



ANIMAL WELFARE
SCIENCE CENTRE

THE ANIMAL WELFARE SCIENCE CENTRE ANNUAL REPORT 2012-2013

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Foreward

The past year has been a rewarding one for the Centre as it not only maintained RD&E activities but also grew this activity while at the same time managing the effects of the retirement of Monash University from the Centre.

A changed environment in research focus at Monash University led to its recent retirement from the AWSC in June 2012. Monash University played a pivotal role in the establishment of the AWSC in 1997 and the School of Psychology and Psychiatry and the Department of Physiology were important contributors to the AWSC becoming internationally recognised for RD&E achievements over the last 15 years.

Ground-breaking research on the human-animal relationship was made possible by the close collaboration between animal behaviourists, psychologists and physiologists within the Centre. This unique and innovative multidisciplinary research program identified the major human characteristics, such as attitude and behaviour, affecting fear responses in farm and companion animals which can seriously limit animal welfare. By demonstrating and understanding the influence of human attitudes and behaviour on animals, this research has lead international research and training developments in the area of human-animal relationships.

The past year also saw the strengthening of the relationship between the University of Melbourne and the Department of Environment and Primary Industries (DEPI) as animal welfare research and technical staff were transferred from DEPI to the University. Funding from DEPI was maintained, demonstrating a clear commitment by the State Government to animal welfare research.

The Bureau of Animal Welfare has funded a part-time position of Professor, Human-Animal Relationships at the School of Land and Environment at the University of Melbourne. The appointment of Grahame Coleman will strengthen research capability and leadership in companion animal welfare and will also maintain the AWSC focus on human characteristics, including attitudes, which are pivotal to human-animal interactions in all animal use sectors. The relationship also affects community attitudes and community behaviours that impact on the animal use.

The Centre is engaged in continuing discussions on the University of Adelaide and the South Australian Research and Development Institute joining the AWSC as full partners. AWSC scientists already have strong links with the South Australians especially in the areas of pig and poultry research and it is clear that an expanded partnership would bring to the AWSC substantial intellectual and facility capacity in animal welfare science across a range of species.

Background

The Animal Welfare Science Centre (AWSC) is a research centre of the University of Melbourne and was established in 1997 by the University of Melbourne, Monash University and the Department of Primary Industries (Victoria) as a collaborative Centre for research, teaching and training in animal welfare.

The AWSC has three partners –

Department of Environment and Primary Industries, Victoria. (DEPI Vic), Future Farming Systems Research Division.

The University of Melbourne, (UOM), School of Land and Environment and Faculty of Veterinary Science.

The Ohio State University, (OSU), Department of Animal Sciences and College of Veterinary Medicine.

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

Animal welfare awareness is growing in society, strongly influencing views on animal use and the acceptability of various animal management practices. Stakeholders in the animal welfare domain 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 the operations of livestock industries, medical research, the management of feral and wild animals and the care of recreational and companion animals.

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 unaware 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 expected that certain animal production and management practices will be highlighted from time to time by community groups and that their viewpoints will be broadcast to the community. It is important that the community has a fully informed perspective that includes scientific information.

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 Australian community, Industry and Government is served by two Commonwealth animal welfare initiatives which have been established under the Primary Industries Standing Committee (PISC), The Australian Animal Welfare Strategy (AAWS) and the National Animal Welfare Research Development and Extension Strategy.

The AAWS guides the development of new, nationally consistent policies that will enhance existing animal welfare arrangements in all Australian states and territories. The strategy covers the humane treatment of all animals in Australia including:

- livestock/production animals
- animals used for work, sport, recreation or display
- companion animals
- animals in the wild
- aquatic animals, and

- animals used in research and for teaching purposes.

The AWSC is recognised by the AAWS as a leading provider of animal welfare research and expert advice and provides representatives who sit on relevant working groups.

The AAWS facilitated the development of a relationship agreement between the AWSC, CSIRO and the Centre for Animal Welfare and Ethics at the University of Queensland (CAWE) whereby each organisation has agreed to collaborate in animal welfare research.

The National Animal Welfare Research Development and Extension Strategy brings together the core providers of farm animal welfare research with the major funding organisations to deliver targeted cross-sectoral research, development and extension within Australia's livestock industry sector.

The AWSC, together with CSIRO, University of Queensland (Centre for Animal Welfare and Ethics), and DAFF are the Australian partners in the OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis which was formed in 2009 with the Animal Welfare Science and Bioethics Centre of Massey University, the Animal Behaviour and Welfare Research Centre of AgResearch and the Ministry for Primary Industries in New Zealand. The OIE Centre supports the OIE region for Asia, the Far East and Oceania by, for example, building regional capacity through "twinning" programs and developing an animal welfare training course.

The AWSC has built upon key discipline strengths of animal behaviour, veterinary science, stress physiology and psychology in studying human/animal interaction, animal housing and husbandry and community attitudes and behaviour.

Animal Welfare Science Centre activities

The Centre conducts research in three program areas:

1. **Welfare methodology** or the development and validation of methods to assess 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

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.

Prof. Alan Tilbrook (Livestock & Farming Systems, South Australian Research & Development Institute) - 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. 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.

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.

Dr. Angus Campbell (Faculty of Veterinary Science, The University of Melbourne) – Angus completed his PhD through the Mackinnon Project in Nov 2006. He provides consultancy services on animal production and farm management to individual farmers, and has considerable experience in delivering educational programs to small groups of farmers.

Prof. Grahame Coleman (School of Land and Environment, The University of Melbourne) – 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.

Dr. Maurice Eastridge (Department of Animal Sciences, The Ohio State University) – Research interests include the effects of nutrition and housing systems on the productivity and welfare of dairy cows and calves.

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.

Ms. 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.

Dr. Lauren Hemsworth (School of Land & Environment, The University of Melbourne) - Research interests include field welfare assessment in farm and companion animals and developing education programs for recreational horse owners.

Dr. Joe Hogan (Department of Animal Sciences, The Ohio State University) – Research interests include dairy cow health and welfare with emphasis on mastitis control.

Dr. Ellen Jongman (School of Land and Environment, The University of Melbourne) - Research interests include the effect of housing, husbandry procedures and management on the welfare of sheep and dairy cows.

Dr. Mariko Lauber (Bureau of Animal Welfare, 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.

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

Dr. Mike Lilburn (Department of Animal Sciences, The Ohio State University) – Specialist in poultry nutrition and physiology.

Assoc. Prof. Peter Mansell (Faculty of Veterinary Science, The University of Melbourne) - Special interests include the management of dairy cattle and mastitis control.

Dr. 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.

Dr. Michael Pyman (Faculty of Veterinary Science, The University of Melbourne) - Research interests include the factors which impact upon dairy cattle fertility and reproduction.

Dr. Jean-Loup Rault (School of Land and Environment, The University of Melbourne) – PhD from Purdue University aimed to elucidate the involvement of oxytocin in social behaviour. He has also worked on swine castration, swine euthanasia and human animal interactions. Jean-Loup has worked with an array of species but will focus his research in Melbourne on pigs and poultry. His position is supported by Australian Pork Limited, Australian Egg Corporation Limited and Rural Industries Research Corporation (Chicken meat).

Dr. Henry Zerby (Department of Animal Sciences, The Ohio State University) – Expertise in fresh meat quality and wholesomeness. Specialist in the nutritional and genetic programs and pre- and post-harvest management strategies that impact the composition, safety, palatability, and healthfulness of fresh and further processed meat products.

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.

Dr. Samia Toukhsati (Austin Hospital, Melbourne) – 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.

