

ANIMAL WELFARE
SCIENCE CENTRE

**THE ANIMAL WELFARE
SCIENCE CENTRE
VICTORIAN NODE
ANNUAL REPORT
2015-2016**

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Foreword

The Animal Welfare Science Centre, (AWSC) welcomed two new partners during the past year.

The South Australian State Government's research institute (South Australian Research and Development Institute, SARDI) and the University of Adelaide will add to the Centre's expertise to create one of the largest animal welfare focused research groups in the world, bringing together key scientific expertise and research infrastructure to improve animal welfare standards across government, industry, community and academic sectors. The Ohio State University is expected to re-join the Centre under a joinder agreement in late 2016.

The Centre undertook its third external review in 2015, and the review panel, chaired by Dr Graham Mitchell AO, delivered its report and recommendations to the Board of the AWSC in July 2015. The review report and supporting documents can be found on the AWSC website by following the following link – [AWSC 2015 Review](#).

Background

The Centre has four 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 South Australian Research and Development Institute, (SARDI), Livestock & Farming Systems.
- The University of Adelaide, (UOA), School of Animal and Veterinary Sciences.

Across partner organisations, the AWSC has capability across a wide range of research disciplines:

Applied Ethology, Biometrics, Immunology, Neurophysiology, Neuroendocrinology, Psychology, Sociology, Stress Physiology and Veterinary Science.

Research is conducted across a range of animal sectors including pork, dairy, eggs, meat chicken, beef, sheep meat, wool, companion animals and zoo animals.

Scientists also provide technical and advisory functions on Government, industry and scientific committees including the National Primary Industries Animal Welfare R,D&E Strategy and the OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee.

The Centre has a long-established relationship with the College of Veterinary Medicine and the Department of Animal Sciences at The Ohio State University (OSU).

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

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 and care 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 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 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 (now re-named as the Centre for Animal Welfare Science and Bioethical Analysis; the David Bayvel Consortium) 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'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"

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 development or revision of animal welfare standards and guidelines and 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 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.

Centre personnel

Staff of the Centre (VIC Node)

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.

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, DEDJTR, 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.

Prof. Andrew Fisher (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Chair of Cattle and Sheep Production Medicine. 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 the human-animal relationship and its influence on animal welfare and productivity, field welfare assessment in farm and companion animals and developing education programs for recreational horse owners.

Dr. Tiffani Howell (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Tiffani currently works closely with Grahame Coleman in delivering the Centre's program on attitudinal research.

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. 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 the University of Melbourne, Australian Egg Corporation Limited, Rural Industries Research Corporation (Chicken meat) and grants obtained from the Pork industry.

Mr. Jeremy Skuse (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Jeremys interests lie in translating research outcomes into practice change in the livestock industries.

Dr. Megan Verdon (Faculty of Veterinary & Agricultural Sciences, The University of Melbourne) – Megan's interests include the effects of mixing and early socialisation on the welfare of pigs.

Associate Scientists

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.

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. 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.

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

Andrew Carlyon, Research Assistant, The University of Melbourne

Samantha Borg, Technical Officer, The University of Melbourne

Emily McLeod, Research Assistant, The University of Melbourne

Maxine Rice, Research Assistant, The University of Melbourne

Jeremy Skuse, Executive Officer, AWSC – VIC, The University of Melbourne

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.

Leigh Atkinson (MSc student, The University of Melbourne) - Working on cognitive bias in sheep

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.

Meghan Berghamin (MSc student, The University of Melbourne) - Working on Duty of Care for companion animals.

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.

Sarah Cook (MSc student, The University of Melbourne) - Working on conditioned feeding to increase feed intake in a mature gilt model.

Natalia Espejo (MSc student, The University of Melbourne) – Investigating the feeding behaviour of sows and its relationship to sow aggression and welfare.

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

Ruby Fones (MSc student, The University of Melbourne) – Relationship between dog behaviour and lamb fear behaviour pre-slaughter.

Belinda Hall (MSc student, The University of Melbourne) - Working on zoo animal welfare at Taronga Zoo.

Megan Hayes (Hons student, The University of Melbourne) – Developing a canine approach-avoidance test to measure the behavioural response of a dog to an unknown human in the field.

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.

Samuel Healey (MSc student, The University of Melbourne) - Developing a welfare assessment tool for guardian dogs.

Maria Jorquera (MSc student, The University of Melbourne) – Looking at the relationship between heat tolerance, milking times and temperament of dairy cows milked with a robotic milking system.

Rebecca Kite (MSc student, The University of Melbourne) – Development of a practical animal welfare assessment tool for elephants at Melbourne Zoo.

Sarah Kuyken (PhD candidate, The University of Melbourne) – Development and trial of a horse welfare assessment tool and an investigation into its effects on the welfare of recreational horses.

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

Mark Learmonth (PhD candidate, The University of Melbourne) - Human interaction as enrichment for zoo-housed animals.

Carolina Muñoz (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.

Lydia Rehnberg (PhD candidate, The University of Melbourne) - Working 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.

Marina Salazaar (Hons student, The University of Melbourne) – Wireless EEG in piglets.

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

Desiree Smith (MSc student, The University of Melbourne) – Working on environmental enrichment for kangaroos at Zoos Vic.

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.

Shuto Suzuki (Hons student, The University of Melbourne) – Wireless EEG and emotional states in pigs.

Jessalyn Taylor (MSc student, The University of Melbourne) – Identifying visitor-zoo animal interactions that are perceived as positive in nature for captive fur seals.

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

Elanor Tiernan (MSc student, The University of Melbourne) – Effects of summer evening concerts on zoo animals.

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

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

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

Jinyu Yan (MSc student, The University of Melbourne) – Investigating the relationship between social hierarchy and sham-chewing in group housed sows.

