



THE ANIMAL WELFARE SCIENCE CENTRE ANNUAL REPORT 2010-2011

Background

The Animal Welfare Science Centre (AWSC) was established in 1997 and comprises 4 collaborative partners – Department of Primary Industries, Victoria (through the Future

Farming Systems Research Division), The University of Melbourne (School of Land and Environment and Faculty of Veterinary Science), Monash University (School of

Psychology and Psychiatry and Department of Physiology) and The Ohio State University (Department of Animal Sciences and College of Veterinary Medicine).

The AWSC together with the Centre for Animal Welfare and Ethics of The University of Queensland (CAWE), the Animal Welfare Unit of CSIRO and 2 New Zealand organisations, (the Animal Welfare Science and Bioethics Centre at Massey University and AgResearch), are designated as an OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis.

The Centre has considerable research and teaching capacity in animal welfare science and has made a number of important national and international contributions to research, teaching and training.

Operating Environment

Human-domestic animal relationships are inevitably unequal, involving human management and control of animals. Thus the management of animals by humans is basically governed by two important principles and applies to a range of animal uses from individual pets to livestock production. These are, on the one hand, management to comply with the objectives of human profit, benefits or pleasure, and on the other hand, management responsibilities under a duty of humane care of animals. The latter is based on the widely-held view in our community that the use of animals by humans is acceptable provided that such use is humane.

Animal welfare is an increasingly contributing perspective in society, strongly influencing views on animal use in society and the acceptability of various animal management options. It has its origins in an array of experiences, which can arouse strong sentiments but disparate individual targets for attention.

Stakeholders in the animal welfare domain thus include the public, generally as consumers, owners or concerned observers, special interest groups, businesses based on the commercial supply of animals and animal products and those developing, implementing or auditing compliance with relevant policy at government or community level. Thus consumer and public attitudes to animal welfare have the potential to dramatically affect the use of animals in society, influencing for better or for worse, the operations of livestock industries, medical research, the management of feral and wild animals and the care of recreational and companion animals.

Failure to assure these stakeholders that the welfare standards for domestic animals are underpinned by sound science will not only risk the adoption of new technology in the animal industries, but has the potential to adversely influence the profitability and viability of these industries by affecting specific animal uses.

While consumer and public attitudes to animal welfare ultimately determine society's use of domestic animals, science has a critical role in underpinning society's decisions on animal use and the attendant conditions and compromises. Lack of awareness of factual information means that many people are ignorant of the conditions under which domestic animals live, how they are treated and their species-specific requirements.

Thus there are basically four key areas of activity necessary to rationally address animal welfare:

- **animal welfare science**
- **understanding public and consumer attitudes to animal welfare**
- **public education** and
- **industry education**

It is important to gain an understanding of public and consumer attitudes. Reliable and valid measures for monitoring community attitudes about animal welfare will assist Governments, industry and scientific and community groups in establishing research, education and regulatory policy in animal welfare. It is clear that policy makers and the livestock industries need to be able to respond to these community concerns either through appropriate public education programs, supporting research and/or by changing industry practices.

For example, research on contentious welfare issues is required to underpin welfare standards. Furthermore, through public education, science has a critical role in underpinning society's decisions on animal use and the attendant conditions and compromises.

Finally, while research can be utilised to underpin the establishment, amendment or validation of industry welfare standards and practices, it is critical to deliver industry education, through staff selection and training strategies, and modify legislation, codes of practice and/or welfare QA programs to achieve these welfare standards.

The Animal Welfare Science Centre has built upon key discipline strengths of animal behaviour, stress physiology and psychology and their importance in studying human/animal interaction, animal housing and husbandry and community attitudes/behaviour.

Animal Welfare Science Centre activities

The Centre conducts research in three program areas:

1. **Welfare methodology** where we develop and validate methods to measure animal welfare.
2. **Housing and husbandry effects on animal welfare.**

3. Attitudinal effects:

- a. The effects of the attitudes of stockpeople, animal handlers and animal owners on the welfare of their animals.
- b. The effects of attitudes to animal welfare on consumer and community behaviour.

These programs support the fourth program area:

4. Tertiary, post-graduate and industry education and training.

Through these programs, the Centre aims to:

- Develop scientifically defensible welfare methodology.
- Use scientifically defensible methodology to establish, amend or validate animal welfare standards and practices.
- Develop and support industry education and training strategies and provide scientific advice to support the modification of codes of practice and the development of quality assurance programs to introduce scientifically defensible welfare standards in the animal industries.
- Understand public and consumer attitudes to animal welfare to assist Governments and industry in
 - developing animal welfare policy
 - assuring local and international consumers, public and other governments of the sound welfare standards for Australian domestic animals.
- Ensure tertiary students entering the animal industries are better prepared to provide sound, science-based advice on animal welfare practices to industry, interest groups and the public.
- Provide high quality postgraduate and postdoctoral training for the next generation of researchers and teachers in animal welfare science.

The Centre's activities are guided by our vision and mission:

Our Vision

“Animal welfare and its constant improvement are societal and cultural norms”

Our Mission

“To contribute to improved animal welfare as a world leading provider of expert information, advice and education underpinned by rigorous research”

CENTRE PERSONNEL

Staff of the Centre

The Centre's research and teaching capacity is considerable with scientific expertise and experience in the key disciplines of animal behaviour, psychology, stress physiology and veterinary medicine.

Scientists

Dr. Ian Bland (School of Land and Environment, The University of Melbourne) – Lecturer in Animal Science and Management. Ian is interested in the behaviour and welfare of neonatal/weaned pigs and zoo animal animals.

Dr. Naomi Botheras (Department of Animal Sciences, The Ohio State University) – Naomi has a research/extension role at OSU where she works with dairy, swine and poultry producers and scientists in the area of farm animal welfare. She is a member of the Dairy Working Group, and also develops educational materials related to food animal welfare.

Mr. Kym Butler (Future Farming Systems Research, DPI, Werribee) – Kym works within the Biometrics Unit, Future Farming Systems Research and applies biometric analysis to the Centre's research projects.

Dr. Peter Cakebread (School of Land and Environment, The University of Melbourne) – Senior Lecturer in Animal Science and Management. Peter's research interests include welfare implications of common dental procedures in horses, behavioural and welfare effects of jaw and dental abnormalities in sows and locomotion and welfare effects of lameness in sows.

Prof. Grahame Coleman (School of Psychology and Psychiatry, Monash University) – Grahame has followed a research career in aspects of human and animal behaviour associated with biological rhythmicity and sleep and changes in stress-related and reproductive hormones. Current research interests focus primarily on human-animal interactions in farm and companion animals and public attitudes to animal welfare.

Assoc. Prof Candace Croney (College of Veterinary Medicine, The Ohio State University) – Research interests include animal cognition and welfare, effects of environmental enrichment and early rearing environment on animal behavior and welfare and (effects of alternative housing systems and management on animal behavior and welfare.

Prof. Andrew Fisher (Faculty of Veterinary Science, The University of Melbourne) – Chair of Cattle and Sheep Production Medicine with the Faculty of Veterinary Science, Andrew has significant experience in the area of animal welfare, with a particular focus on production animal management and transport. Research interests include welfare aspects of flexible feeding systems of dairy cows.

Dr. Gervaise Gaunt (Future Farming Systems Research, DPI, Rutherglen) – A livestock research and extension scientist, with extensive experience in project development, management, analysis, interpretation, delivery and communication. Research interests include identifying strategies that improve the management of sheep for meat and wool production.

Prof. Paul Hemsworth (School of Land and Environment, The University of Melbourne) – Director of the Centre: A research career studying the behaviour and welfare of farm and companion animals, particularly examining the influence of the social and physical environment on farm animal behaviour and welfare and the influence of human-animal interactions on animal welfare and productivity.

Dr. Ellen Jongman (Future Farming Systems Research, DPI, Werribee) - Research interests include the effect of housing, husbandry procedures and management on the welfare of sheep and dairy cows

Dr. Mariko Lauber (Animal Health Field Services, DPI, Attwood) – Research interests include behavioural development in dairy calves and its implication in assessing animal welfare implications of new practices and technologies. Current activities focusing on industry, public and tertiary training in animal welfare.

Dr. Brian Leury (School of Land and Environment, The University of Melbourne) – Research interests include animal nutrition and physiology.

Dr. Linda Marston (Adjunct Research Fellow, Monash University). Interests include animal hoarding, animal welfare education and training

Assoc. Prof. Steve Moeller (Department of Animal Sciences, The Ohio State University) –Research interests include human-animal interactions in swine, the effects of housing systems on the welfare of swine and the effects of genetics on pork quality.

Prof. Alan Tilbrook (Department of Physiology, Monash University) – Deputy Director of the Centre: A research career in endocrinology and behaviour of domestic animals. Particular interests include the endocrine and neuroendocrine control of reproduction in males, the effects of stress on reproduction and endocrine and behavioural responses to stress.

Dr. Samia Toukhsati (School of Psychology and Psychiatry, Monash University) – Research interests include animal cognition and welfare, and her recent research has included understanding human-animal interactions, particularly with regard to companion animal owner attitudes and behaviours.

Associate Scientists

Dr. Greg Cronin (Faculty of Veterinary Science, University of Sydney) - A research career studying the behaviour and productivity of pigs and in particular the effects of the environment on maternal behaviour and the role of maternal behaviour in piglet survival and growth. Interested also in alternative housing systems for sows during gestation and farrowing/ lactation and housing systems for poultry.

Dr. Keven Kerswell (Honorary Research Fellow, School of Land and Environment, The University of Melbourne) – Research interests include the characteristics of companion animal owners and communication in the dog.

Dr. Rebecca Morrison (Rivalea Australia, Corowa, NSW) - Rebecca is a Research Scientist at Australia's largest pork production enterprise. She conducted her PhD (Behaviour and welfare of pigs in deep-bedded, group housing systems) with Prof. Paul Hemsworth and Dr. Greg Cronin at the University of Melbourne. Rebecca has worked at the University of Minnesota as the Sustainable Swine Production Systems Scientist, working and researching a range of non-crated farrowing systems.

