



ANIMAL WELFARE  
SCIENCE CENTRE

# THE ANIMAL WELFARE SCIENCE CENTRE REVIEW

## 2002-2009



## FOREWORD

The Animal Welfare Science Centre was established in 1997 to provide focus and direction for the partner organisations' academic and research resources in animal welfare.

### **Aims of the Centre:**

1. Conduct strategic and basic animal welfare research to address major animal welfare issues.
2. Targeted industry, public and tertiary education to improve animal welfare and productivity and to assure local and international consumers, the public and Governments that the welfare standards for Australian animals are underpinned by sound and well-accepted science.

### **Outcomes from the Centre:**

1. All animals are managed according to best animal welfare practices through informed, confident and proactive 'industries'.
2. The discussion on animal welfare is facilitated in the general community through well-informed and confident stakeholders.
3. Recognition of high welfare standards in Australia and preferential sourcing by purchasers of Australian products through informed and confident public and markets.

### **Outputs from the Centre:**

1. Develop scientifically defensible welfare methodology.
2. Use scientifically defensible methodology to establish, amend or validate industry welfare standards and practices.
3. 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.
4. Understand public and consumer attitudes to animal welfare to assist Governments and industry in (1) developing animal welfare policy and (2) assuring local and international consumers, public and other governments of the sound welfare standards for Australian domestic animals.
5. 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.
6. Provide high quality postgraduate and postdoctoral training for the next generation of researchers and teachers in animal welfare science.

## **RD&E activities of the Centre:**

The Centre's activities can be described under four major program areas:

1. Animal welfare methodology.
2. Housing and husbandry effects on animal welfare.
3. Attitudes to animals and animal welfare, and farmer, consumer and community behaviour.
4. Industry, tertiary and post-graduate education and training.

The Centre has strong collaborative links with research providers in Australia and overseas and has established memoranda of understanding with Massey University and the West Australian Department of Agriculture and Food.

A strong relationship in research and teaching with The Department of Animal Sciences and College of Veterinary Medicine at The Ohio State University (OSU) has been cemented in 2009 with OSU becoming the fourth partner of the Centre.

The Centre's research and teaching capacity is considerable, with scientific expertise and experience in the key disciplines of animal behaviour, ethology, psychology, stress physiology and veterinary medicine. There are currently 11 scientists and 14 associate researchers operating within the Centre across the partner organisations. The Centre's activities are supported by a full-time Executive Officer.

The scientific output of the Centre is significant, with Centre scientists publishing 91 full journal publications, 10 book chapters and 183 conference publications over the last 7 years.

Centre scientists also undertake a number of education and training activities. Postgraduate programs, with both local and international students, are a significant and critical part of the Centre's successful research programs. There are presently 19 post-graduate students studying under the auspices of the Centre.

Centre staff teach several animal welfare-related subjects to animal science students at the University of Melbourne and have recently developed and delivered the course Animals in Society for The Ohio State University.

There are substantial specialised research and teaching facilities associated with the four partner organisations that are utilised by the scientific personnel working within the Centre. These facilities include research and housing facilities for farm, companion and laboratory animals, endocrine laboratories, multimedia publication laboratories and classroom and seminar facilities for teaching and training.

Centre staff have participated in a range of industry and scientific meetings. Furthermore, the Centre has continued to offer a series of public and scientific meetings on relevant animal welfare topics in order to facilitate discussion and awareness of development of issues and research findings in animal welfare.

The Centre's RD&E program falls within four areas:

## **Program 1. Animal Welfare Methodology**

### **Summary**

The community generally accepts the role of the scientific method to solve problems. However, there is considerable uncertainty within science on the concept of animal welfare. Scientists differ in their views on how animal welfare should be measured or judged, with three prominent concepts of animal welfare in the literature: the welfare of animals is judged on the basis of (1) how well the animal is performing from a biological functioning perspective; (2) affective states, such as suffering, pain and other feelings or emotions; and (3) the expression of normal or 'natural' behaviours.

This scientific uncertainty in relation to animal welfare concepts or views does not necessarily diminish the robustness of the research utilising criteria or methodologies promulgated by these different views or concepts, but this conceptual and scientific uncertainty does affect the credibility of animal welfare science and its role in the welfare discussion.

### **Strategic focus**

Research utilising well-accepted stress models is currently being used to understand the relationships between these concepts and methodologies. Without an agreed methodology, progress in welfare research, development and implementation of welfare standards and development of welfare assessment tools will continue to be both arguable and lacking in a broad consensus. Thus, research in this program will focus on achieving this broader consensus on animal welfare methodology.

### **Current research**

1. Continue the research on welfare methodology (Australian Pork Ltd and Poultry CRC funded, several experiments including PhD projects);
2. Dissecting the impact of stress on reproduction (ARC Discovery project);
3. Continue the development of a benchmarking system for animal welfare in the dairy and lamb industries, and identify the main risk factors for animal welfare in these industries (DPI funded).

## **Program 2. Housing and Husbandry Effects on Animal Welfare**

### **Summary**

Confinement of animals, even for short periods that may occur during transport and lairage of farm animals, is a controversial issue. The main welfare concerns raised are inappropriate social contact, the inability to exercise and the restricted choice of stimuli for interaction, such as with conspecifics and other features of the physical environment. Research on pigs and poultry indicates that the design features of housing systems may be more important than the system *per se* for animal welfare. Therefore, through

fundamental and applied research, it is important to determine the effects of design features (such as space, group size, social and human contact, and furnishings) on the welfare of farm and companion animals in order to define welfare standards for these animals. Furthermore, the animal welfare impacts of recent developments in the dairy and lamb industries with feedlots require monitoring and the apparent difficulty of dogs and, to a lesser extent, cats adapting to shelters and other confined environments requires investigation.

### **Strategic focus**

The key focus of this program is understanding the basic welfare requirements of animals in terms of social, spatial, environmental complexity and climatic requirements. Such knowledge is necessary for designing housing systems, even for short periods as may occur during transport and lairage. Research is needed on the effects of design features (such as space, group size, social and human contact, and furnishings) and environmental enrichment on the welfare of farm and companion animals in order to define appropriate welfare standards, particularly as alternatives or modifications are required to current conventional confinement systems. There is also a need to address acute disturbances, such as surgical husbandry procedures, that impose challenges to the animal's homeostasis and thus in turn elicit substantial adaptive behavioural and physiological responses by the animal. Thus this program will seek to provide knowledge on basic welfare requirements of domestic animals which can be utilized in the design of housing systems, transport and lairage facilities and management strategies for extensively-housed animals.

### **Current Research**

1. Continue project "Effects of group housing during gestation on sow welfare and reproduction" (APL funded, several experiments including a PhD project);
2. Conduct and further develop the project "Transport of bobby calves" (DPI funded);
3. Complete the project "Importance of nests for the welfare of laying hens" (Australian Egg Corporation Ltd funded);
4. Continue (and seek further funding for) current research investigating whether structured enrichment improves the welfare of kennelled dogs.

## **Program 3. Attitudes to Animals and Animal Welfare, and Farmer, Consumer and Community Behaviour**

### **Summary**

Human behaviour significantly impacts on animals both directly and indirectly. For livestock, direct effects include the adverse impact of inappropriate handling during production and slaughter, where fear and stress, physical trauma, ease of handling, reproductive performance, growth, productivity, health, meat quality and welfare may all be affected. For zoo, laboratory and companion animals, inappropriate handling includes effects on fear, stress,

behavioural problems and welfare. Indirect effects of human behaviour on all of these animals result from the impact of community attitudes on the use of animals for research, companionship and as food and fibre sources. Community behaviours opposing animal experimentation affect the approaches of both regulators and researchers to animal research. In the livestock industries, responses of retailers and suppliers to community behaviours in opposition to agricultural practices have led to changed practices and the imposition of welfare audits on farm animal production in a number of countries. For companion animals, community concerns about stray cats and dogs together with dog and cat behavioural problems have led to changes to regulations and codes of practice for companion animals in many Western countries. For zoo animals and other facilities such as dog shelters, research is also needed to examine the implications of human attitudes and behaviour on these animals and the standards by which they are managed.