Board of Management

Dr. Greg Harper

Interim Chair. Executive Director, Agriculture Research and Development, Agriculture and Rural Division, Department of Economic Development, Jobs, Transport and Resources

Prof. Gavin Begg

Research Chief, South Australian Research and Development Institute, Aquatic Sciences.

Assoc. Prof. Brian Leury

Acting Dean, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne.

Prof. Phil Hynd

Deputy Head, School of Animal and Veterinary Sciences, The University of Adelaide.

Dr. Robert Holmes

Animal Behaviour Clinics (Ex-officio).

Professor Paul Hemsworth
(officio).

Co-Director AWSC, The University of Melbourne (Ex-

Professor Alan Tilbrook

Co-Director AWSC, SARDI Livestock and Farming Systems (Ex-officio).

AWSC Representation on committees in a technical/advisory capacity

AECL Hen Welfare Advisory Group	Paul Hemsworth
APL Specialist Group 2 (Genetics, reproduction and welfare)	Paul Hemsworth
Animal Welfare Advisory Committee	Paul Hemsworth Jean-Loup Rault (alt)
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 Livestock Industry Consultative Committee	Andrew Fisher
Dairy Moving Forward Animal Husbandry Steering Group	Paul Hemsworth Andrew Fisher
Greyhound Racing Victoria Welfare Committee	Grahame Coleman
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)
RSPCA Victoria Animal Welfare Policy Committee	Ellen Jongman
National Primary Industries Animal Welfare Strategy Steering Committee	Paul Hemsworth
OIE <i>ad hoc</i> Group on Animal Welfare and Pig Production Systems	Paul Hemsworth
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee	Paul Hemsworth
Zoos Victoria Animal Welfare Peer Review Committee	Paul Hemsworth

Summary of major Centre RD&E projects and 2015/16 project funding if applicable

1. Dairy industry

1.1. Ensuring dairy cow welfare with increasing scale of production

Investigators: A.Fisher
Student: D. Beggs (PhD)
Funding: Dairy Australia
2015/16 - \$ 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.

1.2. Dairy welfare

Investigators: A. Fisher, P. Hemsworth, E. Jongman, G. Coleman
Student: M. Jorquera (MSc)
Funding: Department of Economic Development, Jobs, Transport and Resources
2015/16 - \$ 336,000
Commencement date: 2015
Completion date: 2016

This 1-year project will contribute to enhanced management strategies for large herds, (resulting in better welfare outcomes) and management strategies related to heat stress in dairy cows and behavioural changes of dairy cows selected for heat adaptation.

2. Pork industry

2.1. The feeding behaviour of sows and its relationship to sow welfare and reproduction

Investigators: M. Verdon, R. Morrison, P. Hemsworth
Student: Natalia Espejo (MSc)
Funding: CRC for High Integrity Australian Pork
2015/16 - \$ 14,280
Commencement date: 2016
Completion date: 2016

This project will determine the relationships between sow feeding behaviour, welfare and productivity when sows are fed over multiple feed drops per day.

2.2. Welfare implications of group lactation at various ages

Investigators: J-L. Rault, R. Morrison, M. Verdon
Funding: CRC for High Integrity Australian Pork
2015/16 - \$ 85,884
Commencement date: 2015
Completion date: 2016

This project will examine the implications of grouping sows during lactation on sow and piglet welfare and productivity, and comparing grouping at 7 and 14 days after farrowing in a commercial setting. A two-stage lactation systems may bring immediate benefits in terms of sow welfare, and possibly long-term benefits for the development of pigs' social skills in later life.

2.3. Carbon dioxide stunning of pigs

Investigators: J-L. Rault, E.C. Jongman
Student: R. Woodhouse (MPhil)
Funding: Australian Pork Limited
2015/16 - \$ 108,561
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.

2.4. 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
2015/16 - \$ 83,588
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.

2.5. Conditioned feeding to increase feed intake in the mature gilt model

Investigators: L.M. Hemsworth
Student: S. Crook (MSc)
Funding: Commonwealth

2015/16 - \$ 20,000

Commencement date: 2016

Completion date: 2017

2016 Science and Innovation Awards (APL sponsored): This project aims to provide proof of concept in the use of conditioning to facilitating meal initiation and increasing feed intake in mature gilts as a model for lactating sows. The project will be conducted over 3 replicates. Masters student – Sarah Cook

2.6. Redevelop ProHand® for the pork industry

Investigators: G. Coleman, P. Hemsworth and J. Skuse

Funding: Australian Pork Limited, Australian Meat Processor Corporation

2015/16 - \$ 30,000

Commencement date: 2013

Completion date: 2016

This project delivered a stable, effective platform for the delivery of ProHand Pigs, and ProHand Pork Abattoir. Training can be undertaken on-line or remotely for sites with limited internet access.

2.7. ProHand® Pigs technical support

Investigators: J. Skuse and G. Coleman

Funding: Australian Pork Limited

2015/16 - \$ 11,500

Commencement date: 2012

Completion date: 2017

This project provides technical support to ProHand® Pigs and Abattoir training.

3. Poultry and egg industries

3.1. 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)

2015/16 - \$39,790

Commencement date: 2013

Completion date: 2016

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. Finishing in May and June 2016.

3.2. 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
Commencement date: 2012
Completion date: 2016

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
2015/16 - \$ 78,812
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.

4.2. Quantifying welfare improvements in the live export industry

Investigators: R. Doyle, P. Hemsworth, G. Coleman
Funding: Meat and Livestock Australia
2015/16 - \$ 46,165
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.

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

Student: C. Muñoz

Funding: Australian Meat Processor Corporation
2015/16 - \$ 32,631

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.