Administration and technical staff

Melanie Conley, Technical Officer, The University of Melbourne

Leila Greenfield, Research Assistant, Monash University

Judy Nash, Research assistant, The University of Melbourne

Vanessa Rohlf, Research Assistant, Monash University

Maxine Rice, Research assistant, The University of Melbourne

Bruce Schirmer, Technical Officer, DPI, Victoria

Jeremy Skuse, Executive Officer, AWSC

Tracey Storey, Technical Officer, The University of Melbourne

Postgraduate students

Linda Beer (Masters student, The University of Melbourne) - Linda's project aims to retrospectively analyse data collected at greyhound race tracks across Victoria to determine the prevalence of injuries sustained by greyhounds during racing, and to identify possible factors that may increase or decrease the likelihood of a greyhound sustaining a serious injury during a race.

Puja Buch (Masters student, The Ohio State University) - Researching cognition and welfare implications for domestic and wild dogs.

Mia Cobb (PhD candidate, Monash University) - Researching the effects of social and environmental enrichment on the welfare of dogs housed in kennel facilities.

Jo Coombe (PhD candidate, The University of Melbourne) - Studying the effects of flexible feeding systems on the health and welfare of dairy cows.

Sarah Crawford (PhD candidate, The Ohio State University) - The main focal points of Sarah's research are to learn more about stockpeople that work with market pigs in the state of Ohio and also to implement ProHand Pigs in half of the research farms with the aim of improving the stockperson's attitude and behaviours towards the pigs with which they work.

Anoma Dilrukshi (PhD candidate, The University of Melbourne) - The aim of Anoma's research is to define dairy cow behaviour and welfare in feeding systems based on total mixed ration fed in conjunction with grazed pasture.

Joanna Engel (PhD candidate, The University of Melbourne) - The research investigates the effects of housing design on the welfare of laying hens, both physiologically and behaviourally. The housing design consists of three factors; rearing floor space allowance, production floor space allowance, and production nest box access.

Sally Haynes (PhD candidate, The University of Melbourne) - This PhD examines the human-canine relationship in animal shelters during the first 8 days in quarantine kennels, specifically the relationship between the attitudes and behaviours of human handlers and the behaviour and welfare of the dogs. The research will contribute to the training of dog handlers in animal shelters to improve dog behaviour, ease of handling and outcomes as well as providing valuable scientific knowledge regarding the human-canine relationship.

Lauren Hemsworth (PhD candidate, Monash University) - Investigating the welfare of recreational horses in Victoria with emphasis on the occurrence and factors associated with horse welfare.

Tiffani Howell (PhD candidate, Monash University) - Working on the development of a minimally-invasive method for recording EEG in dogs.

Marcus Karlen (PhD candidate, The University of Melbourne) - Lameness is a common affliction of breeding sows. However, lameness is difficult to diagnose, variations in the physical and physiological state of the sow translate in variations on the sow's gait. Initially this study seeks to establish reliable and repeatable gait scoring to improve detection of mild lameness in sows and then utilise this in the investigation of the importance of the level of aggression on the incidence of lameness in group housed sows.

Tammie King (PhD candidate, Monash University) - Working on methods to identify 'ideal' companion dogs for Australia. Nowadays, dogs are primarily kept as pets, no longer serving the working role for which they were once bred. With differing lifestyles and an increase in urban living it is necessary to determine what constitutes an ideal dog in the present day and ways to accurately identify these desirable behaviour traits.

Megan McCarthy (PhD candidate, Monash University) - aims to undertake a cross-cultural examination of attitudes and behaviours towards pet ownership, specifically cats and dogs, in Australia and Thailand. This study will examine two culturally distinct nations with diverse histories of pet ownership practices. This research will provide a better understanding of how culture is constructed in the process of human interaction with cats and dogs. It is hoped the findings can be utilised to inform animal welfare education programs and policy.

Kate Mornement (PhD candidate, Monash University) - Working on a behavioural assessment of adult shelter dogs to develop a standard, verified protocol to assist in the re-homing of dogs. There are two aims of this study; to review current assessment protocols used by shelters to evaluate adoption suitability (Part 1) and to develop and scientifically validate a standardised shelter dog assessment protocol (Part 2) to potentially be used in shelters and pounds Australia wide.

Jessica Pempek (PhD candidate, The Ohio State University) - Conducting research examining the effects of individual or paired housing on the behaviour and performance of dairy heifer calves.

Cameron Ralph (PhD candidate, The University of Melbourne) - Working on determining the relationship between an acute increase in plasma corticosterone and glucose metabolism in select target tissues of the laying hen.

Maxine Rice (Masters student, The University of Melbourne) - Validating the use of proximity loggers in measuring feeder visits, displacements and social interactions in pigs in competitive feeding situations.

Lauren Roberts (PhD candidate, Monash University) - The objectives of the study include developing a supervisor questionnaire for assessing pig stockperson handling and work performance along with developing a self-report questionnaire to assess stockperson attitudes, behaviour and technical knowledge. The questionnaires will not only provide us with an individual report for each employee, but a large-scale average on work performance, attitudes, behaviour and technical knowledge within the pig industry. This benchmark can then be used in future studies to develop targeted programs.

Mhairi Roberts (Masters student, The University of Melbourne) - Factors associated with breeding success in the captive spotted tree frog.

Vanessa Rohlf (PhD candidate, Monash University) - Studying relationships between owner attitudes and their behaviour towards dogs.

Sally Sherwen (PhD candidate, The University of Melbourne) - Studying the relationship between the visitor behaviour and zoo animal behaviour.

Judi Stella (PhD candidate, The Ohio State University) - Working on enrichment and welfare of shelter cats.

Bronwyn Stevens (PhD candidate, The University of Melbourne) - Investigating the hypothesis that restricting an animal's access to a highly preferred resource will result in altered biological function.

Megan Verdon (PhD candidate, The University of Melbourne) - Megan's study hypothesises that pigs display specific and consistent behaviours, such as aggressiveness, and that these behaviours can be used to classify the social strategy (dominant, sub-dominant and submissive) a pig adopts when group-housed under stress. In addition, a relationship should exist between a pig's social strategy and its performance in terms of welfare and productivity. Consequently, her study aims to test whether the distribution of strategies within a group affects the performance of individuals in that group, as well as the group as a whole.

Catherine Webb (PhD candidate, The University of Melbourne) - Using aversion learning and other preference testing techniques, Catherine will investigate the dog's perception of a range of dog training collars and methods to assess both their effectiveness and impact on dog welfare.

Board of Management

Professor Mike Rickard	Chair.
Dr. Ron Prestidge	Executive Director, Future Farming Systems Research, DPI, Victoria.
Professor Rick Roush	Dean, School of Land and Environment, The University of Melbourne.*
Professor Ken Hinchcliffe	Dean, Faculty of Veterinary Science, The University of Melbourne.*
Professor Grahame Coleman	School of Psychology and Psychiatry, Monash University.
Professor James Kinder	Chair, Department of Human Nutrition, The Ohio State University.
Professor Paul Hemsworth	Director AWSC, The University of Melbourne.
Professor Alan Tilbrook	Deputy-Director, AWSC, Monash University.

* Profs. Roush and Hinchcliffe alternate on a year by year basis

Advisory Committee

Robert Holmes	Chair - Veterinarian, Animal Behaviour Clinics
Onn Ben David	Deputy Chair - Veterinarian, Caulfield South Veterinary Clinic
Lisa Dwyer	Dairy farmer, Hawkesdale, Victoria
Michelle Edge	CEO, Australian Meat Processors Corporation
Geoff Fiskien	Beef / Sheep farmer, Lal Lal, Victoria
Ian McCauley	Scientist, Future Farming Systems Research, DPI Victoria
David Mellor	Director, Animal Welfare Science and Bioethics Centre, Scientist, Massey University
Denise Noonan	Animal Welfare Officer, University of Adelaide
Glenys Oogjes	Executive Director, Animals Australia
Siobhan O'Sullivan	Social Scientist, The University of Melbourne
Clive Phillips	Director, Centre for Animal Welfare and Ethics, University of Queensland
Kenton Shaw	General Manager, Farming Operations, Rivalea Australia
Philip Szepe	Managing Director, Kinross Farm
Steve Tate	Director, Bureau of Animal Welfare

AWSC Representation on committees in a technical/advisory capacity

Naomi Botheras, The Ohio State University

Member of the Technical Research Advisory Committee (TRAC) for the Ohio Livestock Care Standards Board

Member of the Ohio Dairy Producers Association Dairy Care Standards Committee

Mia Cobb, Monash University

Australian Animal Welfare Strategy, (AAWS) Animals used in work, sport, recreation and on display, Working Dog Subcommittee

Grahame Coleman, Monash University

Animal Welfare Advisory Committee Victoria, (AWAC)

AWAC Responsible Pet Ownership Advisory Committee

AWAC Animal Welfare Advisory Committee Working Group 1

AAWS Education Subcommittee

Andrew Fisher, The University of Melbourne

Dairy Australia Animal Welfare Reference Group

Live Trade Animal Welfare Partnership Project Advisory Committee

World Organisation for Animal Health, (OIE) Working Group on Animal Welfare in Beef Cattle Production

American Veterinary Medicine Association Animal Welfare Curriculum Planning Group

Sheep Welfare Standards Writing Group

AAWS Production Animals Subcommittee

Paul Hemsworth, The University of Melbourne

Animal Welfare Advisory Committee Victoria (AWAC)

OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee

AAWS RD&E Subcommittee

Dairy Australia Animal Welfare Reference Group

National Animal Welfare R,D&E Strategy Steering Committee

Australian Pork Limited Specialist Group (Environment and Welfare)

Australian Egg Corporation Limited Hen Welfare Advisory Group

AAWS Animals in Research and Teaching Subcommittee

Ellen Jongman, Department of Primary Industries, Victoria

Consultative Forum on the Livestock Export Industry

Steve Moeller, The Ohio State University

National Pork Board Animal Welfare Committee

Bobby Moser, The Ohio State University

Livestock Care Standards Board

Mike Rickard, Animal Welfare Science Centre,

AAWS Animals in Research and Teaching Subcommittee

Jeremy Skuse, Animal Welfare Science Centre

Australian Pork Limited Specialist Group (Industry capability and technology transfer)

SUMMARY OF CENTRE RD&E PROJECTS and competitive funding if applicable

Program 1 Welfare methodology

Animal preferences: effect of environmental and animal factors on the choice behaviour of laying hens

Investigators:	P. Hemsworth, Cronin and Petherick
Student:	Laine (PhD)
Funding:	Poultry CRC
Commencement date:	September 2009
Completion date:	August 2010
10/11 Funding	\$ n/a

The preferences of animals may tell us what is important to them and thus provide an indication of what is required to optimise their welfare. Animal preference tests conducted in a Y-maze apparatus, where an animal is offered a choice between two resources, one in each arm, may appear to be relatively straightforward. However, aspects of the design of the Y-maze test may have the potential to influence animal motivation and thus the choice made by the animal, leading to spurious results that are not reflective of the animal's true preferences.