### **Strategic focus**

There is substantial evidence that the most reliable proximal predictor of behaviour that is under volitional control is the attitude towards the behaviour in question. This approach has been widely applied in the intensive livestock industries to understand farmer behaviour in the context of animal productivity and welfare. This knowledge has been utilised to develop training programs in the dairy and pork industries that target those farmer attitudes and behaviours that seriously limit animal productivity and welfare. Similar opportunities exist in other livestock industries and other animal use settings.

### **Current Research**

1. Undertake review for APL on the value and practicality of monitoring public attitudes to inform animal welfare policy development;
2. Complete the project “Minimising handling stress” – prototype training packages for the dairy, cattle, pig and laying hen (EU 6th Framework funded);
3. Complete the project “ProHand for the livestock processing industry – a professional handling package” (Mintrac funded).

## **Program 4. Industry, Tertiary and Post-graduate Education and Training**

### **Summary**

It is generally well accepted that education and training have an important role in improving animal welfare associated with many aspects of animal housing and husbandry. In fact, training of stockpeople, both informal and formal training, can improve the welfare of animals during all routine housing and management practices. Education and training have two specific elements: a competency based component and a knowledge component; both need to be included in animal welfare education and training programs. This education and training should include both non-award and formal education and training.

Furthermore, there is the need for both attitudinal and technical skills training and education of livestock handlers to safeguard the welfare of their livestock, particularly for new entrants to agriculture. While it is obvious that technical skills and knowledge are important prerequisites, the importance of attitudes is not intuitively obvious; however, extensive research has shown the importance of the latter in determining animal welfare.

### **Strategic focus**

Animal welfare is an issue of increasing interest and concern to the broader community and both government and livestock industries are looking to better assess and monitor their performance in addressing animal welfare issues. The concept of benchmarking and compliance has the potential to assess industry performance in relation to animal welfare. It is important that animal industries can demonstrate compliance with welfare codes and standards industry wide, so that consumers (both domestic and overseas) have confidence in the standards under which production occurs.

### **Current research, education and training activities**

1. Continue the revision of the previously developed (AWSC/AMIC) animal welfare standards for the meat processing sector in collaboration with MLA;
2. Develop animal welfare education program for farmers, animal handlers and animal owners as well as Government and welfare agencies staff who work directly with animal users that will assist them in identifying animal welfare problems in farm, laboratory and companion animals. Note: The package will provide comprehensive training in animal welfare and welfare assessment to underpin the assessments in existing further education certificates; such as the Animal Management and Control Certificate IV and the Animal Welfare Inspector Certificate IV;
3. The Centre will support The Ohio State University in promoting the ProHand suite of programs in the North American pork and dairy industries.
4. The Centre will continue to deliver the course “Animals in Society” for The Ohio State University and will further develop for flexible delivery in Australia and the US.

## AWSC RESEARCHERS AND STUDENTS

### Current Researchers

Paul Hemsworth	University of Melbourne, (Director AWSC)
Grahame Coleman	Monash University, (Deputy Director AWSC)
Pauleen Bennett	Monash University
Sarah Chaplin	University of Melbourne
Andrew Fisher	University of Melbourne
Ellen Jongman	Department of Primary Industries, Victoria
Mariko Lauber	Department of Primary Industries, Victoria
Jacqui Ley	Monash University
Linda Marston	Monash University
Alan Tilbrook	Monash University
Samia Toukhsati	Monash University

### Associate Researchers

Ian Bland	University of Melbourne
Peter Cakebread	University of Melbourne
Naomi Botheras	The Ohio State University
Steve Boyles	The Ohio State University
Candace Croney	The Ohio State University
Maurice Eastridge	The Ohio State University
Sue Hides	Department of Primary Industries, Victoria
Joe Hogan	The Ohio State University
Jim Kinder	The Ohio State University
Brian Leury	University of Melbourne
Steve Moeller	The Ohio State University
Linda Lobao	The Ohio State University
Linda Lord	The Ohio State University
Mike Lilburn	The Ohio State University

### **Current Postgraduate students**

Rachael Bindloss	Masters, Melbourne
Felicity Butterly	PhD, Monash
Mia Cobb	PhD, Monash
Sara Crawford	PhD, Ohio
Joanna Engel	PhD, Melbourne
Sally Haynes	PhD, Melbourne
Lauren Hemsworth	PhD, Monash
Tiffani Howell	PhD, Monash
Renee Huggard	Masters, Melbourne
Marcus Karlen	PhD, Melbourne
Tammie King	PhD, Monash
Sonja Laine	PhD, Melbourne
Kate Mornement	PhD, Monash
Jessica Pempek	Masters, Ohio
Cameron Ralph	PhD, Melbourne
Vanessa Rohlf	PhD, Monash
Jordan Schaan	PhD, Monash
Bronwyn Stevens	PhD, Melbourne
Catherine Webb	Masters, Melbourne

### **Current Honours students**

Rachel Bloomfield	Melbourne
Vivian Ewe	Monash
Alan Gatt	Melbourne
Jaipal Gill	Melbourne
Lauren Roberts	Melbourne
Jonathan Roe	Monash
Samantha Rokx	Melbourne
Nicole Telfer	Monash
Lara Thompson-Hollingsworth	Melbourne
Zhengzhou Lee	Melbourne

## **Past post-graduate students**

Adele Arnold (PhD, Melbourne)  
Naomi Botheras (PhD, Melbourne)  
Kate Breuer (PhD, Monash)  
Peter Cransberg (Masters, Melbourne)  
Fleur Dwyer (D.Psych, Monash)  
Lauren Edwards (PhD, Melbourne)  
Joanna Engel (Masters, Ohio)  
Marcus Karlen (Masters, Melbourne)  
Keven Kerswell (PhD, Melbourne)  
Amanda Kobelt (PhD, Melbourne)  
Mariko Lauber (PhD, Melbourne)  
Jacqui Ley (PhD, Monash)  
Linda Marston (PhD, Monash)  
Andrew McLean (PhD, Melbourne)  
Naomi Pearson (Masters, Melbourne)  
Bree Pierce (PhD, Monash)  
Sabine Roussel (PhD, Melbourne)  
Rebecca Sargent (PhD, Melbourne)  
Ken Smith (Masters, Ohio)  
Anne Turner (PhD, Monash)  
Neva Van de Kuyt (Masters, Melbourne)

## COMMITTEES

<b>AAWS Production Animals Subcommittee</b>	Andrew Fisher
<b>AAWS RD&amp;E Subcommittee</b>	Paul Hemsworth
<b>AAWS Education Subcommittee</b>	Grahame Coleman
<b>AAWS Animals in Research and Teaching Subcommittee</b>	Paul Hemsworth Mike Rickard
<b>AAWS Animals used in work, sport, recreation and on display Working Dog Subcommittee</b>	Mia Cobb
<b>AECL Hen Welfare Advisory Group</b>	Paul Hemsworth
<b>APL Specialist Group</b>	Paul Hemsworth
<b>Animal Welfare Advisory Committee</b>	Paul Hemsworth Grahame Coleman (alt)
<b>Animal Welfare Advisory Committee Working Group 1</b>	Grahame Coleman
<b>Australian Poultry Veterinary Alliance's Animal Welfare Subcommittee</b>	John Barnett
<b>DA Animal Welfare Reference Group</b>	Paul Hemsworth Andrew Fisher
<b>Poultry CRC Welfare Program Manager</b>	John Barnett Paul Hemsworth
<b>Responsible Pet Ownership Advisory Committee</b>	Grahame Coleman
<b>RSPCA Scientific Committee</b>	John Barnett
<b>Sheep Welfare Standards Writing Group</b>	Andrew Fisher

## AWSC BOARD OF MANAGEMENT

Prof. Mike Rickard	Chair
Dr. Ron Prestidge	Department of Primary Industries, Victoria
Prof. Rick Roush	The University of Melbourne
alternate with:	
Prof. Ken Hinchcliffe	The University of Melbourne
Prof. Iain Clarke	Monash University
Prof. Jim Kinder	The Ohio State University
Prof. Paul Hemsworth	Director AWSC
Prof. Grahame Coleman	Deputy Director AWSC

## AWSC ADVISORY COMMITTEE

Dr. Peter Penson	Chair, Animal welfare consultant
Dr. Onn Ben-David	Vice- President, RSPCA, Vic
Mr. Alan Bowman	Victorian Farmers Federation
Ms. Michelle Edge	DPI, Victoria
Dr. Robert Holmes	Animal Behaviour Clinics
Dr. Michelle Jones-Lennon	DPI, Victoria
Mr. Noel Maughan	MLA (Ret)
Prof. David Mellor	Animal Welfare Science and Bioethics Centre, Massey University
Dr. Denise Noonan	University of Adelaide
Ms. Glenys Oogjes	Director, Animals Australia
Prof. Clive Phillips	Centre for Animal Welfare and Ethics, University of Queensland
Mr. Nick Renyard	United Dairyfarmers of Victoria
Mr. Kenton Shaw	QAF Meat Industries
Dr. Stephen Tate	Bureau of Animal Welfare

## **FUNDING FOR MAJOR AWSC RD&E PROJECTS (2002 – 2009)**

### **State Government / Department of Primary Industry (DPI), Initiative Funding**

“Animal welfare across industries – market intelligence, scale of production and methodology.” (two major sub-projects “Public attitudes to animal welfare” and “Time budgets of behaviour in grazing dairy cows”) – P.H. Hemsworth, G.J. Coleman and J.L. Barnett (2002/03 - 2004/05 - \$569,408).

