



Session IV-2: Farm animal research and the Three Rs

Session IV-2: Oral presentations

IV-2-652

Beyond harm reduction: good lives for farm animals

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During the European enlightenment, intellectuals attempted to use logic and empirical investigation to replace traditional beliefs. The Enlightenment arguably gave rise to modern science and the Industrial Revolution. It also provided the idea of balancing harms and benefits as a basis of ethical decision-making, and ultimately underlay the harm-reduction approach that is widely applied in the ethics of animal research.

Reacting against the new emphasis on science and industry was the Romantic Movement whose adherents valued emotion ahead of reason, and valued a simple, natural life ahead of technology. Although the rationalist/empiricist tradition still thrives in the world of science, Romantic values are prominent in Western

societies today, perhaps revived during decades when pollution, climate change, genetic engineering and other developments have led to renewed skepticism regarding science and industry.

Seen through the eyes of the Romantic Movement, the keeping of animals would require more than harm-reduction and cost-benefit analysis. Rather, it would require that animals kept for human purposes have “good lives” in the sense of being healthy, being able to enjoy life, and living under circumstances that match their nature and adaptations. Given that Romantic values are deeply rooted in modern Western thought, public acceptance of animal research, and of livestock production practices, requires that these values be taken into account to at least some degree.

IV-2-611

Species-specific approaches are needed for effective implementation of the Three Rs in farm animal research

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Comprehensive, high quality standard operating procedures (SOPs) developed for individual species can provide guidance for novice researchers, inexperienced designated veterinarians and lay members of animal ethics committees. Those with regulatory responsibilities for experimental animal facilities sometimes have greater experience with laboratory and companion animals than with farm animals, and this can result in attempts to apply unnecessary or inappropriate conditions to the management of farm animals before and during laboratory or field studies. Biologically a rat is not a dog is not a pig is not a sheep. The purpose of this paper is to briefly outline, as an example, the de-

velopment of a *Policy on the Care and Use of Sheep for Scientific Purposes Based on Good Practice* by Australian and New Zealand experts in sheep biology, behaviour, experimentation, husbandry and welfare, which led to the formulation of institutional SOPs for sheep. The areas covered include: teamwork and training; applying the code of practice; appropriateness of animals for the purpose, including their selection, acclimatisation and training; minimising stress; pain relief; facilities; confinement; movement of animals; and monitoring. On the basis of this experience guidance will be provided on the development of such SOPs.



IV-2-075

Positive reinforcement training in large experimental animals

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The use of large animals such as mini pigs, pigs and ruminants in animal experimentation often includes the need for some kind of force or restraint to perform a variety of procedures, e.g. moving the animal, different dosing regimens and clinical examinations. In animals of a certain size, these procedures are not only highly aversive to the animals but they also often force animal caretakers and technicians to work in ergonomically undesirable ways. To avoid or at least minimize the negative impact of such procedures on animals and technical staff, implementation of positive reinforcement training (PRT, aka clicker-training) is a promising tool, combining cognitive enrichment of the animals, improved animal-human relations and less straining working procedures for the staff. The use of PRT may in some cases even be cost-effective. PRT may present the possibility to

do research that would otherwise not have been possible. Implementation of PRT has been carried out with success in both the pharmaceutical industry, in non-clinical safety testing and at the University of Copenhagen. Several procedures have been trained successfully and resulted in a more smooth and gentle working procedure during for example intra nasal dosing, subcutaneous dosing of high volumes, rectal probe measures and flushing of catheters.

This presentation will explain the theories behind PRT, namely classical and operant conditioning, and highlight the usefulness of the method using video examples demonstrating how clicker training has been used to train the animals to actively cooperate with the technicians during the above mentioned procedures.

