

ANIMAL WELFARE
SCIENCE CENTRE

THE ANIMAL WELFARE SCIENCE CENTRE ANNUAL REPORT 2014-2015

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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 partners –

- Department of Economic Development, Jobs, Transport and Resources, Victoria. (DEDJTR), Agriculture 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 Industries 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 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 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. 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. Mike Lilburn (Department of Animal Sciences, The Ohio State University) – Specialist in poultry nutrition and physiology.

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. 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. Megan Verdon (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Megan was awarded her PhD by the University of Melbourne in 2014 and her interests include the effects of mixing and early socialisation on the welfare of pigs.

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, The 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.

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.

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

Beatrice Chang (Masters student, The University of Melbourne) - Visitor-Animal Interactions at an African Wild Dog Exhibit at Melbourne Zoo.

Samantha Chiew (PhD candidate, The University of Melbourne) - Sam is studying the effects of zoo visitor-zoo animal interactions at display enclosures on both the animal and the visitor.

An Diep (Masters student, The University of Melbourne) - Early behavioural signs of sickness in chickens.

Joanna Engel (PhD student, The University of Melbourne) – The importance of rearing environment, space and nests for laying hens (*Gallus gallus domesticus*) in cages.

Kristy Ficken (MPhil student, The University of Melbourne) - Studying the effect of keeper interactions on elephants at Melbourne Zoo.

Sally Haynes (PhD candidate, The University of Melbourne) - The relationship between the attitudes and behaviours of human handlers and the behaviour and welfare of shelter dogs.

Maria Jorquera (Masters student, The University of Melbourne) - The relationship between heat tolerance, milking times and temperament of dairy cows milked with a robotic milking system.

Sarah Kuyken (Masters student, The University of Melbourne) – Validating horse welfare indices.

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

Mark Learmonth (Masters student, The University of Melbourne) - Effects of visitor contact on the behaviour of captive quokka (*Setonix brachyurus*) in a walk-through exhibit.

Jamie Mazur (Masters student, The University of Melbourne) – Measuring cognitive biases in orang-utans.

Carolina Munoz (PhD Candidate, The University of Melbourne) - Assessing and addressing on-farm sheep welfare.

Monoar Sayeed Pallab (PhD candidate, The University of Melbourne) - The assessment and management of calf health and welfare in dairy systems.

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 (MPhil 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) - T Pig stockperson handling and work performance to assess stockperson attitudes, behaviour and technical knowledge.

Declan Segal (Masters student, The University of Melbourne) – A Novel Method of Analysing Oxytocin through PCR.

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.

Amelia Thompson (Masters student, The University of Melbourne) – Effects of handling programs on Green Tree frog (*Litoria caerulea*) behaviour and welfare.

Catherine Webb (PhD candidate deferred, The University of Melbourne) - The welfare implications of physical versus psychological punishment in dog training.

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

Rebecca Woodhouse (MPhil student, The University of Melbourne) - CO2 stunning of pigs.

Board of Management

Professor Mike Rickard	Chair.
Dr. Chris Korte	Agriculture Research, Agriculture Productivity Division, Department of Economic Development, Jobs, Transport and Resources, 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 2015/16)

AWSC Representation on committees in a technical/advisory capacity

AECL Hen Welfare Advisory Group	Paul Hemsworth Alan Tilbrook
APL Specialist Group 2 (Genetics, reproduction and welfare)	Paul Hemsworth Alan Tilbrook
Animal Welfare Advisory Committee	Paul Hemsworth Jean-Loup Rault (alt)
Animal Welfare Advisory Committee <i>Responsible Pet Ownership Advisory Committee</i>	Grahame Coleman Paul Hemsworth
Animal Welfare Advisory Committee <i>Animal welfare education working group</i>	Grahame Coleman Jeremy Skuse
Australian Cattle Welfare Standards Reference Group	Andrew Fisher
Australian Sheep Welfare Standards Writing Group	Andrew Fisher
Council for Sustainable Egg Farming	Paul Hemsworth Jean-Loup Rault
DEDJTR Beef and Sheep Industry Leadership Group	Paul Hemsworth
DEDJTR Dairy Industry Leadership Group	Andrew Fisher
DEDJTR Livestock Industry Consultative Committee	Andrew Fisher
Dairy Moving Forward Animal Husbandry Steering Group	Paul Hemsworth Andrew Fisher
Hassad-Australia Animal Welfare Committee	Paul Hemsworth
International Society of Applied Ethology	Jean-Loup Rault (sec)
International Society of Applied Ethology, Australasia-Africa	Rebecca Doyle (sec)
National Pork Board Animal Science Committee	Steve Moeller
National Pork Board Extension Educators Executive Committee	Steve Moeller
National Pork Board Youth Pork Quality Assurance Committee	Steve Moeller
National Primary Industry Animal Welfare R,D&E	Alan Tilbrook (Chair)
Strategy Steering Committee	Paul Hemsworth
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee	Paul Hemsworth
Pork CRC R&D Committee	Alan Tilbrook
Red Meat Co-investment Committee	Alan Tilbrook

Summary of Centre RD&E projects and 2014/15 project funding if applicable

1. Dairy industry

1.1. 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
2014/15 - \$ 5,875
Commencement date: 2014
Completion date: 2014

The main objectives of this study were to: 1) determine the effect overstocking the feeding area during the dry period may have on cow comfort, stress, faecal 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. Project data are in the final stages of analysis

1.2. Ensuring dairy cow welfare with increasing scale of production

Investigators: A. Fisher
Student: D. Beggs (PhD)
Funding: Dairy Australia
2014/15 - \$ 33,250
Commencement date: 2013
Completion date: 2016

This 3 year project supports 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. Initial results are detailed under 1.3 below.

1.3. Dairy systems welfare: Ensuring animal welfare in Victorian dairy systems

Investigators: A. Fisher, P. Hemsworth, E. Jongman
Students: A. Dilrukshi (PhD) and J. Coombe (PhD)
Funding: Department of Economic Development, Jobs, Transport and Resources
2014/15 - \$ 450,000
Commencement date: 2012
Completion date: 2015

This 3 year project has provided information in the areas of flexible feeding systems and bobby calf management. Two University of Melbourne students within the flexible feeding project were awarded their PhD theses and graduated in December 2014:

- Joanne Coombe, The effect of flexible feeding systems on the health and welfare of dairy cows.