4.4. Lamb welfare

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

Funding: Department of Economic Development, Jobs,
Transport and Resources
2015/16 - \$ 224,000

Commencement date: 2015

Completion date: 2016

This 1-year project will determine the relationships between stockperson characteristics, lamb behaviour pre-slaughter, and measures of stress, metabolic state, hydration, and muscular exhaustion and bruising post-slaughter. It will also investigate the stockperson attitude-stockperson behaviour-animal stress relationships at abattoirs.

4.5. Welfare implications of "NumNuts"

Investigators: E. Jongman

Funding: Meat and Livestock Australia
2015/16 - \$ 87,509

Commencement date: 2015

Completion date: 2016

This 1-year project will assess pain responses following castration of lambs using an Elastrator ring with and without midline injections of lignocaine.

4.6. Animal Welfare training for beef stockpeople in China

Investigators: R. Doyle, P. Hemsworth, A. Fisher, M. Reed (Elders International), R. Warner, J. Larsen

Funding: Australian / China agricultural agreement, Elders
2015/16 - \$ 17,658

Commencement date: 2016

Completion date: 2017

This project will deliver animal welfare training to Chinese stockpeople who work in the beef industry.

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
2015/16 - \$ 117,061

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.

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

Investigators: E. Jongman, and L. Hemsworth

Student: S. Kuyken

Funding: ANZ Trustees, Kathleen Agnes Back Trust
2015/16 - \$ 25,000

Commencement date: 2013

Completion date: 2016

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.

6. General/Other

6.1. Animal Welfare Science Centre (VIC Node)

Investigators: P. Hemsworth, J. Skuse
Funding: Department of Economic Development, Jobs,
Transport and Resources, The University of Melbourne
2015/16 - \$178,295
Commencement date: 2015
Completion date: 2020

This project supports the operation of the Victorian node of the AWSC to deliver services to the AWSC board in its governance activities, effectively communicate the work of the AWSC in providing independent, authoritative scientific knowledge and advice to government, industry and the community and maintain a reliable, independent and accessible knowledge resource.

6.2. Australian Animal Welfare Views.

Investigators: J-L Rault, V. Rohlf, T. Howell, G. Coleman
Funding: National Primary Industries Animal Welfare RD&E Strategy
and Department of Agriculture
2015/16 - \$ 26,814
Commencement date: 2015
Completion date: 2016

Aims to develop a Web forum for social engagement on key topics relating to animal welfare. Funded by Commonwealth Department of Agriculture, Australian Egg Corporation, Australian Pork, Rural Industries R&D Corporation, Meat and Livestock Australia, Dairy Australia and Livecorp.

Significant collaboration

Attitudes to piglet euthanasia

Investigators: P. Holyoake, **J-L Rault, G.J. Coleman**
Funding: Australian Pork Limited
Commencement date: 2014
Completion date: 2016

The objective of this project is to develop flexible protocols backed up by training resources to identify, assess and euthanize compromised pigs based on sound decision-

making. These resources will be developed following consultation of stockpersons to determine their attitudes and knowledge of euthanasia.

A novel two-step gas system to allow for humane on-farm euthanasia of piglets

Investigators: D. Lay, **J-L Rault**, R. Gates

Funding: National Pork Board (US)

Commencement date: 2015

Completion date: 2017

This project forms part of a large USDA/ NIFA project. Part 1, aims to measure a piglet's aversion to a gas chamber following a previous exposure to a gas treatment in the chamber and part 2 aims to validate telemetric EEG recording in freely moving pigs in order to assess the welfare implications of inhaling nitrous oxide.

Intra-specific behavioural contagion of the human-animal relationship in pigs

Investigators: C. Tallet, M.C. Meunier-Salaun, **J-L Rault**

Funding: INRA

Commencement date: 2016

Completion date: 2016

Collaborative research project with INRA (St Gilles, France; pork behaviour and physiology team), Jean-Loup co-supervision of a Master student: Oceane Leribillard (University of Rennes 1, France), in collaboration with Celine Tallet and Marie-Christine Meunier-Salaun on the topic: "Intra-specific behavioural contagion of the human-animal relationship in pigs".

Effect of perch height on meat chicken behaviour

Investigators: R. Poletto, **J-L Rault**

Funding: Instituto Federal do Rio Grande do Sul, Brazil

Commencement date: 2016

Completion date: 2017

This project will examine the effect of perch height on the perching behavior of meat chickens. The experiments will be carried out in facilities of the Câmpus Sertão, Instituto Federal do Rio Grande do Sul, Brazil.

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

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 practice reproduction and welfare management.

Final reports

AECL Project 1UM121. Free-range hen welfare: Characterisation of ‘outdoor’ and ‘indoor’ hens and physical features in the range. Jean-Loup Rault, Paul Hemsworth and Greg Cronin.

APL Project 2013/030. The re-development of ProHand: Training programs for stockpeople in the pig industry. Grahame Coleman, Paul Hemsworth, Jeremy Skuse, Tammie King, Vanessa Rohlf, Tiffani Howell.

DEDJTR Project 105527. Lamb Welfare. Paul Hemsworth, Ellen Jongman.

DEDJTR Project 105528. Dairy Welfare. Andrew Fisher, Ellen Jongman.

MLA Project B.AWW.0249. Assessment of pain responses following castration of lambs using the Elastrator ring with and without midline injections of lignocaine. Ellen Jongman, Paul Hemsworth and Angus Campbell.

National Primary Industries Animal Welfare RD&E Strategy Project. Exploring stakeholder views towards animal welfare issues using online forums. Tiffani Howell, Vanessa Rohlf, Grahame Coleman and Jean-Loup Rault.

