite their estimated black market value of $60,000. Only 22% of case prosecutions resulted in a prison sentence, the maximum being 3 years and 6 months imprisonment for the importation of 20 exotic reptiles including 6 CITES listed species. The authors determined that despite having tougher penalties than the US or UK for breaches of wildlife legislation, the penalties actually issued in Australia tend to be less severe.

Finally, the authors discuss the use of new genetic techniques to detect the trafficking of wildlife and wildlife products and to provide evidence for prosecutions in cases where species cannot by identified simply by their morphology. DNA can also be used to determine the geographic origin of the seized goods and identify areas where flora and fauna are most vulnerable to illegal harvesting.

Alacs, E. & Georges, A. (2008) Wildlife across our borders: a review of the illegal trade in Australia. *Australian Journal of Forensic Sciences* **40**(2):147-160

other publications of interest

Caulfield, M.P. & Cambridge, H. (2008) The questionable value of some science-based 'welfare' assessments in intensive animal farming: sow stalls as an illustrative example, *Australian Veterinary Journal*, **86**(11): 446-448.

Fleischer, S. (2008) Which comes first: preventing boar taint or improvement in pig welfare through the abolition of castration? *The Veterinarian*, October 2008, p. 26, Essay selected for The Veterinarian magazine Prize for Written Communication for Sydney University third-year veterinary science students.

Gooneratne, S.R. *et al.* (2008) Acute and long-term effects of exposure to sodium monofluoroacetate (1080) in sheep, *Onderstepoort J Vet Res* **75**(2):127-139.

Gregory, N.G. *et al.* (2009) Effectiveness of poll stunning water buffalo with captive bolt guns, *Meat Science*, **81**(1): 178-182.

Kjaer, J.B. & Guémené, D. (2009) Adrenal reactivity in lines of domestic fowl selected on feather pecking behavior, *Physiology & Behavior*. In Press.

Mellor, L. (2008) Giving animals what they really, really want, *The Veterinarian*, October 2008, p. 12.

Moesta, A. *et al.* (2008) The effect of litter condition and depth on the suitability of wood shavings for dustbathing behaviour, *Applied Animal Behaviour Science*, **115**(3-4): 160-170.

Petherick, J.C. & Phillips, C.J.C. (2009) Space allowances for confined livestock and their determination from allometric principles, *Applied Animal Behaviour Science*, In Press.

Poyzer, L. (2008) The welfare benefits of loose-farrowing systems, *The Veterinarian*, November 2008, p. 35, Essay selected for The Veterinarian magazine Prize for Written Communication for Sydney University third-year veterinary science students.

Rankin, C.H. *et al.* (2009) Habituation revisited: An updated and revised description of the behavioral characteristics of habituation, *Neurobiology of Learning and Memory*, In Press.

Rodenburg, T.B. *et al.* (2008) Welfare assessment of laying hens in furnished cages and non-cage systems: assimilating expert opinion, *Animal Welfare*, **17**: 355-361.

Rodriguez, P. *et al.* (2008) Assessment of unconsciousness during carbon dioxide stunning in pigs, *Animal Welfare*, **17**: 341-349.

Rushen, J. *et al.* (2008) The welfare of cattle, Springer, Dordrecht, The Netherlands.

Stewart, M. *et al.* (2008) Infrared thermography as a non-invasive method for detecting fear-related responses of cattle to handling procedures, *Animal Welfare*, **17**: 387-393.

Stilwell, G. *et al.* (2008) The effect of duration of manual restraint during blood sampling on plasma cortisol levels in calves, *Animal Welfare*, **17**: 383-385.

Voiceless (2008) From nest to nugget: An expose of Australia's chicken factories, Voiceless The Fund for Animals, Sydney.

