



ANIMAL WELFARE
SCIENCE CENTRE

THE ANIMAL WELFARE SCIENCE CENTRE ANNUAL REPORT 2013-2014

Foreward

The past year has been full of change and has seen the Animal Welfare Science Centre consolidating its capabilities in animal welfare research and teaching.

Negotiations with the South Australian Research and Development Institute and the University of Adelaide will result in their admission to the Centre as full partners in the coming year. The SA 'arm' of the Centre will bring key scientific expertise together with research infrastructure, which will greatly strengthen the Centre's research capability across all sectors but especially in the intensive industries.

From July 2014, it is anticipated that the expanded Centre will operate across eight program areas with Program Leaders to be appointed from the partner institutions to support the research, education and training in these program areas.

Programs

1. Novel methods of assessing animal welfare
2. Housing and adult animal welfare
3. Housing and neo-natal and juvenile animal welfare
4. Husbandry, post-farm gate practices and animal welfare assurance
5. Human-animal interactions and animal welfare
6. Animal health and animal welfare
7. Industry education and training
8. Tertiary and post-graduate education and training

The Centre at the University of Melbourne will be operating out of a new Faculty which has been established. When approved by the University Council in late July 2014, the Faculty of Veterinary and Agricultural Sciences will enhance the already strong communication between veterinarians and animal scientists and will deliver an integrated learning experience for students at all levels.

The Centre has strengthened its capability in the beef and sheepmeat industries through the appointment of Dr Rebecca Doyle as Research Fellow at the University of Melbourne. Rebecca's position is supported by the Victorian Department of Environment and Primary Industries and Meat and Livestock Australia.

The Australian Research Council has granted funding to the Centre for a 3 year Linkage Project involving industry partners (Zoos Victoria, Taronga Conservation Society, Detect Australia and the Victorian Department of Environment and Primary Industries) and collaborators from Deakin University and The University of Bolton. *Human-animal relationships in zoos: Optimising animal and visitor experiences* will provide zoos with practical animal management and educational strategies to optimise both animal welfare and visitor experience.

The Ohio State University has made two key appointments in the past year. Dr Katy Proudfoot has been appointed Assistant Professor within the Department of Veterinary Preventive Medicine. Katy has a wide interest in production animal welfare and her research interests currently are dairy cow welfare and the effects of social stress on immunity in cattle. The other key appointment is that of Dr Monique Pairis Garcia who has joined the Department of Animal Sciences. Monique is a veterinarian who obtained her PhD from Iowa State University in the study of lameness in sows and pain management. Monique is experienced in welfare assurance programs in both the pork and dairy industries which will add to the Centre's expertise in this area.

Three Board members have resigned this year, Dr Ron Prestidge (Future Farming Systems Research DEPI), Prof Ron Kensinger (The Ohio State University) and Prof Rick Roush (Melbourne School of Land and Environment). The Centre is very appreciative of their considerable input to the Centre over the years, particularly their guidance and governance.

Dr. Henry Zerby (Department of Animal Sciences) has taken over from Prof Kensinger as OSU representative on the Board, Prof Ken Hinchcliff will maintain the University of Melbourne representation on the Board in his capacity as Dean, Faculty of Veterinary and Agricultural Sciences and Dr. Chris Korte of the Agriculture Productivity Division has replaced Ron Prestidge as DEPI representative.

Students of the Centre continue to demonstrate their excellence on both the local and world stages. Megan Verdon was awarded the APL 2014 Science and Innovation Award, Josh Aleri has been awarded the 14th Gustav Rosenberg Award which is awarded annually to young and promising veterinarians to develop bovine medicine, Hannah Larsen was judged to have given the best student presentation at the Australian Poultry Science Symposium, Peta Taylor, was awarded a Graduate Research in Agriculture, Conservation and Environment Scholarship to support her project to investigate the effect of environmental enrichment on broiler fear response and range use in free range systems and Sally Sherwen won the University of Melbourne 3 minute thesis competition.

Prof. Paul Hemsworth was awarded honorary membership of the Australian Veterinary Association in recognition of his contribution to animal welfare science and Prof. Mike Rickard was awarded the AVA's most prestigious award, The Gilruth Prize. This prize is awarded to members and non-members of the AVA for outstanding service to veterinary science in Australia.

As a result of the change in the Commonwealth Government, the Australian Animal Welfare Strategy has been disbanded together with the Australian Animal Welfare Advisory Committee (AusAWAC). The Commonwealth has formed the Animal Welfare Task Group which will not be a 'standing committee' but will respond, as required, to requests from the Agriculture Senior Officials Committee (ASOC) and other Government agencies.

The Centre is a member of the National Primary Industry Animal Welfare Research Development and Extension Strategy (funded by the Rural Development Corporations, core research providers and the Victorian and Queensland State Governments and Chaired by Prof Alan Tilbrook, SARDI). This RD&E Strategy will continue to pursue its charter to deliver animal welfare research, development and extension programs in the primary industries sector which are nationally significant, high priority and cross-sectoral in application and require a high degree of collaboration in research and funding.

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Background

The Animal Welfare Science Centre 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 Centre has three current partners –

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

The University of Melbourne, (UOM), Faculty of Veterinary and Agricultural Sciences.

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 continues to increase 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 promoted to the community. It is important that the community is well informed, including the scientific perspective.

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 Centre is recognised by the Australian community, industry and government, as a leading provider of animal welfare research and expert advice and provides representatives who sit on relevant working groups. The Centre has a relationship agreement between the Centre, 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 Centre is also represented on the National Primary Industry Animal Welfare Research Development and Extension Strategy which 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 Centre, CSIRO and the University of Queensland (Centre for Animal Welfare and Ethics) are the current 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 Centre 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 currently 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 (Faculty of Veterinary and Agricultural Sciences, 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 - SARDI) - 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, the effects of stress on reproduction and endocrine and behavioural responses to stress. Alan is Chief of Research of the SARDI Division of Livestock and Farming Systems.

Dr. Ian Bland (Faculty of Veterinary and Agricultural Sciences, The University of Melbourne) – Lecturer in Animal Science and Management. Ian is interested in the behaviour and welfare of neonatal/weaned pigs and zoo animals.

Mr. Kym Butler (Agriculture Research, DEPI, Hamilton and Faculty of Veterinary and Agricultural Sciences, The University of Melbourne) – Kym works within the Biometrics Unit, Agriculture Research and applies biometric analysis to the Centre’s research projects.