RIRDC Project PRJ-008899. Assessment of factors influencing behavior and welfare of birds in free-range systems. Jean-Loup Rault and Paul Hemsworth.

Centre RD&E Communications

1.a Research publication in refereed journals

Aleri, J.W., Hine, B.C., **Pyman, M.F.**, Wales, W.J., Mallard, B. and **Fisher, A.D.** (2016). Assessing adaptive immune response phenotypes in Australian Holstein-Friesian heifers in a pasture-based production system. *Journal of Animal Science*, 93(7) 3713-3721.

Aleri, J.W., Hine, B.C., **Pyman, M.F.**, **Mansell, P.D.**, Wales, W.J., Mallard, B. and **Fisher, A.D.** (2016). An assessment of immune and stress responsiveness in Holstein-Friesian cows selected for high and low feed conversion efficiency. *Animal Production Science*, <http://dx.doi.org/10.1071/AN15406>

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. *J. Dairy Sci.* 98(8):1-9. [http://www.journalofdairyscience.org/article/S0022-0302\(15\)00347-1/abstract](http://www.journalofdairyscience.org/article/S0022-0302(15)00347-1/abstract)

Coleman, G.J., **Jongman, E.**, Greenfield, L. and **Hemsworth, P.H.** (2016). Farmer and public attitudes towards lamb finishing systems. *J Appl Anim Welf Sci.* 2016 Feb 16:1-12.

Cornish, A.R., Caspar, G.L., Collins, T., Degeling, C., Fawcett, A., **Fisher, A.D.**, Freire, R., Hazel, S.J., Hood, J., Johnson, A.J., Lloyd, J., Phillips, C.J., Stafford, K., Tzioumis, V. and McGreevy, P.D. (2016). Career Preferences and Opinions on Animal Welfare and Ethics: A Survey of Veterinary Students in Australia and New Zealand. *J Vet Med Educ.* 2016 May 6:1-11

Bloomfield, R.C., Gillespie, G.R., **Kerswell, K.J.**, **Butler, K.L.** and **Hemsworth, P.H.** (2015). Effect of partial covering of the visitor viewing area window on positioning and orientation of zoo orangutans: a preference test. *Zoo Biology* 34 3: 223-229.

Doyle, R. E., **Coleman, G. J.**, McGill, D.M., Reed, M., Ramdani, W. and **Hemsworth, P.H.** (2016). Investigating the welfare, management and human-animal interactions of cattle in four Indonesian abattoirs *Animal Welfare* 25 (2), 191-197

Doyle, R.E., Lee, C, McGill, D.M. and Mendl, M. (2015). Evaluating pharmacological models of high and low anxiety in sheep. *PeerJ* 3:e1510 <https://doi.org/10.7717/peerj.1510>

Dunston, E.J., Abell, J., **Doyle, R.E.**, Kirk, J., Hilley, V.B., Forsyth, A., Jenkins, E. and Freire, R. (2016). An assessment of African lion *Panthera leo* sociality via social network analysis: prerelease monitoring for an ex situ reintroduction program. *Current Zoology*, zow012

Hartcher, K.M., **Hemsworth, P.H.**, Wilkinson, S.J., Thomson, P.C. and, Cronin, G.M. (2016). The association between plumage damage and feather-eating in free-range laying hens. *Animal*, 10(5), 854-62. <http://dx.doi.org/10.1017/S1751731115002608>

Hartcher, K., Hickey, K., **Hemsworth, P.H.**, Cronin, G., Wilkinson, S., Singh, M. (2016). Relationships between range access as monitored by radio frequency identification technology, fearfulness, and plumage damage in free-range laying hens. *Animal*, 10(5), 847-853. <http://dx.doi.org/10.1017/S1751731115002463>

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Hartcher, K.M, **Hemsworth, P.H.**, Wilkinson, S.J., Thomson, P.C and Cronin, G.M. (2015). The association between plumage damage and feather-eating in free-range laying hens. *Animal*, DOI: <http://dx.doi.org/10.1017/S1751731115002608> 9 pages.

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technology, fearfulness, and plumage damage in free-range laying hens. *Animal*. 2015 Nov 23:1-7.

Hemsworth, L.M., Jongman, E.C. and Skuse J. (2015). Validity of modified methods to assess three welfare indices for use in on-farm pig welfare monitoring. *Animal Production Science* 55 (11) 1487 <http://dx.doi.org/10.1071/ANv55n12Ab128>.

Jongman, EC, Borg, S. and Hemsworth, P.H. (2016). Assessment of pain responses associated with castration of 10-week-old lambs using the Callicrate 'WEE Bander' compared with a standard elastrator. *Applied Animal Behaviour Science*. doi:10.1016/j.applanim.2016.03.014

Lee, C., Verbeek, E., **Doyle, R.E.** and Bateson, M. (2016) Attention bias to threat indicates anxiety differences in sheep. *Biology Letters* 12 (6), 20150977

Munoz, C., Hemsworth, P.H. and Jongman E.C. (2015). A study of agonistic strategies after mixing in group housed sows. *Animal Production Science* 55 (12) :1488 <http://dx.doi.org/10.1071/ANv55n12Ab094>.

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Oliva, J.L., **Rault, J-L.**, Appleton, B. and Lill, A. (2016). Oxytocin blocks pet dog (*Canis familiaris*) object choice task performance being predicted by owner-perceived intelligence and owner attachment. *Pet Behaviour Science* 1: 31-46.

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Rault, J-L. (2016). Effects of positive and negative human contacts and intranasal oxytocin on cerebrospinal fluid oxytocin. *Psychoneuroendocrinology* 69: 60-66.