- Anoma Hetti Arachchige, Defining dairy cow behaviour and welfare in feeding systems based on mixed ration fed in conjunction with grazed pasture in south eastern Australia. A survey of dairy farmers identified that insufficient feeding space at the feed face and keeping dairy herds off-pasture for extended periods due to the use of feed-out areas were the main welfare concerns associated with the use of feedpads and required further investigation. However, no effects of feeding dairy cows on feedpads per se on comfort behaviours such as lying were found. The research did identify minimum feed space and the use of barriers to maximize feeding behaviour of cows on feedpads.

The project on flexible feeding systems has addressed specific questions relating to cow comfort and behaviour within PMR systems as well as the effect of intensive feeding systems on hoof health and acidosis. The research found that it was the adaptation of the cows to their diet, rather than the absolute level of grain in the ration that helped to ensure animal welfare. The anticipated outcome of this large project is to facilitate the ability of dairy producers to adopt more flexible, more profitable feeding systems while achieving appropriate standards of cow health and welfare.

Two other University of Melbourne students have commenced their PhD:

- David Beggs, Ensuring dairy cow welfare with increasing scale of production (a project with co-investment from Dairy Australia).

- Josh Aleri, Assessing phenotypic and genetic adaptive immune response in Australian Friesian heifers in a pasture-based production system.

As part of the project on increased scale of production an industry wide survey has been conducted on management strategies of large herds and the effect on risks to animal welfare. The survey found that animal welfare issues appear to differ with different herd sizes. However no evidence was found of a relationship between herd size and adverse welfare outcomes in terms of reported disease. This ongoing project aims to provide information on reducing risks to animal welfare in large herds. In addition a project on the effect of calf feeding management relating to amount and frequency of feeding calves in the first week of life was completed and the results will provide information on the effect of calf feeding management on calf welfare. These projects ensure animal welfare concerns will be addressed in a fashion to ensure community acceptance of increased intensification in the dairy industry.

2. Pork industry

2.1. Carbon dioxide stunning of pigs

Investigators: J-L. Rault, E.C. Jongman

Student: R. Woodhouse (MPhil)

Funding: Australian Pork Limited
2014/15 - \$ 50,000

Commencement date: March 2015

Completion date: December 2016

This 2 year project will conduct a systematic, critical literature review on gas stunning methods for pigs, assess the effects of various factors on the reaction of pigs to CO₂ stunning and identify practical indicators and develop minimum operating standards on CO₂ stunning systems.

2.2. Developing ways to measure and increase sow contentment

Investigators: R.Doyle, K. Plush, R. Morrison, C. Ralph, G. Cronin, C. Lee, S. Hazel

Funding: CRC for High Integrity Australian Pork
2014/15 - \$ 41,000

Commencement date: February 2015

Completion date: December 2016

This 2 year project will assess the contentment of sows during lactation by using scientific indicators of positive welfare and then developing practical measures for use on farm. This study will also assess the effect enrichment has on the welfare of lactating sows, with the hypothesis being that enrichment will increase the level of contentment a sow experiences during lactation.

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

Investigator: M. Verdon, P. Hemsworth

Funding: Department of Agriculture
2014/15 - \$ 1,948

Commencement date: 2014

Completion date: 2015

While group-lactation systems are thought to improve sow welfare through increased opportunity for movement and increased social interaction, this research provides evidence that these housing systems in lactation may also improve piglet welfare by reducing aggression and injuries at weaning. Further investigation is required to determine whether there are long-term effects of socialisation on pig welfare.

2.4. Oxytocin effects on the response of piglets to weaning

Investigator: J-L. Rault, J. Pluske, F. Dunshea

Funding: Australian Pork Limited
2014/15 - \$ 1,000

Commencement date: 2014

Completion date: 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 found no advantages for the use of oxytocin at weaning, either through subcutaneous or intranasal administration, on the performance and welfare of pigs after weaning based on growth, stress or aggressive behaviour.

2.5. Delivery of Pork Quality Assurance+ Advisor Training and Certification Programs

Investigators: S. Moeller, D. Ricker

Funding: The National Pork Board

Commencement date: 2014

Completion date: ongoing

PQA Plus is a producer-driven program they can use to ensure U.S. pork products are of the highest quality and safe, and animals raised for food are cared for in a way ensuring their well-being. Modeled after the Hazard Analysis Critical Control Point (HACCP) programs used by food manufacturers to ensure the safety of food products, PQA was then customized for on-farm use. The Ohio State University delivers these QA and training programs to state pork producers.

2.6. Delivery of Transportation Quality Assurance Advisor Training and Certification

Investigators: S. Moeller, D. Ricker
Funding: The National Pork Board
Commencement date: 2014
Completion date: ongoing

The TQA program was developed for on-farm animal handlers, transporters and those who handle pigs at the destination site. It is a voluntary education-certification program, through which more than 13,000 individuals have been certified. Most of the major packers in the United States require TQA certification of all transporters delivering hogs to their facilities. The Ohio State University delivers this QA training programs to state producers and transport drivers.