“The importance of ecological farming, including animal welfare, on meat export markets”, Dept. Natural Resources & Environment (STI Initiative) J.L. Barnett and G.J. Coleman (2003/04 - \$10,500)

“Welfare QA for the processing sector” - P.H. Hemsworth, and J.L. Barnett (2003/04 - \$244,810)

“Development of a multimedia training program for dairy farmers” – G.J. Coleman, P.H. Hemsworth (2004/05 - \$20,137)

“The development and evaluation of a multimedia educational program on livestock farming for primary schools” – M. Hay, G.J. Coleman (2004/05 - \$18,000)

“Welfare methodology” – P.H. Hemsworth and J.L. Barnett (2004/05 – 2006/07 - \$754,750)

“Developing welfare standards for the meat processing and livestock transport industries” – J.L. Barnett (2006/07 - \$77,928)

“Development and analysis of survey data for public consultation on the Code of Practice for Pigs Regulatory Impact Statement (RIS)” – S. Toukhsati (2006/07 - \$15,000)

“Evaluation of welfare issues associated with extended lactation in dairy cows” – E.C. Jongman (2006/07 – 2007/08 - \$114,176)

“Behavioural responses of dairy cows to mastitis: Indicators of pain and welfare and productivity implications” – N.A. Botheras (2007/08 - \$15,000)

“Strategic labour saving and productivity technologies for livestock industries” – G.M. Cronin (2007/08 - \$80,000)

“Benchmarking welfare indicators for the dairy and lamb industries” – E.C. Jongman (2007/08 - \$120,000)

“Transport of bobby calves” – E.C. Jongman (2008/09 - \$100,000)

**State Government / DPI total funds, (2002-2009) - \$2,139,709**

## **Australian Pork Limited, (Pig Research and Development Corporation) (APL)**

“A training program for pig handlers at abattoirs” G.J. Coleman and P.H. Hemsworth (2002/03 - \$16,000)

“Stockperson selection modules development and testing”. – G.J. Coleman and P.H. Hemsworth. (2002/03 - \$29,768)

“Evaluation of sow stall dimensions” – J.L. Barnett, G.M. Cronin and P.H. Hemsworth (2002/03 - 2003/04 - \$129,000)

“The Effects of Consumer Attitudes and Behaviour on the Pork Industry” – G.J. Coleman (2002/03 – 2003/04 - \$71,000)

“The welfare of pregnant gilts and sows in large-group, deep-litter housing systems” – P.H. Hemsworth (2002/03 -2004/05 - \$261,936)

“Education in Agriculture: knowledge and attitudes of *pork* farming and food production in pre-adolescents” G.J. Coleman and M. Hay (2003/04 - 2004/05 - \$168,000)

“The development and evaluation of a multimedia educational program on pork farming for primary schools” – M. Hay, G.J. Coleman and J.L. Barnett (2004/06 – 2005/06 - \$92,360)

“Field trial of pig stockperson selection” – G.J. Coleman (2006/07 – 2007/08 - \$13,848)

“Revision of Pig ProHand” – G.J. Coleman and P.H. Hemsworth (2006/07 – 2007/08 - \$75,595)

“Welfare methodology – relationships between biological function and preference methodologies in studying animal welfare, pigs” – P.H. Hemsworth (2007/08 – 2008/09 - \$165,000)

“The effects of group housing during gestation on sow welfare and reproduction” – P.H. Hemsworth (2007/08 – 2008/09 - \$681,848)

***APL/PRDC total funds, (2002–2009) - \$1,704,355***

## **Australian Egg Corporation Ltd (AECL)**

“Welfare of hens in furnished cages”- J.L. Barnett (2002/03 - 2004/05 - \$337,857)

“Effects of consumer attitudes and behaviour on the egg industry” – G.J. Coleman (2002/03 –2004/05 - \$66,551)

“The importance of nests for the welfare of laying hens”- G.M. Cronin (2004/05 - 2008/09 - \$463,199)

***AECL total funds, (2002-2009) - \$867,607***

## **Poultry CRC**

- “Welfare Audit Implementation (meat)” - J.L. Barnett (2003/04 - \$27,732)
- “Human-Animal relationships in the laying hen” - J.L. Barnett and P.H. Hemsworth (2004/05- 2007/08 - \$291,151)
- “Improving the scientific assessment of poultry welfare” - J.L. Barnett and P.H. Hemsworth (2005/06 – 2007/08 - \$300,670)
- “Using machine vision to count hens and reduce egg breakage – “proof of concept” – G.M. Cronin (2006/07 – 2007/08 - \$161,890)
- “Implementation of Animal Welfare Standards into the meat chicken industry’s company QA programs” – J.L. Barnett (2007/08 - \$23,550)

***Poultry CRC total funds, (2002-2009) - \$804,993***

## **Bureau of Animal Welfare (BAW)**

- “Factors affecting successful canine adoption from animal welfare centres” – P.C. Bennett (2002 - \$5,320)
- “Greyhound space allowance” -E.C. Jongman (2003/04 - 2004/05 - \$92,510)
- “An evaluation of the Responsible Pet Ownership Program for pre-adolescents” - G.J. Coleman and M. Hay (2005 - \$23,111)
- “Attitudes towards cats and responsible cat ownership in Victorian residents” – S. Toukhsati, G.J. Coleman, P.C. Bennett, M. Hay (2005/06 - \$52,545)
- “Tracking Cat Shelter Admission Statistics” – P.C. Bennett, G.J. Coleman, M. Hay, S. Toukhsati (2005/06 - \$31,982)
- “Cat welfare in confinement” – E.C. Jongman (2006/07 - \$56,491)
- “Assessment of shelter dog behaviour” – P.C. Bennett (2006/07 - \$50,000)
- “The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare” – G.J. Coleman (2006/07 – 2007/08 - \$100,000)
- “A summary of Australian research pertaining to cat ownership and overpopulation” – P.C. Bennett (2007 - \$ 4,711)
- “Effects of an enrichment program for kennelled domestic dogs” – P.C. Bennett and M. Cobb (2007 - \$5,000)
- “A survey of Victorian Councils regarding excess animal permits” – P.C. Bennett (2007 - \$5,434)
- “Review of the actual and potential effectiveness of compulsory desexing programs for companion animals” – P.C. Bennett (2007 - \$10,000)
- “Operationalising ‘noise-related annoyance’ as a psychological construct as it relates to barking dogs” – S.Toukhsati (2007 - \$10,000)

“Cats and dogs that visit veterinarians: where do they come from, do they have litters, and what happens to their offspring?” – P.C. Bennett and L.C. Marston (2007/08 - \$45,878)

“Behavioural assessment of adult companion dogs: Development of national standards for identifying shelter dogs suitable for re-homing” – K.M. Mornement and P.C. Bennett (2007/08 – 2008/09 - \$50,000)

“Scoping proposal for Mandatory Desexing project” – L.C. Marston and P.C. Bennett (2008 - \$7,000)

“What happens to cats that are adopted from shelters?” – L.C. Marston and P.C. Bennett (2008/09 - \$52,671)

“An Evaluation of the effectiveness of the introduction of mandatory desexing by Councils” – L.C. Marston and P.C. Bennett (2009 - \$22,250)