Administration and technical staff

Samantha Borg, Technical Officer, DPI, Victoria

Melanie Conley, Research Assistant, The University of Melbourne

Frances Fitzpatrick, Technical Officer, The University of Melbourne

Maxine Rice, Research Assistant, The University of Melbourne

Vanessa Rohlf, Research Assistant, The University of Melbourne

Jeremy Skuse, Executive Officer, AWSC

Tracie Storey, Technical Officer, The University of Melbourne

Rebecca Woodhouse, Research Assistant, The University of Melbourne

Postgraduate students

Josh Aleri (PhD candidate, The University of Melbourne) - This research focuses on dairy cow immunology and welfare to identify tools that will assist dairy heifers to cope better during their transition stage.

Linda Beer (Masters student, The University of Melbourne) – Risk factors for injuries in racing greyhounds.

David Beggs (PhD candidate, The University of Melbourne) - David will be undertaking on-farm studies to determine relationships between farm characteristics and practices associated with scale of production and animal welfare measures.

Miranda Coffey (Masters student, The University of Melbourne) - Working within the area of human attitudes towards cats.

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

Shelby Cree (Masters student, The University of Melbourne) - Studying the effects of dehydration in poultry.

Anoma Dilrukshi Hetti Arachchige (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.

Trista Harvey (Masters student, The University of Melbourne) - Investigating human attitudes to enclosure design in zoos.

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.

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.

Hannah Larsen (PhD candidate, The University of Melbourne) - Investigating the characteristics of free-range systems on the welfare of laying hens.

Alina Nayton (PhD candidate, The University of Melbourne) - Studying the relationships between fear of humans, temperament and handling pre-slaughter and lamb welfare and meat quality.

Skye Peck (Masters student, The University of Melbourne) - Investigating the effect of visitors on the welfare and behaviour of macropods in a zoo environment.

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.

Candice Powell (Masters student, The University of Melbourne) - Validating an assessment protocol for fear of humans across the different housing systems of gestating and lactating sows.

Maxine Rice (Masters student, The University of Melbourne) - The relationship between social behavior, feeding behaviour and stress in lambs in intensive finishing systems.

Lauren Roberts (PhD candidate, The University of Melbourne) - 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.

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

Clara Singh (Masters student, The University of Melbourne) – Carrying out observations on maternal behaviour and piglet suckling behaviour in follow-on sow lactation pens.

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.

Peta Taylor (PhD candidate, The University of Melbourne) - Studying the behaviour and welfare of free range broiler chickens.

Rachel Taylor (Masters student, The University of Melbourne) – Investigating the stress response of sows during gestation.

Jennifer Truong (Masters student, The University of Melbourne) – Investigating the behaviour of lambs in feedlots.

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.

Dennis Wormald (PhD candidate, The University of Melbourne) - Studying the assessment and key features of anxiety traits in dogs.

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 Hinchcliff	Dean, Faculty of Veterinary Science, The University of Melbourne.*
Professor Ron Kensinger	Chair, Department of Animal Sciences, The Ohio State University.
Professor Paul Hemsworth	Director AWSC, The University of Melbourne.
Professor Alan Tilbrook	Deputy-Director, AWSC, SARDI Livestock and Farming Systems.

* Profs. Roush and Hinchcliff 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
Darryl D'Souza	General Manager, Research and Innovation, Australian Pork Limited
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
Philip Szepe	Managing Director, Kinross Farm
Steve Tate	Director, Bureau of Animal Welfare

* Ms. Dwyer retired from the Advisory Committee in March 2013

AWSC Representation on committees in a technical/advisory capacity

Grahame Coleman, The University of Melbourne
Animal Welfare Advisory Committee Victoria, (AWAC)
AWAC Responsible Pet Ownership Advisory Committee
AUSAWAC Education and training Working Group

Andrew Fisher, The University of Melbourne
American Veterinary Medicine Association Animal Welfare Curriculum Planning Group

Dairy Moving Forward Animal Husbandry Steering Group
Sheep Welfare Standards Writing Group
DPI Victoria Livestock Industry Consultative Committee
Cattle Welfare Standards Reference Group

Paul Hemsworth, The University of Melbourne

Animal Welfare Advisory Committee Victoria (AWAC)
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis
Management Committee

Dairy Moving Forward Animal Husbandry Steering Group
Hassad-Australia Animal Welfare Committee

National Animal Welfare R,D&E Strategy Steering Committee
Australian Egg Corporation Limited Hen Welfare Advisory Group
AUSAWAC Animals in research and teaching Working Group
AUSAWAC Research and development Working Group

Ellen Jongman, The University of Melbourne

Consultative Forum on the Livestock Export Industry

Steve Moeller, The Ohio State University

National Pork Board Animal Science Committee
National Pork Board Youth Pork Quality Assurance Committee
National Pork Board Extension Educators Executive Committee

Bobby Moser, The Ohio State University

Livestock Care Standards Board

Jean-Loup Rault, The University of Melbourne

Australian Pork Limited Specialist Group 2 (Genetics, reproduction and welfare)
Secretary, International Society of Applied Ethology

Jeremy Skuse, Animal Welfare Science Centre

Australian Pork Limited Specialist Group 4 (Industry capability and technology transfer)
Executive Officer, National Animal Welfare R,D&E Strategy Steering Committee

Summary of Centre RD&E projects and 2012/13 project funding if applicable

Program 1 Welfare methodology

The sensitivity of sows to stressors throughout gestation

Investigators: **J-L. Rault, A. Tilbrook, P. Langendijk**
Funding: CRC for High Integrity Australian Pork
12/13 Funding: \$ 62,310
Commencement date: August 2012
Completion date: July 2013

This 1 year project will be conducted in collaboration with SARDI and aims to elucidate the mechanisms underlying this reduced stress response observed post-mixing, whether it is due to habituation to small spaces or HPA axis hyporesponsivity, is highly applicable to determine best mixing practices that limit aggression between sows and reduce the stress of this housing system on the sow. It will clarify if a critical period exists to mix sows or if increased space allowance only for a few days after mixing or throughout gestation is required. Investigating the involvement of progesterone and allopregnanolone in the stress response of pigs could open a whole new area of research to understand and minimize the impact of stressors on pigs.

Animal welfare monitoring in research settings

Investigators: **M. Rice, P. Hemsworth, J-L. Rault, J. Skuse, E. Jongman**
Student: C. Ng (Masters)
Funding: CRC for High Integrity Australian Pork
12/13 Funding: \$ 37,446
Commencement date: August 2012
Completion date: June 2013

This 1 year project aims to:

1. Conduct a comprehensive review of the literature of current welfare assessment tools and identify those indices that could be used to assess the welfare of sows and their piglets in husbandry and housing systems under study in Pork CRC-funded projects.
2. Develop a welfare index compiled from the scores of the identified welfare indices to assess the welfare of pregnant sows and parturient/lactating sows and their litters.
3. Validate the feasibility of using this assessment tool to monitor the welfare of sows and piglets and welfare risks associated with developing Pork CRC husbandry and housing systems. This will be achieved through a targeted questionnaire delivered to researchers to obtain basic information on these individual welfare indices.

The development of practical measures to benchmark pig welfare in the Australian Pork Industry

Investigators: **J. Skuse, L. Hemsworth**

Funding: Australian Pork Limited

12/13 Funding: \$ 23,697

Commencement date: September 2012

Completion date: June 2013

This 1 year project will produce:

A literature review of welfare outcome assessment measure in use in the global pork industry, a set of practical on-farm measures which will be trialled for their ease of use

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

Investigators: **A. Tilbrook, P. Hemsworth, C. Lee**

Funding: Australian Pork Limited

12/13 Funding: \$ 89,031

Commencement date: November 2010

Completion date: March 2013

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.

Review and report on animal welfare measures for the Australian dairy industry

Investigator: **E. Jongman**
Funding: Dairy Australia
12/13 Funding: \$ 6,500
Commencement date: February 2013
Completion date: May 2013

This project will detail potential on-farm tools which might be used by the dairy industry to monitor dairy cow welfare

Program 2 Housing and husbandry effects on animal welfare

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

Investigators: **P. Hemsworth**, R. Morrison, G. Cronin, **A. Tilbrook**, T. Widowski
Student: M. Verdon (PhD)
Funding: CRC for High Integrity Australian Pork
12/13 Funding: \$ 65,856
Commencement date: January 2010
Completion date: February 2013

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.