Dr. Peter Cakebread (Faculty of Veterinary and Agricultural Sciences, 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 and Agricultural Sciences, 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 (Faculty of Veterinary and Agricultural Sciences, 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. Rebecca Doyle (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Rebecca’s research projects have included animal cognition and cognitive bias; correlating stress physiology with behavioural and cognitive welfare measures; and how to make practical animal welfare improvements locally and in developing countries. Her position

with Centre will continue her work focusing on welfare improvements in the sheep and beef industries.

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 & Agricultural Sciences, 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. Lauren Hemsworth (Faculty of Veterinary & Agricultural Sciences, 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 (Faculty of Veterinary & Agricultural Sciences, 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 (Animal Health Field Services, DEPI, 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 (Faculty of Veterinary & Agricultural Sciences, 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 & Agricultural Sciences, 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 Monique Pairis Garcia (Department of Animal Sciences, The Ohio State University) – Research interests include lameness, pain relief and animal welfare assurance programs.

Dr. Katy Proudfoot (Department of Veterinary Preventive Medicine, The Ohio State University) – Research interests currently relate to dairy cow welfare and the effects of social stress on immunity in cattle. Research history has focused on the effect of management on the behavior, health and lameness of dairy cows during the calving period.

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

Dr. Jean-Loup Rault (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Jean-Loup has worked with an array of species but focuses his research on pigs and poultry, specifically social behaviour and oxytocin, free-range systems in poultry, and euthanasia and slaughter. His position is supported by Australian Pork Limited, Australian Egg Corporation Limited and Rural Industries Research Corporation (Chicken meat).

Dr. Vanessa Rohlf (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – A psychologist, Vanessa was awarded her PhD by Monash University in 2013. The topic of her thesis was investigating “Beliefs underlying dog owner’s management practices”. Vanessa currently works closely with Grahame Coleman in delivering the Centre’s program on attitudinal research.

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, Faculty of Veterinary & Agricultural Sciences, 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, The University of Melbourne

Tammie King, Research Assistant, The University of Melbourne

Maxine Rice, 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) - Focusing 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.

Samantha Chiew (Masters student) - Sam will be looking at the effects of visitors on reptile behaviour through the manipulation of visitor-induced vibrations.

Miranda Coffey (PhD candidate, The University of Melbourne) – Miranda will work within the ARC Linkage Project, Human-animal relationships in zoos: Optimising animal and visitor experiences.

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

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.

Kristy Ficken (Masters student) - Studying the effect of keeper interactions on elephants at Melbourne Zoo.

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.

Annie Lin (Masters student) - Conducting a research project on how the temperament of exported cattle influences stockperson behaviour.

Lena Ly (Masters student) - Conducting a research project on the welfare and social behaviour of free range laying hens.

Monica Mungcal (Masters student) - Examining the relationship between ranging behaviour of the laying hens and their behaviour and welfare in free-range systems.

Carolina Munoz (PhD Candidate, The University of Melbourne) - Carolina will be working within the assessing and addressing on-farm sheep welfare project which will examine the relationships between farmer attitudes, other job-related characteristics, farm management, profits and animal welfare.

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.

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.

Lydia Rehnberg (PhD candidate, The University of Melbourne) - Lydia will work within the ARC Linkage Project, Human-animal relationships in zoos: Optimising animal and visitor experiences.

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.

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

Megan Skarajew (Masters student, The University of Melbourne) – Conducting a research project on oxytocin administration to piglets at weaning.

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.

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.

Catherine Webb (PhD candidate deferred, 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.

Kimberley Woods (Masters student, The University of Melbourne) - Project aims to develop a modified test to assess fear of humans in sows housed in farrowing crates that is highly correlated with a human approach test validated for experimental setting.

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. Chris Korte	Director Special Projects, Agriculture Research, Agriculture Productivity Division, DEPI, Victoria.
Professor Ken Hinchcliff	Dean, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne.
Dr. Henry Zerby	Chair, Department of Animal Sciences, The Ohio State University.
Professor Paul Hemsworth	Director AWSC, The University of Melbourne (Ex-officio).
Professor Alan Tilbrook	Deputy-Director AWSC, SARDI Livestock and Farming Systems (Ex-officio).
Dr. Robert Holmes	Veterinarian, Animal Behaviour Clinics (Ex-officio).

Advisory Committee

(An Advisory Committee will be appointed in 2014/15)

AWSC Representation on committees in a technical/advisory capacity

Grahame Coleman, The University of Melbourne
AWAC Responsible Pet Ownership Advisory Committee

Andrew Fisher, The University of Melbourne
Australian Cattle Welfare Standards Reference Group
Dairy Moving Forward Animal Husbandry Steering Group
DEPI Livestock Industry Consultative Committee
DEPI Dairy Industry Leadership Group
Sheep Welfare Standards Writing Group

Paul Hemsworth, The University of Melbourne
Animal Welfare Advisory Committee Victoria (AWAC)

Australian Egg Corporation Limited Hen Welfare Advisory Group
Australian Pork Limited Specialist Group 2 (Genetics, reproduction and welfare)
Council for Sustainable Egg Farming
Dairy Moving Forward Animal Husbandry Steering Group
DEPI Beef and Sheep Industry Leadership Group
Hassad-Australia Animal Welfare Committee
National Primary Industry Animal Welfare R,D&E Strategy Steering Committee
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee

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
Professional Animal Auditing Certification Organization (PAACO)– Pork Quality Assurance Plus Audit Trainer and Audit Reviewer

Bobby Moser, The Ohio State University
Livestock Care Standards Board

Jean-Loup Rault, The University of Melbourne
Council for Sustainable Egg Farming
Animal Welfare Advisory Committee Victoria, (AWAC)
Secretary, International Society of Applied Ethology

Jeremy Skuse, Animal Welfare Science Centre
Executive Officer, National Primary Industry Animal Welfare R,D&E Strategy Steering Committee

Alan Tilbrook, The South Australian Research and Development Institute
Chair, National Animal Welfare R,D,&E Strategy Steering Committee
Australian Egg Corporation Limited Hen Welfare Advisory Group
Australian Pork Limited Specialist Group 2 (Genetics, reproduction and welfare)
Pork CRC R&D Committee
Red Meat Co-investment Committee
Chair, Board of Roseworthy Piggery Pty Ltd
Board member of Eyre Peninsula Agricultural Research Foundation
Chair, PIRSA Animal Ethics Committee

Summary of Centre RD&E projects and 2013/14 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
13/14 Funding: \$ -
Commencement date: March 2013
Completion date: March 2014

This project is being 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.