2.7. 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
2014/15 - \$ 8,799
Commencement date: 2013
Completion date: 2014

This 1 year project examined 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 investigated the inter- and intra-observer reliability of the modified animal-based welfare indices included in the on-site pig welfare benchmarking protocol. The validity testing largely indicated a moderate relationship with slight to fair levels of agreement modified and validated methodologies. These results may be due a lack of variation in the condition of the animals sampled, rather than a genuine lack of validity of the modified methodologies. Moderate to substantial levels of agreement demonstrated the intra- and inter-observer reliability of the three modified methodologies as on-farm measures of body condition score, lameness and injury in group housed pigs. Given these findings, further validity testing in populations with greater variation is required to confirm the validity of the three modified methodologies

2.8. Redevelop ProHand® for the pork industry

Investigators: G. Coleman, P. Hemsworth and J. Skuse
Funding: Australian Pork Limited, Australian Meat Processor Corporation
2014/15 - \$ 74,366
Commencement date: 2013
Completion date: 2016

The objectives of this project are to design and deliver a stable, effective platform for the delivery of ProHand Pigs, ProHand Pig Transport and ProHand Pork Abattoir. The project also aims to deliver an integrated program which will target stockperson attitudes and introduce low stress handling concepts throughout the production chain

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

Investigators: J-L. Rault, D. Lay, C. Johnson, M Sutherland
Funding: National Pork Board (US)
Commencement date: 2013
Completion date: 2014

Collaborating with USDA, Massey University and AgResearch NZ, this project aimed to assess gas alternatives to carbon dioxide for piglet euthanasia on-farm. This project showed that nitrous oxide is a humane alternative to carbon dioxide, as it is much less aversive to piglets based on behavioural and neurophysiological (EEG) evidence.

2.10. ProHand® Pigs technical support

Investigators: J. Skuse and G. Coleman
Funding: Australian Pork Limited
2014/15 - \$ 11,500
Commencement date: 2012
Completion date: 2016

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

3. Poultry and egg industries

3.1. 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)
2014/15 - \$ 19,469
Commencement date: 2014
Completion date: 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 provided a summary of the up-to-date verifiable evidence.

3.2. Assessment of factors influencing behaviour and welfare of birds in free range systems (broilers)

Investigators: J-L. Rault, P. Hemsworth
Student: P. Taylor (PhD)
Funding: Rural Industries Research & Development Corp.
(Chicken meat)
2014/15 - \$39,790
Commencement date: 2013
Completion date: 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. The first experiment

investigated behaviour performed in various areas in the range. The second experiment is in early stages, using RFID tags to track birds and correlate use of the range with behaviour and physiology.

3.3. 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
2014/15 - \$ 96,896
Commencement date: 2012
Completion date: 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. The first experiment investigated behaviour performed in various areas in the range. The second experiment investigated the effects of artificial structures placed in the range to attract hens (vertical vs. horizontal, tall vs. short, and 3 different density of cover). The third experiment will use RFID tags to track hens and correlate use of the range with behaviour and physiology.

4. Beef and sheep industries

4.1. Assessing and Addressing On-Farm Sheep Welfare

Investigators: R. Doyle, P. Hemsworth, G. Coleman, J. Webb-Ware, A. Fisher, L. Kubeil
Student: C. Munoz (PhD)
Funding: Meat and Livestock Australia
2014/15 - \$ 235,222
Commencement date: 2014
Completion date: 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. A total of 952 people completed the survey in its entirety: General public = 512 (53.6%), Producer = 262 (27.4%), Scientist = 95 (9.9%), and Service provider = 87 (9.1%). Five groups of welfare indicators were identified. Numerous interesting data were collected. For example, when asked 'what is essential to know in order to assess the welfare of a sheep' all indicators were ranked as important: Pain and fear (3.98); Nutritional (4.22); Mortality and management (4.27); Feed on offer (4.4); Number of illnesses/injuries (4.33). The mean scores are presented in parentheses and the maximal value was 5 = 'essential to know'. There were also interesting differences between the stakeholder groups. Results are current being interpreted and will be written into a series of manuscripts.

4.2. Quantifying welfare improvements in the live export industry

Investigators: R. Doyle, P. Hemsworth, G. Coleman

Funding: Meat and Livestock Australia
2014/15 - \$ 111,422

Commencement date: 2014

Completion date: 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. In the first stage of this study the slaughter of 304 cattle was observed at Indoensian four abattoirs that stunned animals prior to slaughter and a manuscript of the study has been prepared and submitted to a journal for publication. The study provides novel information on the animal handling, management and human-animal interactions in Indonesian abattoirs and it highlights both negative and positive welfare outcomes that were common to all four abattoirs.

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

Investigators: P. Hemsworth, G. Coleman, E. Ponnampalam

Funding: Australian Meat Processor Corporation
2014/15 - \$ 50,486

Commencement date: 2013

Completion date: 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.

The behavioural characteristics (both on-farm and in lairage) and the pre-slaughter stress response of 400 lambs were recently examined and video analyses and endocrine assays are presently underway.

4.4. Lamb systems welfare: Ensuring animal welfare in Victorian lamb systems

Investigators: P. Hemsworth, A. Campbell, E. Jongman

Funding: Department of Economic Development, Jobs,
Transport and Resources

Student: M. Rice (MPhil)
2014/15 - \$ 275,000

Commencement date: 2012

Completion date: 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.

5. Companion, zoo, work animals

5.1. Human-animal relationships in zoos: Optimising animal and visitor experiences

Investigators: G. Coleman, P. Hemsworth, R. Rassool, K. Fanson, K. Butler, M. Magrath, V. Melfi, D. Peake, W. Shaw
Students: S. Chiew (PhD), L. Rehnsberg (PhD)
Funding: ARC Linkage
2014/15 - \$ 122,838
Commencement date: 2014
Completion date: 2017

Extensive research on human-animal relationships in agricultural and domestic settings shows that human-animal interaction affects animal behaviour and welfare, which in turn affect human attitudes to animals. As conservation and welfare organisations, zoos aim to provide visitors with opportunities to closely interact with animals to improve visitor experience and conservation outcomes, whilst maintaining good animal welfare. Some visitor interactions may be stressful for some animals creating conflict between animal welfare and visitor experience. By determining visitor effects, this project aims to provide zoos with practical animal management and educational strategies to optimise both animal welfare and visitor experience.

Experiments are commencing to examine the effects, both aversive and rewarding, of visitor contact on zoo animals such as quokkas, and reptiles.

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

Investigators: E. Jongman, and L. Hemsworth
Funding: ANZ Trustees, Kathleen Agnes Back Trust
2014/15 - \$ 50,000
Commencement date: 2013
Completion date: 2015

This project is developing an independent website, to be managed and maintained by the Victorian Horse Council (VHC), which will provide recreational horse owners with the resources required to appropriately manage their horses, in order to improve the welfare of recreational horses, and reduce the incidence of horse welfare investigations in Victoria. The website will include an interactive tool, based on a horse welfare assessment protocol which will consist of a range of welfare indices, including body condition score, lameness score, hoof score, injury score and dental score, which recreational horse owners will use to measure the health and welfare outcomes of their horses. The results of the assessment, inputted back into the program, will then direct horse owners to the areas of the website with information relevant to their outcomes.