Session IV-2: Poster presentations

IV-2-306

Farm animal research in Canada's private feedlot industry

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Feedlot Health Management Services Ltd (FHMS) is a private industry company providing animal health management, nutrition, and production consulting services, as well as individual animal data collection and management tools, to commercial feedlots in Canada and the United States. FHMS has a professional consulting team consisting of veterinarians and animal scientists with expertise in animal health and welfare, epidemiology, nutrition, production management, pathology, meat science, applied research, and economic modeling. At present, FHMS provides professional services for beef feedlots with an annual throughput of between one and two million animals. Research is a key pillar supporting our business model, providing value to clients through generation of data for high-level evidence-based decision making. At present, FHMS conducts over 50 studies annually,

including: disease investigations; new technology assessments; product safety, efficacy and licensing studies, pathogen and antimicrobial resistance surveillance; individual animal and small pen research pilot studies; and large pen commercial field trials. Working with an emphasis on the Three Rs, FHMS conducts cattle research with the overall goal of enhancing animal health and welfare while providing results that are relevant and applicable to commercial feedlot producers. Based on over 25 years of feedlot research experience, large-scale field trials are often required to accurately reflect the disease dynamics and animal behaviour that occur in commercial production settings. With research results that are immediately applicable to Canadian and global beef industries, FHMS continually strives to enhance animal health and welfare and to be a proactive leader in these areas.



IV-2-319

Rumen Simulation Technique (RUSITEC) – an *in vitro* alternative for fermentation studies in cattle

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RUSITEC, a laboratory device for simulating the rumen (cattle stomach) environment was utilized to assess the effect of vegetable oil supplementation on *in vitro* nutrient digestibility of cattle diet. It is a semi continuous culture system which simulates the rumen in terms of pH, temperature, anaerobiosis, microbes and mixing action. Eight reaction vessels were filled with 650 ml rumen liquor and 200 ml artificial saliva and immersed in a water bath at 38°C. The feed container inside the reaction vessel consisted of two nylon bags, each containing test diet and solid rumen digesta. Saliva infusion into the reaction vessel was regulated to 800 ml/24 h and as fermentation proceeded, effluent and gas were collected in separate containers. A control diet (10 g) was supplemented with three different

plant oils, namely sunflower oil (SFO), soyabean oil (SBO) and corn oil (CNO) at 6% level and incubated in duplicate. After an adaptation period of seven days, three days were allotted for sample collection. The dry matter degradability (DMD%) was 46.36 in the control group and SFO, SBO and CNO reduced ($P < 0.05$) DMD to 42.63, 40.61 and 44.16 respectively. The fiber degradability (%) was not significantly ($P > 0.01$) altered between treatments, which was 39.54, 38.06, 39.02 and 39.26 in the control, SFO, SBO and CNO groups, respectively. The current study using RUSITEC precludes surgical fistulation, associated trauma, stress and appalling appearance of the cattle. Therefore, RUSITEC can be considered as an alternative to live animal experimentation.

IV-2-551

Paddock or laboratory – What determines suitable living conditions for sheep?

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Farm animals are used in research for a variety of purposes and the associated husbandry requirements can range from being kept in a group in a paddock to intensive, indoor housing. Much research involving farm animals is undertaken in agricultural or veterinary sciences and directed towards the health and management of the species involved; specific husbandry requirements being dictated by the study purpose. But some farm animals, notably pigs and sheep, also are used in biomedical research in the study of human health and disease and, in these circumstances, most often need to be housed indoors under intensive conditions.

From both a scientific and an animal welfare perspective, the living conditions of animals need to be designed and managed to meet their specific physiological and behavioural needs; irrespective of the husbandry system the same evidence informs such decisions.

Although, when used in research, sheep are often kept under intensive conditions, to date little attention has been given

to the development of science-based guidelines to benchmark acceptable living conditions. A systematic literature review highlights their need for social, visual and auditory contact, the relationship between rest and rumination, the importance of synchronisation of rest periods, the effects of space and group size on social dynamics and their response to isolation (Animal Research Review Panel, 2010). Informed by available evidence, the elements of any husbandry system that may negatively influence species-specific physiological and behavioural responses must be taken into account in the design and management of the system so as to eliminate or minimize such effects.

Reference

Animal Research Review Panel, NSW Department Industry & Investment (2010). *Guidelines for the Housing of Sheep in Scientific Institutions.*