Rault, J-L., Cree, S. and Hemsworth, P.H. (2015). Welfare implication of water deprivation for laying hens. *Poultry Science*. 95(3): 473-81

Rault, J-L., Ho, H., Verdon, M. and Hemsworth, P.H. (2015). Feeding behaviour, aggression and dominance in group-housed sows. *Animal Production Science* 55 (12) 1495. <http://dx.doi.org/10.1071/ANv55n12Ab001>.

Rault, J-L., Kells, N., Johnson, C., Sutherland, M., Dennis, R. and Lay, D. (2015). Nitrous oxide for piglet gas euthanasia. *Animal Production Science* 55(12): 1485. <http://dx.doi.org/10.1071/ANv55n12Ab119>.

Rault, J-L, Kells, N., Johnson, C., Dennis, R., Sutherland, M. and Lay, D.C. (2015). Nitrous oxide as a humane method for piglet euthanasia: behavior and electroencephalography (EEG). *Physiol Behav.* 1(151):29-37. doi: 10.1016/j.physbeh.2015.06.026.

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Sherwen, S.L., Magrath, M.J., **Butler, K.M.** and **Hemsworth, P.H.** (2015). Little penguins, *Eudyptula minor*, show increased avoidance, aggression and vigilance in response to zoo visitors. *Applied Animal Behaviour Science* 168(2015): 71–76.

Sherwen, S.L., **Hemsworth, P.H.**, **Butler, K.M.**, Fanson, K.V. and Magrath, M.J. (2015). Impacts of visitor number on kangaroos housed in free-range exhibits. *Zoo Biology* 34(4): 287-295 DOI: 10.1002/zoo.21226

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Widowski, T., **Hemsworth, P.H.**, **Barnett, J.** and **Rault, J-L.** (2016). Laying hen welfare I. Social environment and space. *World's Poultry Science Journal* 72 (2): 333-342

Wilson, R. L., **Doyle, R. E.**, Cronin, G. M. and Holyoake, P. K. (2015). A comparison of inflammation models in weaner pigs. *Animal Production Science* 55(12) 1449-1449 <http://dx.doi.org/10.1071/ANv55n12Ab081>.

Wilson, R. L., **Doyle, R. E.**, Cronin, G. M. and Holyoake, P. K. (2015). A comparison of three anti-inflammatory drugs in weaner pigs using Improvac® as an inflammation model. *Animal Production Science* 55(12) 1529-1529 <http://dx.doi.org/10.1071/ANv55n12Ab082>.

Wormald, D., Lawrence, A.J., Carter, G. and **Fisher, A.D.** (2016). Validation of modified open field behaviour as a measure of trait anxiety in the dog. *Applied Animal Behaviour Science* 179, 95-102.

1.b Research papers in press

Oliva, J.L, Wong, Y.T, **Rault, J-L.** and Appleton, B. (2016). The oxytocin receptor gene, an integral piece of the evolution of *Canis familiaris* from *Canis lupus*. *Pet Behaviour Science* (in press).

Powell, C., **Hemsworth, L.M.**, **Rice, M.** and **Hemsworth, P.H.** (2016). Comparison of methods to assess fear of humans in commercial breeding gilts and sows. *Applied Animal Behaviour Science*, DOI: 10.1016/j.applanim.2016.05.027. (in press).

Rault, J-L. (2016). Social interaction patterns according to stocking density and time post-mixing in group-housed gestating sows. *Animal Production Science* in Press.

Chousalkar, K. Gole, V., Caraguel, C. and **Rault, J-L.** (2016). Chasing *Salmonella Typhimurium* in Free range egg production system. *Veterinary Microbiology*, In Press.

2. Refereed Conference publications

Cronin, G.M., Tran, K.T.N., Hartcher K.M. and **Hemsworth, P.H.** (2016). Free-ranging by laying hens soon after the pop-holes open. *Aust.Poult. Sci.Symp.* 27. 72-75

Doyle, R., Lee, C., McGill, D. and Mendl, M. (2015). Assessing pharmacological models of anxiety in sheep. *Behaviour2015*. Cairns, 9-14 August 2015, 674.

Doyle, R.E. (2015). Using cognitive biases to assess animal welfare. *Australasian Animal Studies Association Conference*, Melbourne, 12-15 July 2015, 48.

Dunston, E., Freire, R., **Doyle, R.** and Abell, J. (2015). Sociality and functionality of captive-bred origin prides and a wild pride of African lions (*Panthera leo*) as part of pre-release monitoring for an ex-situ reintroduction program. *Behaviour2015*. Cairns, 9-14 August 2015, 584.

Ficken, K., Jongman, E.C., Magrath, M. and Moss, D. (2015). Effects of change in keeping method on elephant welfare at Melbourne Zoo. *Behaviour2015*. Cairns, 9-14 August 2015, 861.

Fisher, A.D. (2016). Do animals know what's good for them? - Aligning animal preferences and their biological needs in welfare studies. Refereed paper in the Proceedings of the Australian Veterinary Association Annual Conference, Adelaide 22-26 May 2016.

Hartcher K.M., Hickey K.A., **Hemsworth P.H.**, Cronin G.M., Wilkinson S.J. and Singh M. (2016). Using radio frequency identification (RFID) technology to improve our understanding of the relationships between range access, fearfulness and plumage damage in free-range laying hens. *Proceedings of the 6th annual Australian and New Zealand Spatially Enabled Livestock Management (SELM) Symposium*. 31 Mar - 1 April 2016, Sydney. 28

Hartcher K.M., Hickey K.A., **Hemsworth P.H.**, Cronin G.M., Wilkinson S.J. and Singh M. (2016). Is range use related to fearfulness and plumage damage? *Aust.Poult. Sci.Symp.* 27. 76

Hartcher, K., Hickey, K., **Hemsworth, P.H.**, Cronin, G.M. and Singh, M. (2015). The association between plumage condition, fearfulness and range use as monitored by RFID, in free-range laying hens. *Proceedings of the 49th Congress of the International Society for Applied Ethology*. 14-17 September, Sapporo, Japan, 56.