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

Investigators: **E. Jongman, L. Hemsworth, P. Hemsworth**, R. Morrison, **J. Skuse**
Funding: Australian Pork Limited
13/14 Funding: \$ 71,039
Commencement date: October 2013
Completion date: September 2014

This 1 year project will examine the external validity of the modified animal-based welfare indices (body condition score, body lesion score and lameness score) identified by APL project 2012/1025 as on-farm measures of pig welfare in the Australian Pork Industry and will investigate the inter- and intra-observer reliability of the modified animal-based welfare indices included in the on-site pig welfare benchmarking protocol.

Program 2. Housing and husbandry effects on animal welfare

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

Investigators: **P. Hemsworth, A. Tilbrook, JL. Rault, S. Moeller**, R. Morrison, P. Hughes, T. Widowski
Student: M. Verdon (PhD)
Funding: CRC for High Integrity Australian Pork
13/14 Funding: \$ 208,370
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.

Welfare and productivity of sows and litters housed in farrowing pens compared to farrowing crates

Investigators: **P. Hemsworth**, G. Charles
Student: C. Singh (Masters)
Funding: CRC for High Integrity Australian Pork
13/14 Funding: \$ 23,354
Commencement date: July 2013
Completion date: October 2013

This project assessed the viability of improving the welfare conditions for lactating sows by eliminating the use of farrowing crates from 3 days of lactation.

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
13/14 Funding: \$ -
Commencement date: March 2013
Completion date: September 2013

This innovative project examined 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
13/14 Funding: \$ -
Commencement date: January 2013
Completion date: July 2013

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

Pre-weaning social exposure: effects on aggression, injuries and growth of weaner and growing pigs

Investigator: **M. Verdon, P. Hemsworth**
Funding: Department of Agriculture
13/14 Funding: \$ 19,477
Commencement date: March 2014
Completion date: February 2015

Research indicates that socialising piglets with other litters during lactation helps them achieve a stable hierarchy sooner and sustain fewer injuries when mixed post-weaning. Thus early socialisation may have implications for piglet welfare (aggression, stress, injuries) and productivity (growth, mortality, feed conversion). However, the effectiveness of early socialisation on aggression over a longer period has not been explored. This experiment will assess whether housing piglets in group-housed sow lactation systems reduces aggression and injuries, and increases piglet growth, following mixing at the weaning and growing stages of production, in comparison to piglets raised in a non-group lactation system.

The Grant is being provided as part of the Science and Innovation Awards for Young People in Agriculture program which provides grant funding for young people aged 18-35 to undertake and innovative project that will contribute to the ongoing success and sustainability of Australia's rural industries.

Oxytocin effects on the response of piglets to weaning

Investigator: **J-L. Rault, J. Pluske, F. Dunshea**
Funding: Australian Pork Limited
13/14 Funding: \$ 32,747
Commencement date: May 2014
Completion date: November 2015

The weaning transition in the pig is often an abrupt process associated with poor performance, stress, and growth restriction at least for the first week post-weaning.

This project will investigate the use of oxytocin at weaning, either through subcutaneous or intranasal administration, on the performance and welfare of pigs after weaning.

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

Investigator: **J-L. Rault, P. Hemsworth, G. Cronin**
Student: H. Larsen (PhD)
Funding: Australian Egg Corporation Limited
13/14 Funding: \$ 92,618
Commencement date: October 2012
Completion date: September 2015

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

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)
13/14 Funding: \$ 129,120
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.

Review of evidence to underpin development of welfare standards and guidelines

Investigators: **J-L. Rault, L. Matthews**
Funding: Rural Industries Research & Development Corp. (Chicken meat)
13/14 Funding: \$ 23,795
Commencement date: March 2014
Completion date: September 2014

The standards and guidelines for the welfare of meat chickens are soon to be under development in Australia. The standards are to be based, in part, on verifiable evidence yet there is no up-to-date review of the scientific literature on key welfare topics to inform the process. This project will provide a summary of the up-to-date verifiable evidence.

Lamb systems welfare: Ensuring animal welfare in Victorian lamb systems

Investigators: **P. Hemsworth, A. Campbell, E. Jongman**
Funding: Department of Environment & Primary Industries, Victoria
13/14 Funding: \$ 304,768
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.

Quantifying welfare improvements in the live export industry

Investigators: **R. Doyle, P. Hemsworth, G. Coleman**
Funding: Meat and Livestock Australia
13/14 Funding: \$ 24,560
Commencement date: May 2014
Completion date: June 2016

The way workers handle animals presents the greatest risk to an animal's welfare. MLA provides extensive support in live export markets to educate workers on the best and safest ways to handle animals and improve animal welfare. This project aims to gather objective data of the changes in animal handling following the delivery of MLA's Live Export Training Program to workers. To do this, data on the behaviour and physiology of animals during handling, the

behaviour of workers and their understanding of good animal welfare will be collected before and after training.

Assessing and Addressing On-Farm Sheep Welfare

Investigators: **R. Doyle, P. Hemsworth, G. Coleman, J. Webb-Ware, A. Fisher, L. Kubeil**

Student: Carolina Munoz (PhD)

Funding: Meat and Livestock Australia

13/14 Funding: \$ 78,205

Commencement date: May 2014

Completion date: August 2017

The welfare and survival of sheep are vital to both farming profits and community acceptance of products. This project will examine the relationships between farmer attitudes, other job-related characteristics, farm management, profits and animal welfare. This project will also assess the efficacy of an intervention method on improving management and welfare on farm in an effort to encourage practice change, reduce mortalities and improve farm production and profitability.

Relationships between fear of humans, temperament and handling pre-slaughter and lamb welfare and meat quality

Investigators: **P. Hemsworth, G. Coleman**

Student: A. Nayton (PhD)

Funding: Australian Meat Processor Corporation

13/14 Funding: \$ 80,819

Commencement date: August 2013

Completion date: August 2016

The objectives of this project are to determine the relationships between

- key animal characteristics and handling pre-slaughter on lamb welfare (on the basis of stress and behaviour) and meat quality.
- behavioural measures pre-slaughter and stress pre-slaughter and consequently poor welfare and meat quality.

Dairy systems welfare: Ensuring animal welfare in Victorian dairy systems

Investigators: **A. Fisher, P. Hemsworth, E. Jongman**

Students: J. E. Coombe (PhD) and A. D. Hetti Arachchige (PhD)

Funding: Department of Environment & Primary Industries, Victoria

13/14 Funding: \$ 531,721

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.

Ensuring cow welfare with increasing scale of production

Investigators: **A. Fisher, P. Hemsworth**

Student: D. Beggs (PhD)

Funding: Dairy Australia

13/14 Funding: \$ 38,791

Commencement date: July 2013

Completion date: December 2016

This 3 year project will support a PhD student who will be undertaking on-farm studies to determine relationships between farm characteristics and practices associated with scale of production and animal welfare measures.