5.3 Exploring trait anxiety, stress coping style and behaviour problems in dogs

Investigator: A. Fisher
Student: D. Wormald
External collaborators: Prof. A. Lawrence and Dr. G. Carter

Funding: University of Melbourne

Commencement date: 2013

Completion date: 2016

Anxiety-related behaviour problems which affect dogs include separation anxiety, thunderstorm and firework phobias, and anxiety-related aggression to people and other dogs. A range of predisposing factors to these behaviour problems are suspected. This PhD project aims to measure all three of these factors and look for differences between dogs that are affected or unaffected with anxiety-related behaviour problems.

6. General/Other

6.1. Human and animal interactions course impact study

Investigators: K. George and S. Moeller

Funding: Animals for Life Foundation
2014/15 - \$ 4,294

Commencement date: 2014

Completion date: 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.

6.2. Professor in Human-Animal relations at the University of Melbourne

Investigator: G. Coleman

Funding: Bureau of Animal Welfare
2014/15 - \$ 50,000

Commencement date: 2012

Completion date: 2015

6.3. 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
2014/15 - \$ 68,181

Commencement date: 2011

Completion date: 2015

6.4. Delivery of "Animals in Society" as a breadth subject at the University of Melbourne.

Funding: The University of Melbourne

Commencement date: 2008

Completion date: ongoing

This course is offered as a breadth subject throughout the University and is designed to encourage students to begin to think about how and why animals are so integral to human society. The course investigates the human-animal relationships, where they originated, during domestication, and where they are now.

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

Funding: The Ohio State University

Commencement date: 2007

Completion date: ongoing

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

Significant collaboration

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

14/15 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

14/15 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

Student: Kate Hartcher (PhD The University of Sydney)
Project: *The underlying behavioural motivation for the development of injurious feather-pecking and cannibalism in free-range laying hens.*

Supervisors: Greg Cronin, **Paul Hemsworth**, Stuart Wilkinson

Student: Rebecca Wilson (PhD Charles Sturt University)
Project: *Assessment and alleviation of adverse stimuli in pigs.*

Supervisors: **Rebecca Doyle**, Trish Holyoake, Greg Cronin

Student: Ashleigh Wildridge (PhD The University of Sydney)
Project: *Optimising the use of technology and infrastructure to improve cow wellbeing and farm profitability on a pasture based AMS*

Supervisors: Kendra Kerrisk, Cameron Clark, Sergio Garcia, **Ellen Jongman**

Centre RD&E Communications

1. Books / book chapters

Moran, J. and **Doyle, R.E.** (2015). Cow Talk: Understanding dairy cow behaviour to improve their welfare on Asian farms. CSIRO Publishing. ISBN: 9781486301614

2.a Research publications in refereed journals

Doyle, R. E., Groat, J., Wynn, P. and Holyoake, P. K. (2015). Physiological and non-physiological indicators of body condition score in pigs. *Journal of Animal Science* 93: 1-9

Hartcher, K.M., Tran, K.T.N., Wilkinson, S.J., **Hemsworth, P.H.**, Thomson, P.C. and Cronin, G.M. (2015). The effects of environmental enrichment and beak-trimming during the rearing period on subsequent feather damage due to feather-pecking in laying hens. *Poult Sci.* 2015 May;94(5):852-9. doi: 10.3382/ps/pev061. Epub 2015 Feb 25

Hartcher, K.M., Tran, M.K.T.N., Wilkinson, S.J., **Hemsworth, P.H.**, Thomson, P.C., Cronin, G.M. (2015). Plumage damage in free-range laying hens: Behavioural characteristics in the rearing period and the effects of environmental enrichment and beak-trimming. *Applied Animal Behaviour Science* 164, 64–72.

Hemsworth, L.M., **Jongman, E.C.** and **Coleman, G.J.** (2015). Recreational horse welfare: The relationships between recreational horse owner attributes and recreational horse welfare. *Applied Animal Behaviour Science* 165, 1-16 <http://dx.doi.org/10.1016/j.applanim.2014.11.019>

Hemsworth, P.H., Mellor, D.J., Cronin, G.M. and **Tilbrook, A.J.** (2015). Scientific assessment of animal welfare. *New Zealand Veterinary Journal*, 63, 1, 24-30. DOI 10.1080/00480169.2014.966167

Johnson, C.B., Mellor, D.J., **Hemsworth, P.H.** and **Fisher, A.D.** (2015). A scientific comment on the welfare of domesticated ruminants slaughtered without stunning. *New Zealand Veterinary Journal*, 63, 1, 58-65. DOI 10.1080/00480169.2014.964345

McGregor, B.A. and **Butler, K.L.** (2015). Wear of permanent incisors with age on commercial Australian Angora goat farms. *Australian Veterinary Journal*, 93, 36-39. DOI 10.1111/avj.12280

Mornement, K.M., **Coleman, G.J.**, Toukhsati, S.R. and Bennett, P.C. (2015). Evaluation of the predictive validity of the Behavioural Assessment for Re-homing K9's (B.A.R.K.) protocol and owner satisfaction with adopted dogs. *Applied Animal Behaviour Science*, 167, 35–42

Oliva, J. L., **Rault, J-L.**, Appleton, B., & Lill, A. (2015). Oxytocin enhances the appropriate use of human social cues by the domestic dog (*Canis familiaris*) in an object choice task. *Animal cognition*. 1-9.

Rault, J-L. (2015). Pets in the digital era: live, robot or virtual? *Front. Vet. Sci.* doi: 10.3389/fvets.2015.00011

Rault, J-L., Ferrari, J., Pluske, J.R. and Dunshea, F.R. (2015). Neonatal oxytocin administration and supplemental milk ameliorate the weaning transition and alter hormonal expression in the gastrointestinal tract in pigs. *Domestic Animal Endocrinology*, 51:19-26. DOI: 10.1016/j.domaniend.2014.11.001.