Hemsworth, P.H., Rice, M., Morrison, R.S., **Butler, K. and Tilbrook, A.J.** (2015). Effects of floor space allowance on aggression and stress in grouped sows. *Proceedings of the 49th Congress of the International Society for Applied Ethology*. 14-17 September, Sapporo, Japan, 65.

Hemsworth, P.H. (2015). Role of science in the future of animal agriculture. *Joint Annual Meeting of the American Society of Animal Science and American Dairy Science Association*, Orlando Florida, July 12-16, 2015, Paper 32.

Jongman, E.C., Rice, M. and Hemsworth, P.H. (2015). Development of a practical 'fear of humans' test for sheep in extensive systems. *Behaviour2015*. Cairns, 9-14 August 2015, 250.

Larsen, H., Cronin, G.M., Gebhardt-Henrich, S.G., **Hemsworth, P.H.**, Smith, C.L. and **Rault, J-L.** (2016). Individual tracking of free-range laying hens on an Australian commercial property using Radio Frequency identification. *Proceedings of the 6th annual Australian and New Zealand Spatially Enabled Livestock Management (SELM) Symposium*. 31 Mar - 1 April 2016, Sydney. 8

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Matthews, L.R. and **Rault, J-L.** (2016) A focused review of science-based evidence on the welfare of Australian meat chickens. *Aust.Poult. Sci.Symp.* 27. 47-50.

Monk, J., Belwon, S., **Doyle, R.**, Small, A., Cronin, G.M. and Lee, C. (2015). Development of an attention bias test to measure anxious states in Merino sheep. *Behaviour*2015. Cairns, 9-14 August 2015, 677.

Rault, J.-L., Clark, K.V., Groves, P.J. and Cronin, G.M. (2016). Effects of light intensity on broiler productivity and leg health. *Aust.Poult. Sci.Symp.* 27. 51

Rault, J.-L., Webber, S. and Carter, M. (2015). Cross-Disciplinary Perspectives on Animal Welfare Science and Animal-Computer Interaction. The Second International Congress on Animal Human Computer Interaction, Malaysia

Rault, J.-L. (2015). Pets in the digital era: live, robot or virtual. Proceedings of the 49th Congress of the International Society for Applied Ethology. 14-17 September, Sapporo, Japan, 92.

Rice, M., Jongman, E.C., Borg, S., Butler, K. and Hemsworth, P.H. (2015). Identifying inanition in lambs in feedlots. *Behaviour*2015. Cairns, 9-14 August 2015, 248.

Sherwen, S., Hemsworth, P.H., Butler, K., Fanson, K. and Magrath, M. (2015). The effect of visitor number on kangaroo behavior and welfare in free-range exhibits. Proceedings of the 49th Congress of the International Society for Applied Ethology. 14-17 September, Sapporo, Japan, 94.

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Taylor, P. S., Hemsworth, P.H. and Rault, J.-L. (2015). The effects of environmental enrichment on broiler chicken behaviour. *Behaviour*2015. Cairns, 9-14 August 2015, 562.

Verdon, M., Morrison, R.S. and Hemsworth, P.H. (2015). The effects of sow housing on aggression and injuries in weaner pigs. Proceedings of the 49th Congress of the International Society for Applied Ethology. 14-17 September, Sapporo, Japan, 63.

Woodhouse, R., Morrison, R.S., Hemsworth, P.H., Rault, J.-L., Hansen, C. and Hansen, L. (2015). The effects of parity on sexual behaviours in group weaned sows. Proceedings of the 49th Congress of the International Society for Applied Ethology. 14-17 September, Sapporo, Japan, 127.

Wormald, D., Lawrence, A.J., Carter, G. and Fisher, A.D. (2015). A comparison of stress coping style in greyhound dogs with or without aggression. *Behaviour*2015. Cairns, 9-14 August 2015, 222.

3. Theses

Engel, J. (2016). The importance of rearing environment, space and nests for laying hens (*Gallus domesticus*) in cages. PhD thesis, The University of Melbourne.

Roberts, L.J. (2016). The indicators of stockmanship and their relationships with behavioural observations and supervisor assessments of stockpeople. PhD thesis, The University of Melbourne.

Sherwen, S.L. (2015). The visitor effect: an investigation into the impact of visitors on the behaviour and welfare of zoo animals. PhD thesis, The University of Melbourne.

Animal Welfare Science Centre Seminars

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

June '16

Tina Widowski, University of Guelph, Canada

Marketing vs science –
who's really winning in the free range egg debate?

[PDF](#) [VIDEO](#)

February '16

Jo Edgar, The University of Bristol, UK

Empathy in animals

[PDF](#) [VIDEO](#)

December '15

John Webster, The University of Bristol, UK

Animal Welfare: Science, Values and Action

[PDF](#) [VIDEO](#)

October '15

Peter Sandoe, The University of Copenhagen, Denmark

Love hurts –
the dark side of human attachment to companion animals

[PDF](#) [VIDEO](#)