***BAW total funds, (2002-2009) - \$624,903***

### **Australian Wool Innovation (AWI)**

“A study of the behavioural responses of lambs to an alternative mulesing procedure” – P.H. Hemsworth – (2005/06 - \$21,674)

“Welfare implications of alternative mulesing procedures” - P.H. Hemsworth – (2005/06 – 2006/07 - \$261,936)

“Differences in pain and stress between the modified tail docking technique and conventional tail docking with a hot docking iron” – P.H. Hemsworth – (2006 - \$15,910)

“Re-run of Phase II welfare trial” – P.H. Hemsworth – (2006-07 – \$51,772)

***AWI total funds, (2002-2009) - \$351,292***

### **Beef CRC**

“Fear / Stress model for beef cattle” – J.L. Barnett and P.H. Hemsworth – (2006/07 – 2007/08 - \$234,055)

***Beef CRC total funds, (2002-2009) - \$234,055***

### **EU 6<sup>th</sup> Framework (EU)**

“Minimising Handling Stress” - Prototype training packages for dairy, cattle, pigs and laying hens – G.J. Coleman (2006/07 – 2007/08 - \$221,753)

***EU 6<sup>th</sup> Framework total funds, (2002-2009) - \$221,753***

## **Petcare Information and Advisory Services (PIAS)**

“Behavioural problems and welfare of dogs in suburban backyards” – ARC SPIRT project. P.H. Hemsworth, G.J. Coleman and J.L. Barnett (2002 - \$7,500)

“The effects of breed and morphology on the development of investigative social behaviour in dogs” – K. Kerswell, P.C. Bennett and P.H. Hemsworth (2002/03 - \$45,000)

“An evaluation of companion dog training methods: effectiveness of current methods and factors determining initial and ongoing participation by dog owners” – P.C. Bennett and G.J. Coleman (2003/04 - \$10,000)

“Identification of factors influencing the breeding of companion dogs” – J.Ley and P.C. Bennett (2006 - \$5,000)

“Behavioural assessment of adult companion dogs: Development of national standards for identifying shelter dogs suitable for re-homing” – K.M. Mornement and P.C. Bennett (2006/07 - 2008/09 - \$55,000)

“Characteristics of successful human – dog relationships” – J. Ley (2007/08 - \$26,000)

“Are owner-dog relationships influenced by canine personality, canine behaviour and owner characteristics?” – J. Ley and P.C. Bennett (2008/09 - \$52,000)

***PIAS total funds, (2002-2009) - \$200,500***

## **Ohio Agricultural Research and Development Centre (OARDC)**

“Farm animal welfare in Ohio: Assessing public concern and implications for the food animal industry” - G.J. Coleman (2006/07 – 2008/09 - \$132,240)

“Behavioural responses of dairy cows to mastitis: Indicators of pain and welfare and productivity – implications” – N.A. Botheras and P.H. Hemsworth (2007/08 - \$ 53,400)

***OARDC total funds, (2002-2009) - \$185,640***

## **National Meat Industry Training Advisory Council Limited (Mintrac)**

“ProHand for the livestock processing industry: a professional livestock handling package” – P.H Hemsworth and G.J. Coleman (2006/07 – 2008/09 - \$176,520)

***Mintrac total funds, (2002-2009) - \$176,520***

## **Australian Research Council (ARC)**

“Behavioural problems and welfare of dogs in suburban backyards” – ARC Linkage project. P.H. Hemsworth, G.J. Coleman and J.L. Barnett (2002 - \$40,447)

“Dissecting the impact of stress on reproduction: Novel peptide mediates inhibitory effects of stress on female reproduction” – ARC Discovery project. A.J. Tilbrook (2009/10 - \$130,000)

***ARC total funds, (2002-2009) - \$170,447***

## **Meat and Livestock Australia (MLA)**

“The effects of consumer attitudes and behaviour on the red meat and livestock industries” G.J. Coleman, S. Toukhsati (2005/06 - \$76,263)

“Review national animal welfare standards for livestock processing establishments” – J.L. Barnett (2008/09 - \$80,000)

***MLA total funds, (2002-2009) - \$156,263***

## **CRC for Innovative Dairy Products (Dairy CRC)**

“Understanding behavioural development in calves as a means for assessing the welfare of cloned and genetically modified calves” – P.H. Hemsworth and J.L. Barnett (2003/04 – 2005/06 - \$120,000)

***Dairy CRC total funds, (2002-2009) - \$120,000***

## **National Health and Medical Research Council (NHMRC)**

“Sex differences in the mechanisms by which stress inhibits the secretion and actions of GnRH” - A.J. Tilbrook and I.J. Clarke (2002/03 - \$135,000)

***NHMRC total funds, (2002-2009) - \$135,000***

## **Dairy Research and Development Corporation (DRDC)**

“Studies of Cow Behaviour and the Design of Milking Sheds” – P.H. Hemsworth and K.G. Ng (2002/3 - 2004/5 - \$93,554)

***DRDC total funds, (2002-2009) - \$93,554***

## **William Buckland Foundation (WBF)**

“Education in Agriculture: Livestock farming, food production and food choices in pre-adolescents” – M. Hay, G.J. Coleman (2002/03 - \$67,870)

***WBF total funds, (2002-2009) - \$67,870***

### **Queensland Dept of Primary Industries (QDPI)**

“A review and evaluation of strategies to manage unwanted cats and dogs in Queensland” – L.C. Marston and P.C. Bennett (2007/08 - \$65,000)

***QDPI total funds, (2002-2009) - \$65,000***

### **Geoffrey Gardiner Foundation (GGF)**

“Education in Agriculture. An evaluation of the learning outcomes of a multi-media educational program on dairy farming and dairy food production” - Hay, M. and Coleman, G.J. (2005/06 - \$25,053)

“Effect of breed on behavioural development in young calves” – P.H. Hemsworth and J.L. Barnett (2005/06 - \$35,000)

***GGF total funds, (2002-2009) - \$60,053***

### **The Ohio State University (OSU)**

“Design and delivery of “Animals in Society” as part of the “Human and animal interactions” cluster” at The Ohio State University” – P.C. Bennet, M.C.Y. Lauber and S. Toukhsati (2007/08 - \$50,989)

***OSU total funds, (2002-2009) - \$50,989***

### **University of Melbourne Research Grants Scheme (MRG)**

“Improving the assessment of animal welfare” – P.H. Hemsworth (2004 - \$31,800)

***MRG total funds, (2002-2009) - \$31,800***

### **Monash University Small Grants (MSG)**

“An evaluation of companion dog training methods: effectiveness of current methods and factors determining initial and ongoing participation by dog owners” – P.C. Bennett and G.J. Coleman (2003/04 - \$30,000)

***MSG total funds, (2002-2009) - \$30,000***

### **Australian Animal Welfare Strategy (AAWS)**

“Animal welfare performance measures: a model to monitor and benchmark the welfare of animals in research” – Jongman (2009 - \$20,000)

***AAWS total funds, (2002-2009) - \$20,000***

### **Midwest Poultry Consortium USA (MPC)**

“Behavioural responses of turkeys to humans, and relationship to bird welfare and productivity” – N.A. Botheras (2008/09 - \$17,148)

***MPC total funds, (2002-2009) - \$17,148***

### **Guide Dogs Victoria (GDV)**

“Effects of an enrichment program for kennelled domestic dogs” –P.C. Bennett and (2007/08 - \$15,000)

***RSPCA total funds, (2002-2009) - \$15,000***

### **RSPCA Australia (RSPCA)**

“Behavioural assessment of adult companion dogs: Development of national standards for identifying shelter dogs suitable for re-homing” – K.M. Mornement and P.C. Bennett (2007/08 - \$9,000)

***RSPCA total funds, (2002-2009) - \$9,000***

### **Australian Companion Animal Council (ACAC)**

“Behavioural problems and welfare of dogs in suburban backyards” – ARC SPIRT project. P.H. Hemsworth, G.J. Coleman and J.L. Barnett (2002 - \$7,500)

***ACAC total funds, (2002-2009) - \$7,500***

### **Australian Alpaca Association (AAA)**

“Development of the Monash Alpaca Husbandry Survey” – P.C. Bennett (2005 - \$5,000)

***AAA total funds, (2002-2009) - \$5,000***

**TOTAL COMPETITIVE RESEARCH FUNDING FROM  
2002–2009 - \$ 8,550,951**

# AWSC RD&E PROJECTS 2002-2009

(For summaries, see appendix I)