Sherwen, S.L., Harvey, T.J., Magrath, M.J., **Butler, K.L.**, Fanson, K.V. and **Hemsworth, P.H.** (2015). Effects of visual contact with zoo visitors on Black-capped Capuchin welfare. *Applied Animal Behaviour Science* DOI: 10.1016/j.applanim.2015.03.004.

Stevens, B., **Karlen, G.M.**, Morrison, R., Gonyou, H.W., Butler, K.L., **Kerswell, K.J.** and **Hemsworth, P.H.** (2015). Effects of stage of gestation at mixing on aggression, injuries and stress in sows, *Applied Animal Behaviour Science*, 165, 40-46. <http://dx.doi.org/10.1016/j.applanim.2015.02.002>

Verdon, M., Hansen, C. F., Rault, J-L., Jongman, E., Hansen, L. U., Plush, K., & Hemsworth, P. H. (2015). Effects of group-housing on sow welfare: A review. *Journal of Animal Science*. In press: 10.2527/jas2014-8742

Colditz, I.G., Ferguson, D.M., Collins, T., Matthews, L. and **Hemsworth, P.H.** (2014). A prototype tool to enable farmers to measure and improve the welfare performance of the farm animal enterprise: The Unified Field Index. *Animals* 2014, 4(3), 446-462; doi:10.3390/ani4030446

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* 156, 62–69

Fisher, A.D., Stevens, B.H., Conley, M.C., Jongman, E.C., Lauber, M.C., Hides, S.J., Anderson, G.A., Duganzich, D.M. and Mansell, P.D. (2014) The effects of direct and indirect road transport consignment in combination with feed withdrawal in young dairy calves. *Journal of Dairy Research*, 81,pp 297-303.

Ralph, C.R., Hemsworth, P.H., Leury, B.J. and Tilbrook, A.J. (2014). Relationship between plasma and tissue corticosterone in laying hens (*Gallus gallus domesticus*): implications for stress physiology and animal welfare. *Domestic Animal Endocrinology* 50 (2015) 72–82.

Rault, J-L., Morrison, R.S., Hansen, C.F., Hansen, L.U. and Hemsworth, P.H. (2014). Effects of group housing after weaning on sow welfare and sexual behavior. *Journal of Animal Science*, 92(12):5683-5692. DOI: 10.2527/jas2014-8238

Rault, J-L., Hemsworth, P.H., Cakebread, P.L., Mellor, D.J. and Johnson, C.B. (2014). Evaluation of microwave energy as a humane stunning technique based on electroencephalography (EEG) of anaesthetised cattle. *Animal Welfare* 2014, 23: 391-400, doi: 10.7120/09627286.23.4.391

Rowell, Z.E. (2014). Locomotion in captive Asian elephants (*Elephas maximus*). *Journal of Zoo and Aquarium Research*, Vol 2, No 4, pp130-135. <http://www.jzar.org/jzar/article/view/50/48>

2.b Research papers in press

Beggs, D.S., Fisher, A.D., Jongman, E.C. and Hemsworth, P.H. (2015). A survey of Australian dairy farmers to investigate animal welfare risks associated with increasing scale of production. *Journal of Dairy Science* (in press)

Verdon, M., Hansen, C. F., Rault, J-L., Jongman, E.C., Hansen, L. U., Plush, K., and Hemsworth, P. H. (2015). Effects of group-housing on sow welfare: A review. *Journal of Animal Science* (in press).

3.a Refereed Conference publications

Rault, J-L., Scott, P. Tilbrook, A. and Hemsworth, P.H. (2015). The effect of time off water on the welfare of spent laying hens. *Aust.Poult.Sci.Symp.* 26. pp245-47

Taylor, P., Hemsworth, P.H., Dawkins, M.S., Groves, P. and Rault, J-L. (2015). Free-range broiler chicken behavioural time budgets: Inside and outside of the shed. *Aust.Poult.Sci.Symp.* 26. p227.

Chiew, S., Hemsworth, P.H., Magrath, M. and Sherwen, S. (2014). The effect of zoo visitors on reptile behaviour. *ISAE Regional Meeting, Sydney*, p17

Coleman, G.J., Roberts, L. and Rohlf, V. (2014). Benchmarking stockmanship for welfare assessment. *Proceedings of the 6th International Conference on the Assessment of Animal Welfare at the Farm and Group Level (WAFL), France*, p64

Doyle, R.E., Primmer, T., Casey, R., Freire, R., Neilsen, S. and Mendl, M. (2014). Using judgment bias to assess positive affect in dogs. *48th Congress of the International Society for Applied Ethology (ISAE), Spain*, p21

Ficken, K., Jongman, E.C., Moss, D. and Magrath, M. (2014). Effects of change in management approach on elephant welfare at Melbourne Zoo. ISAE Regional Meeting, Sydney, p24

Hartcher, K., Wilkinson, S., **Hemsworth, P.H.** and Cronin, G.J. (2014). The association between feather-eating and severe feather-pecking in free range laying hens. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p293

Hemsworth, L. and Skuse, J. (2014). The development of practical measures to benchmark pig welfare in the Australian pork industry. Proceedings of the 6th International Conference on the Assessment of Animal Welfare at the Farm and Group Level (WAFL), France, p69

Hemsworth, P.H. and Doyle, R.E. (2014). The effects of human-ruminant interactions on animal welfare and productivity in the tropics. 16th Asian-Australasian Association of Animal Production Societies, Yogyakarta, Indonesia, pp 73-83.