The results of this research have important implications for the design of preference test methodology and interpretation of results. If scientists are to use preference tests to determine what is necessary for improved welfare, it must be assured that it is a rigorous methodology that reflects true preferences. The current work has demonstrated the Y-maze design factors, which may have been overlooked in the past, such as the quantity of reward, interval of testing and quality of resource on offer, are likely to be important influences on choices made by animals. It is apparent that preference test design requires further research to determine the most appropriate methodology that accurately reflects animals' preferences.

Assessing animal welfare: understanding biological functioning and preferences in animals.

Investigators:	P. Hemsworth, Tilbrook and Leury
Students:	Stevens (PhD) and Ralph (PhD)
Funding:	Poultry CRC, APL and DPI (Vic)
Commencement date:	July 2006
Completion date:	December 2010
10/11 Funding	\$ n/a

There is uncertainty within science on the concept of animal welfare. This uncertainty arises basically because scientists differ in their concept of animal welfare and thus how animal welfare should be measured or judged. Scientists have basically used two methodologies to study animal welfare: the welfare of animals has been assessed on the basis of either biological functioning or animal preferences. The first approach is an integrated one measuring behavioural, physiological, health and fitness responses to assess biological functioning on the basis that difficult or inadequate adaptation will generate welfare problems for animals. The second uses animal preference testing on the basis that animal preferences are influenced by the animal's emotions, which have evolved to motivate behaviour in order to avoid harm and facilitate survival, growth and reproduction. An important question in addressing this scientific uncertainty is "Does depriving animals of their more preferred resource result in biological dysfunction". One of these PhD programs (Stevens) is examining this question and has provided limited evidence that deprivation of a highly preferred resource may result in biological dysfunction.

The other PhD program (Ralph) is directed at improving our understanding of the measurement of biological functioning. The current stress assessment methodology most commonly involves measuring changes in plasma glucocorticoid (corticosteroids) concentrations, specifically free cortisol, bound cortisol or total cortisol. Thus an elevation of plasma glucocorticoid concentration, particularly the free hormone, is used as evidence that the animal is stressed. This method is widely accepted as an adequate technique to assess the stressed state of an animal. However recent data indicate a lag-time between glucocorticoid secretion into plasma and the appearance of the effects of glucocorticoids on target tissue, the sites in which glucocorticoids exert their biological consequences. This PhD program is studying the relationship between plasma glucocorticoids and intracellular glucocorticoids to improve our understanding of the connection between changes in plasma glucocorticoids and the pathway to physiological changes in the animal. Such knowledge is important in studying and appreciating the impact of stress on the biological fitness of animals and consequently the welfare implications.

Novel peptide mediates the inhibitory effects of stress on female reproduction

Investigators: Tilbrook, Clarke and P. Hemsworth
Students: Papargiris (PhD) and Keating (PhD)
Funding: ARC Discovery
Commencement date: January 2009
Completion date: December 2011
10/11 Funding \$ 120,000

Stress inhibits reproduction in females but the specific mechanisms driving this inhibition are unknown. This project offers a novel approach to elucidating stress-induced inhibitors of reproduction. A novel peptide, gonadotropin inhibitory hormone (GnIH), which is present in the brain, is proposed to be the principle protagonist in mediating the inhibitory effects of stress on sexual behaviour and secretion of reproductive hormones in the female. This project will determine the impact of stress on the synthesis and secretion of GnIH and will quantify the effects of GnIH in mediating the inhibitory effects of stress on reproduction in females.

In the first year we showed that stress did not influence the level of mRNA of GnIH in the hypothalamus and we established a working GnIH radioimmunoassay. We also showed that GnIH administered centrally did not influence the secretion of luteinizing hormone in ovariectomized ewes. It was also reaffirmed that the stress hormone cortisol inhibits sexual receptivity but not sexual motivation or the ability of females to attract males. Further, we established that the mechanism of action of cortisol to inhibit receptivity does not involve disruption of the oestradiol signal to induce oestrus.

We plan to generate data to assist in the mechanisms by which stress inhibits sexual motivation and sexual attractivity including the role of GnIH and other relevant neuropeptides.

We have published three journal articles to date and have presented data at national and international laboratories. We have submitted an abstract to the International Congress of Neuroendocrinology. To date, publications and presentation of data at international laboratories has generated substantial debate to the point where requests to collaborate internationally have been forthcoming.

Validating the use of proximity loggers in measuring feeder visits, displacements and social interactions in pigs in competitive feeding situations

Investigators:	P. Hemsworth, Jongman and Morrison
Student:	Rice (MPhil)
Funding:	Australian Pork Limited
Commencement date:	January 2009
Completion date:	December 2011
10/11 Funding	\$ 44,098

High levels of aggression which occur when mixing sows has prompted a large amount of research into the optimal housing, group size and space allowance to reduce aggression. Recently APL funded a research project examining the behavioural characteristics of individual sows which may predict aggression in groups.

When working with a large number of animals behavioural studies can be time consuming, and sometimes impossible to do with videos (e.g. large space allowances, and large group sizes often make video observations more complicated and tracking individual animals becomes very difficult).

The use of proximity loggers may provide an opportunity to overcome these limitations, however they have not been used within this setting. This project will enable a greater understanding of the full potential of the proximity logger in this setting and secondly validate a methodology for measuring displacements from feeders which could later be tested as a predictive test of aggression.

Objectives

1. To examine the practicability of using proximity loggers with intensively group housed pigs
2. To investigate the accuracy of the proximity logger in determining displacements of pigs from feeders and by whom
3. To examine the repeatability of these displacement observations over time.

Usefulness of preference for resources and biological functioning to assess animal welfare

Investigators:	Tilbrook, P. Hemsworth and Lee
Funding:	Australian Pork Limited
Commencement date:	November 2010
Completion date:	March 2013
10/11 Funding	\$ 69,741

Animal welfare (AW) elicits a range of views within the community, which lead to marked attitudes to AW issues. Welfare groups lobbying specific animal industries/ practices indicate the strength and implications of these views.

Science has a critical role in underpinning our decisions on animal use and attendant conditions and compromises. Biologists have the responsibility of establishing the facts on how animals biologically respond to various practices, whether they relate to farming, laboratory or general community uses of animals. Gaining a consensus on the welfare implications of a specific animal use would appear to be an easier task to achieve amongst scientists than within the general community. However, conflicts have arisen in science around the definition of AW and the methodology used to assess AW varies amongst scientists.

Differing definitions of AW provoke debate on AW assessment and standards. This unease with the definition exists both within science and more broadly when decisions on acceptable welfare standards are being made by individuals or the community. This is a limitation, since an important step in developing defensible policies on animal care and use is to assemble factual information on the animal's biological responses to the particular system or treatment.

While there is limited evidence that deprivation of highly preferred resources results in biological dysfunction, research utilizing well-accepted stress models is required to understand the relationships between these concepts and methodologies. Particularly, research is required to examine the effects of deprivation of these resources on the animal's behaviour, physiology, health and fitness.

Therefore, the general objective of this project is to improve our understanding of the relationship between these two main methodologies of AW by testing the hypothesis that deprivation of highly preferred resources results in biological dysfunction. This fundamental research may assist in reducing the interpretative differences in AW science.

Objectives

To determine the relationships between the two main approaches to welfare assessment, the functioning approach and the preference approach. A sound understanding of these two methodologies is essential in the validation of welfare research methodology to establish welfare standards and develop tools to measure welfare in the field.

Program 2 Housing and husbandry effects on animal welfare

Develop and evaluate a model to monitor and benchmark the welfare of animals in research institutions

Investigator: Jongman
Funding: DAFF (AAWS)
Commencement date: June 2009
Completion date: October 2010
10/11 Funding n/a

This project will develop and evaluate a model to monitor and benchmark the welfare of animals in research. Current and previous research at Australian research institutes will be used and the model will be evaluated on sheep used for research conducted under Animal Ethics Committee (AEC) approved protocols. It has been decided to use sheep as a model in this pilot project as they are commonly used in disease models in biomedical studies as well as livestock production research.

Several indices of animal welfare will be recorded for this RAWMP project, to evaluate those indicators that may be practical and predictive of animal welfare. The results of this study may therefore be used to develop a benchmarking system of animal welfare within and between species and institutions. Recordings for the present pilot project will include animal health and fitness indices such as mortality and morbidity, environmental parameters (“resources”) and animal behaviour responses.

Presently AEC protocols may not consistently include detailed estimates and expectations of outcomes of the most important welfare indices such as mortality, morbidity and culls (specifically due to fitness problems), and therefore the AEC (and the scientists) may not be aware when these indices exceed predictions and problems may be occurring.

This RAWMP project will utilize observations and reports by both the RAWM project team researchers and the experimenters undertaking the AEC approved experiments.