September '15

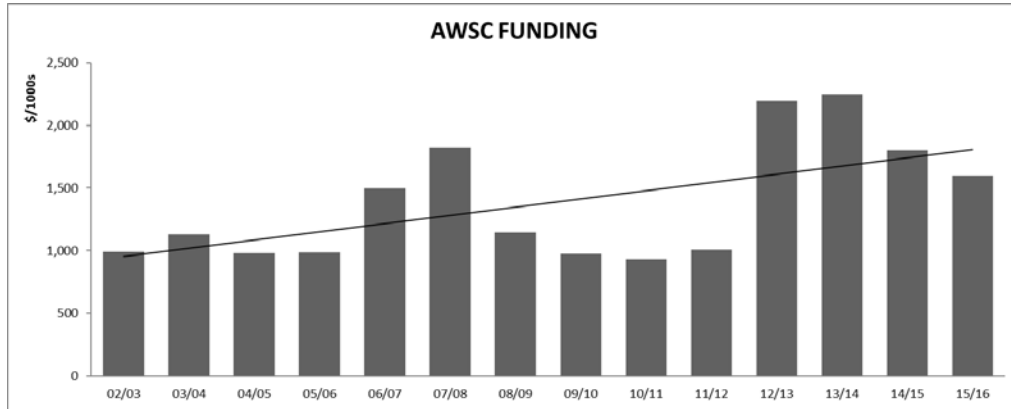
David Mellor, Massey University, NZ

The onset of cognitively-based survival-critical behaviours
in diffident groups of mammalian young

[PDF](#) [VIDEO](#)

Addendum – AWSC KPIs

1. Increase funding by 10% annually (not achieved)



Funding 2015 / 2016 - \$ 1,596,798

2. Increase conference presentations (achieved)

Refereed	2009/2010	2010/2011	2011/2012	2012/2013	2013/14	2014/15	2015/16	TOTAL
Congress of ISAE	15	6	11	10	No conference in reporting year	7	7	56
Australian Poultry Science Symposium	2	5	1	2	2	2	5	19
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	-	-	-	-	-	1	4
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	-	-	-	11	13
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
Australasian Animal Studies Association Conference							1	1
Australian and NZ Spatially Enabled Livestock Management Symposium							2	2
International Congress on Animal Human Computer Interaction							1	1
TOTAL	25	16	22	25	14	18	28	148

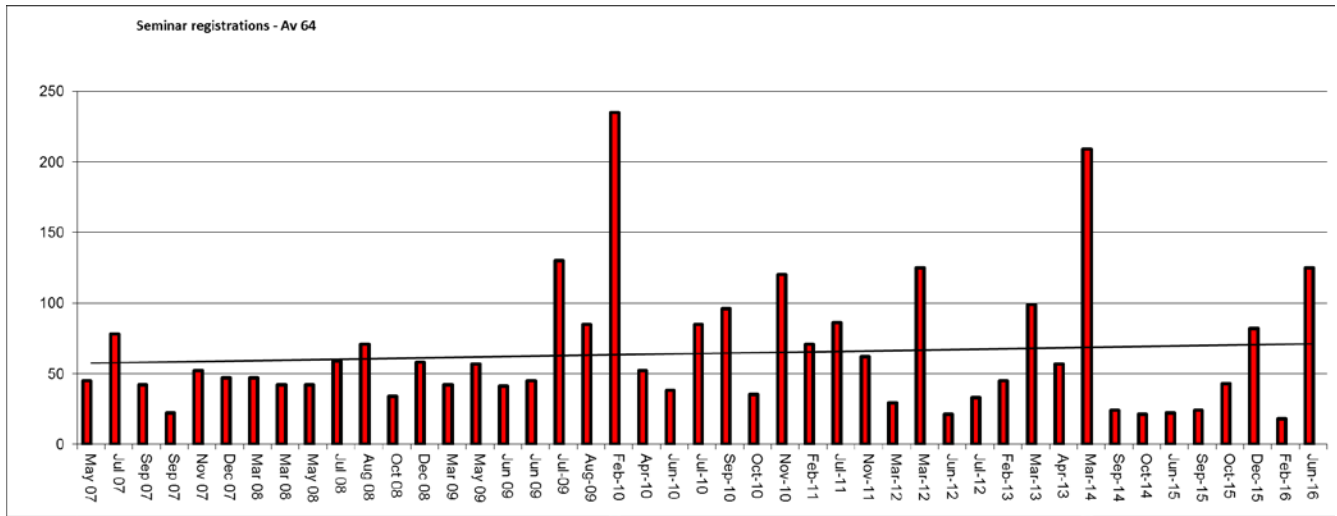
3. Increase the publication of papers in high quality journals (achieved)