Jongman, E.C. and Fisher, A.D. (2014). Effect of feeding frequency and total amount of milk replacer on young calves. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p269

Larsen, H., Cronin, G., Hemsworth, P.H., Smith, C. and Rault, J-L. (2014). Behaviour of free-range laying hens in distinct outdoor environments. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p186

Lee, C. **Fisher, A.D., Colditz, I.G. Lea, J and Ferguson, D.M. (2014).** Assessment of cattle motivation for access to pasture or feedlot environments. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p95

Ly, L., Larsen, H. and Rault, J-L. (2014). Should I stay or should I go? Ranging distance in free-range laying hens. ISAE Regional Meeting, Sydney, p28

Oliva, J.L., **Rault, J.L.,** Appleton, B. and Lill, A. (2014). Owner perceived closeness and owner perceived intelligence of dog can predict dog's performance on object choice task. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p120

Rault, J-L. and Taylor, R. (2014). Nature of agonistic behaviours between sows mixed at different space allowances. 48th Congress of the International Society for Applied Ethology (ISAE), Spain, p189

Rice, M., Ng, C. and Hemsworth, L. (2014). The assessment of animal welfare in pig research settings. Proceedings of the 6th International Conference on the Assessment of Animal Welfare at the Farm and Group Level (WAFL), France, p122

Webb, C., Holmes, R. and Hemsworth, P.H. (2014) An investigation into the efficacy and welfare implications of associative learning in puppies using positive and negative conditioning. ISAE Regional Meeting, Sydney, p21

Wormald, D., Lawrence, A, Carter, G. and Fisher, A.D. (2014). Validation of modified open field behaviour as a measure of trait anxiety in the dog. ISAE Regional Meeting, Sydney, p12

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.

3.c Industry and other presentations

- Andrew Fisher attended the AVA Northern Victorian Branch meeting on 2nd of July in Bendigo. He gave a presentation on dairy calf health and welfare and presented results of Jongman feeding study. 20 Vets attended.
- Dan Weary (UBC Canada), Andrew Fisher (AWSC) and Ellen Jongman spoke at the AWSC dairy cow welfare seminar. Topics included cow comfort and lameness, farm size and animal welfare, understanding public views, welfare in new feeding

systems and feeding and transport of bobby calves. 22 attendees from industry, animal welfare groups.

- Ellen Jongman presented AWSC current research in dairy at an AWSC – convened Dairy Welfare RD&E planning meeting on 1st December. 17 attendees (AWSC Scientists, DA, Veterinarians, DEPI, RSPCA, Consultants).
- Ellen Jongman, Rebecca Doyle and Paul Hemsworth presented AWSC current research in sheep welfare at an AWSC – convened Sheep Welfare RD&E planning meeting on 4th September. 18 attendees (AWSC Scientists, MLA, AWI, AMPC, Veterinarians, DEPI, RSPCA, Consultants).
- Hosted a delegation from National Taiwan Univ, National Chung Hsing Univ and National Chiayi Univ from Taiwan. Interested in collaboration in pig and poultry research. Extended an invitation for a Centre scientist to present a seminar in Taiwan in December. Rebecca Doyle conducted 3 seminars at 3 universities in early December to a mixed audience of over 250 scientists and industry representatives.
- Paul Hemsworth delivered an invited presentation, “The effects of human-ruminant interactions on animal welfare and productivity in the tropics” at the 16th Asian-Australasian Association of Animal Production Societies, Yogyakarta, Indonesia in November 2014.
- Paul Hemsworth delivered an invited presentation, “The effects of stockperson education and training on farm animal welfare” at an International Conference, Improving pig welfare–what are the ways forward? Danish Ministry of Food, Agriculture and Fisheries, Copenhagen, Denmark, April 2015.
- Doyle – presented at LiveEX - ‘Quantifying welfare improvements in the live export industry’
- Paul Hemsworth, Jean-Loup Rault presented AWSC current research in pig welfare at an AWSC – convened Pig Welfare RD&E planning meeting on 16th September. 22 attendees (AWSC Scientists, APL, Pork CRC, Industry, Veterinarians, DEPI, RSPCA, Consultants).
- Coleman – Presentation at 4th National Primary Industries AW RD&E Forum on Oct 30, Sydney – “Development of a monitoring scheme to inform livestock animal welfare policy”.
- Skuse - Presentation at 4th National Primary Industries AW RD&E Forum on Oct 30, Sydney – “Development of an AW project register”.
- Skuse - Presentation at Vic Pig Fair, Apr 15, Bendigo, – “ProHand redevelopment – an update”.

4. Research Reports

Hemsworth, P.H. and Rault, J-L. (2014). National Welfare RD&E Capacity Building Project. Final report to Australian Pork Limited. 2011/2204.

Hemsworth, P.H., Morrison, R., Tilbrook, A. Butler, K., Rice, M. and Moeller, S. (2014). Effects of floor space on the welfare of group housed sows. Final report to the Co-operative Research Centre for High Integrity Australian Pork. 1C-105.

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. B.AWW.0232

Jongman, E., Hemsworth, L.M. and Skuse, J.M. (2014). Validation of on-farm pig welfare indices. Final report to Australian Pork Limited. 2013/062.

Rault, J-L. and Lay, D.C. (2014). Nitrous Oxide for piglet euthanasia: validation by electroencephalography (EEG). Final report to the National Pork Board. NPB #13-109.

Rault, J-L. and Matthews, L. (2014). Review of evidence to underpin development of Welfare Standards and Guidelines. Final report to RIRDC Chicken meat. PRJ-009533.

Rault, J-L., Dunshea, F. and Pluske, J. (2014). Oxytocin effects on the response of piglets to weaning. Final report to Australian Pork Limited. 2014/2136.

Rault, J-L., Plush, K. and Langendijk, P. (2014). The sensitivity of sows to stressors throughout gestation. Final report to the Co-operative Research Centre for High Integrity Australian Pork. 1C-108.