Effects of floor space on the welfare of group-housed sows

Investigators: **P. Hemsworth, A. Tilbrook, J.L. Rault, S. Moeller**, R. Morrison, P. Hughes T. Widowski

Student: M. Verdon (PhD)

Funding: CRC for High Integrity Australian Pork

12/13 Funding: \$ 170,984

Commencement date: January 2012

Completion date: July 2014

Housing gestating sows in stalls is being voluntarily phased out by the Australian pork industry by 2017, making the viability and logistics of group housing an important concern for the Australian Pork Industry, with the industry investigating several group housing options. Furthermore, and of critical importance, the Australian Model Code of Practice for the Welfare of Animals – Pigs is due for review by 2018.

The aim of this project is to provide the Australian pork industry and Government with scientifically-sound and scientifically-defensible recommendations on spatial requirements of group-housed gestating sows.

The knowledge gained through this project will be provided to the Australian pork industry and the wider community via a Pork CRC Final Report, industry publications, industry conferences and scientific publications.

Effects of group housing after weaning on sow welfare and sexual behaviour

Investigators: **J-L. Rault, P. Hemsworth**, R. Morrison, **A. Tilbrook**, C. Hansen

Funding: CRC for High Integrity Australian Pork

12/13 Funding: \$ 34,994

Commencement date: March 2013

Completion date: September 2013

This innovative project will examine the effects of grouping sows either after weaning or after insemination on sexual behaviour, aggression, injuries, stress and reproductive performance.

The knowledge gained through this project will be provided to the Australian pork industry and the wider community via a Pork CRC Final Report, industry publications, industry conferences and scientific publications.

Literature review and collaboration with the Danish Pig Research Centre on effects of group housing both post-weaning and post-insemination on sow productivity and welfare

Investigators: **P.Hemsworth**, C.Hansen, **J-L.Rault**, L.Hansen, **A.Tilbrook**, P.Hughes, **M. Verdon**

Funding: CRC for High Integrity Australian Pork

12/13 Funding: \$12,825

Commencement date: January 2013

Completion date: July 2013

This project will review the effects of group housing on sow productivity and welfare and will assist in collaboration between Australian and Danish researchers.

Evaluation of sow and piglet behaviour and performance in individual follow-on lactation pens

Investigators: **J. Skuse**, **P. Hemsworth**, G. Charles

Student: C. Singh (Masters)

Funding: Australian Pork Limited

12/13 Funding: \$ 5,000

Commencement date: March 2012

Completion date: June 2013

Observations on maternal behaviour and piglet suckling behaviour will be recorded together with performance data. Knowledge gained through this project will be provided to the Australian pork industry and the wider community via an APL Final Report, industry publications, industry conferences and scientific publications.

Effect of mannan oligosaccharides (Bio-Mos) and outdoor access housing on pig growth, feed efficiency and carcass composition

Investigators: **B. Wenner**, **H. Zerby**, W. Gebreye, **S. Moeller**

Student: B. Wenner (Masters)

Funding: Ohio State University Internal

Commencement date: August 2011

Completion date: August 2012

This project evaluated indoor and outdoor access housing of grower finisher pigs overlaid with the addition of Bio-moss (mannan oligosaccharides), a growth promoting level of tetracycline, and a basal control diet set of treatments. Growth rate, feed conversion efficiency, health status, blood haematocrit, animal behaviour, and carcass composition were evaluated in all treatment combinations. Manuscript in final review with Journal of Animal Science.

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

Investigators: **P. Hemsworth, A. Tilbrook, T. Widowski**
Student: J. Engel (PhD)
Funding: Australian Egg Corporation Limited
12/13 Funding: \$ n/a
Commencement date: September 2009
Completion date: December 2012

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.

Free-range hen welfare: Characterisation of 'outdoor' and 'indoor' hens and physical features in the range

Investigator: **J-L. Rault, P. Hemsworth**
Student: H. Larsen (PhD)
Funding: Australian Egg Corporation Limited
12/13 Funding: \$ 93,705
Commencement date: October 2012
Completion date: September 2014

This 2 year project aims to increase our understanding of both the physical attributes of the environments and the attributes of the hen and how they affect the utilisation of the outdoor environment in free range systems.

The effects of time off feed and water on the welfare of spent laying hens

Investigators: **J-L. Rault, P. Hemsworth, P. Scott, G. Parkinson, A. Tilbrook**
Funding: Australian Egg Corporation Limited
12/13 Funding: \$77,012
Commencement date: November 2012
Completion date: May 2013

This 1 year project aims to equate physiological changes induced by time off water with behavioural changes in order to understand potential welfare implications. The project will estimate the time off water after which the welfare of laying hens is compromised and thus establishing a benchmark from which policies can be established to ensure acceptable welfare outcomes.

Assessment of factors influencing behaviour and welfare of birds in free range systems

Investigators: **J-L. Rault, P. Hemsworth**
Student: P. Taylor (PhD)
Funding: Rural Industries Research & Development Corp. (Chicken meat)
12/13 Funding: \$45,400
Commencement date: May 2013
Completion date: December 2015

This 3 year project aims to increase our understanding of both the physical attributes of the environments and the attributes of the meat chicken and how they affect the utilisation of the outdoor environment in free range systems

Welfare of lambs in intensive finishing systems Part 2

Investigators: **P. Hemsworth, A. Tilbrook, E. Jongman, A. Campbell, B. Leury**
Student: M. Rice (MPhil)
Funding: Department of Environment and Primary Industries, Victoria
12/13 Funding: \$ 9,254
Commencement date: July 2010
Completion date: June 2013

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'.

Lamb systems welfare: Ensuring animal welfare in Victorian lamb systems

Investigators: **P. Hemsworth, A. Campbell, E. Jongman**
Funding: Department of Environment & Primary Industries, Victoria
12/13 Funding: \$ 275,000
Commencement date: July 2012
Completion date: June 2015

This 3 year project will study both lamb behaviour and stress in order to understand potential effects of design features on lamb welfare and productivity in feedlots. The information will be used to provide a sound scientific basis for decisions by policy makers on any regulation of the industry and by industry to implement best practice management of lambs in feedlots.

Dairy systems welfare: Ensuring animal welfare in Victorian dairy systems

Investigators: **A. Fisher, P. Hemsworth, E. Jongman**
Funding: Department of Environment & Primary Industries, Victoria
12/13 Funding: \$ 450,000
Commencement date: July 2012
Completion date: June 2015

This 3 year project has recently commenced and will provide further information in the areas of cow lameness and bobby calf management that will ensure animal welfare concerns will be addressed in a fashion to ensure community acceptance of increased intensification in the dairy industry.

The project will identify calf feeding and management strategies to enhance fitness for travel, and will determine the prevalence of lameness in Victorian dairy cows and develop management guidelines based on the foot problems that are recorded. The project also aims to optimise feeding and management practices and fertility of cows.

Identification of risk factors for racetrack injuries in greyhounds in Victoria

Investigators: **A. Campbell, A. Fisher, K. Stafford**
Student: L. Beer (Masters)
Funding: University of Melbourne, Greyhound Racing Victoria
12/13 Funding: n/a
Commencement date: December 2009
Completion date: June 2013

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.

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

Assessing public metrics to benchmark stock handling

Investigators:	G. Coleman, P. Hemsworth, S. Toukhsati
Student:	L. Roberts (PhD)
Funding:	Australian Pork Limited
11/12 Funding:	\$ 85,365
Commencement date:	September 2010
Completion date:	June 2013

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:	S. Moeller, N. Botheras, P. Hemsworth, G. Coleman
Student:	S. Crawford (PhD)
Funding:	The Ohio State University (AWSC) Funded
12/13 Funding:	\$ n/a
Commencement date:	March 2010
Completion date:	December 2012

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.