Overstocking the feeding area may affect the welfare and productivity of dairy cows and calves

Investigators: **M. Eastridge, G. Habing, K. Proudfoot, K. Daniels**

Student: **J. Pempek** (PhD)

Funding: OARDC Research Enhancement Competitive Grants Program

13/14 Funding: US\$ 5,000

Commencement date: June 2014

Completion date: October 2014

The main objectives of this study are to: 1) determine the effect overstocking the feeding area during the dry period may have on cow comfort, stress, fecal pathogen shedding, udder health and milk production during the subsequent lactation, and 2) determine the effect overstocking of the feeding area for the dam during the dry period has on the postnatal growth, physiology, and stress reactivity of dairy calves.

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

Monitoring public attitudes to inform animal welfare policy development

Investigators: **G. Coleman, V. Rohlf, S. Toukhsati, D. Blache**

Funding: Australian Pork Limited, Australian Meat Processor Corporation, Australian Wool Innovation, Department of Agriculture

13/14 Funding: \$ 93,667

Commencement date: February 2013

Completion date: February 2014

This National Primary Industry Animal Welfare RD&E Strategy project examined the relationship between attitudes and community behaviour and will assist in development of community education and awareness activities to demonstrate the importance of animal welfare. Improving community understanding of arrangements and measures with the appreciation that good animal welfare is essential for ecosystems, recreation, industry profitability and sustainability.

Metrics to benchmark stock handling – Field Trial

Investigators: **G. Coleman, P. Hemsworth, S. Toukhsati**
Student: L. Roberts (PhD)
Funding: Australian Pork Limited
13/14 Funding: \$ 28,016
Commencement date: October 2013
Completion date: July 2014

It has been established that stockpeople have a major impact upon animal welfare. Monitoring stockpeople as part of welfare monitoring schemes may improve current welfare monitoring schemes that do not take stockpeople into account and should result in improvements in animal welfare.

APL has recognised this need to develop a metrics to benchmark stock handling and welfare for use by producers internally and by industry in setting training programs. The ability to benchmark stock handling through the development of tools which reliably measure attitudes, knowledge and beliefs will allow the pork industry to further demonstrate a clear commitment to animal welfare and in addition, enable the industry to demonstrate improvements in welfare and in staff competence.

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,**
Student: S. Sherwen (PhD)
Funding: The University of Melbourne (AWSC), Zoos Victoria, DAFF
13/14 Funding: \$ -
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 filled a major gap in our knowledge and was the first to thoroughly investigate visitor effect on animal welfare using preference testing, behavioural observations, physiological assessment and replication.

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: The University of Melbourne (AWSC), DAFF
13/14 Funding: \$ -
Commencement date: March 2009
Completion date: June 2014

The results of this study 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.

Program 4 Tertiary and post-graduate education and training

Redevelop ProHand® for the pork industry

Investigators: **G. Coleman, P. Hemsworth and J. Skuse**
Funding: Australian Pork Limited, Australian Meat Processor Corporation
13/14 Funding: \$ 98,642
Commencement date: November 2013
Completion date: July 2015

The objectives of this project are to:

1. Design and deliver a stable platform for the delivery of ProHand Pigs and ProHand Pork Abattoir
2. Revise the delivery method to enhance the effectiveness of the program
3. Increase the uptake of ProHand Pigs and Pork Abattoir within the Australian pork industry
4. Develop an integrated tool to measure and benchmark pig welfare, stockperson attitudes for the whole pork chain
5. Deliver an integrated program which will target stockperson attitudes and introduce low stress handling concepts throughout the production chain

ProHand® Pigs technical support

Investigators: **J. Skuse and G. Coleman**
Funding: Australian Pork Limited
13/14 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.

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

Investigators: **E. Jongman, L. Hemsworth**
Funding: ANZ Trustees, Kathleen Agnes Back Trust
13/14 Funding: \$ 25,000
Commencement date: February 2013
Completion date: February 2016

This 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.

Human and animal interactions course impact study

Investigators: **K. George and S.J. Moeller**

Funding: Animals for Life Foundation

13/14 Funding: US\$ 3,650

Commencement date: January 2014

Completion date: August 2014

Research is focused on post-participation assessment of specific learning outcomes when comparing groups of students that have participated in study abroad programs with contemporary groups of students who were not enrolled in study abroad programs offered by the Department of Animal Sciences.

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

Delivery of Pork Quality Assurance Plus V2.0 Advisor Training and Certification Programs: State Trainers serving in Train-the-Trainer Roles, certifying veterinarians and animal scientists in PQA Plus V2.0 materials and methods for proper on-farm site assessment procedures.

S. Moeller, D. Ricker

Delivery of Transportation Quality Assurance Advisor Training and Certification: State trainers serving in Train-the-Trainer Roles, certifying industry leaders and swine transporters on the TQA program of the National Pork Board.

S. Moeller, D. Ricker

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

13/14 Funding: \$ 136,364

Commencement date: October 2011

Completion date: February 2015

Professor in Human-Animal relations at the University of Melbourne

Investigator: **G. Coleman**
Funding: Bureau of Animal Welfare
13/14 Funding: \$ 50,000
Commencement date: July 2012
Completion date: June 2014

Animal Welfare Science Centre

Investigators: **J. Skuse, P. Hemsworth**
Funding: Department of Environment & Primary Industries, Victoria
13/14 Funding: \$ 100,000
Commencement date: July 2012
Completion date: June 2015

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.

Executive Support to the National Primary Industry Animal Welfare RD&E Strategy

Investigator: **J. Skuse**
Funding: National Primary Industry AW RD&E Strategy
13/14 Funding: \$ 43,999
Commencement date: July 2012
Completion date: June 2014

Significant collaboration

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
13/14 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.

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
 13/14 Funding: UWA project
 Commencement date: June 2011
 Completion date: April 2014

Collaborating with University of Western Australia, this project demonstrated the effects of stockperson training in sheep feedlots on animal welfare and the stockpersons attitudes and behaviour towards sheep.

Nitrous oxide for piglet euthanasia: validation by electroencephalography (EEG)

Investigators: **J-L. Rault**, D. Lay, C. Johnson, M Sutherland
 Funding: National Pork Board (US)
 13/14 Funding: USDA project
 Commencement date: September 2013
 Completion date: September 2014

Collaborating with USDA, Massey University and AgResearch NZ, this project aims to ultimately develop and validate a gas euthanasia procedure that leads to a humane death of the piglets and that is practical and feasible on-farm. The specific objectives of this proposal are to: 1) evaluate the aversiveness of inhaling nitrous oxide and oxygen, using our previously validated approach which relies on the pig's perspective, and 2) validate the effectiveness and humaneness of nitrous oxide and oxygen to induce loss of consciousness by electroencephalogram (EEG) recording.