The effects of group housing during gestation on sow welfare and reproduction

Investigators:	P. Hemsworth, Morrison, Cakebread and Tilbrook
Student:	Karlen (PhD)
Funding:	Australian Pork Limited
Commencement date:	July 2007
Completion date:	December 2010
10/11 Funding	\$ 25,000

There is increasing community concern with society's treatment of animals. Confinement housing of livestock such as those common in modern pig and poultry production appear to be at the forefront of these concerns. In relation to pig housing, the most contentious animal welfare issue is housing of dry (non-lactating) sows. Increasing community concern about confinement housing has led internationally to legislation, consumer and retailer pressure to increase the use of group housing for gestating sows. Housing sows in stalls is being phased out in the European Union by 2013 and in New Zealand by 2015 except for the first 4 weeks of gestation. Recent changes in the Australian Model Code of Practice for the Welfare of Animals – Pigs recommend restricting the duration of housing gestating sows in stalls to early gestation.

Industry experience however indicates that the opportunity for group housing to improve sow welfare is presently limited by the high levels of aggression that is commonly observed in newly formed groups of sows after mixing: this aggression, especially if intense and prolonged, may lead to injuries and stress. While stress and injury clearly have welfare implications, stress has been shown to inhibit reproduction in many species, including pigs. Furthermore, injury is responsible for a large number of early culls and deaths in breeding sows and thus injury increases the cost of production by increasing replacement rates. For example, it has been reported that an average of 9% of sows, with a maximum of 19% of sows, die on Australian farms, with many sows having injuries severe enough to result in early culling. There are few rigorous recommendations in the scientific literature on the design features of sow group housing that reduce aggression.

This project is examining the effects of floor space and group size on aggression, stress, injury, lameness and reproduction in sows housed in groups during gestation. Recent research by the group found that the practice of housing sows in stalls immediately after mating and delaying mixing in large groups on deep litter until pregnancy is confirmed, by reducing aggression at mixing, may provide some distinct welfare advantages over housing sows either in stalls or in large groups on deep litter for the entire gestation. This 'hybrid' system is also presently being investigated in this current APL Project.

Transport of bobby calves

Investigator:	Jongman
Funding:	Department of Primary Industries, Victoria
Commencement date:	October 2008
Completion date:	June 2011
10/11 Funding	\$ n/a

Transport of bobby calves is a major welfare issue for the dairy industry in Victoria. There is no recommendation for loading density for bobby calves during transportation in Victoria, for either short or long duration journeys. The only guideline for loading density offered in the Code of Accepted Farming Practice for the Welfare of Cattle suggests that during transportation, bobby calves should have sufficient space to lie down.

This project aims to provide scientifically-validated recommendations for the stocking density, age and conditions for the transport of bobby calves by:

- identifying the space allowance requirements for transport of bobby calves;
- gaining an understanding of factors such as age, distance travelled and flooring that minimise risks to welfare during transport of bobby calves; and
- developing understanding of how age affects ease of handling, which may indicate ease of loading and unloading and handling at the abattoir

Importance of rearing environment, space and nests for laying hens in cages

Investigators:	P. Hemsworth, Tilbrook and Widowski
Student:	Engel (PhD)
Funding:	Australian Egg Corporation Limited
Commencement date:	September 2009
Completion date:	April 2012
10/11 Funding	\$ 114,253

The two most contentious issues in relation to cage housing and hen welfare are space and the need for a nest. The literature on space allowance in cages shows that in general as floor space increases, within a range of 300 to 650 cm²/hen, welfare generally increases, based on decreased mortality and higher egg production and body weight. At the lower space there is also evidence of increased stress. A recent AECL project that included measures of stress showed that in cages with a space allowance of 750 and 1500 cm²/hen, while there were effects of group size there were no effects of space allowance on hen welfare. Similarly, a recent AECL project on nests in cages showed that about 30% of hens consistently chose to lay eggs on the cage floor and that the presence or absence of a nest had no effects on a number of stress-related measures indicative of a chronic stress response.

This project is using the 2 most common methodologies to assess animal welfare, measuring animal preferences and biological functioning. Preference tests are used by scientists to draw inferences on animal welfare on the basis that these preferences are influenced by the animal's emotions (or feelings), which are prime determinants of its welfare. Measuring biological functioning involves the integrated use of behavioural, physiological, health and fitness measures.

Determining how space allowance and nests in cages affect hen welfare will assist the egg industry both by demonstrating that cages may be an appropriate environment for laying hens and in any negotiations with Government on future space allowances and/or requirement for nests for laying hens.

Effects of aggressive characteristics of individual sows and mixing strategies on the productivity and welfare of group-housed gestating sows

Investigators:	P. Hemsworth, Morrison, Cronin, Tilbrook and Widowski
Student:	Verdon (PhD)
Funding:	Australian Pork Limited
Commencement date:	January 2010
Completion date:	June 2012
10/11 Funding	\$96,229

High levels of aggression are commonly observed in newly formed groups of sows after mixing: this aggression, especially if intense and prolonged, may lead to injuries and stress. However, there are few rigorous recommendations in the scientific literature on the design features of sow group housing that reduce aggression. While the problem of pig aggression has received considerable attention, detailed studies of aggressive behaviour have generally used staged paired encounters or small group sizes. These research settings are very different from commercial settings.

While space, time of mixing and provision of feeding stalls may reliably reduce aggression and stress in group-housed sows, it is clear that a better understanding of the effects of the composition of the group, particularly aggressive behaviour of individual sows, may have important implications for both the welfare and reproductive performance of the group as a whole. For example, the opportunity arises to assemble groups that perform well in terms of overall welfare and reproductive performance based on the composition of the group if (1) the composition of the group in terms of aggressiveness of its individuals is related to the overall stress level in the group and (2) this behavioural characteristic is stable over time and/or is heritable.

Therefore, project is examining whether the composition of groups, particularly in terms of the aggressive behaviour of individual sows, is related to the welfare and reproductive performance of the group as a whole. Furthermore, this project will also examine the use of boars, straw enrichment and dietary supplements on aggression in sows at mixing.

This project will provide fundamental knowledge to the Australian pig industry on basic principles of mixing pregnant sows. Such knowledge is essential as the industry moves to more use of group housing systems for breeding females. Furthermore, such knowledge is required to develop and defend science-based recommendations on sow housing during gestation.

Welfare of lambs in intensive finishing systems Part 2

Investigators:	P. Hemsworth, Tilbrook, Jongman, Campbell, Leury
Funding:	Department of Primary Industries, Victoria
Commencement date:	July 2010
Completion date:	June 2012
10/11 Funding	\$ 94,970

This two year project will involve two main studies, one a preparatory study and one a major study. The first study will validate remote proximity sensors (radio frequency identification tags) to measure feeding behaviour and social interactions (e.g. displacements from feeders). The opportunity will also be taken in this study to examine relationships between feeding behaviour, and social interactions. The second study will examine the effects of floor and feeder trough space on lamb welfare in an 'industry best practice intensive finishing system'.

Objective/s:

1. Determine the validity of remote proximity sensors to measure feeding behaviour and displacements from feeders.
2. Identify the effects of floor and feeder trough space on lamb welfare in an 'industry best practice intensive finishing system'.

Optimising dairy cow behaviour and welfare within flexible feeding systems

Investigators:	Fisher, Jongman, Mansell, Pyman, Auldist and Wales
Students:	Dilrukshi (PhD) and Coombe (PhD)
Funding:	Department of Primary Industries, Victoria
Commencement date:	February 2010
Completion date:	June 2012
10/11 Funding	\$ 199,676

Dairy farmers in south eastern Australia are challenged by the need to feed their dairy cows profitably in the face of increased climate variability which directly impact on the availability of water for grazed forage production. More recently, that grazed pasture constitutes less than 50% of a cow's diet annually, with the remainder being made up of expensive, high-energy concentrates. By necessity this simple system is being replaced with flexible systems that integrate mixed rations, fed on feed pads with grazed pastures (Partial Mixed Rations-PMR), while optimizing cow behaviour and welfare.

This project will address specific questions relating to cow comfort and behaviour within PMR systems and the success of this project will enable dairy farmers to adopt strategies that optimize cow behaviour and welfare within flexible feeding systems.

The anticipated outcome of this large project is to facilitate the ability of dairy producers to adopt more flexible, more profitable feeding systems while achieving appropriate standards of cow health and welfare.

Identification of risk factors for racetrack injuries in greyhounds in Victoria

Investigators: Campbell, Fisher and Stafford
Student: Beer (MSc)
Funding: University of Melbourne, Greyhound Racing Victoria
Commencement date: December 2009
Completion date: June 2013
10/11 Funding \$ n/a

This project aims to analyse data collected at greyhound race tracks across Victoria to determine the prevalence of injuries sustained by greyhounds during racing, and to identify possible factors that may increase or decrease the likelihood of a greyhound sustaining a serious injury during a race.

Effect of cage enrichment and predictability on health outcomes of shelter cats.

Investigators: Croney and Lord
Students: Stella (PhD)
Funding: Morris Animal Foundation
10/11 Funding \$ n/a

The goal of this project is to improve the behaviour and well-being of shelter cats using environmental enrichment as an intervention.

Preliminary data has been collected and project protocol has been refined to mimic shelter environment in a research cat colony to facilitate data collection and test proof of concept

Domestication and development of social cognition in dogs, wolves and pigs

Investigators: Croney and Shreyer
Students: Buch (MSc)
Funding: The Ohio State University
10/11 Funding \$ n/a

Theory of mind, the ability to reason about thoughts, beliefs, and desires of others, allows for successful navigation of human society. However, this skill may not be uniquely human; nonhuman primates demonstrate basic theory of mind skills such as understanding pointing

In dogs, complex social-cognitive skills may have evolved during the domestication process, allowing them to navigate human society. Evidence for the domestication hypothesis comes from the extraordinary performance of dogs on several social

cognitive tasks as well as striking failures of a closely related non-domesticated species, the wolf, on similar tasks. Thus, domestication may account for dogs' success and wolves' failures on social cognitive tasks, and may lead to similar results when comparing the outcomes on social cognitive tasks of other species of domesticated animals such as pigs with their respective wild relatives, such as warthogs and Babirusa pigs.

Since domestic dogs and pigs have mastered social-cognitive skills foundational to theory of mind, they may be capable of more complex skills, such as understanding intentions. In humans, recognition of intentions develops later than other similar skills (i.e., eye gaze and pointing), generally appearing by 12 months (Saxe et al., 2004; Woodward et al., 2001); therefore, recognition of intentions appears to be a cognitively demanding process.