Research Results published as Ph.D. Dissertation - Title. Improving the attitudes and behavior of stockpersons toward pigs and the subsequent influence on animal behavior and production characteristics of commercial finishing pigs in Ohio [electronic resource] / by Sara Maria Crawford. Available online at:

https://etd.ohiolink.edu/ap:10:0::NO:10:P10_ACCESSION_NUM:osu1325216784

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

Investigators: **P. Hemsworth, G. Coleman**
Student: S. Haynes (PhD)
Funding: University of Melbourne (AWSC), DAFF
12/13 Funding: \$ 2,110
Commencement date: March 2009
Completion date: December 2012

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.

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

Investigators: **P. Hemsworth**, C. Phillips, M. Magrath, **S. Sherwen**
Student: S. Sherwen (PhD)
Funding: The University of Melbourne (AWSC), Zoos Victoria, DAFF
12/13 Funding: \$ 2,250
Commencement date: June 2011
Completion date: December 2014

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 a 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). This project will also investigate the effect of visitors on arboreal primates. It complements recent research which has manipulated visitor behaviour to investigate the effect on meerkats, kangaroos and orang-utans. These studies will make a significant contribution to the body of knowledge on the visitor effect on animal welfare in zoos.

Program 4 Tertiary and post-graduate education and training

Review of registered ProHand® Pigs facilitators

Investigator: **J. Skuse**
Funding: Australian Pork Limited
12/13 Funding: \$ 700
Commencement date: February 2012
Completion date: June 2013

This project will audit ProHand® Pigs facilitators to ensure the program is being delivered to an acceptable standard. Future training needs will also be identified and a refresher course will be provided for facilitators.

ProHand® Pigs technical support

Investigators: **J. Skuse and G. Coleman**
Funding: Australian Pork Limited
12/13 Funding: \$ 11,500
Commencement date: June 2012
Completion date: June 2016

This project will provide technical support to ProHand® Pigs facilitators and make recommendations on program improvements.

Support the delivery of ProHand® Dairy

Investigator: **J. Skuse**
Funding: Dairy Australia
12/13 Funding: \$ 5,000
Commencement date: August 2012
Completion date: July 2013

This project will support ProHand® Dairy as it is rolled out to industry in the beginning of 2013.

Design and delivery of a Day 2 Powerpoint Presentation for ProHand® Dairy

Investigator: **J. Skuse**
Funding: Dairy Australia
12/13 Funding: \$ 6,000
Commencement date: February 2012
Completion date: January 2013

This project will develop a multimedia presentation to deliver Day 2 ProHand Dairy content.

Development of husbandry and management educational material for Victorian recreational horse owners

Investigators: **E. Jongman, L. Hemsworth**
Funding: ANZ Trustees, Kathleen Agnes Back Trust
12/13 Funding: \$ 50,131
Commencement date: February 2013
Completion date: February 2014

This 1 year project aims to:

1. Develop and provide Victorian horse owners with the resources necessary to appropriately manage the health, husbandry and welfare of their recreational horses.
2. Develop a pilot horse welfare benchmarking tool to enable recreational horse owners to benchmark their horses welfare/time and monitor their husbandry and management practices.
3. Improve the health and welfare of Victorian recreational horses, and reduce the incidence of horse welfare investigations in Victoria.
4. Reach recreational horse owners who potentially have limited access to information and support due to a lack of membership to horse clubs and societies, and/or limited contact with other horse owners.

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

S. Moeller, J. Osborne, K. George

Delivery of “Animals in Society”, “Animal Welfare & Ethics” and Applied Animal Behaviour” as undergraduate subjects and “Animal Welfare” and “Behaviour of Farm and Companion Animals” post-graduate subjects at the University of Melbourne

P. Hemsworth, J.L. Rault, B. Stevens, T. Chamberlain, J Skuse

Other

Research Fellow (pigs and poultry) at the University of Melbourne

Investigator: **J-L. Rault**
Funding: Australian Pork Limited, Australian Egg Corporation Limited, Rural Industries Research and Development Corporation (Chickenmeat), The University of Melbourne
12/13 Funding: \$ 120,000
Commencement date: October 2011
Completion date: September 2014

Melbourne Early Career Researcher Grant Scheme

Investigator: **J-L. Rault**
Project: Learning to be social: Oxytocin and socio-behavioural development in pigs
Funding: The University of Melbourne
12/13 Funding: \$ 38,694
Commencement date: January 2013
Completion date: October 2013

Professor in Human-Animal relations at the University of Melbourne

Investigator: **G. Coleman**
Funding: Bureau of Animal Welfare
12/13 Funding: \$ 50,000
Commencement date: January 2013
Completion date: December 2015

Animal Welfare Science Centre

Investigators:	J. Skuse, P. Hemsworth
Funding:	Department of Environment & Primary Industries, Victoria, The Ohio State University, The University of Melbourne
12/13 Funding:	\$ 188,880
Commencement date:	July 2012
Completion date:	June 2013

The Centre was established to provide a focus and direction for the partner organisations' academic and research resources in animal welfare. The specific aims of the Centre are as follows:

1. To coordinate the research interests of the collaborating organisations to stimulate basic and applied research on the welfare of domestic, farm and companion animals.
2. To provide undergraduate and graduate teaching in the academic programs of the Universities.
3. To provide the farming community and the general community with an internationally competitive research, teaching and training resource in animal welfare.
4. To play a major national and international role in the advances and understanding of the welfare of farm and other animals.

Significant collaboration

Identify and integrate measures of animal welfare that meet the needs of animals and society

Investigators:	D. Fergusson, I. Colditz, T. Collins, L. Matthews and P. Hemsworth
Funding:	National Animal Welfare RD&E Strategy including: Australian Egg Corporation, Australian Meat Processors' Corporation, Australian Pork Limited, Dairy Australia, Meat and Livestock Australia, Rural Industries' Research & Development Corporation and the Australian Animal Welfare Strategy.
12/13 Funding:	\$ 5,296 CSIRO Project
Commencement date:	January 2012
Completion date:	December 2012

There are three prominent concepts of animal welfare in the literature: the welfare of animals is judged on the basis of:

1. How well the animal is performing from a biological functioning perspective;
2. Affective states, such as suffering, pain and other feelings or emotions; and
3. The expression of normal or "natural" behaviours.

The so-called "five freedoms", that is freedom from hunger and thirst, from discomfort, from pain, injury and disease, to express normal behaviour, and from fear and distress include aspects of all three of the animal welfare concepts described above. While most would accept that these freedoms are necessary to avoid a lack of suffering, in terms of a consensus on animal welfare

assessment, there has been little attempt to define the levels of freedom that are desirable together with the adverse consequences of not providing such freedoms.

This project will:

1. Review the scientific literature on welfare measures to identify those that are the best candidates to integrate into a uniform index to assess the welfare status of livestock
2. Examine novel methods for integrating these measures into a welfare index.

The review will include recommendations of the most robust and credible welfare measures and assessment systems across or within species and identify knowledge gaps where further research and development is required.

The livestock industries will be more informed about contemporary and future welfare assessment measures and methodologies and how these can be integrated into field-based welfare indices. This in turn, will guide strategic direction within each industry regarding the development and implementation of welfare assessment and assurance systems.

Optimising the management of group-housed gestating sows

Investigators: P.Hughes, R. Kirkwood, W. van Wettere, **P. Hemsworth and J-L Rault**

Funding: CRC for High Integrity Australian Pork

12/13 Funding: SARDI Project

Commencement date: January 2012

Completion date: July 2014

This 3 year project has three specific aims:

1. To identify the optimum time to mix sows (pre-weaning, at weaning, at breeding or in gestation) to maximise farrowing rates & litter sizes
2. To design specific mixing pens & protocols to minimise aggression at mixing, such that farrowing rates & litter sizes are not adversely affected
3. To identify key elements of group housing (e.g. space allowance, parity mix & feed level) that determine reproductive success at all times of the year.