Getting to the meat of the matter: social and economic issues in animal welfare in Australia's livestock industries

Investigators: R.A. Ankeny, W.J. Umberger, G. Tapscott, J. Healing, **A.J. Tilbrook**, E. Gunner
 Funding: The Australian Research Council Linkage Program
 13/14 Funding: University of Adelaide project
 Commencement date: January 2014
 Completion date: December 2016

Animal welfare in Australia's livestock industries is an issue of increasing concern to both Australian consumers and meat and livestock producers. This project will provide an understanding of both the social and economic impacts of consumer views on animal welfare and help to foster more productive dialogue between consumers and producers.

Informing future sheep extension strategies to improve reproduction and related welfare outcomes

Investigators: J. Trompf, L. Kubeil, C. Hollier, C. Arnot, J. Young, G. Kearney, **G. Coleman**

Funding: Meat and Livestock Australia

13/14 Funding: DEPI project

Commencement date: June 2014

Completion date: June 2017

This project will inform future extension strategy by improving industry understanding of how to influence producer attitudes and behaviours towards sheep reproduction and related welfare outcomes, particularly lamb survival. The ultimate aim of this project is to change on farm behaviour increasing the rate of adoption of industry best practise reproduction and welfare management.

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

Coleman, G.J. and Hemsworth, P.H. (2014). Training to improve stockperson beliefs and behaviour towards livestock enhances welfare and productivity. *Rev.sci.tech.Off cint Epiz*, 33(1), 131-137.

Cronin, G.M. and **Rault, J-L.** (2014). Lessons learned from past experience with intensive livestock management systems. *Rev.sci.tech.Off cint Epiz*, 33(1), 139-151.

2.a Research publications in refereed journals

Arnold, N.A. and **Hemsworth, P.H.** (2013). Examining the usefulness of a Y-maze choice method to measure the preferences of laying hens. *Animal Production Science*, 53(12) pp 1283-1290. Available online <http://dx.doi.org/10.1071/AN12390>.

Coombe, J.E., Pyman, M.F., Mansell, P.D., Auld, M.J., Anderson, G.A., Wales, W.J., Malmo, J., **Conley, M.J., Fisher, A.D.** (2013). The effects on claw health of supplement feeding grazing dairy cows on feed pads. *The Veterinary Journal*.

Ellingsen, K., **Coleman G.J.**, Mejdell, C.M. and Lund, V. (2014). Using Qualitative behaviour assessment to explore the link between stockperson behaviour and dairy calf behaviour. *Applied Animal Behaviour Science*.153, 10-17.

Fisher, A. D., Webster, J. R. (2013) Dairy cow welfare: the role of research and development in addressing increasing scrutiny. *Animal Production Science* 53, 924–930. <http://dx.doi.org/10.1071/AN12276>.

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., Špinko, 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*. 198: pp19–27.

Gunaseelan, S., **Coleman, G.J.** and Toukhsati, S. (2013). Attitudes toward Responsible Pet Ownership Behaviors in Singaporean Cat Owners *Anthrozoos*, 26,199-211.

Hawken, P.A.R., Luckins, N., **Tilbrook, A.J.**, Fiol, C., Martin, G.B., Blache, D.P. (2013). Genetic selection for temperament affects behaviour and the secretion of adrenal and reproductive hormones in sheep subjected to stress. *Stress-the international journal on the biology of stress*, 16, 1, pp. 130-142.

Hemsworth, P.H., Rice, M., Nash, J., Giri, K., **Butler, K.L., Tilbrook, A.J.** and Morrison, R.S. (2013). Effects of group size and floor space allowance on group housed sows: aggression, stress, skin injuries and reproductive performance. *Journal of Animal Science* 91, 4953-4964.

Hetti Arachchige, A. D., Fisher, A. D., Wales, W. J., Auld, M. J., Hannah, M. C., & **Jongman, E. C.** (2014). Space allowance and barriers influence cow competition for mixed rations fed on a feed-pad between bouts of grazing. *Journal of Dairy Science* 97, 3578-3588.

Hetti Arachchige, A.D., Fisher, A.D., Auld, M.J., Wales, W. J. and **Jongman, E.J.** (2013). Effects of different systems of feeding supplements on time budgets of cows grazing restricted pasture allowances. *Applied Animal Behaviour Science* 148, 13-20. Available online <http://dx.doi.org/10.1016/j.applanim.2013.08.002>.

Jongman, E.C. and **Butler, K.L.** 2014. The effect of age, stocking density and flooring during transport on welfare of young dairy calves in Australia. *Animals*, 4, 184-199

Larsen, M.J., Sherwen, S.L. and **Rault, J-L.** (2014). Number of nearby visitors and noise level affect vigilance in captive koalas. *Applied Animal Behaviour Science*, Feb 2014 Available online <http://dx.doi.org/10.1016/j.applanim.2014.02.00>.

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: 53-59.

Mornement, K., **Coleman, G.J.**, Toukhsati, S. and Bennett, P. (2014). Development of the behavioural assessment for re-homing K9's (B.A.R.K.) protocol. *Applied Animal Behaviour Science*. 151, 75–83.

Pighin, D. G., Brown, W., Ferguson, D. M., **Fisher, A. D.** and Warner, R. D. (2014). Relationship between changes in core body temperature in lambs and post-slaughter muscle glycogen content and dark-cutting. *Animal Production Science*, 2014, 54, 459–463. Available online <http://dx.doi.org/10.1071/AN12379>.

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. *Aust Vet Jnl*. Vol 91, No.10 pp423-426.

Rault, J-L., Elmore, M. R. P., Biehl, D. J., Russell, M. A., Garner, J. P. (2013), The World is a Natural Laboratory, and Social Media is the New Petri Dish. *Ethology*. doi: 10.1111/eth.12125.

Rault, J-L., Mack, L.A., Carter, C.S., Garner, J.L., Marchant-Forde, J.N., Richert, B.T. and Lay Jr., D.C. (2013). Prenatal stress puzzle, the oxytocin piece: Prenatal stress alters the behaviour and autonomic regulation in piglets, insights from oxytocin. *Applied Animal Behaviour Science*. Available online [Http://dx.doi.org/10.1016/j.applanim.2013.07.001](http://dx.doi.org/10.1016/j.applanim.2013.07.001).