## 1. Dairy industry

- 1.1. Designing components of milking sheds – DRDC
- 1.2. Developing a training programme targeting stockperson attitudes and behaviour on cow productivity – DRDC, DPI
- 1.3. Time budgets of behaviour in grazing dairy cows – DPI
- 1.4. Evaluation of welfare issues associated with extended lactation in dairy cows – DPI
- 1.5. Benchmarking welfare indicators for the dairy and lamb industries – DPI
- 1.6. Behavioural responses of dairy cows to mastitis: Indicators of pain, and welfare and productivity implications – OARDC, DPI
- 1.7. Calf transport pilot study – AWSC
- 1.8. Transport of bobby calves - DPI

## 2. Pork industry

- 2.1. Evaluation of sow stall dimensions – APL
- 2.2. The effects of community attitudes and behaviour on the pork industry – APL
- 2.3. The welfare of gestating sows in large groups on deep litter – APL
- 2.4. Selection of stockpersons – APL
- 2.5. Revision of Pig ProHand – APL
- 2.6. Field trial of pig stockperson selection – APL
- 2.7. Development and analysis of survey data for public consultation on the Code of Practice for Pigs Regulatory Impact Statement (RIS) – DPI
- 2.8. Welfare methodology – APL, DPI
- 2.9. The effects of group housing during gestation on sow welfare and reproduction – APL

## 3. Poultry

- 3.1. The importance of nests for the welfare of laying hens – AECL
- 3.2. Welfare methodology – Poultry CRC, DPI
- 3.3. Human – animal relationships in the egg industry – Poultry CRC

- 3.4. Using machine vision to count hens and reduce egg breakage – proof of concept – Poultry CRC
- 3.5. Implementation of Animal Welfare Standards into the meat chicken industry's company QA programs – Poultry CRC
- 3.6. Human-animal interactions in the turkey industry – MPC

#### **4. Beef and sheep industries**

- 4.1. Developing welfare standards for the meat processing and livestock transport industries – AMIC, DPI
- 4.2. Fear / Stress model for beef cattle – Beef CRC
- 4.3. Welfare implications of alternative mulesing procedures – AWI
- 4.4. ProHand for the livestock processing industry: a professional livestock handling package – Mintrac
- 4.5. Strategic labour saving and productivity technologies for livestock industries – DPI
- 4.6. Review national animal welfare standards for livestock processing establishments – MLA
- 4.7. Time budgets and abnormal behaviour of individually housed shedded sheep – Commercial, AWSC

#### **5. Companion animals**

- 5.1. An evaluation of companion dog training in the community – BAW
- 5.2. A study of owner attitudes towards their dog's behaviour – BAW
- 5.3. The creation of a multi-dimensional human-companion bonding scale – BAW
- 5.4. Measuring personality in dogs – BAW
- 5.5. Identifying 'ideal' companion dogs for Australia – BAW, PIAS
- 5.6. A study of factors affecting long-term retention of companion dogs – BAW
- 5.7. An investigation of factors affecting the success of canine adoptions from animal welfare shelters – BAW
- 5.8. Human factors affecting obesity in dogs – BAW
- 5.9. Behavioural problems and welfare of dogs in suburban backyards – ARC Linkage, PIAS, ACAC
- 5.10. Dog communication – PIAS
- 5.11. Tracking Cat Shelter Admission Statistics – BAW
- 5.12. Attitudes towards cats and responsible cat ownership in suburban and Melbourne and rural Victorian residents. – BAW

- 5.13. Cats and dogs that visit veterinarians: where do they come from, do they have litters, and what happens to their offspring? – BAW
- 5.14. Welfare implications of a commercial husbandry procedure for horses – Commercial
- 5.15. The mental evolution of the horse and its consequences for training
- 5.16. The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare – BAW
- 5.17. A summary of Australian research pertaining to cat ownership and overpopulation – BAW
- 5.18. Cat welfare in confinement – BAW
- 5.19. Assessment of shelter dog behaviour – BAW
- 5.20. Review of the actual and potential effectiveness of compulsory desexing programs for companion animals – BAW
- 5.21. Effects of an enrichment program for kennelled domestic dogs – BAW, GDV
- 5.22. Characteristics of pets and owners who visit veterinarians – BAW
- 5.23. Post-adoptive interviews conducted with people who have adopted cats from welfare shelters – BAW
- 5.24. Characteristics of successful human/dog relationships – PIAS
- 5.25. A review and evaluation of strategies to manage unwanted cats and dogs in Queensland – QDPI

## **6. General/Other**

- 6.1. Public attitudes to animal welfare – AECL, MLA, DPI
- 6.2. Education in agriculture: livestock farming, food production and food choices in pre-adolescents – WBF, ARC, APL, DPI
- 6.3. “Minimising Handling Stress” - Development of a prototype training package for farmers to improve their human-farm animals relationship – EU
- 6.4. Farm Animal Welfare in Ohio: Assessing Public Concern and Implications for the Food Animal Industry – OARDC
- 6.5. Dissecting the impact of stress on reproduction: Novel peptide mediates inhibitory effects of stress on female reproduction – ARC
- 6.6. Design and delivery of “Animals in Society” as part of the “Human and animal interactions” cluster at The Ohio State University – OSU
- 6.7. Animal welfare performance measures: a model to monitor and benchmark the welfare of animals in research – AAWS
- 6.8. Animal welfare education package - AWSC

## AWSC RD&E COMMUNICATIONS

### Books and chapters

1. Barnett, J.L. and Glatz, P.C. (2004). Developing and implementing a welfare audit in the Australian chicken meat industry. In: "Measuring and Auditing Broiler Welfare", Eds. C. Weeks and A. Butterworth, CABI Publishing, Wallingford; pp. 231-240.
2. Coleman. G.J., (2004). Personnel management in agricultural systems. In: "Maximizing Well-being and Minimizing Suffering in Farm Animals", Eds. Rollin, B.E. and Benson, J. Iowa State University Press, Iowa; pp. 167-181.
3. Cutler, R.S., Fahy, V.A., Spicer, E.M. and Cronin, G.M. (2004). Prewearing mortality. In: "Diseases of Swine, 9<sup>th</sup> Edition", Eds. B.E. Straw, S. D'Allaire, W.L. Mengeling and D.J. Taylor. Ames, Iowa, Iowa State University Press; pp 985-1001.
4. Fisher, A.D., Paull, D.R., Lee, C., Atkinson, S.J. and Colditz, I.G. (2008). New research on pain-alleviating methods for farm animals. In: "Scientific Assessment and Management of Animal Pain", Eds. D.J. Mellor, P.M. Thornber, A.C.D. Bayvel and S. Kahn. OIE Technical Series; Vol. 10. pp 145-156.
5. Hemsworth, P.H. (2004). Human-animal interactions. In: "Welfare of the Laying Hen", Ed. G.C. Perry, CABI Publishing, Oxon UK; pp. 329-343.
6. Hemsworth, P.H. (2004). Human-livestock interaction. In: "The Well-Being of Farm Animals: Challenges and Solutions", Eds. G.J. Benson and B.E. Rollin, Blackwell Publishing, Iowa, USA; pp. 21-38.
7. Hemsworth, P.H. and Coleman, G.J. (2004). Human factors influencing broiler welfare. In: "Measuring and Auditing Broiler Welfare", Eds. C. Weeks and A. Butterworth, CABI Publishing, Wallingford; pp. 197-205.
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9. Hemsworth, P.H. (2007). Behavioural Principles of Pig Handling. In: "Livestock Handling and Transport, 3rd Edition", Ed. T. Grandin, CAB International, Oxon, UK; pp. 214-227.
10. Hemsworth, P.H. (2008). Human-pig relationships. In: "Welfare of Pigs", Eds. L. Faucitano and A.L. Schaefer, Wageningen Academic Publishers, Wageningen, NL; pp. 271-288.