Assessment of pain induced by tail docking in piglets and strategies to reduce this pain

Investigators: R. Morrison, **P. Hemsworth**, C. Johnson, **A. Tilbrook**

Funding: Australian Pork Limited

12/13 Funding: Rivalea Australia project

Commencement date: July 2010

Completion date: June 2013

There is limited information in the scientific literature on whether or not the procedure of tail docking is actually painful, and in fact, whether it is necessary to provide pain relief for this procedure.

Collaborating with Rivalea Australia, this project will aim to assess the pain induced by tail docking using two common procedures and to investigate long/short term strategies to eliminate or reduce pain if the procedure(s) is painful.

Effects of rearing on inappropriate conflict behaviours that predispose cannibalism in the laying hen

Investigators: G. Cronin, **P. Hemsworth**, J. Downing
Funding: Australian Egg Corporation Limited
12/13 Funding: The University of Sydney project
Commencement date: October 2010
Completion date: September 2013

The aims of this research are to understand and characterise the effects of rearing conditions on cannibalism across all egg production systems and to characterise the benefits and disadvantages of production systems and practices.

Investigating the effects of stock-handling training in sheep feedlots

Investigators: S. Bickel, D. Blache, **P. Hemsworth**, **G. Coleman** and **J. Skuse**
Funding: Meat and Livestock Australia
12/13 Funding: UWA project
Commencement date: June 2011
Completion date: April 2014

Collaborating with University of Western Australia, this project will aim to demonstrate the effects of stockperson training in sheep feedlots on animal welfare and the stockpersons attitudes and behaviour towards sheep. Training will take place in WA in July 2013.

Student supervision (non-AWSC)

Student: Jessica Oliver (PhD Monash University)
Project: *Does central oxytocin in dogs facilitate bonding with humans?*
Supervisors: Alan Lill, Linda C. Marston, **Jean-Loup Rault**, Belinda Appleton

Centre RD&E Communications

1. Books / book chapters

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2.a Research publications in refereed journals

McGregor, B.A. and Butler, K.L. (2013). Eruption of first permanent incisors and live weight gain in grazing yearling Angora goats. *Australian Veterinary Journal*, 91, pp179-184.

Edwards, L.E., Coleman, G.J. and Hemsworth, P.H. (2013). Close human presence reduces avoidance behaviour in commercial caged laying hens to an approaching human. *Animal Production Science*. Available online <http://dx.doi.org/10.1071/AN12342>.

Fisher, A.D., Giraud, A., Martin, P.A.J. and Paton, M.W. (2013). The use of quantitative risk assessment to assess lifetime welfare outcomes for breech strike and mulesing management options in Merino sheep. *Animal Welfare*, 22: pp275-275.

Hemsworth, P.H., Cronin, G.M., the late Barnett, J.L., Butler, K.L., Jongman, E.C., Karlen, G.A., Coffey, A. and Arnold, N.A. (2012). Behavioural responses of lambs to plastic clips as an alternative procedure to mulesing. *Australian Veterinary Journal*, 90: pp373-380.

Jongman, E.C. and Butler, K.L. (2013). Ease of moving young calves at different ages. *Australian Veterinary Journal*. 91 (3), pp94-98.

Kerswell, K.J., Bennett, P., Butler, K.L. and Hemsworth, P.H. (2013). Self-reported comprehension ratings of dog behaviour by owners of adult dogs. *Anthrozoos*, 26 (1), pp5-11.

Lee, C., Fisher, A.D., Colditz, I.G., Lea, J.M. and Ferguson, D.M. (2013). Preference of beef cattle for feedlot or pasture environments. *Applied Animal Behaviour Science*, 145, pp53-59.

Matthews, L.R. and Hemsworth, P.H. (2012). Drivers of change: law, international markets, and policy. *Animal Frontiers* 2, pp40-45.

Paton, M.W., Martin, P.A.J. and Fisher, A.D. (2013). Risk assessment principles in evaluation of animal welfare. *Animal Welfare*, 22: pp277-285.

Pempek, J.A., M. L. Eastridge, N. A. Botheras, C. C. Croney, and W. S. Bowen Yoho. (2013). Effects of alternative housing and feeding systems on the behavior and performance of dairy heifer calves. *Professional Animal Scientist* 29:278-288.

Pighin, D.G., Brown, W., Ferguson, D.M., Fisher, A.D. and Warner, R.D. (2013). Relationship between changes in core body temperature in lambs and post-slaughter muscle glycogen content and dark-cutting. *Animal Production Science*. Available online <http://dx.doi.org/10.1071/AN12379>.

Rault, J.L., Carter, C.S., Garner, J.L., Marchant-Forde, J.N., Richert, B.T. and Lay Jr., D.C. (2013). Repeated intranasal oxytocin administration in early life dysregulates the HPA axis and alters social behaviour. *Physiology and Behaviour*. Available online DOI 10.1016/j-physbeh.2013.02.007.

Rault, J.L., McMunn, K.A, Marchant-Forde, J.N. and Lay Jr., D.C. (2012). Gas alternatives to carbon dioxide for euthanasia: A piglets perspective. *Journal of Animal Science*. Available online. DOI 10.2527/jas.2012-5761.

2.b Research papers in press

Fraser, D., Duncan, I.J.H., Edwards, S.A., Grandin, T., Gregory, N.G., Guyonnet, V., Hemsworth, P.H., Huertas, S.M., Huzzey, J.M., Mellor, D.J., Mench, J.A., Špinká, M. and Whay, H.R. (2013). General Principles for the welfare of animals in production systems: The underlying science and its application. *The Veterinary Journal* (in press).

3.a Refereed Conference publications

Coombe, J.E., Pyman, M.F., Mansell, P.D., Auldish, M.J., Anderson, G.A., Wales, W.J. Conley, M.J. and Fisher, A.D. (2012). Use of indwelling rumen pH meters to compare the rumen pH of grazing dairy cows fed supplement either in the dairy or as a partial mixed ration on a feed pad. Proceedings, Australian Dairy Symposium, November 13-15, Melbourne, pp255-256. Available online. http://www.adssymposium.com.au/inewsfiles/ADSS_Final_Proceedings.pdf

Fisher, A.D. and Webster, J.R. (2012). Dairy cow welfare - the role of research and development in addressing increasing scrutiny. Proceedings, Australian Dairy Symposium, November 13-15, Melbourne, pp215-223. Available online. http://www.adssymposium.com.au/inewsfiles/ADSS_Final_Proceedings.pdf

Hartcher, K.M., Tran, K.T.N., Wilkinson, S.J., Hemsworth, P.H. and Cronin, G. (2013). Effect of rearing conditions on the development of feather-pecking behaviours in free-range laying hens. Proceedings, Australian Poultry Science Symposium 24, pp192-195.

Haynes, S.J., Coleman, G.J. and Hemsworth, P.H. (2012). The relationship between human and dog behavior in animal shelters. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. p33.

Hemsworth, P.H., Rice, M., Giri, K. and Morrison, R. (2012). Effects of group size and floor space allowance on aggression and stress in grouped sows. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. p154.

Hetti Arachchige, A.D., Jongman, E., Wales, W.J., Fisher, A.D. and Auldish, M.J. (2012). Time budget of dairy cows in feeding systems based on total mixed ration fed in conjunction with reduced grazed pasture. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. p156.