This project is currently in its planning phase with data collection anticipated to begin August 2010.

Behavioural assessment of adult shelter dogs: Development and validation of the Behavioural Assessment for Re-homing K9's (B.A.R.K.) protocol

Investigators: Bennett, Toukhsati and Coleman

Student: Mornement (PhD)

Funding: Monash University (AWSC) and RSPCA Australia

10/11 Funding \$ n/a

Shelter dogs typically undergo a behavioural assessment (or "temperament test") prior to being made available for adoption. However, very few such tests have been evaluated for their validity, reliability and feasibility. This is welfare concern because dogs that pass are made available for adoption whereas those that fail are generally euthanased. Decisions made on the basis of an invalid assessment are therefore problematic. This research has several aims: To review shelter dog assessment protocols currently used in Australian shelters and to develop and validate a standardised shelter dog assessment protocol. We also investigated the attitudes of the Australian public towards shelter dogs, their behaviour and the assessment of their behaviour to ascertain what they considered to be important for inclusion in a shelter dog assessment protocol.

Part 1- In the first year we completed a review of the assessment protocols used by several Australian shelters (n=11). This involved observing assessments on individual dogs (n=52), collecting instructions and scoring protocols for the various assessments and interviewing shelter workers responsible for assessing dogs. The results of this review, which showed a significant lack in standardisation, reliability and validity of the tests, will be published this year in Applied Animal Welfare Science.

Part 2- The Behavioural Assessment for Rehoming K9's (BARK) protocol was then developed on the basis of the results of Part 1 and focus group sessions with experts on canine behaviour. The BARK protocol is a standardised assessment and was implemented into several Australian animal shelters to evaluate its reliability and validity. Measures of test-retest, inter-rater reliability and predictive validity are currently being analysed.

Part 3 – Community attitudes towards shelter dogs, their behaviour and the assessment of their behaviour were explored via an online survey. Data on the 1647 completed surveys are currently being analysed.

The results of this research so far have been presented at numerous National and International conferences and our first paper will be published in Applied Animal Welfare Science in July this year (2010). This research has the potential to improve the way shelter dogs are assessed for their adoption suitability and has generated much interest from welfare agencies in Australia and overseas.

Program 3 Attitudes to animals and animal welfare, and farmer, consumer and community behaviour

Farm animal welfare in Ohio: Assessing public concern and implications for the food animal industry

Investigators:	Lobao, Coleman, Eastridge, P. Hemsworth and Botheras
Students:	Deemer (MSc) and Pempek (MSc)
Funding:	Ohio Agricultural Research and Development Center
Commencement date:	April 2006
Completion date:	December 2010
10/11 Funding	\$ n/a

Farm animal welfare has long concerned animal scientists, social scientists, and the food animal industry. However, relatively little is known about the U.S. population's recent views regarding farm animal welfare. Much of our knowledge is based on case-studies or other research with limited generalized inferences. Among the questions consistently raised by analysts is the relationship between the public's knowledge of farm animals and their attitudes and food consumption behaviour. Our research addresses the gap in the literature by examining the public's knowledge of farm animals, as well as other key covariates and their relationship to attitudes and food consumption behaviour. Data are from a large, random sample of the Ohio population (N=1,000) and a comparative smaller nationwide sample taken during 2007. Along with variables measuring knowledge about farm animal production, we evaluated the relevance of key demographic variables, such as rural-urban residence, gender, income, and ethnicity. Multiple regression models using different dependent variables of animal welfare attitudes and behaviour were employed. Across these models, the most consistent correlates of greater concern with farm animal welfare were gender (women) and urban residence. Based on these and other control variables, knowledge of farm animal production had little impact on attitudes and behaviour. These results suggest that educational outreach to improve knowledge of farm animal production may have limited impact on attitudes and behaviour relating to farm animal welfare.

The next step is to evaluate the manner by which the farm animal industry (with focus on dairy and swine producers) is adapting to new protocols for animal treatment. We contacted food retailers/processors and they provided us with some information from

which we developed a survey instrument. The survey will be conducted with producers to evaluate the degree to which they will adopt animal-welfare friendly protocols.

Welfare of lambs in intensive finishing systems. Part 1.

Investigators:	Coleman, Jongman, P. Hemsworth, Campbell, Leury and Toukhsati
Funding:	Department of Primary Industries, Victoria
Commencement date:	March 2010
Completion date:	December 2010
10/11 Funding	\$ 96,190

Intensive feeding of lambs is likely to increase in the future due to pressure from climate change and natural resource management. Systems include opportunity feedlots, containment feeding in emergency situations, as well as feedlotting. Current scientific opinion is that some of the variation in lamb performance (and welfare) can be attributed to design features (e.g. stocking density, feeder space, etc.), shy feeders, feed adaptation, subclinical disease and breed effects.

Public attitudes of intensification of animal production are seen as posing a “high risk” to this development and the sheep meat industry as a whole (e.g. association of sheep meat production with typical intensive industries). Therefore it is also important to understand public and farmer attitudes to the welfare of lambs in intensive finishing systems in developing R&D policy. Furthermore, such an understanding can be used by government and industry in developing animal welfare policy. Understanding how individuals perceive animal welfare issues can also assist in developing strategies for managing public perception in the broader community.

In this preliminary project, the most contentious issues in intensive feeding systems and containment of lambs will be identified through conducting a literature review of the relevant scientific literature on the welfare implications of confinement systems together with the use of attitude questionnaires assessing both the public and farmers attitudes to farm animal welfare, particularly those welfare issues concerning the lamb production in intensive finishing systems.

The results of the project will be used by the Centre and DPI to assist in the planning of a proposed subsequent major animal experiment studying the most contentious and likely contributors to poor lamb welfare.

The relationships between human attitudes, human behaviour and the behaviour and welfare of dogs in shelters and veterinary clinics.

Investigators: P. Hemsworth and Coleman
Student: Haynes (PhD)
Funding: University of Melbourne (AWSC)
Commencement date: March 2009
Completion date: March 2012
10/11 Funding \$ n/a

Previous research has demonstrated the existence of a significant sequential relationship between stockperson attitudes, stockperson behaviour and animal behaviour and animal welfare in livestock settings. Routine stockperson behaviours used to inspect and handle animals may have profound effects on the behaviour and stress physiology of livestock, in turn affecting livestock productivity and welfare.

Despite more than 37% of Australian households owning one or more dogs, there is a limited understanding of the link between human attitudes and behaviour and canine behaviour and welfare. This project will study the human-canine relationship in several well-defined settings, each setting defined and differing in terms of the duration and nature of human contact. Veterinary clinics and animal shelters will be used to examine the relationships between the attitudes and behaviour of 'handlers' to dogs, for example shelter attendants and veterinarians, and the behavioural response of dogs to both the handler and to humans in general. The opportunity will also be taken to examine outcomes in these settings such as ease of handling and subsequent responses to the veterinary clinic as well as rehousing outcomes in animal shelters. The results of these studies will contribute to the handling recommendations for dogs in shelters and veterinary clinics to improve dog behaviour, ease of handling and outcomes as well as providing valuable scientific knowledge regarding the human-canine relationship.

If these are significant relationships between the attitudes and behaviour of 'handlers' in these settings to dogs and the behavioural response of dogs to both the handler and to humans in general, the opportunity arises to utilise training programs to target attitudes and behaviours to improve human-animal interactions in these settings and thus some behavioural and perhaps welfare outcomes for the dogs.

The relationship between attitudes and behaviour of human care-takers and animal behaviour of dogs in a shelter environment

Investigators:	P. Hemsworth, Coleman and Haynes
Student:	Haynes (PhD)
Funding:	DAFF (AAWS)
Commencement date:	March 2011
Completion date:	April 2012
10/11 Funding	\$ 3,527

This study aims to improve the welfare of shelter dogs by identifying training opportunities (e.g. cognitive-behavioural intervention) that target key attitudes and behaviours of animal shelter attendants when interacting with dogs during their first eight days. Attitudes and behaviours of animal attendants towards shelter dogs will be measured in addition to measurements of fear of humans and stress in these shelter dogs. This initial research will form the basis of subsequent research examining the causal basis of these relationships and thus provide the opportunity to improve the welfare of shelter dogs through animal attendant training.

Assessing public metrics to benchmark stock handling

Investigators:	Coleman, P. Hemsworth and Toukhsati
Student:	Roberts (PhD)
Funding:	Australian Pork Limited
Commencement date:	September 2010
Completion date:	December 2012
10/11 Funding	\$ 65,051

Research has shown that stockpeople have a major impact on the welfare of their livestock, however the topic of 'stockmanship' has received relatively little attention. While welfare monitoring schemes are likely to improve animal welfare, the impact of such schemes will only be realised by recognising the limitations of stockpeople and including stockperson benchmarking in welfare audits. Monitoring the stockperson is a key component of any welfare monitoring scheme.

The ability to benchmark stockhandling through the development of tools which reliably measure stockperson attitudes, knowledge and beliefs will enable the industry to demonstrate a clear commitment to animal welfare and will also enable the industry to demonstrate improvements in stockperson attitudes and behaviour.

Objectives

1. Development of a supervisor questionnaire for assessing stockperson handling and general work performance

2. Development of a self report questionnaire to assess stockperson attitudes and knowledge

ProHand® Pigs in US

Investigators: Moeller, Botheras, P. Hemsworth and Coleman
Student: Crawford (PhD)
Funding: The Ohio State University (AWSC) Funded
Commencement date: March 2010
Completion date: December 2012
10/11 Funding \$ n/a

Today in the United States there are more pigs being raised under contract production than ever. In a study completed by the USDA, it was reported that the total number of hogs raised under contract increased from five percent in 1992 to 67 percent in 2004 (USDA). However, little information is known about contract producers with regard to their attitudes, behaviours, gender, or previous swine production experience, to name a few characteristics.

This project will study the contract producers with two primary objectives in mind:

1. To assess baseline stockperson/contract grower beliefs and attitudes toward grower-finisher pigs and assess the subsequent behaviours toward pigs as they influence pig fear responses, and
2. Assess the efficacy of ProHand Pigs stockperson training in modifying existing attitudes, beliefs and behaviours of stockperson toward pigs, with the ultimate goal of developing a version directed toward contract grower-finisher production settings.