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 Seminars

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

October '14

Isabelle Veissier, INRA, France

Animal welfare - Towards transdisciplinarity -

Research at INRA -

[PDF](#)

[VIDEO](#)

[PDF](#)

[VIDEO](#)

September '14

AWSC Dairy cow and calf welfare seminar

Dan Weary, University of British Columbia

Cow comfort and lameness

Farm size and animal welfare

Understanding public views

[PDF](#)

[VIDEO](#)

[PDF](#)

[VIDEO](#)

[PDF](#)

[VIDEO](#)

Andrew Fisher, AWSC, The University of Melbourne

Dairy cow welfare in new farm feeding systems

[PDF](#)

[VIDEO](#)

Ellen Jongman, AWSC, The University of Melbourne

Feeding and transport of bobby calves

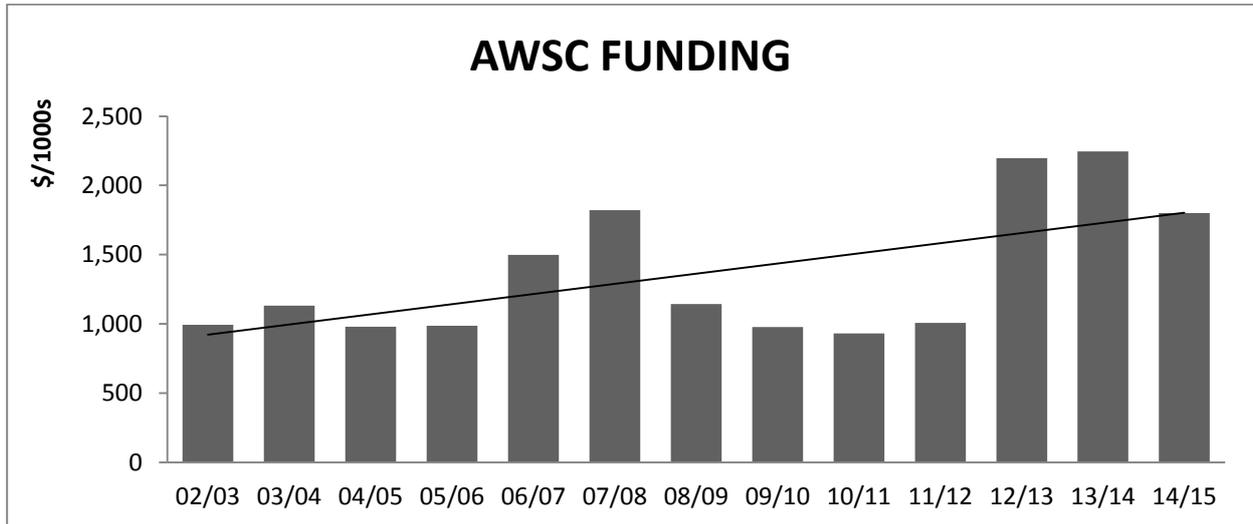
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[VIDEO](#)

Addendum – AWSC KPIs

1. Increase funding by 10% annually

Funding 2014 / 2015 - \$ 1,795,336



2. Increase conference presentations

Refereed	2009/2010	2010/2011	2011/2012	2012/2013	2013/14	2014/15	TOTAL
Congress of ISAE	15	6	11	10	No conference in reporting year	7	49
Australian Poultry Science Symposium	2	5	1	2	2	2	14
Australasian Pig Science Association (Biennial)	3	-	5	-	5	-	13
ISAE Regional Meeting	-	-	-	7	6	5	18
Assessment of Animal Welfare at the Farm and Group Level (WAFL)	-	-	-	-	-	3	3
Asian-Australasian Association of Animal Production Societies	-	-	-	-	-	1	1
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	25	14	18	120

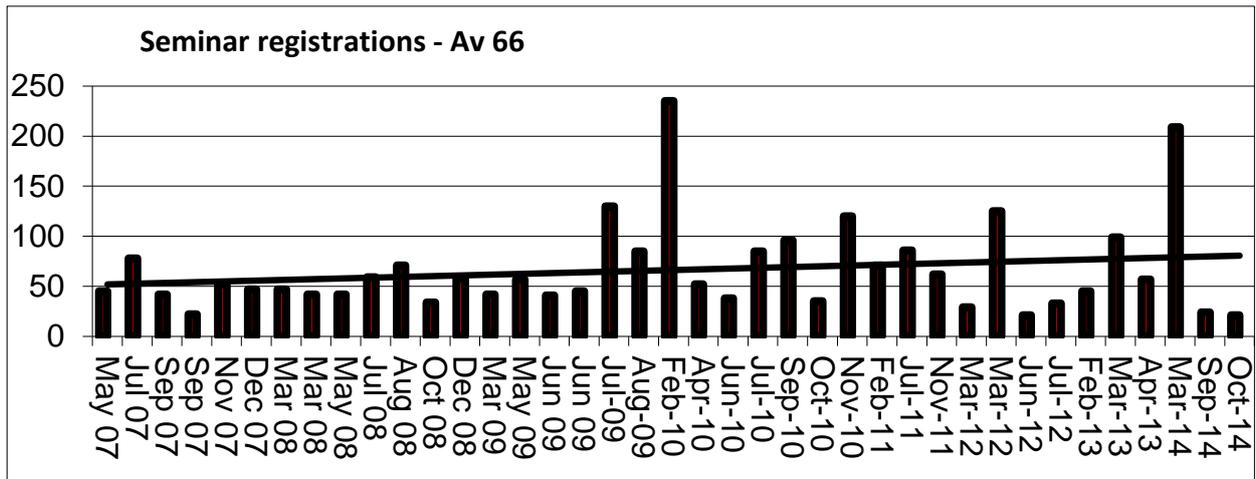
3. Increase the publication of papers in high quality journals