Hetti Arachchige, A.D., Jongman, E., Wales, W.J., Fisher, A.D. and Greenwood, J. (2012). The effect of feed trough space and feed barriers on heart rate responses in partial mixed ration fed cows on a feed pad. Proceedings, Australian Dairy Symposium, November 13-15, Melbourne, pp247-250. Available online. http://www.adssymposium.com.au/inewsfiles/ADSS_Final_Proceedings.pdf

Jongman, E., Butler, K., Rice, M. and Hemsworth, P.H. (2012). Early adaptation of lambs to a feedlot system. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. P152.

Jongman, E.C. and Butler, K.L. (2012). The effect of space allowance during transport on the welfare of bobby calves. Proceedings, Australian Dairy Symposium, November 13-15, Melbourne, pp306-307. Available online. http://www.adssymposium.com.au/inewsfiles/ADSS_Final_Proceedings.pdf

Lay, D.C jr., Rault, J-L., McMunn, K.A. and Marchant-Forde, J.N. (2013). A search for humane gas alternatives to carbon dioxide for euthanizing piglets: a piglet perspective. Proceedings of 47th Congress of the International Society of Applied Ethology, 2 June - 6 June 2013, Florianopolis, Brazil. p108.

Muns Vila, R., Farish, M., Rault, J-L. and Hemsworth, P.H. (2012). A positive mindset in the face of stress. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. p26.

Oliva, J.L., Marston, L. Rault, J.L., Appleton, B. and Lill, A. (2012). Central oxytocin function and behaviour in the canine. 8th Federation of European Neurosciences, Barcelona, Spain. Poster.

Oliva, J.L., Marston, L. Rault, J.L., Appleton, B. and Lill, A. (2012). Increasing our understanding of the role of oxytocin in dogs-human bonding. International Society for Anthrozoology, Cambridge, U.K. Oral communication.

Rault, J-L., Van de Wouw, A. and Hemsworth, P.H. (2013). Fly the coop! Vertical structures influence the distribution and behaviour of laying hens in an outdoor range. Proceedings, Australian Poultry Science Symposium 24, p247.

Sherwen, S., Magrath, M., Butler, K, Kerswell, K. and Hemsworth, P.H. (2013). A multi-zoo study on the effect of manipulated visitor behaviour on zoo meerkats. Proceedings of 47th Congress of the International Society of Applied Ethology, 2 June - 6 June 2013, Florianopolis, Brazil. p52.

Verdon, M., Morrison, R., Rice, M. and Hemsworth, P.H. (2013). Group-housed sows who engage in aggression after mixing have reduced injuries and gain more weight. Proceedings of 47th Congress of the International Society of Applied Ethology, 2 June - 6 June 2013, Florianopolis, Brazil. p68.

Webb, C.L. and Hemsworth, P.H. (2012). Effects of citronella and odourless cold airspray on aversion in dogs. Proceedings of 46th Congress of the International Society of Applied Ethology, 31 July-4 Aug 2012, Vienna, Austria. p88.

3.b Other Conference publications

Hartcher, K.M., Tran, K.T.N., Wilkinson, S.J., Hemsworth. P.H. and Cronin, G. (2012). Effect of rearing conditions on the development of feather-pecking behaviours in free-range laying hens. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p14. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Haynes, S.J., Coleman, G.J. and Hemsworth. P.H. (2012). Relationships between handlers and their dogs at animal shelters. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p15. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Jongman, E.J. and Butler, K. (2012). Lying behavior as a measure of comfort during road transport of bobby calves. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p16. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Rault, J-L., van de Wouw, A. and Hemsworth. P.H. (2012). Fly the coop! Vertical structures influence the distribution and behavior of laying hens in an outdoor range. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p20. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Sherwen, S., Magrath, M., Butler, K. and Hemsworth. P.H. (2012). Meerkats show no behavioural change in response to experimentally manipulated visitor conditions in Australian zoos. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p23. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Verdon, M., Morrison, R., Rice, M. and Hemsworth. P.H. (2012). The welfare and productivity of group-housed gestating sows is dependent on individual aggressive characteristics. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p28. Available on-line: <http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

Webb, C., Holmes, R. and Hemsworth. P.H. (2012). A survey of the training methods used by professional dog trainers. Proceedings, Regional ISAE Meeting, 26 October 2012, Melbourne 24, p29. Available on-line:
<http://www.animalwelfare.net.au/sites/default/files/ISAE%20meeting%20programme%20%20abstracts%20booklet%2024-10-2012.pdf>

3.c Industry presentations and invited presentations

- Hemsworth, Coleman and Skuse trained NCDEA trainers in the delivery of ProHand Dairy Cows in September 2012
- Hemsworth, Fisher, Skuse and Coombe presented/attended the DA Lameness Forum in October 2012
- Hemsworth presentations on the “Lessons from Europe - R&D directions & potential commercial applications in Australia” at the Pork CRC and APL Group Housing Solutions Workshops in October 2012 in Toowoomba Queensland and Melbourne
- Rault presented at AECL Hen Welfare Legislator forum in October 2012
- Fisher, Coombe, Hetti Arachchige and Jongman presented/attended the Australasian Dairy Science Symposium in Melbourne in November 2012
- Skuse and L. Hemsworth presented on benchmarking pig welfare at the Pork CRC meeting at Tullamarine in November 2012
- Coleman presentation on the effects of stockperson behaviour on the behaviour of farm animals in January 2013 at the Veterinary Research Institute, Oslo, Norway
- Coleman presentation on the effects of stockperson behaviour on the behaviour of farm animals in January 2013 at the University of Life Sciences, Oslo, Norway
- Fisher presented on the AWSC’s welfare research at a CSIRO Animal Welfare Forum in Armidale in February 2013
- Skuse interviewed in March 2013 for AAWS ProHand video <http://www.youtube.com/watch?v=y-5WMmrgZOU>
- Hemsworth presented on sow housing at the March 2013 meeting of the American Society of Animal Science Des Moines.
- Andrew Fisher presented on animal welfare to the Seymour Sheep and Wool Farmer Group in April 2013
- Hemsworth presentation on the “Results of recent research on lactation pens for piglets and mixing principles to reduce aggression in grouped sows” at the Pork CRC Sow Housing Advisory Group Meeting in April 2013 in Melbourne
- Fisher presented on animal welfare in free-ranging systems at the Australian Veterinary Association Annual Conference in Cairns in May 2013
- Fisher presented on animal welfare management to the Yeoman Society farmer group in May 2013
- Hemsworth presentation on the “The importance of rearing environment, space and nests for laying hens in cages” at the 18th AECL Industry Forum in May, 2013 on the Sunshine Coast, Queensland
- Coleman presentation entitled "Zoo Animal-Visitor Interactions: An Approach to Research" at the 2nd International Symposium on Zoo Animal Welfare in June 2013 at Brookfield Zoo Chicago

- Skuse and Coleman met/presented on ProHand at a meeting with representatives of OSU, Ohio Ag Tech Institute, Certified Angus Beef, Ohio Farm Bureau and Bob Evans LLC at Wooster, OH in June 2013
- Fisher attended the Boehringer Forum on Farm Animal Wellbeing in Bilbao, Spain in June
- Skuse presented at the Australian Pig Veterinarians conference in Melbourne in June 2013

4. Research Reports

Beggs, D.S., Pyman, M.P., Mansell, P.D. and Fisher, A.D. (2012). Review of disbudding and dehorning in the dairy industry. Report to Dairy Australia

Coleman, G.J., Hemsworth, P.H., Roberts, L. and Rohlf, V. (2013). Metrics to benchmark stock handling. Final report to Australian Pork Limited, APL Project 2010/1022.362.

Hemsworth, P.H., Widowski, T., Tilbrook, A. and Engel, J. (2012). Importance of rearing environment, space and nests for laying hens in cages - Welfare implications of floor space and nest boxes. Final report to the Australian Egg Corporation Limited, AECL Project No: 1UM091.

Hemsworth, P.H., Morrison, R., Verdon, M. and Rice, M. (2013). Effects of aggressive characteristics of individual sows and mixing strategies on the productivity and welfare of group-housed gestating sows. Final report to the Co-operative Research Centre for High Integrity Australian Pork.