Data collection will be beginning in the second quarter of 2010 on 32 Ohio farms and will continue into 2011

The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare

Investigators: Coleman and Jongman
Student: L. Hemsworth (PhD)
Funding: Bureau of Animal Welfare
10/11 Funding \$ n/a

In Australia, the number of horse welfare problems investigated by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) relative to other domestic animal problems remains high, with significant time and resources utilised in dealing with these problems. Research by Pearson (2004) found that owner attributes that were specifically correlated with reduced horse welfare were lack of commitment to horse ownership, the belief that horses made good companion animals, the belief that horses were difficult to

care for, a low education and residing in the outer metropolitan area or the outer-fringes of the city. While this study highlighted the opportunity to reduce welfare issues in domestic horses by understanding owner characteristics, this study provided little information on the extent of animal welfare problems in recreational horses or indeed the extent of this relationship between owner characteristic and horse welfare in the broader and larger horse recreational group.

The Victorian Animal Welfare Advisory Committee's Working Group on the Welfare Issues Associated with Unidentified Horses, Cats and Dogs has concluded that very little is known about the horse ownership in Victoria, mainly because of the lack of compulsory identification and registration of horses and the difficulty in contacting horse owners that are not members of horse clubs.

There is therefore an obvious need to identify horse numbers in Victoria and the circumstances surrounding their ownership such as participation in horse clubs and activities, foals produced, and surrender and euthanasia. Furthermore, understanding the occurrence and extent of horse welfare problems, as well as factors associated with these welfare problems would provide valuable information for the development and implementation of state and local government policy on responsible horse management.

Identifying 'ideal' companion dogs for Australia

Investigators:	Bennett and Marston
Student:	King (PhD)
Funding:	Pet Industry Advisory Service and Bureau of Animal Welfare
10/11 Funding	\$ n/a

With differing lifestyles and an increase in urban living it is likely that the characteristics of an 'ideal' pet dog i.e. one that is well suited to a modern lifestyle, have changed. The aim of this study is to a) determine what behavioural characteristics people consider 'ideal' in a pet dog today, b) develop a standardised behaviour assessment to measure a desirable canine personality trait and c) evaluate the assessment's reliability and validity.

Previously developed behavioural assessments have not been assessed for their validity, reliability and predictive qualities. Some have been developed to assess working dog traits and are not relevant to the average pet owner. None have been designed using a systematic scientific approach. The initial phase of this study identified that people prefer a dog which exhibits affectionate, friendly and calm behaviour. These characteristics are related to the canine personality trait; amicability, which has been previously described in the literature. A canine behaviour assessment protocol was developed, which was designed to elicit behaviour indicative of the trait 'amicability' in pet dogs.

Currently 200 adult dogs are being assessed to determine which behavioural variables accurately reflect this trait. This assessment has the potential to objectively assess amicability without using owner reports, which are subjective and often unreliable. The development of a behavioural assessment which has been scientifically tested for reliability and validity, to measure amicability of companion dogs, could be of great benefit to large range of dog-related organisations and paves the way to the development of a wider range of tests characterising canine behaviour.

We have published one journal article to date and have presented data at numerous national conferences and seminars. Three abstracts were recently submitted to international conferences (ISAZ, IAHAIO and CSF). Two abstracts have been accepted for oral presentations. The third is pending. To date, publication and presentation of the data has sparked great interest within the dog owning community and the general media.

Human-animal relationships in zoos: understanding the impact of visitors on the welfare of non-human primates in Australian zoos

Investigators: P. Hemsworth, Phillips, Magrath and Sherwen
Student: Sherwen (PhD)
Funding: DAFF (AAWS)
Commencement date: June 2011
Completion date: October 2011
10/11 Funding \$ 3,170

Zoo visitors are an integral part of life for zoo animals but we have limited understanding of how visitor numbers and behaviour influence their welfare. This project will fill a major gap in our knowledge and be the first to thoroughly investigate visitor effect on animal welfare using preference testing, behavioural observations, physiological assessment and replication.

In this preliminary study, five target zoos across Australia will be visited to define enclosure characteristics and create an ethogram of animal behaviours (with visitors present and absent).

Program 4 Tertiary and post-graduate education and training

Animal welfare education project

Investigators: Lauber, Coleman, P. Hemsworth and Skuse
Funding: Department of Primary Industries, Victoria and the Telematics Trust
Commencement date: July 2009
Completion date: September 2010
10/11 Funding \$ n/a

Key concepts in animal welfare will be introduced along with an introduction to the topic of human-animal interactions and the impacts of these interactions on animal. Issues of supervision and care, attitudes and handling will be discussed as a strong emphasis is placed on the pivotal and often underestimated role that humans play in the welfare of animals and those human behaviours that can compromise the human-animal

relationship. The package will be delivered in a flexible, self-paced manner and nor require expert teachers for delivery.

Mapping ProHand[®] stockperson training packages against current livestock industry competencies and establishing recommendations for future accreditation

Investigators: Skuse, Edge, Brown
Funding: DAFF (AAWS)
Commencement date: June 2010
Completion date: December 2011
10/11 Funding \$ 13,000

This project will address the above by first, mapping in detail, all of the available ProHand program(s) to all of the relevant livestock industry competency units (within several different diplomas), including the core assessment requirements. This exercise will also provide insight into future revisions of ProHand that may include specific assessment tools required to fulfil the applicable competency requirements of the mapped units.

The project will also examine options for accrediting the ProHand packages. There are several ways this may be examined – first, as part of quality assurance certification, where the package may be accredited in relation to specific standards, and second – registration of the packages as a formal course in accordance with the policies specified by the National Training Information Service and State Training Authorities. Depending on the mapping exercise, ProHand may be more suitable for the latter option, especially as it is likely that the program may only meet part of the guidelines of existing Training Package(s) or accredited course(s). The objective of the project will be to produce a report with two parts: 1) the mapping of ProHand against the core competency assessment requirements for relevant livestock units and 2) discussion on the options for accreditation of the ProHand packages based on the findings for part 1.

Delivery of “Animals in society” as part of the “Human and animal interactions” cluster at The Ohio State University.

Investigator: Bennett, Osborne
Funding: The Ohio State University
Commencement date: July 2007
Completion date: ongoing
10/11 Funding \$ n/a

“Animals in Society” (AIS) is an introductory course designed to introduce students to the social, cultural, economic and legal frameworks within which current human-animal relationships exist. The course was developed by the Animal Welfare Science Centre in collaboration with the Department of Animal Sciences at OSU. AIS fulfils a Social Science elective and was offered for the first time during the Autumn 2007 quarter.

Students in this course, explore a wide range of current animal roles with a view to broadening their understanding of how integral our relationships with animals are in maintaining human physical, social and psychological health and well-being. Currently, there is a wide range of views about animals, often based on misinformation and poorly informed value-based judgments. AIS is designed to equip students with the knowledge and critical thinking skills necessary to address questions concerning how animals can best co-exist with human societies.

Students learn to appreciate the physical, social and psychological interdependence between species and be able to use the knowledge acquired to objectively, critically, and sensitively evaluate and comment on emerging issues regarding animals in society.

Delivery of “Animals in Society” as a breadth subject at the University of Melbourne.

Investigator: P. Hemsworth, Lauber, Edwards, Stevens, Chamberlain

Funding: The University of Melbourne

Commencement date: July 2008

Completion date: ongoing

10/11 Funding \$ n/a

This course is offered as a breadth subject throughout the University and is designed to encourage students to begin to think about how and why animals are so integral to human society.

The course investigates the human-animal relationships, where they originated, during domestication, and where they are now. Also examined in detail are some key relationships between humans and animals, including animals as pets, in agriculture, as research subjects, in educational roles and as pests.

A key topic is a study of the changing attitudes of humans towards animals throughout time and humankind's moral and ethical obligation to animal wellbeing. The course animal welfare science and discusses some of the current animal welfare issues in livestock industries around the world. The course looks to the future and where the relationship between humans and animals may be headed.

CENTRE RD&E COMMUNICATIONS

1. Books / book chapters

Gaunt, G., Jolly S., Duddy, D. (2010) Intensive Production Systems. In: The international sheep and wool handbook. 2nd Edition. Edited by D. Cottle, Nottingham University Press, Nottingham, UK, Chapter 24, pp. 565-580.

Hemsworth, P.H. and Coleman, G.J. (2010). Managing poultry: human-bird interactions and their implications. In "The Welfare of Domestic Fowl and Other Captive Birds", edited by I.J.H. Duncan and P. Hawkins, Springer Dordrecht, Heidelberg, Germany, pp. 219-235.

2.a Research publications in refereed journals

Barnett, J. L., Hemsworth, P. H., Butler, K. L., Schirmer, B. N., Borg, S. S. and Cronin, G. M. (2011). The effects of stall dimensions on the welfare of pregnant sows. *Animal Production Science* 51, pp. 1–10.

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Keating, C., Tilbrook, A. and Kulkarni, J. (2010). Oestrogen: an overlooked mediator in the neuropsychopharmacology of treatment response? *International Journal of Neuropsychopharmacology*, published online doi:10.1017/S1461145710000982.

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Lambert, E., Lambert G., Ika-Sari C., Dawood, T., Lee, K., Chopra, R., Straznicki, N., Eikelis, N., Drew, S., Tilbrook, A. and Dixon, J. (2011). Ghrelin modulates sympathetic nervous system activity and stress response in lean and overweight males. *Hypertension* 58 43-50.

McGregor, B.A. and Butler, K.L. (2010). Relationship of weaning weight to the mature liveweight of cashmere does on Australian farms. *Animal Production Science*, 50, pp. 581-584.

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Rohlf, V., Bennett, P., Toukhsati, S.R., and Coleman, G.J. (2010). Addressing dog obesity: can dog owners' feeding and exercise intentions and behaviours be predicted from attitudes? *Journal of Applied Animal Welfare Science*, 13(3), pp. 213-236.