Sherwen, S.L., Magrath, M.J.L., **Butler, K.L.**, Phillips, C.J.C. and **Hemsworth, P.H.** (2014). A multi-enclosure study investigating the behavioural response of meerkats to zoo visitors. *Applied Animal Behaviour Science*, 156, 70-77.

2.b Research papers in press

Conley, M.J., Fisher, A.D., and Hemsworth P.H. (2014). Effects of human contact and toys on the fear responses to humans of shelter-housed dogs. *Applied Animal Behaviour Science* (in press).

3.a Refereed Conference publications

Hartcher, K., Tran, M. Wilkinson, S.J, **Hemsworth, P.H.** and Cronin, G.M. (2014). The attractiveness of loose feathers to free-range laying hens exhibiting severe feather-pecking. *Proceedings, Australian Poultry Science Symposium 25*, p. 117.

Hemsworth, P.H. (2013). The role of science in improving animal welfare. A.C. Dunkin Memorial Lecture, *Manipulating Pig Production XIV*. Proceedings of the 14th Biennial Conference of the Australasian Pig Science Association, pp. 3-16.

Larsen, H. and **Rault, J-L.** (2014). Go outside and play? Behavioural time budget of free-range laying hens in a natural shrub structure. *Proceedings, Australian Poultry Science Symposium 25*, pp. 113-116.

Morrison, R.S., Sawyer, K.S.B., Kells, N.J., Johnson, C.B. and **Hemsworth, P.H.** (2013). Stress responses of two-day old piglets to tail docking. *Manipulating Pig Production XIV*. Proceedings of the 14th Biennial Conference of the Australasian Pig Science Association, p. 128.

Rault, J-L., McMunn, K.A., Marchant-Forde, J.N. and Lay, D.C. (2013). Gas alternatives to carbon dioxide for euthanasia: A piglet perspective. *Manipulating Pig Production XIV*. Proceedings of the 14th Biennial Conference of the Australasian Pig Science Association, p. 130.

Singh, C. and **Hemsworth, P.H.** (2013). Comparison of the behaviour of piglets housed in loose pens and farrowing crates. *Manipulating Pig Production XIV*. Proceedings of the 14th Biennial Conference of the Australasian Pig Science Association, p. 241.

Verdon, M., Morrison, R., **Rice, M.** and **Hemsworth, P.H.** (2013). Aggressive strategies in grouped sows: The relationship between individual aggressive behaviour and welfare. *Manipulating Pig Production XIV*. Proceedings of the 14th Biennial Conference of the Australasian Pig Science Association, p. 245.

Webb, C., Hemsworth, P.H. and Holmes, R. (2013). An investigation into the training methods used by professional dog trainers. Proceedings of 1st Australian Working Dog Alliance Conference, Sydney, p20.

3.b Other publications

Hemsworth, P.H, Coleman, G.J. and Skuse, J.M. (2014) Do natural settings safeguard the welfare of domesticated animals? *Farm Policy Journal*, Vol 11 No. 1 pp 25-31.

Pempek, J.A., Eastridge, M.L., Swartzwelder, S.E., Daniels, K.M. and Yohe, T.T. (2014). Housing system may affect performance and behavior of jersey heifer calves. Poster presentation at the 27th ADSA Discover Conference, May, Illinois.

Rault, J-L. and Sherwen, S.L (2014). How many visitors can a koala bear? *The Conversation UK*:

<http://theconversation.com/how-many-visitors-can-a-koala-bear-not-many-it-seems-26970>

3.c Industry and other presentations

- Hemsworth presented at the CHM Alliance meeting, QLD, August. He outlined Centre research on the effects of mixing gestating sows Rault - Presentation at MSLE research day July 25th 2013: "Animal welfare as a whole, oxytocin as an example".
- Sherwen presented at the AAWS conference, Gold Coast, August 2013. She outlined the results of her research on the effects of visitors on zoo animals.
- Rault - Invited talk: "Recent advances in Poultry Welfare", South Australian Poultry Industry Day, October 3rd, 2013, Roseworthy campus, Adelaide. To poultry producers. Abstract published in the Poultry Hub and Poultry Digest.
- Rault - Invited talk: "Assessment of factors influencing bird welfare in free-range production systems", Australian Poultry Veterinarian Association Scientific Meeting, October 4th, 2013, Adelaide.
- Sherwen presented a summary of her research on the effects of visitors on zoo animals as part of the 3 Min thesis competition. It was the winner of the University of Melbourne competition and she participated in the Aus/NZ finals in Sydney later in October 2013.
- Fisher participated in Australian Animal Welfare Standards combined Sheep & Cattle Writing Group workshop, Canberra 30-31st October 2013.
- Coleman presented "Why does animal welfare matter" at the Australian Working Dog Conference held in Sydney 4-5th November 2013.
- Sherwen presented at Melbourne University Research Strategy Conference about Zoo Welfare on November 7th 2013.
- Hemsworth presented at Australian Farm Institutes' 10th annual Australian Agriculture Roundtable Conference on 6th of November 2013 in Sydney. "The future of animal welfare policy in Australia and its implications for livestock industries: Does science provide a factual basis for rational decision-making?"
- Rault, Hemsworth presented at the APL/Pork CRC 'Successful Group Housing Systems for Dry Sows Workshops' at Toowoomba and Melbourne on April 2nd and 4th 2013.
- Jongman gave a presentation on 'International developments in animal welfare assessment and how it may be applied in Australia' to the Sheep CRC on April 16th in Sydney.
- Hemsworth presented at the Pan Pacific Pork Expo "Update on Current and Future Approaches to Gestation Sow Housing and Space Allowance" on the Gold Coast on the 21st and 22nd May 2014.
- Rault - Poultry Information Exchange 2014 invited talk: The implications of outdoor range use on hen welfare in free-range flocks. 27th May 2014, Gold Coast.
- Proudfoot and Pempek participated in the US National Dairy FARM Program's "Train the Trainer" workshop June 18th and 19th 2014.

- Rault - Presentation at the Poultry Health and Welfare Liaison Group- Victoria: "Update of current research projects on free range system", 26th June 2014.

4. Research Reports

Coleman, G.J., Rohlf, V.R. (2014). ProHand Benchmark User Manual. Final report to Australian Pork Limited.

Coleman, G.J., Rohlf, V.R., Toukhsati, S. and Blache, D. (2014). Development of a Public Attitude Monitoring Scheme. Final report to Australian Pork Limited, Australian Meat Processor Corporation, Australian Wool Innovation and Department of Agriculture.

Coleman, G.J. (2013). Evaluation and participant satisfaction of the EU Welfare Quality Handling Dairy Program. Final report to Department of Agriculture.