Jongman, E., Hemsworth, P.H. and Rice, M. (2013). Welfare of lambs in intensive finishing systems - Study 2. Final report to Department of Environment and Primary Industries, Future Farming Systems Research. CMI No. 103159.

Rice, M., Hemsworth, P.H., Rault, J-L, Skuse, J.M, Jongman, E., Hemsworth, L.M. and Ng, C. (2013). Animal welfare monitoring in pig research. Final report to the Co-operative Research Centre for High Integrity Australian Pork.

Skuse, J.M and Hemsworth, L.M. (2013). The development of practical measures to benchmark pig welfare in the Australian Pork Industry. Final report to Australian Pork Limited, APL Project 2012/1025.

Skuse, J.M, Stevens, B. and Singh, C. (2013). Group demonstration award - Lactation Pens. Final report to Australian Pork Limited, APL Project 2011/2311.

Skuse, J.M (2013). Review of registered 'ProHand Pigs' facilitators. Final report to Australian Pork Limited, APL Project 2011/2222.

5. Thesis

Ralph, C.R. (2013) Circulating plasma glucocorticoid concentrations did not consistently predict intracellular glucocorticoid concentrations or their effect on glucose metabolism in the pig (*Sus scrofa*) or the laying hen (*Gallus gallus domesticus*). The University of Melbourne.

Animal Welfare Science Centre Seminars

<http://www.animalwelfare.net.au/article/scientific-seminars>

July '12

Dairy Seminar.

Speakers: Neil Chesterton, VET Services, Inglewood, NZ. Lameness in dairy cows.
Jeremy Skuse, AWSC. ProHand Dairy training.
Neil Aird, National Centre for Dairy Education Australia. Training opportunities in the Australian dairy industry

February '13

AWSC / RSPCA Public Lecture

Speaker: James Yeates, Chief Veterinary Officer, RSPCA UK " How happy does a happy animal have to be..... (and how can we tell)?"

Zoo Seminar - Visitor-animal relationships in zoos

Speakers: Sally Sherwen (PhD Student, AWSC, The University of Melbourne) outlined some of her research which is investigating the effect of visitors on zoo animals.

Vicky Melfi (Behavioural Biologist, Taronga Conservation Society) discussed human-animal bonds in the zoo environment.

Rosie Martin (Taronga Conservation Society) presented some results from her Master's research at Plymouth University (UK) which compared zoo animal behaviour in the presence of familiar and unfamiliar people.

Roger Rassool (School of Physics, The University of Melbourne) demonstrated some practical applications that his group has developed which will be of assistance in remotely observing animal behaviour.

Grahame Coleman (AWSC, The University of Melbourne) reviewed the interactions between zoo animal behaviour and human attitudes.

Andrew Tribe (CAWE, University of Queensland) gave a presentation focussing on how visitors view the captive environment.

Katie Pahlow (Director, Visitor & Community Development, Zoos Victoria) outlined Zoos Victoria programs which target visitors' attitudes to assist in wildlife conservation.

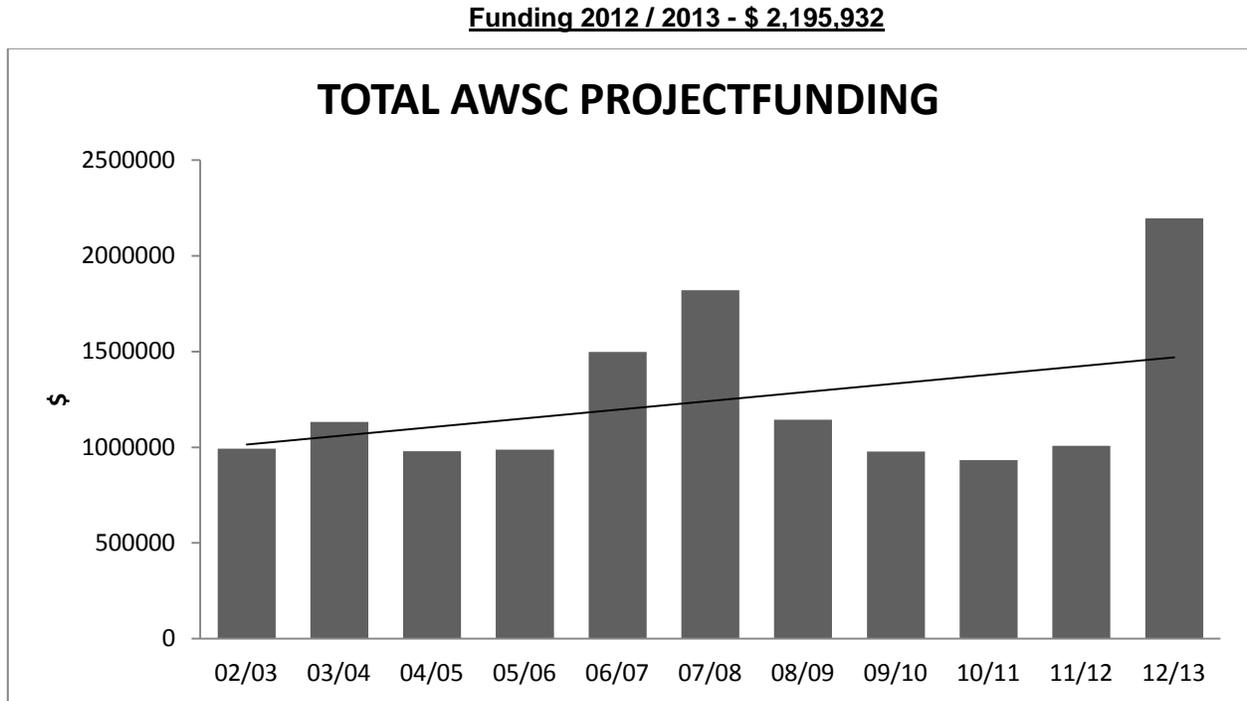
April '13

Animal ethics

Speaker: Professor David Fraser, Professor, AW Program, University of British Columbia. "The prince, the rose and the fox: an ethic for animals and nature"

Addendum – AWSC KPIs

1. Increase funding by 10% annually



2. Increase conference presentations

Refereed	2009/2010	2010/2011	2011/2012	2012/2013	TOTAL
Congress of ISAE	15	6	11	10	32
Australian Poultry Science Symposium	2	5	1	2	8
Australasian Pig Science Association (Biennial)	3	-	5	-	8
American Dairy Science Association	3	-	-	-	3
Australian Society of Animal Production	1	-	-	-	1
Society for the Study of Reproduction	1	1	-	-	2
Australasian Society for the Study of Animal Behaviour	-	1	1	-	2
ENDO 2011	-	1	-	-	1
International Society of Anthrozoology	-	1	-	1	1
Australasian Dairy Science Symposium	-	1	-	4	1
Humane Slaughter Association International Symposium	-	-	1	-	1
World Buiatrics Congress	-	-	1	-	1
World Congress on Alternatives and Animal Use in the Life Sciences	-	-	1	-	1
National Summit to end companion animal overpopulation	-	-	1	-	1
8th Federation of European Neurosciences				1	
TOTAL	25	16	22	18	81