Spencer, S.J. and Tilbrook, A.J. (2011). The glucocorticoid contribution to obesity. *Stress*, published online DOI: 10.3 109/10253890.2010.534831.

Turner, A.I., Rivaland, E.T.A., Clarke, I.J. and Tilbrook, A.J. (2010). Stressor specificity of sex differences in hypothalamo-pituitary-adrenal axis activity: cortisol responses to exercise, endotoxin, wetting, and isolation/restraint stress in gonadectomised male and female sheep. *Endocrinology*, 151 4324-4331.

Wagenmaker, E.R., Breen, K.M., Oakley, A.E., Tilbrook, A.J. and Karsch, F.J. (2010). The estrous cycle of the ewe is resistant to disruption by repeated, acute psychosocial stress. *Biology of Reproduction*, 82 1206-1215.

2.b Research papers in press

McGregor, B.A. and Butler, K.L. (2011). Determinants of permanent first incisor eruption in grazing Australian Angora goats. *Australian Veterinary Journal*, (in press).

Papargiris, M. M., Rivalland, E.T.A., Hemsworth, P.H., Morrissey, A.D. and Tilbrook, A.J. (2011). Acute and chronic stress-like levels of cortisol inhibit the oestradiol stimulus to induce sexual receptivity but have no effect on sexual attractiveness or proceptivity in ewes. *Hormones and Behavior* (in press).

Rohlf, V. I., Bennett, P. C., Toukhsati, S. and Coleman, G. (2011). Beliefs underlying responsible dog owners' health care behaviours. *Anthrozoos*, (in press).

Toukhsati, S.R., Young, E., Bennett, P.B., and Coleman, G.J. (2011). Wandering cats: attitudes and behaviours towards cat containment in Australia. *Anthrozoos*, (in press).

2.c Research papers submitted to refereed journals

Coleman, G.J., Rice, M., Barnett, J.L. and Hemsworth, P.H. (2011). Human-animal relationships at abattoirs I: relationships between the attitudes and behaviour of stockpeople to sheep and cattle. Submitted to *Applied Animal Behaviour Science*.

Fisher, A.D. (2011). Addressing pain caused by mulesing in sheep. Submitted to *Applied Animal Behaviour Science*.

Gunaseelan, S., Toukhsati, S.R., and Coleman, G.J. (2011). Predicting responsible pet ownership behaviors in Singaporean cat owners. Submitted to *Anthrozoos*.

Jongman, E.C. and Butler, K.L. (2011). Ease of handling of young calves at different ages. Submitted to *Australian Veterinary Journal*.

Hemsworth, P.H., Cronin, G.M., Barnett, J.L., Butler, K.L., Jongman, E.C., Karlen, G.A., Coffey, A., and Arnold, N.A. (2011). Behavioural responses of lambs to an alternative procedure to mulesing. Submitted to *Australian Veterinary Journal*.

Hemsworth, P.H., Rice, M., Karlen, M.G., Calleja, L., Barnett, J.L. and Coleman, G.J. (2011). Human- animal relationships at abattoirs II: relationships between handling and animal stress in sheep and cattle. Submitted to *Applied Animal Behaviour Science*.

Howell, T., Conduit, R., Toukhsati, S. and Bennett, P. (2011). Challenges and opportunities for using electroencephalography (EEG) in dog (*Canis familiaris*) cognition research. Submitted to *Physiology and Behaviour*.

Howell, T., Conduit, R., Toukhsati, S. and Bennett, P. (2011). Stimulus discrimination in dogs, as indicated by mismatch negativity (MMN), recorded using minimally-invasive EEG. Submitted to *Behavioural Processes*.

Lauber, M.CY. and Barnett, J.L. (2011). Effect of age on physiological variables and recovery behaviours of young calves transported for 10 h in individual pens. Submitted to *Animal: An International Journal of Animal Bioscience*.

3.a Refereed Conference publications

Botheras, N.A, Pempek, J.A., Enigi, D.K. and Hemsworth, P.H. (2010). Relationship between fear of humans and amount of human contact in commercially reared turkeys. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 127.

Brown, J. S., Telbisz, R.M. and Toukhsati, S.R. (2011). When A Shelter Becomes A Home: The Ethical Considerations Surrounding Environmental Enrichment. Proceedings of The Australasian Society for the Study of Animal Behaviour, Australia, Adelaide, April 11th – 13th 2011.

Croney, C., Morris, H. and Newberry, R. (2010). Effects of early rearing environment on learning ability and behavior of laying hens. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 33.

Cronin, G.M., Downing, J.A., Storey, T.H., Borg, S.S., Schirmer, B.N. and Barnett, J.L. (2011). A retrospective study of the impact of injurious pecking on stress response in hens, measured via egg corticosterone. Proceedings, Australian Poultry Science Symposium 22, pp. 135-138.

Doyle, R.E., Hinch, G.N., Fisher, A.D., Boissy, A., Henshall, J.M. and Lee, C. (2010). Administration of serotonin inhibitor p-Chlorophenylalanine induces pessimistic-like judgement bias in sheep. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 63.

Edwards, L. E. (2011). The relationship between shed cleanliness and hen productivity. Proceedings, Australian Poultry Science Symposium 22, pp. 118-121.

Engel, J., Widowski, T.M., Tilbrook, A.J. and Hemsworth, P.H. (2011). Further investigation of non-invasive measures of stress in laying hens. Proceedings, Australian Poultry Science Symposium 22, pp.126-129.

Jongman, E. (2010). The effect of age on young calves on the ease of movement through an obstacle course. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 167.

Laine, S.M., Cronin, G.M., Petherick, J.C. and Hemsworth, P.H. (2010). The effects of interval of testing and quality of resource on the choice behaviour of Hy-Line Brown laying hens in a Y-maze preference test. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 186.

Laine, S.M., Cronin, G.M., Petherick, J.C. and Hemsworth, P.H. (2011). Individual variation in how hens interact with a dust substrate. Proceedings, Australian Poultry Science Symposium 22, pp.130.

Papargiris, M.M., Hemsworth, P.H., Rivalland, E.T.A., Morrissey, A.D., and Tilbrook, A.J. (2010). Cortisol inhibits sexual receptivity, but has no effect on attractivity or proceptivity in ovariectomized ewes treated with different doses of estradiol benzoate. Proceedings of the 43rd Conference of the Society for the Study of Reproduction (Milwaukee, USA, July 2010). Presentation 573.

Ralph, C.R., Tilbrook, A.J., Hemsworth, P.H. and Leury, B.J. (2011) An Acute Increase in Plasma Corticosterone-Induced Tissue-Specific Changes in Corticosterone and Glucose Metabolism in Select Target Tissue of the Laying Hen (*Gallus domesticus*). ENDO 2011: The 93rd Annual Meeting & Expo, June 4-7 in Boston, Massachusetts.

Stevens, B.H., Tilbrook, A.J. and Hemsworth, P.H. (2011). Effects of deprivation of a preferred resource, social contact or dustbathing substrate on the biological functioning of laying hens. Proceedings, Australian Poultry Science Symposium 22, pp.131-134.

Toukhsati, S.R., Coleman, G.J., Podberscek, A.L., Phillips, C., & Cargill, C.F. (2010). Attitudes and behaviours towards companion animals in Thailand: Results from interviews. Proceedings for the 19th Annual Conference of the International Society of Anthrozoology, Stockholm, 30th June 2010, p16.

Verkerk G.A. and Hemsworth, P.H. (2010). Managing cow welfare in large dairy herds. Proceedings of the 4th Australasian Dairy Science Symposium (Lincoln University, Christchurch, New Zealand, August-September, 2010), pp. 436-443.

Windschurner, I., Boivin, X., Coleman, G.J., Ruis, M., Mounaix, B. and Waibelinger, S. (2010). Modifying attitudes and behavior towards dairy cattle by multi-media based cognitive-behavioural intervention. Proceedings of the 44th Congress of the International Society for Applied Ethology, 4-7 August 2010, Uppsala, Sweden, p. 52.

3.b Other Conference publications

Botheras, N.A. and Croney, C.C. (2011). Animal Welfare Issues – Locally and Nationally. Proceedings of the Tri-State Dairy Nutrition Conference, April 19-20, 2011, Fort Wayne, IN

Coleman, G.J. and Hemsworth, P.H. (2011). The attitudes and behaviour of stockpeople at Australian sheep and cattle abattoirs. HSA International Symposium: Recent Advances in the Welfare of Livestock at Slaughter 30th June & 1st July, Portsmouth, UK.

Cronin, G.M., Glatz, P.C. and Hemsworth, P.H. (2011). The significant contribution of John L. Barnett to poultry welfare research. Proceedings, Australian Poultry Science Symposium 22, pp. 1-7.

Croney, C. (2010). Ethics, Animals and Science: 21st Century Challenges. North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Lead, follow or simply market compassion: The Veterinarian's Role in Animal Welfare. North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Words matter 1: The ethics of semantics: how different stakeholders frame animal welfare issues. North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Words matter 2: Perceptions, Persuasion, Propaganda and Public "Education" on Animal Welfare. North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Ethics and the Politics of Farm Animal Welfare: Does Science Really Matter? North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Addressing animal welfare in the new millennium: lessons from OH. North Carolina Veterinary Conference. Raleigh, NC.

Croney, C. (2010). Scientific, Educational and Ethical Challenges Facing the Dairy Industry. ADSA Discover Conference. Nashville, IN.

Croney C. (2011). Introduction to animal welfare. North American Veterinary Conference, Orlando, FL.

Croney, C. (2011). Politics and animal welfare. North American Veterinary Conference, Orlando, FL.

Fisher, A.D. (2010). Bird health management – when does it become a welfare issue? PIX 2010, Gold Coast, 23-26 May 2010. Invited speaker.

Fisher, A.D. (2010). Health and welfare research in Australian dairying. Australian College of Veterinary Scientists. Gold Coast, 1-3 July 2010.

Fisher, A.D. (2010). Managing Sheep welfare in a research environment. ANZLAA Conference, Melbourne, 1-3 September 2010. Invited speaker.