Journal	2013 Impact factor	2010/2011	2011/2012	2012/2013	2013/14	2014/15	TOTAL
Animal Cognition	2.631					1	
Animal Frontiers	Not cited	-	-	1	-		1
Animal Production Science	1.028	3	2	2	3		10
Animal Welfare	1.228	-	1	2	-	1	3
Animals	Not cited	-	1	-	1	1	2
Anthozoos	0.672	-	2	1	1		4
Applied Animal Behaviour Science	1.626	1	3	1	5	6	11
Asia-Pacific Journal of Endocrinology	Not cited	1	-	-	-		1
Australian Veterinary Journal	1.018	-	-	3	1	1	4
Behavioural Processes	1.457	2	1	-	-		3
Biology of Reproduction	3.451	1	-	-	-		1
CAB Reviews	Not cited	1	-	-	-		1
Domestic Animal Endocrinology	1.783	-	-	-	-	2	-
Endocrinology	4.644	1	-	-	-		1
Ethology	1.556	-	-	-	1		1
Frontiers of Veterinary Science	Not cited					1	
Hormones and Behavior	4.511	-	1	-	-		1
Hypertension	7.632	1	-	-	-		1
Journal of Animal Science	1.920	-	2	1	1	3	4
Journal of Applied Animal Welfare Science	0.694	3	-	-	-		3
Journal of Dairy Research	1.394					1	
Journal of Dairy Science	2.550	1	1	-	1		3
Journal of Neuroendocrinology	3.507	1	1	-	-		2
Journal of Neuroscience Methods	1.959	-	1	-	-		1
Journal of Proteome Research	5.001	-	1	-	-		1
Journal of Veterinary Behaviour	1.221	-	3	-	-		3
Journal of Veterinary Medical Education	0.826	-	-	-	-		-
Journal of Zoo & Aquarium Research	Not cited					1	
Neuroendocrinology	4.934	-	-	-	-		-
Neuropsychopharmacology	7.833	1	-	-	-		1
NZ Veterinary Journal	1.219					2	
Poultry Science	1.544					1	
Preventative Veterinary Medicine	2.506	-	-	-	-		-
Physiology and Behavior	3.033	1	-	1	-		2
Professional Animal Scientist	Not cited	-	-	1	-		1
Psychoneuroendocrinology	5.591	1	-	-	-		1
Stress	3.463	1	-	-	1		2
The Veterinary Journal	2.165	-	1	-	2		3
	TOTAL	20	21	13	17	21	72
	AV Impact Factor	2.856	1.908	1.347	1.670	1.630	

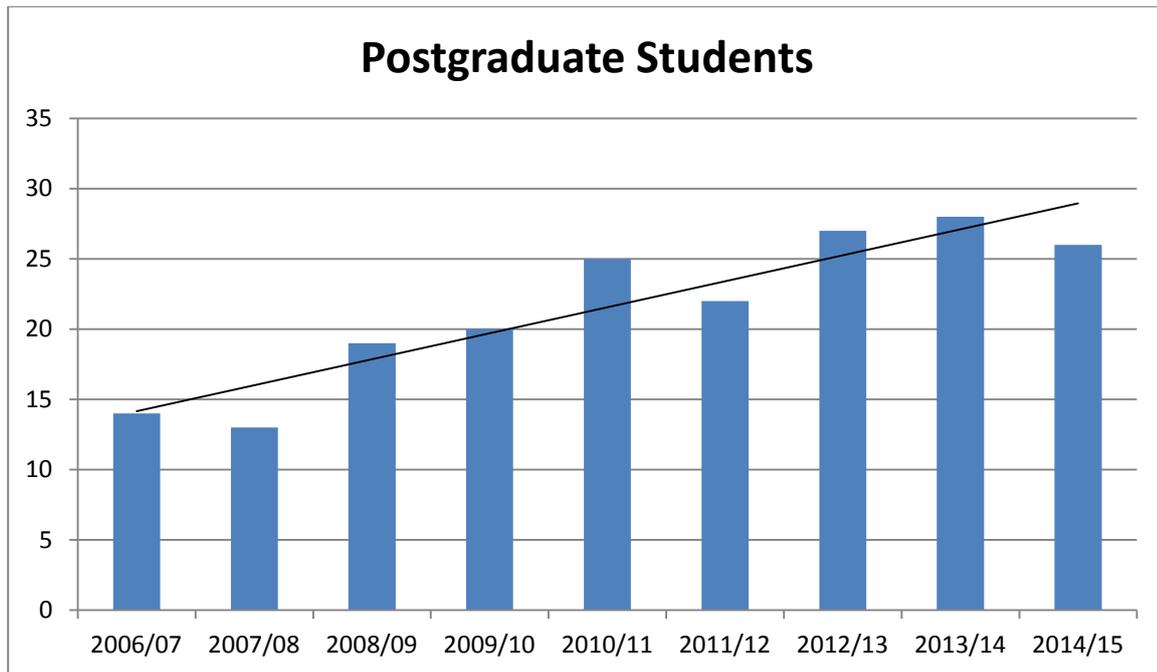
4. AWSC Representation on committees in a technical/advisory capacity

AECL Hen Welfare Advisory Group	Paul Hemsworth Alan Tilbrook
APL Specialist Group 2 (Genetics, reproduction and welfare)	Paul Hemsworth Alan Tilbrook
Animal Welfare Advisory Committee	Paul Hemsworth Jean-Loup Rault (alt)
Animal Welfare Advisory Committee <i>Responsible Pet Ownership Advisory Committee</i>	Grahame Coleman Paul Hemsworth
Animal Welfare Advisory Committee <i>Animal welfare education working group</i>	Grahame Coleman Jeremy Skuse
Australian Cattle Welfare Standards Reference Group	Andrew Fisher
Australian Sheep Welfare Standards Writing Group	Andrew Fisher
Council for Sustainable Egg Farming	Paul Hemsworth Jean-Loup Rault
DEDJTR Beef and Sheep Industry Leadership Group	Paul Hemsworth
DEDJTR Dairy Industry Leadership Group	Andrew Fisher
DEDJTR Livestock Industry Consultative Committee	Andrew Fisher
Dairy Moving Forward Animal Husbandry Steering Group	Paul Hemsworth Andrew Fisher
Hassad-Australia Animal Welfare Committee	Paul Hemsworth
International Society of Applied Ethology	Jean-Loup Rault (sec)
International Society of Applied Ethology, Australasia-Africa	Rebecca Doyle (sec)
National Pork Board Animal Science Committee	Steve Moeller
National Pork Board Extension Educators Executive Committee	Steve Moeller
National Pork Board Youth Pork Quality Assurance Committee	Steve Moeller
National Primary Industry Animal Welfare R,D&E	Alan Tilbrook (Chair)
Strategy Steering Committee	Paul Hemsworth
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee	Paul Hemsworth
Pork CRC R&D Committee	Alan Tilbrook
Red Meat Co-investment Committee	Alan Tilbrook

5. Measure seminar attendance



6. Increase number of post-graduate students



Notes

**Copies of the Animal Welfare Science Centre Annual Report
2014 – 2015 are available on request from:**

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