Journal	2015 Impact factor	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	TOTAL
Animal Cognition	2.582	-	-	-	-	1	-	1
Animal Frontiers	Not cited	-	-	1	-	-	-	1
Animal Production Science	1.286	3	2	2	3	-	10	20
Animal Welfare	1.314	-	1	2	-	1	1	5
Animals	Not cited	-	1	-	1	1	1	4
Anthrozoos	0.700	-	2	1	1	-	-	4
Applied Animal Behaviour Science	1.691	1	3	1	5	6	4	20
Asia-Pacific Journal of Endocrinology	Not cited	1	-	-	-	-	-	1
Australian Veterinary Journal	1.046	-	-	3	1	1	-	5
Behavioural Processes	1.567	2	1	-	-	-	-	3
Biology of Reproduction	3.318	1	-	-	-	-	-	1
CAB Reviews	Not cited	1	-	-	-	-	-	1
Domestic Animal Endocrinology	2.171	-	-	-	-	2	-	2
Endocrinology	4.503	1	-	-	-	-	-	1
Ethology	1.791	-	-	-	1	-	-	1
Frontiers of Veterinary Science	Not cited	-	-	-	-	1	-	1
Hormones and Behavior	4.632	-	1	-	-	-	-	1
Hypertension	6.480	1	-	-	-	-	-	1
Journal of Animal Science	2.108	-	2	1	1	3	3	10
Journal of Applied Animal Welfare Science	0.739	3	-	-	-	-	1	4
Journal of Dairy Research	1.598	-	-	-	-	1	-	1
Journal of Dairy Science	2.573	1	1	-	1	-	1	4
Journal of Neuroendocrinology	3.138	1	1	-	-	-	-	2
Journal of Neuroscience Methods	2.025	-	1	-	-	-	-	1
Journal of Proteome Research	4.245	-	1	-	-	-	-	1
Journal of Veterinary Behaviour	0.957	-	3	-	-	-	-	3
Journal of Zoo & Aquarium Research	Not cited	-	-	-	-	1	-	1
Neuropsychopharmacology	7.833	1	-	-	-	-	-	1
NZ Veterinary Journal	1.219	-	-	-	-	2	-	2
Poultry Science	1.544	-	-	-	-	1	4	5
Physiology and Behavior	3.033	1	-	1	-	-	2	4
Professional Animal Scientist	Not cited	-	-	1	-	-	-	1
Psychoneuroendocrinology	4.944	1	-	-	-	-	1	2
Stress	2.715	1	-	-	1	-	1	3
The Veterinary Journal	1.755	-	1	-	2	-	-	3
Zoo Biology	0.831	-	-	-	-	-	2	2
PeerJ	Not cited	-	-	-	-	-	1	1
Current Zoology	1.594	-	-	-	-	-	1	1
Animal	1.841	-	-	-	-	-	3	3
Biology Letters	3.248	-	-	-	-	-	1	1
Pet Behaviour Science	Not cited	-	-	-	-	-	1	1
Cattle Practice	0.190	-	-	-	-	-	1	1
Society and Animals	0.704	-	-	-	-	-	1	1
Journal of Vet Med Education	0.88	-	-	-	-	-	1	1
TOTAL		20	21	13	17	21	41	133
	AV Impact Factor (cited jnls)	2.747	1.869	1.443	1.672	1.741	1.730	

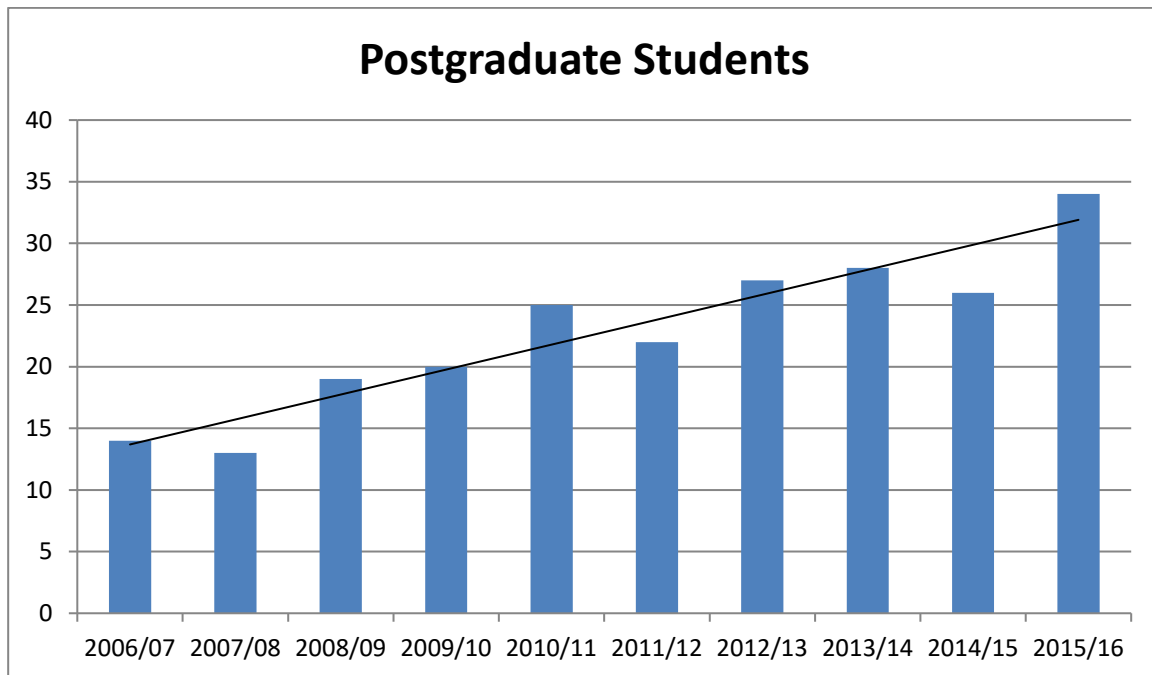
4. AWSC Representation on committees in a technical/advisory capacity

AECL Hen Welfare Advisory Group	Paul Hemsworth
APL Specialist Group 2 (Genetics, reproduction and welfare)	Paul Hemsworth
Animal Welfare Advisory Committee	Paul Hemsworth Jean-Loup Rault (alt)
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 Livestock Industry Consultative Committee	Andrew Fisher
Dairy Moving Forward Animal Husbandry Steering Group	Paul Hemsworth Andrew Fisher
Greyhound Racing Victoria Welfare Committee	Grahame Coleman
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)
RSPCA Victoria Animal Welfare Policy Committee	Ellen Jongman
National Primary Industries Animal Welfare Strategy Steering Committee	Paul Hemsworth
OIE <i>ad hoc</i> Group on Animal Welfare and Pig Production Systems	Paul Hemsworth
OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis Management Committee	Paul Hemsworth
Zoos Victoria Animal Welfare Peer Review Committee	Paul Hemsworth

5. Measure seminar attendance



6. Increase number of post-graduate students (achieved)



Notes

**Copies of the Animal Welfare Science Centre Victorian Node
Annual Report 2015 – 2016 are available on request from:**

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Parkville
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