## Research publications (full) in refereed journals

1. Arnold, N.A., Ng, K.T., Jongman, E.C. and Hemsworth, P.H. (2007). Responses of dairy heifers to the visual cliff formed by a herringbone milking pit: evidence of fear of heights in cows. *Journal of Comparative Psychology*, 121: pp 440-446.
2. Arnold, N.A., Ng, K.T., Jongman, E.C. and Hemsworth, P.H. (2007). The behavioural and physiological responses of dairy heifers to tape-recorded milking facility noise with and without a pre-treatment adaptation phase. *Applied Animal Behaviour Science*, 106: pp 13-25.
3. Arnold, N.A., Ng, K.T., Jongman, E.C. and Hemsworth, P.H. (2008). Avoidance of tape-recorded milking facility noise by dairy heifers in a Y maze choice task. *Applied Animal Behaviour Science*, 109: pp 201-210.
4. Barnett, J.L. and Hemsworth, P.H. (2003) Science and its application in assessing the welfare of laying hens. *Aust. Vet. J.*, 81: pp 615-624.
5. Barnett, J.L., Cronin, G.M., Tauson, R., Downing, J.A, Janardhana, V., Lowenthal, J.W. and Butler, K.L. (2005). The effects of a perch, dust bath and nest box in furnished cages on the welfare of laying hens. *Animal Science Papers and Reports*, 23 (Supplement 1): 111-119.
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7. Barnett, J.L. (2007). Effects of confinement and research needs to underpin welfare standards. *Journal of Veterinary Behaviour*, 2: pp 213-218.
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10. Barnett, J.L. and Hemsworth, P.H. (2009). Welfare-Monitoring Schemes: Using Research to Safeguard Welfare of Animals on the Farm. *Journal of Applied Animal Welfare Science*, 12(2): pp 114-131.
11. Bennett, P.C. and Perini, E. (2003), Tail docking in dogs: a review of the issues. *Australian Veterinary Journal*, 81(4): pp 208-218.
12. Bennett, P.C. and Perini, E. (2003). Tail docking in dogs: can attitude change be achieved? *Australian Veterinary Journal*, 81(5): pp 277-282.

13. Bennett, P.C., Cooper, N., Rohlf, V. I. and Mornement, K. (2007). Factors influencing owner satisfaction with companion-dog-training facilities, *Journal of Applied Animal Welfare Science*, 10(3): pp 217-241.
14. Bennett, P. C., and Rohlf, V.I. (2007). Owner-companion dog interactions: Relationships between demographic variables, potentially problematic behaviours, training engagement and shared activities. *Applied Animal Behaviour Science*, 102: pp 65-84.
15. Breen, K.M., Oakely, A.E., Pytiak, A.V., Tilbrook, A.J., Wagenmaker, E.R. and Karsch, F.J. (2007). Does cortisol acting via the Type II Glucocorticoid Receptor mediate suppression of Pulsatile LH secretion in response to psychosocial stress? *Endocrinology*, 148: pp 1882-1890.
16. Breuer, K., Hemsworth, P.H. and Coleman, G.J. (2003). The effect of positive or negative handling on the behavioural responses of nonlactating heifers. *Applied Animal Behaviour Science*, 84: pp 3-22.
17. Carless, S.A., Fewings-Hall, S., Hall, M., Hay, M., Hemsworth, P.H. and Coleman, G.J. (2007) Selecting unskilled and semi-skilled blue-collar workers: The criterion-related validity of the PDI-Employment Inventory *International Journal of Selection and Assessment*, 15: pp 335-340.
18. Clarke, T., Cuthbertson, E.M., Greenall, R.K., Hannah, M.C., Jongman, E. and Shoesmith, D. (2004). Milking regimes to shorten milking duration. *Journal of Dairy Research*, 71: pp 419-426.
19. Colditz, I.G., Lloyd, J.B., Paull, D.R., Lee, C., Giraudo, A., Pizzato, C. and Fisher, A.D. (2009). An assessment of the welfare of suckling lambs following intradermal injection of cetrimide as a non-surgical alternative to conventional surgical mulesing. *Australian Veterinary Journal*, 87: pp 12-18.
20. Colditz, I.G., Lloyd, J.B., Paull, D.R., Lee, C., Giraudo, A., Pizzato, C. and Fisher, A.D. (2009). The effect of the non-steroidal anti-inflammatory drug carprofen on some physiological and behavioural responses of weaned sheep to non-surgical mulesing by intradermal injection of cetrimide. *Australian Veterinary Journal*, 87: pp 19-26.
21. Coleman, G. J., McGregor, M., Hemsworth, P. H., Boyce, J. and Dowling, S. (2003). The relationship between beliefs, attitudes and observed behaviours of abattoir personnel in the pig industry. *Applied Animal Behaviour Science*, 82: pp 189-200.
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23. Coleman, G.J. (2008). Public perceptions of animal pain and animal welfare, *OIE Technical Series (World Organisation for Animal Health)* Vol. 10, 2008: pp 26-37.
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25. Cronin, G.M., Dunshea, F.R., Butler, K.L., McCauley, I., Barnett, J.L. and Hemsworth, P.H. (2003). The effects of immuno-castration and surgical-castration on the behaviour and consequently growth of group-housed, male finisher pigs. *Applied Animal Behaviour Science*, 81: pp 111-126.
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31. Edge, M.K. and Barnett, J.L. (2008). Development and integration of animal welfare standards into company quality assurance programs in the Australian livestock (meat) processing industry. *Australian Journal of Experimental Agriculture*, 48: pp 1009-1011.
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38. Hemsworth, P.H., Barnett, J.L., Hofmeyr, C., Coleman, G.J., Dowling, S. and Boyce, J. (2002). The effects of fear of humans and pre-slaughter handling on the meat quality of pigs. *Aust. J Agric. Res.*, 53: pp 1-9.
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40. Hemsworth, P.H. (2007). Ethical stockmanship. *Australian Veterinary Journal*, 85 (5): pp 194-200.
41. Hemsworth, P.H. and Tilbrook, A.J. (2007). Sexual behaviour of male pigs. *Hormones and Behaviour*. *Hormones and behaviour*, 52: pp 39-44.
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43. Hemsworth, P.H., Barnett, J.L., Karlen, G.M., Fisher, A.D., Butler, K.L. and Arnold, N.A. (2009). Effects of mulesing and alternative procedures to mulesing on the behaviour and physiology of lambs. *Applied Animal Behaviour Science*, 117: pp 20-27.
44. Hides, S.J. and Hannah, M.C. (2005). Drying times of umbilical cords of dairy calves. *Aust Vet Journal*, vol 83, no 6: pp 371-373.
45. Jongman, E.C., Bidstrup, I. and Hemsworth, P.H. (2005). Behavioural and physiological measures of welfare of pregnant mares fitted with a novel urine collection device. *Applied Animal Behaviour Science*, 93: pp 147-163.
46. Jongman E.C. (2007). Adaptation of domestic cats to confinement. *Journal of Veterinary Behaviour*, 2 (6): pp 193-196.
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### **Research papers submitted to refereed journals**

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## Conference publications

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## **AWSC SCIENTIFIC SEMINARS 2002-2009**

**(For titles and speakers, see appendix II)**

### **2002**

2 seminars featuring 8 presentations

### **2003**

2 seminars featuring 5 presentations

### **2004**

5 seminars featuring 15 presentations

### **2005**

5 seminars featuring 11 presentations

### **2006**

8 seminars featuring 17 presentations

### **2007**

11 seminars featuring 23 presentations

### **2008**

7 seminars featuring 19 presentations

### **2009 (to June)**

3 seminars featuring 5 presentations

# APPENDIX I

## AWSC RD&E PROJECT SUMMARIES 2002-2009

### 1. Dairy industry

#### 1.1. Designing components of milking sheds - DRDC

Following methodological development, a number of common features in a milking shed were studied in this PhD project. The dairy heifer's responses to shadows, milking shed noise, a milking pit, a close-fronted bail and contrasting and inconsistent floor surfaces were investigated. Based on both direct behavioural and physiological responses and choice behaviour, it is concluded that dairy heifers perceived tape recorded milking shed noise more negatively than any of the other stimuli studied.

The results show that exposure to the milking pit and the close-fronted bail are moderately aversive to the naïve heifer and that familiarisation to these features in a controlled manner prior to the first lactation should facilitate habituation and minimise disruption and carry-over effects on the rest of the herd. Furthermore, the typical noise in a dairy shed is more aversive to heifers than the milking pit and the close-fronted bail and thus it is recommended that noise levels in the dairy shed are reduced. Failure to reduce noise will produce persistent avoidance responses in heifers making handling difficult in terms of reduced ease of entry to the shed and restlessness during milking. Contrasting and inconsistent floor surfaces pose mild challenges to the heifers and given some degree of predictability in exposure, heifers should rapidly habituate to these features. While shadows were also found to be mildly aversive, it is likely that the inconsistent appearance of intense shadows in a very familiar situation in practice may produce a substantial novelty effect leading to baulking. Such situations obviously should be addressed, perhaps through judicious use of shade cloth.