3. Increase the publication of papers in high quality journals

Journal	5 yr Impact factor	2010/2011	2011/2012	2012/2013	TOTAL
Journal of Dairy Science	2.942	1	1	-	2
Journal of Animal Science	2.760	-	2	1	3
Preventative Veterinary Medicine	2.339	-	-	-	-
Applied Animal Behaviour Science	2.093	1	3	1	5
Behavioural Processes	1.781	2	1	-	3
Animal Welfare	1.364	-	1	2	3
Anthrozoos	1.195	-	2	1	3
Animal Production Science	1.072	3	2	2	7
Journal of Veterinary Medical Education	0.913	-	-	-	-
Journal of Veterinary Behaviour	1.143	-	3	-	3
Journal of Applied Animal Welfare Science	0.712	3	-	-	3
Endocrinology	5.103	1	-	-	1
Neuroendocrinology	3.164	-	-	-	-
Domestic Animal Endocrinology	2.009	-	-	-	-
Biology of Reproduction	3.613	1	-	-	1
Journal of Neuroendocrinology	3.281	1	1	-	2
Hormones and Behavior	4.142	-	1	-	1
Australian Veterinary Journal	1.011	-	-	3	3
Stress	3.789	1	-	-	1
Asia-Pacific Journal of Endocrinology	Not cited	1	-	-	1
Hypertension	6.857	1	-	-	1
Neuropsychopharmacology	6.813	1	-	-	1
Psychoneuroendocrinology	4.959	1	-	-	1
Physiology and Behavior	3.339	1	-	1	2
CAB Reviews	Not cited	1	-	-	1
Journal of Proteome Research	5.460	-	1	-	1
Animals	1.461	-	1	-	1
Journal of Neuroscience Methods	2.262	-	1	-	1
The Veterinary Journal	2.644	-	1	-	1
Animal Frontiers	1.744	-	-	1	1
Professional Animal Scientist	Not cited			1	1
	TOTAL	20	21	13	54
	AV Impact Factor	2.589	2.148	1.586	2.187

4. **AWSC Representation on committees in a technical/advisory capacity**

Grahame Coleman, The University of Melbourne

Animal Welfare Advisory Committee Victoria, (AWAC)

AWAC Responsible Pet Ownership Advisory Committee

AUSAWAC Education and training Working Group

Andrew Fisher, The University of Melbourne

American Veterinary Medicine Association Animal Welfare Curriculum Planning Group

Dairy Moving Forward Animal Husbandry Steering Group

Sheep Welfare Standards Writing Group

DPI Victoria Livestock Industry Consultative Committee

Cattle Welfare Standards Reference Group

Paul Hemsworth, The University of Melbourne

Animal Welfare Advisory Committee Victoria (AWAC)

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

Dairy Moving Forward Animal Husbandry Steering Group

Hassad-Australia Animal Welfare Committee

National Animal Welfare R,D&E Strategy Steering Committee

Australian Egg Corporation Limited Hen Welfare Advisory Group

AUSAWAC Animals in research and teaching Working Group

AUSAWAC Research and development Working Group

Ellen Jongman, The University of Melbourne

Consultative Forum on the Livestock Export Industry

Steve Moeller, The Ohio State University

National Pork Board Animal Science Committee

National Pork Board Youth Pork Quality Assurance Committee

National Pork Board Extension Educators Executive Committee

Bobby Moser, The Ohio State University

Livestock Care Standards Board

Jean-Loup Rault, The University of Melbourne

Australian Pork Limited Specialist Group 2 (Genetics, reproduction and welfare)

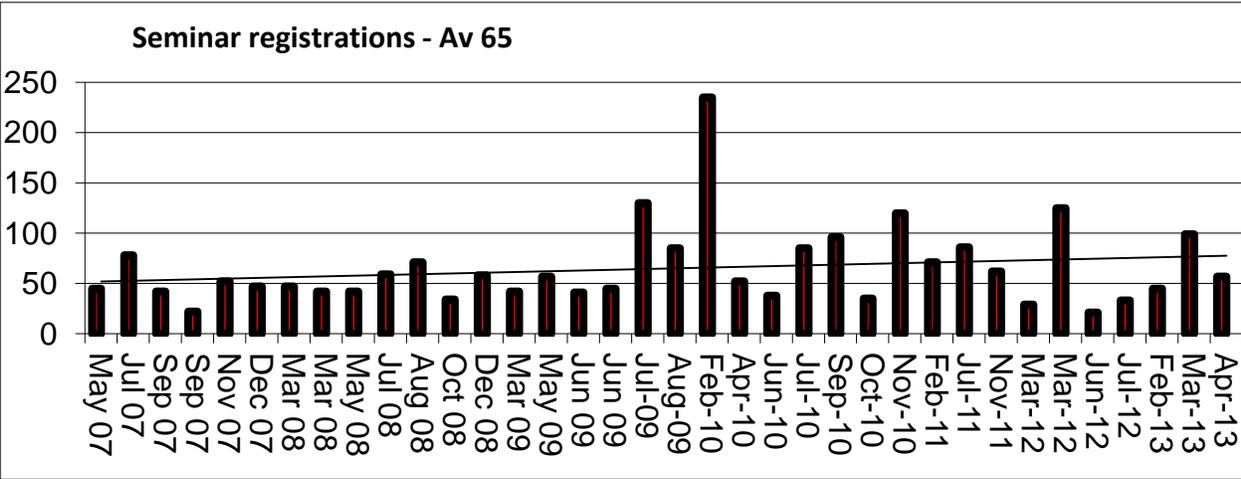
Secretary, International Society of Applied Ethology

Jeremy Skuse, Animal Welfare Science Centre

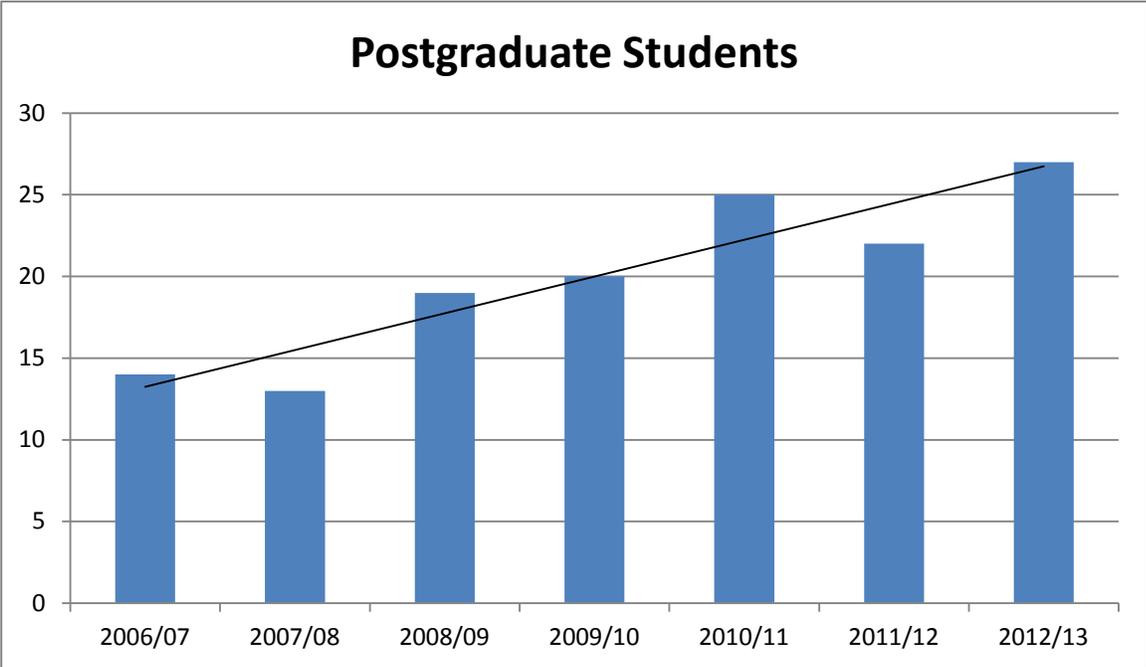
Australian Pork Limited Specialist Group 4 (Industry capability and technology transfer)

Executive Officer, National Animal Welfare R,D&E Strategy Steering Committee

5. Measure seminar attendance



6. Increase number of post-graduate students



Notes

**Copies of the Animal Welfare Science Centre Annual Report
2012 – 2013 are available on request from:**

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