WSPA (2008) Eating our future: The environmental impact of industrial animal agriculture, The World Society for the Protection of Animals, London.

upcoming events

43rd Congress of the International Society for Applied Ethology (ISAE) 6-10 July 2009

"The program is still under development, but there will be plenary sessions, short oral and poster presentations on the sub-themes:

- Welfare assessment and enhancement
  Methods and techniques to assess and improve animal welfare in livestock, companion, captive and laboratory animals, including "on-farm assessment", epidemiological approaches and environmental enrichment.
- Management of unwanted animals
  The application of ethology to the management, control and humane killing of pest, feral and companion animals, and the humane killing of unwanted farm and laboratory animals. Topics may include managing reproductive behaviour; improving our understanding of animal movement; using behaviour to target particular species; using behaviour to exclude animals from specific areas; and assessment of methods of humane killing.
- Animal emotion and cognition
  Topics may include methods for studying emotion and cognition, such as the role of neuroscience; demonstration of cognitive abilities of species; positive emotions, such as pleasure, satiety and satisfaction; and enhancing our scientific understanding of emotional states in animals.
- Animals in extensive and natural environments
  Topics may include technologies for behavioural data logging/capture from animals; the role of ethology in the conservation of native species and harvesting/culling of wildlife; remote management and control of livestock; and the challenges of monitoring behaviour of animals in extensive areas (including aquatic environments).

- Animal-human interactions
  How animals and humans interact and the effect of these interactions on behaviour and welfare of companion, livestock, captive or laboratory species."

Visit http://www.isae2009.com for more information.

International Society for Equitation Science Annual Conference 12-14 July 2009

Many equine scientists, veterinarians, ethologists and behaviour therapists share the view that the historic lack of science in equitation contributes to the prevalence of undesirable equine behaviours with human-related causes. There is a large and growing number of horses worldwide. As a consequence, there is an increasing number of horse owners, many of whom are new to horse-keeping, with little knowledge of how to train their animal. This has led to a rise in the number of associated horse welfare problems culminating in high wastage rates. Such problems are reflective of uninformed practices, poor training techniques, inappropriate use of training equipment and, in some cases, inhumane handling of horses. In addition, horse-related injuries are a major public health concern, with most occurring while the rider is mounted. Death rates from horse related injuries are in the vicinity of one death per million head of population and in terms of injuries, horse riding is more dangerous than motorcycle sports and equally as dangerous as rugby. Improving riders' understanding of horse behaviour and subsequently reducing the number of "conflict behaviours" will reduce the prevalence of such accidents. Furthermore, the increasing profile of "natural horsemanship" and "horse whisperers" has made horse industry personnel question some traditional practices, prompted them to consider how novel techniques operate and to question how the language relating to horse training and riding relates to what is known through psychology, ethology and veterinary science. Equitation science helps them in all of these three endeavours by provide an understanding of the behavioural mechanisms that underpin the human-horse interface. Equitation science is the measurement and interpretation of interactions between horses and their riders. Most importantly, it also explores the welfare consequences of training and competing horses under different disciplines.

In contrast to the latest generation of horse whisperers, advocates of equitation science are not commercial purveyors of techniques, training certificates or merchandise. Equitation science has an extremely promising future since it is more humble, global, accessible and accurate, and less denominational, commercial, open to interpretation and misinterpretation than any formulaic approach. It has the potential to be the most enduring of all approaches used to train the horse.

Visit http://www.equitationscience.com/Sydney2009.html for more information.

Minding Animals 13 - 18 July 2009

"The conference has six major themes and objectives:

- To reassess the relationship between the animal and environmental movements in light of climate change and other jointly-held threats and concerns
- To examine how humans identify and represent nonhuman animals in art, literature, music, science, and in the media and on film
- How, throughout history, the objectification of nonhuman animals and nature in science and society, religion and philosophy, has led to the abuse of nonhuman animals and how this has since been interpreted and evaluated
- To examine how the lives of humans and companion and domesticated nonhuman animals are intertwined, and how science, human and veterinary medicine utilise these important connections
- How the study of animals and society can better inform both the scientific study of animals and community activism and advocacy
- How science and community activism and advocacy can inform the study of nonhuman animals and society"

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