Fisher, A. (2013). A Review of Pre-export Shearing of Sheep. Report for Meat and Livestock Australia and Livecorp.

Haynes, S. and Jongman, E.C. (2014). A review on the assessment of welfare in companion dogs and cats. Report to Department of Environment and Primary Industries.

Haynes, S. (2013). Investigation of the relationship between attitudes and behaviour of human care-takers and animal behaviour of dogs in a shelter environment. Final report to Department of Agriculture.

Jongman, E.C. and Hemsworth, P.H. (2014). Assessment of pain responses associated with castration of 10-week-old lambs using the Callicrate 'Wee Bander' compared with a standard elastrator. Final report to Meat and Livestock Australia.

Rault, J-L., Hemsworth, P.H., Morrison, R., **Tilbrook, A.J.** and Hansen, C. (2014). Effects of group housing after weaning on sow welfare and sexual behaviour. Final report to CRC for High Integrity Australian Pork.

Rault, J-L., Hemsworth, P.H., Tilbrook, A.J. and Scott, P. (2014). The effects of time off feed and water on the welfare of spent laying hens. Phase 2: Behavioural indicators. Final report to Australian Egg Corporation Limited.

Rault, J-L. and Jongman, E.C. (2014). Scientific commentary: Carbon dioxide (CO₂) for the stunning of pigs. AWSC White paper:

<http://www.animalwelfare.net.au/sites/default/files/Scientific%20commentary-CO2%20as%20stunning%20for%20pigs-4.pdf>

5. Theses

Coombe, J.E. (2014). The effect of flexible feeding systems on the health and welfare of dairy cows. PhD thesis, The University of Melbourne.

Hetti Arachchige, A. D. (2014). Defining dairy cow behaviour and welfare in feeding systems based on mixed ration fed in conjunction with grazed pasture in south eastern Australia. PhD thesis, The University of Melbourne.

Verdon, M. (2014). Sow aggression in groups: predicting and implications for sow welfare. PhD thesis, The University of Melbourne.

Animal Welfare Science Centre Seminar

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

March '14

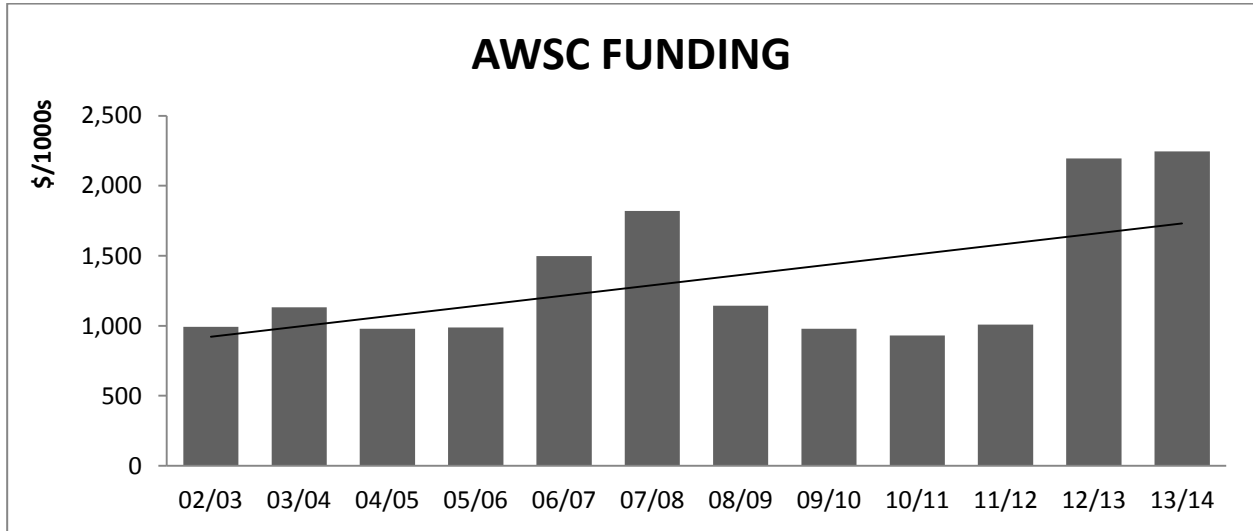
People and Pets - Their behaviour and emotions.

- Speakers:
- Kevin Stafford (Massey University)
The welfare of dogs; what's the problem?
 - Robert Holmes (Animal Behaviour Clinics)
The emotional lives of dogs - particularly those confined to backyards
 - Miranda Coffey (University of Melbourne PhD student)
Food for thought – why do people feed stray cats?
 - Sally Haynes (University of Melbourne PhD student)
It's a (shelter) dog's life: Just how important is human contact?
 - Dennis Wormald (University of Melbourne PhD student)
Measuring Anxiety in Dogs

Addendum – AWSC KPIs

1. Increase funding by 10% annually

Funding 2013 / 2014 - \$ 2,255,594



2. Increase conference presentations

Refereed	2009/2010	2010/2011	2011/2012	2012/2013	2013/14	TOTAL
Congress of ISAE	15	6	11	10	No conference in reporting year	42
Australian Poultry Science Symposium	2	5	1	2	2	12
Australasian Pig Science Association (Biennial)	3	-	5	-	5	13
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	-	2
Australasian Dairy Science Symposium	-	1	-	4	-	5
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	-	1
Working Dog Alliance Conference					1	1
TOTAL	25	16	22	18	8	89

3. Increase the publication of papers in high quality journals

Journal	5 yr Impact factor	2010/2011	2011/2012	2012/2013	2013/14	TOTAL
Journal of Dairy Science	3.009	1	1	-	1	3
Journal of Animal Science	2.1	-	2	1	1	4
Preventative Veterinary Medicine	2.339	-	-	-	-	-
Applied Animal Behaviour Science	2.059	1	3	1	7	12
Behavioural Processes	1.781	2	1	-	-	3
Animal Welfare	1.364	-	1	2	-	3
Anthrozoos	1.0	-	2	1	1	4
Animal Production Science	1.228	3	2	2	3	10
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	0.918	-	-	3	1	4
Stress	3.789	1	-	-	1	2
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	1.648	-	1	-	1	2
Journal of Neuroscience Methods	2.262	-	1	-	-	1
The Veterinary Journal	2.656	-	1	-	2	3
Animal Frontiers	1.744	-	-	1	-	1
Professional Animal Scientist	Not cited	-	-	1	-	1
Ethology	1.947	-	-	-	1	1
	TOTAL	20	21	13	19	73
	AV Impact Factor	2.589	2.148	1.586	1.991	