The methodology developed in this project provides a valuable applied tool for industry to benchmark design features in terms of their impact on the willingness of cows to approach/enter the specific feature. Knowledge on how specific features in a milking shed affect cow behaviour is valuable in constructing new facilities or renovating existing facilities or imposing training procedures to allow the animal to adapt to the relevant facility feature, with the aim of improving cow behaviour, productivity and welfare and farmer comfort in the shed.

#### 1.2. Developing a training programme targeting stockperson attitudes and behaviour on cow productivity – DRDC, DPI

Previous research in the Australian dairy industry has shown significant relationships between the attitudes and behaviour of stockpeople towards their cows and the fear and productivity of their cows. This project developed ProHand Dairy, a practical and inexpensive training programme, targeting the

key attitudes and behaviour of stockpeople, to provide the dairy industry with an excellent opportunity to improve the productivity and welfare of dairy cows.

### **1.3. Time budgets of behaviour in grazing dairy cows - DPI**

In Australia, most dairy cows are managed outdoors all year round. At milking time, the herd is brought from pasture to the milking facility, where cows wait in a holding yard for their turn to be milked. After being milked, each cow is free to return to pasture. Over the last 30 years, the average herd size and farm size of Australian dairy farms has increased and continues to do so. Thus, cows may have to walk long distances between pasture and the milking facility, and the amount of time cows have to wait to be milked may be substantial. Therefore, some cows in a herd may spend several hours per day away from pasture during the milking process. The series of studies in this PhD program examined whether time spent away from pasture influenced the behaviour of grazing lactating dairy cows, and if so, whether cow welfare and productivity were adversely affected.

When time off pasture was experimentally manipulated, cows repeatedly spending a longer time away from pasture were found to have reduced lying times and lower total milk and milk components yields. Although no discernable differences in lameness, via locomotion scoring, were found, cows that spent a longer time away from pasture had higher traumatic-type hoof lesion scores. There was also a trend for these cows to have higher milk cortisol concentrations, raising the possibility that stress was responsible for the lower milk production.

The behaviour, welfare and productivity of cows consistently entering early and late in the milking order was investigated, on three large farms where the duration of milking, and thus time off pasture, was extended. Results were substantially similar to those found when time off pasture was experimentally manipulated. Cows entering later in the milking order had reduced lying and resting times, and sometimes also reduced grazing time. These cows were also found to have reduced liveweight or milk yield, and changes in milk composition, suggestive of underfeeding.

These studies provide evidence that increased time spent away from pasture may reduce grazing and lying behaviour and in turn reduce animal welfare and productivity, and farm profitability, in conventional pasture-based dairying systems. Such findings may also be applicable in other situations in which the feeding and lying behaviour of lactating dairy cows is influenced by management practices and routines. However, further research is required to determine the mechanism(s) by which cow behaviour, welfare and productivity is affected by time off pasture, before definitive recommendations can be offered to farmers.

### **1.4. Evaluation of welfare issues associated with extended lactation in dairy cows - DPI**

The objectives of this study are to examine the impact of extended lactation on animal welfare. While there are some possible positive effects, there may also be negative implications. Awareness of possible negative welfare impacts

may assist in the management of herds with extended lactation. If extended lactation is found to have positive welfare consequences this may help to “sell” this practice to farmers who are struggling to maintain spring calving. Practices with a negative welfare image such as the hormonal induction of calving may be unnecessary in most circumstances if farmers switch to a system with extended lactation, thus improving the welfare image of the whole dairy industry.

Periods when cows are most under metabolic pressure include end of lactation in the first milking cycle, around calving, during peak lactation and at the end of the second milking cycle, and at this time blood samples will be analysed for immunological parameters and milk samples will be analysed for cortisol. Cows will be assessed for lameness twice each year using a visual lameness scoring system. Additionally hoof condition will be assessed once a year, when cows are considered most at risk of lameness, by a trained veterinarian. Any veterinary treatment during the duration of the study will also be recorded. Live weight, white cell count, milk production and milking order will be compared between EL and control cows. In addition electronic observations will be made on time budgets, in particular walking, resting time and grazing. In the third year cows will be weighed shortly before calving as well as after calving. Calves will be tested for early development and the development of EL and control calves will be compared. Cows will again be assessed for white cell count and lameness at this time.

### **1.5. Benchmarking welfare indicators for the dairy and lamb industries - DPI**

Animal welfare is an issue of increasing interest and concern to the broader community and both government and livestock industries are looking to better assess and monitor their performance in addressing animal welfare issues.

The concept of benchmarking and compliance has the potential to assess industry performance in relation to animal welfare. It is important that animal industries can demonstrate compliance with welfare codes and standards industry wide, so that consumers (both domestic and overseas) have confidence in the standards under which production occurs. A literature review conducted last year identified recording systems and benchmark data being used overseas. Particularly in Europe an extensive program is being funded by the EU (Welfare Quality) to implement a benchmarking system across all EU countries. While animal welfare may not be used as a trade barrier, concerns in Europe about imports from countries with lower welfare standards will no doubt be used in marketing EU products. Therefore it is important that Australia not only has similar welfare standards to the EU, but is also able to confirm this through reliable benchmark data on animal welfare. A welfare monitoring scheme should include animal-based measures, resource-based measures and management-based parameters. This project aims to identify recording systems already in place in the dairy and lamb industries that can be used for this purpose. In addition, where existing data are lacking, it will recommend where recording systems (ie QA systems) need to be developed.

## **1.6. Behavioural responses of dairy cows to mastitis: Indicators of pain, and welfare and productivity implications – OARDC, DPI**

The prevention and alleviation of pain are considered important factors in the ethical treatment and care of animals. Pain is also one of the most important aspects determining the welfare of farm animals. Mastitis (inflammation of the mammary gland) is the most prevalent disease in dairy cows and therefore, the welfare of many dairy cows may be at risk due to pain associated with this disease.

An experiment is being conducted to investigate behavioural, physiological, biochemical and production changes associated with experimentally induced mastitis, and also to evaluate an analgesic as an alleviator of clinical signs of pain and thus improvement in animal welfare and rapid return to peak performance.

## **1.7. Calf transport pilot study - AWSC**

This pilot study examined the effects of age over the maximum travel duration allowed for calves less than 3 months of age under the Draft Australian Livestock Transport Standards. Calves aged 3, 5 and 10 days were transported for 10 h in individual pens within a specially designed transport trailer.

The aim of this study was to assess the impact of age on stress responses to long transport on young calves. Blood cortisol concentrations, differential white blood cell counts, and packed cell volume was measured prior to, throughout and post the 10 hour journey. In addition, behaviour for 12 hours post journey was video recorded for analysis. The results were compared to those from a control group, housed for ten hours without access to food or water in pens of the same dimension as the trailer pens.

Total cortisol analysis has yielded some interesting results; in particular, an age effect on total plasma cortisol concentration. We are currently waiting for free plasma cortisol concentrations to be analysed. The differential white blood cell count analysis indicated time, treatment x time and treatment x age effects for lymphocyte cell counts. No other main or interactions effects were noted for neutrophil cell counts, total white blood cell count or packed cell volume.

Behavioural data are currently being extracted and it is estimated that analysis on this data will be complete by mid 2009.

## **1.8. Transport of bobby calves - DPI**

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

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

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

## **2. Pork industry**

### **2.1. Evaluation of sow stall dimensions - APL**

This three-year research project aimed to determine if stall dimensions affect the welfare of sows and if there is a minimum time in stalls that results in improved reproduction without compromising sow welfare.

The housing of dry sows, particularly individual housing, is one of the most controversial issues of conventional pig production. While precise figures are not known, industry opinion indicates that in Australia about 40-60+% of pregnant sows are individually housed in stalls at some stage during pregnancy, with the remainder being group-housed.

Limited survey information suggests that 26% of sows are stall housed in Australia for most of their reproductive cycles (i.e. except for farrowing in crates and a period of group housing around mating) and up to 62% may be in stalls for part of their reproductive cycle (i.e. in stalls for a restricted time followed by group housing, farrowing in crates and group housing around mating).