Fisher, A.D. (2010). Land transport of stock – are we there yet? RSPCA Science Symposium Qld, Brisbane, 1 Oct 2010. Keynote speaker.

Fisher, A.D. (2011). Scientific measures of good welfare. Australian Veterinary Association Conference, Adelaide, 15-20 May 2011.

Jongman, E.C. (2010). Effects of Extended Lactation on Milk Production and Milk Cortisol in the First Production Cycle. Proceedings of the 28th Biennial Conference. University of New England, Armidale, New South Wales 11 - 15 July 2010

Hemsworth, P.H. (2010). Improving farm animal welfare: the roles of science and public perceptions. Australian Society of Animal Production Biennial Conference, 12–15 July 2010 Armidale NSW.

Hemsworth, P.H. (2010). The assessment of animal welfare. Australasian Veterinary Poultry Association, Christchurch, NZ, 14 October 2010.

Hemsworth, P.H. (2010). The importance of the design of the housing system and stockmanship on animal welfare. Australasian Veterinary Poultry Association, Christchurch, NZ, 14 October 2010.

Hemsworth, P.H. (2011). Stockmanship and animal welfare with reference to lameness. International Conference on Lameness in Ruminants, Rotorua, New Zealand, March 1 – 3, 2011.

Hemsworth, P.H., (2011). Human-animal interactions in livestock production. 4th Boehringer Ingelheim Expert Forum on farm animal well-being. May 27th 2011, Seville (Spain) pp 7-11.

Toukhsati, S.R. (2011). Attitudes towards companion animal sterilisation in Thailand. 2011 Science Week. Gold Coast, Australia, 29th June 2011.

R.J. Woodhouse, E.C. Jongman, J. Byron, K. Thomson, K.L. Butler and Ralph Behrendt (2010). The Effect of Clip Mulesing on Breech Wrinkle, Breech Cover and Dag Score of Merino and Crossbred Lambs. Proceedings of the 28th Biennial Conference. University of New England, Armidale, New South Wales 11 - 15 July 2010

3.c Industry presentations

Botheras, N.A. Animal Welfare Issues in Ohio. Ask-the-Authorities broadcast interview at Farm Science Review, Ohio, September, 2010.

Botheras, N.A. Animal Welfare Issues in Ohio. Seminar at Farm Science Review, Ohio, September, 2010.

Botheras, N.A. Animal welfare and the dairy industry: Challenges and opportunities. Dairy Veterinary & Management Services annual client meeting, Goshen IN, December, 2010.

Botheras, N.A. Animal Handling and Production Based Outcomes. Wisconsin Dairy & Beef Animal Husbandry Conference, Neillsville WI, March 2011.

Botheras, N.A. Animal Behavior and Handling. Ohio Farm Bureau, Animal Agriculture 101 training program for animal control and humane officers, Ohio, April, May, 2011.

Croney, C. Invited speaker, Animal welfare and the US Dairy Industries, Cornell Summer Dairy Institute, Ithaca, NY, 2010.

Croney, C. Invited speaker, Methods of Assessing Animal Welfare, Ohio Livestock Care Standards Board Meeting, Reynoldsburg, OH, 2010.

Croney, C. Invited speaker, Addressing Animal Welfare Issues: Lessons from Ohio, Tennessee Farm Bureau Federation Presidents Annual Meeting. Nashville, TN, 2010.

Croney, C. Invited speaker, Ethics and politics, Animal Housing Issues Symposium. Ohio Veterinary Medical Association. Columbus, OH, 2010.

Croney, C. Invited speaker, Addressing Animal Welfare in Ohio, Ohio Livestock Care Standards Board Listening Sessions. Dayton, OH, 2010.

Croney, C. Invited speaker, Addressing Animal Welfare in Ohio, Ohio Livestock Care Standards Board Listening Sessions. Parkman, OH, 2010.

Croney, C. Invited panellist, Animals, ethics and food, Food Chain Communications Roundtable, Philadelphia, PA, 2010.

Croney, C. Invited speaker, Public perceptions and swine production, Ohio swine health symposium. Plain City, OH, 2010.

Croney, C. Invited speaker, Understanding the issues underlying Issue 2, Killbuck Valley Dairy Producers Meeting. Wooster, OH.

Hemsworth, P.H. Australian research on group housing of gestating sows. Presentation at Animal Welfare Science Centre Scientific Seminar, Pig Welfare, July 2010.

Hemsworth, P.H. Space and group size effects on sow welfare. Presentation at the DAFWA "Pig Day Out" conference at Medina, WA, March 2011.

Hemsworth, P.H. Sow housing options – meeting the challenge. Presentation at the DAFWA "Pig Day Out" conference at Medina, WA, March 2011.

Hemsworth, P.H. Group housing of sows – meeting the challenge. Presentation at the Victorian Pig Fair, Bendigo, Victoria, June 2011.

Jongman, E.C. Stockperson behaviour and its effect on lameness. Presentation at the DPI Dairy field day on 'lameness and laneways, Western District Victoria, September 2010.

4. Research Reports

Edwards, L. E., Hemsworth, P.H. and Tilbrook, A.J. (2011). The effects of time off feed and water on the welfare of spent laying hens. Final report to the Australian Egg Corporation Limited, June 2011.

Hemsworth, P.H., Morrison, R., Cakebread, P., Tilbrook, A.J., Karlen, M.G., Rice, M., Nash, J., Butler, K.L. and Giri, K. (2011). The effects of group housing during gestation on sow welfare and reproduction. Final report to the Australian Pork Limited (Project 2193). April 2011.

5. Theses

Laine, S.M. (2011) Animal preferences: effects of environmental and animal factors on the choice behaviour of laying hens. PhD Thesis, The University of Melbourne.

ANIMAL WELFARE SCIENCE CENTRE SEMINARS

July '10

Theme:

Pig Welfare Seminar.

<http://www.animalwelfare.net.au/comm/download/Pig%20Welfare%20Seminar.pdf>

Speakers:

Paul Hemsworth, Director, AWSC, The University of Melbourne - Australian research on group housing of gestating sows

Greg Cronin, The University of Sydney - Reducing pain associated with husbandry procedures in piglets

Graeme Pope, Rural Solutions SA - Benchmarking ProHand Implementation – What are the benefits for pigs & people?

Prof Knut Bøe, Norwegian University of Life Sciences - Loose-housing of lactating sows: Piglet requirements for space and thermal conditions, and experience with a birth-to-slaughter-system in Norway

Rebecca Morrison, Rivalea (Australia) - Commercially viable non-crated farrowing systems

A/Prof Inger Lise Andersen, Norwegian University of Life Sciences - Piglet survival in individual, loose-housed sows – the impact of sow behaviour, farrowing environment and management

Kathleen Plowman, Australian Pork Limited - PigCare: pig welfare and quality assurance

Roger Campbell, Pork CRC - Pig Welfare Considerations in the Pork CRC Rebid –responding to customer and community desires

September '10

Theme:

Animal Welfare Education - why, what and how?

<http://www.animalwelfare.net.au/comm/download/Lawrence%20Ed.pdf>

Speaker:

Alistair Lawrence, Scottish Agriculture College

Theme:

Alternative Farrowing Systems - identifying the gaps in knowledge

<http://www.animalwelfare.net.au/comm/download/Alt%20Farr%20Presentations.pdf>

Speakers:

Greg Cronin, The University of Sydney / Hugh Payne, DAGFWA - An Australian perspective on non-crate farrowing systems

Emma Baxter, Scottish Ag College - The PigSAFE pen design - derivation, principles and practicalities

Sandra Edwards, Newcastle University - Commercial PigSAFE performance to date and how these fit in the UK/EU industry context

Greg Cronin, The University of Sydney - The Norwegian UMB farrowing pen system and gaps in knowledge

Melina Tensen, RSPCA Australia - RSPCA views on traditional and alternative farrowing systems

Rebecca Morrison, Rivalea (Australia) - Industry perspective on housing of farrowing sows and gaps in knowledge

October '10

Theme: ***Australian Poultry Welfare Research Seminar***

<http://www.animalwelfare.net.au/comm/download/Poultry%20Welfare%20Presentations.pdf>

Speakers: Phil Glatz, SARDI - Update on beak trimming research and alternatives

Joanna Engel, AWSC, The University of Melbourne - Non-invasive measures of stress in poultry

Greg Cronin, The University of Sydney - Nest boxes for laying hens and their effects on hen behaviour and stress physiology

Lauren Edwards, AWSC, The University of Melbourne - Opportunities to improve the human – animal relationship in poultry

Peter Groves, The University of Sydney - Lameness in meat chickens

November '10

Theme: ***Animal Welfare Symposium - The Ohio State University***

<http://vet.osu.edu/preventive-medicine/2nd-annual-osu-animal-welfare-symposium-agenda>

Speakers: Dr. Naomi Botheras, AWSC, Animal Sciences, The Ohio State University

Dr. Candace Croney, AWSC, Veterinary Preventive Medicine, The Ohio State University

Dr. Linda Lobao and Ms. Danielle Deemer, AWSC, School of Environment and Natural Resources, The Ohio State University - Ohioans' perceptions of farm animal welfare – results of recent surveys

Mr. Charlie Arnot, The Center for Food Integrity - U.S. consumers' perceptions of animal agriculture – implications for Ohio

Dr. Jan Shearer, College of Veterinary Medicine, Iowa State University - Making decisions about when to euthanize animals, and correct euthanasia techniques

Dr. Tony Forshey, State Veterinarian - Update on the Ohio Livestock Care Standards Board

Dr. Temple Grandin, Department of Animal Sciences, Colorado State University - Humane animal handling, including handling of ill, injured, non-ambulatory or otherwise compromised animals

February '11

Theme: ***Animal welfare research indicators and welfare outcome indicators on farm and at slaughter***

<http://www.animalwelfare.net.au/comm/download/Don%20Broom%20AW%20Indicators.pdf>

Speaker: Don Broom, Professor of Animal Welfare, Department of Veterinary Medicine, University of Cambridge

**Copies of the Animal Welfare Science Centre Annual Report
2010 – 2011 are available on request from:**

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Melbourne School of Land and Environment
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Parkville
Victoria 3010**

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