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

Grahame Coleman, The University of Melbourne

AWAC Responsible Pet Ownership Advisory Committee

Andrew Fisher, The University of Melbourne

Australian Cattle Welfare Standards Reference Group

Dairy Moving Forward Animal Husbandry Steering Group

DEPI Livestock Industry Consultative Committee

DEPI Dairy Industry Leadership Group

Australian Sheep Welfare Standards Writing Group

Paul Hemsworth, The University of Melbourne

Animal Welfare Advisory Committee Victoria (AWAC)

Australian Egg Corporation Limited Hen Welfare Advisory Group

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

Council for Sustainable Egg Farming

DEPI Beef and Sheep Industry Leadership Group

Dairy Moving Forward Animal Husbandry Steering Group

Hassad-Australia Animal Welfare Committee

National Primary Industry Animal Welfare R,D&E Strategy Steering Committee

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

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

Professional Animal Auditing Certification Organization (PAACO)– Pork Quality Assurance Plus Audit Trainer and Audit Reviewer

Bobby Moser, The Ohio State University

Livestock Care Standards Board

Jean-Loup Rault, The University of Melbourne

Council for Sustainable Egg Farming

Animal Welfare Advisory Committee Victoria, (AWAC)

Secretary, International Society of Applied Ethology

Jeremy Skuse, Animal Welfare Science Centre

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

Alan Tilbrook, The South Australian Research and Development Institute

Chair, National Animal Welfare R,D,&E Strategy Steering Committee

Australian Egg Corporation Limited Hen Welfare Advisory Group

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

Pork CRC R&D Committee

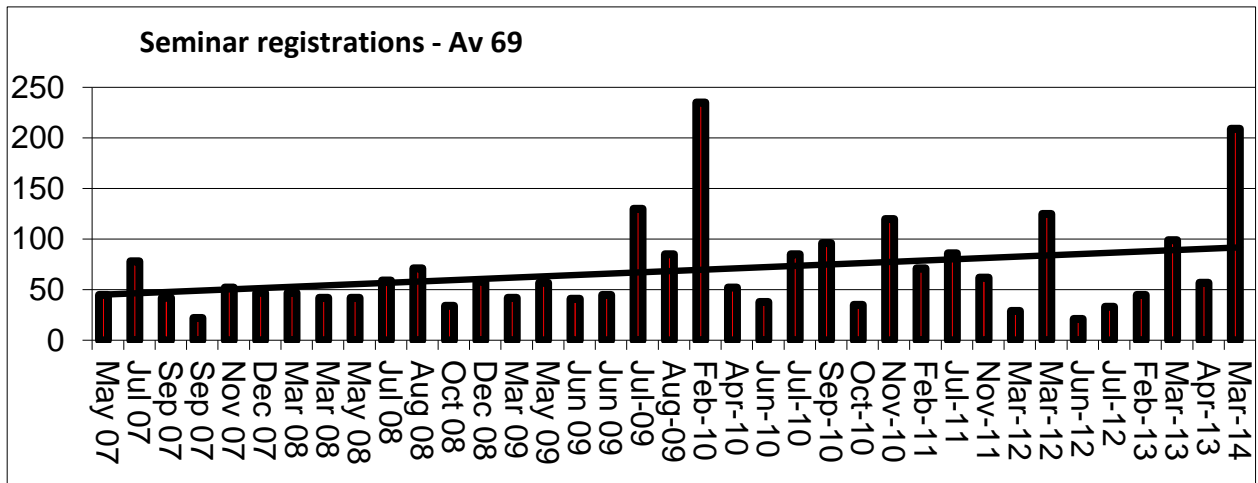
Red Meat Co-investment Committee

Chair, Board of Roseworthy Piggery Pty Ltd

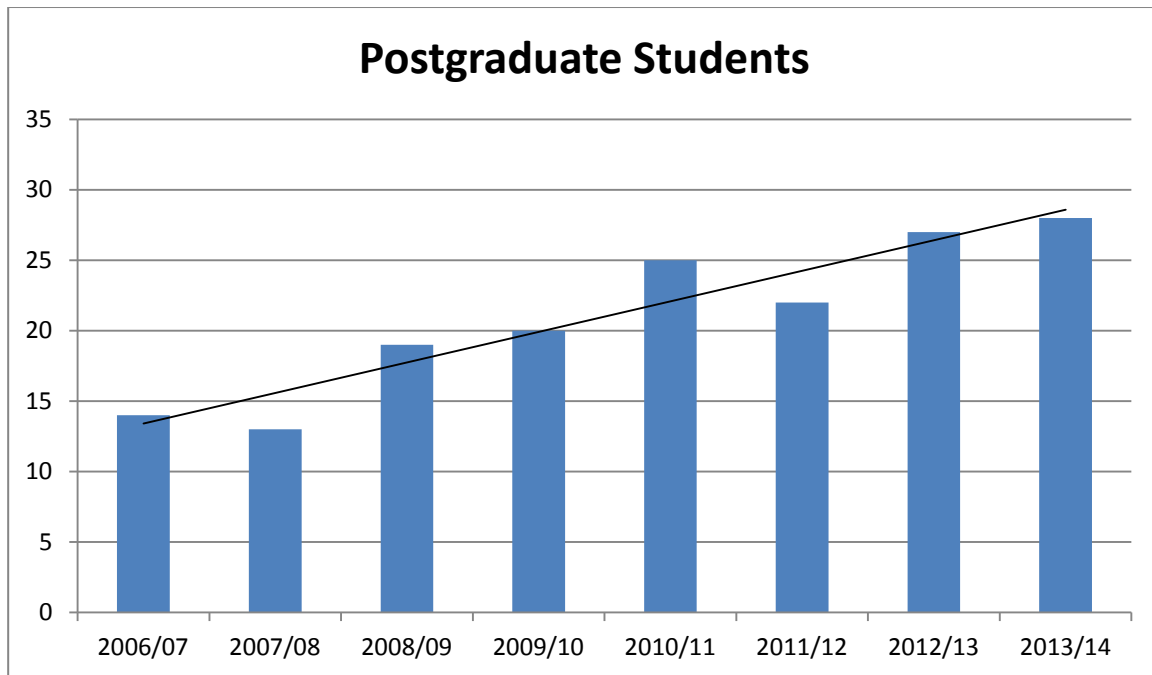
Board member of Eyre Peninsula Agricultural Research Foundation

Chair, PIRSA Animal Ethics Committee

5. Measure seminar attendance



6. Increase number of post-graduate students



Notes

**Copies of the Animal Welfare Science Centre Annual Report
2013 – 2014 are available on request from:**

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