This project examined the effects of stall dimensions on sow welfare, measured on the basis of changes in physiology, injuries and behaviour and their consequences, thus using the homeostasis approach to welfare assessment. In addition, one of the consequences of group housing is the need to group unfamiliar pigs with the associated aggression and potential affects on sow injuries and lameness. An experiment was conducted to determine if responses at grouping were affected by previous housing situation.

The first and main experiment was conducted over two years and examined stall dimensions using two factors (1) Stall Width – 0.6 m and 0.75 m, and (2) Stall Length – 2.0 m, 2.2 m and 2.4 m. Measurements included stress hormone concentrations, immunological status, behaviour and lameness.

Experiments 2 and 3 were conducted on commercial farms to determine the effects of time in stalls and stall dimensions, respectively, on reproductive performance. In experiment 2 the treatments were sows housed continuously in stalls or groups and housed in stalls for 5 or 10 weeks, followed by group housing. The treatments were conventional stall housing for either 5 weeks or

continuously and similar treatments with a modified stall (2.7 m length). The predominant focus of these experiments was production (reproductive performance), albeit the opportunity to make some physiological and behavioural measurements was taken.

Experiment 4 was a student project and examined the effects of stall and group housing on aggression and the formation of stable social hierarchies between unfamiliar pigs when mixed to form a group.

This project showed that for stall width, the data were overwhelmingly in favour of a stall width of 0.6 m compared to 0.75 m and suggest a stall length of 2.2 m to minimise stress effects and consequences on the immune system.

The data showed neither advantages nor disadvantages on reproductive performance, thus from a welfare perspective the recommendation from these experiments is for stall dimensions of 0.6 m x 2.2 m. There were no clear recommendations for time in stalls. Nevertheless, the issue of aggression consequent on grouping unfamiliar pigs remains.

Experiment 4 showed that stall-housed pigs, when grouped after a period of 5 weeks in stall housing, had higher levels of aggression than previously group-housed pigs. This emphasises the need for further research on practical methods to reduce aggression when mixing pigs.

Some recommendations arising both directly and indirectly from this project are:

- A stall length of 2.2m may optimise the welfare of the sow when compared to a stall length of 2.0m
- Further research is required on methods of mixing sows to reduce aggression and risk to welfare.

## **2.2. The effects of community attitudes and behaviour on the pork industry - APL**

The aim of this research was to identify factors that predict consumer and community behaviours relevant to pork production and consumption. Public opinions regarding the purchase of meat products were surveyed using a generic “Farming and the Community” survey and an industry specific “Pork Farming and the Community” survey. The total sample of 508 respondents comprised 354 females and 154 males. Of these, 141 (96 females; 45 males) were interviewed at the point-of-sale. The main findings were as follows:

- The majority of respondents (90%) described themselves as primarily meat eaters, with 77% reporting that they purchase pork products. Monthly average self-reported purchases of pork were 1.87kg per person
- Attitude variables predicted around 8% of the variability in pork purchasing, 11% of the variability in actual pork purchase at the point of sale, and 23% of the variability in people’s community behaviours

- Although there were significant correlations between variables such as quality, shelf life or appearance and pork purchases, these were small and accounted for only about one percent of the variance in pork purchases
- In the case of pork purchases, attitudes accounted for more variance than did the traditional considerations of quality, shelf life and appearance
- It appears that people's attitudes are more likely to translate into community behaviours which are duly responded to by the media and perhaps by politicians than they are to determine buying behaviour
- It was concluded that this study has provided good evidence to suggest that community attitudes should be taken into account in developing marketing strategies and particularly in developing policy. The focus of research should extend beyond food quality issues to include community concerns about animal welfare.

### **2.3. The welfare of gestating sows in large groups on deep litter – APL**

The aim of the two experiments conducted in this project was to examine the animal welfare implications of housing gestating sows in a deep-litter group housing system in comparison to housing in gestation stalls. Furthermore once it became obvious in the first experiment that aggression at mixing immediately after mating may reduce the welfare of sows in the large group, deep litter housing system, the effects of delaying mixing until pregnancy confirmation was studied in the second experiment.

Both experiments indicated that sows housed in large groups on deep litter may have had greater difficulties adapting to their treatment early after mixing relative to sows in conventional stalls as evidenced by differences in salivary cortisol levels. Late in gestation, sows in stalls may have had greater difficulties in adapting than sows in deep litter systems.

An important finding in Experiment 2 was the lower level of aggression when sows were mixed in deep litter systems at Day 35 of gestation rather than immediately following mating and the lower cortisol concentrations at both Day 0 and Day 35 in the sows mixed at Day 35. This result suggests that the practice of housing sows in stalls immediately after mating and delaying mixing in large groups until pregnancy is confirmed may provide some distinct welfare advantages over housing sows either in stalls or in large groups for the entire gestation.

### **2.4. Selection of stockpersons - APL**

This project examined the factors that predict good performance by stockpeople in the pig industry. Computerised questionnaires were used at the start of employment of stockpeople to evaluate the value of measures of personality, motivation, turnover and performance potentials, and attitudes and empathy toward pigs to predict the subsequent performance of

stockpeople. The results indicated that there are several variables which can be assessed in inexperienced stockpeople and which predict future performance. Potentially, these tests can be assembled into a kit for use in selection in the pig industry. However, because this was an exploratory study where many variables were investigated, the levels of variance in stockperson performance accounted for will tend to be inflated as a result of the stepwise strategy employed. It is essential that a validation study be carried out before the findings of this study are implemented widely.

## **2.5. Revision of Pig ProHand - APL**

Research in a number of livestock industries has shown that interactions between stockpeople and their animals can limit welfare and productivity. While these interactions may appear harmless, frequent use of some of these routine behaviours by stockpeople can result in farm animals becoming fearful of humans. It is these increased fear levels, through stress, that appear to limit animal welfare and productivity.

This research has also shown that one of the antecedents of stockperson behaviour is the attitude of the stockperson towards interacting with their animals. Intervention studies in the dairy and pig industries have shown the potential of cognitive-behavioural intervention techniques designed to specifically target the key attitudes and behaviours of stockpeople that have a direct effect on animal fear, productivity and welfare (Coleman et al., 1999; Hemsworth et al., 1994, 2002).

Such intervention techniques involve imparting knowledge and skills, as well as changing established habits, altering well-established attitudes and beliefs (targeting denial and offence in the stockpeople), and preparing stockpeople to handle reactions from both pigs and other people following change.

The ProHand multi-media training program was first developed in 1996 to assist with improving stockperson behaviour and attitudes towards handling pigs. During this time, there have been a number of changes which needed to be incorporated into ProHand.

The revised ProHand program therefore includes a number of alterations which:

- Accommodate changes in farm size
- Incorporate new/alternative housing systems
- Include information about management of AI units and handling AI boars;
- Include information on pig behaviour characteristics - including 'animals at risk' surveillance;
- Provide links to the National Training Package Competencies, including OH&S principles; and
- Make use of improved technology and capabilities of computer systems to deliver the program.

## **2.6. Field trial of pig stockperson selection - APL**

The Stockperson Selection Aid (SSA) was developed by researchers at Monash University's Animal Welfare Science Centre in collaboration with the Victorian Institute of Animal Science. Its development is based on the findings of several years of research undertaken with stockpeople in the Australian pig industry.

The SSA is a tool that can be used by employers in the pig industry to guide the selection of stockpeople. Selected individuals will potentially improve the quality of their work team, maximise productivity and welfare and improve company profits. It should be made clear, however, that the selection of staff should be based on a range of key indicators. Accordingly, *the SSA is just one factor which should be taken into account when making employment decisions.*

This project was designed to test the utility of the SSA in a commercial environment. Several large pig producers will use the SSA to assist in stockperson selection and the usefulness of it will be assessed.

## **2.7. Development and analysis of survey data for public consultation on the Code of Practice for Pigs Regulatory Impact Statement (RIS) - DPI**

On the 1st June, 2006, the Model Code of Practice for the Welfare of Animals – Pigs (Revised) and the associated Regulatory Impact Statement was released for a 60-day public consultation on the Department of Primary Industries web site.

The primary aim of this report was to use the "Pig Regulatory Impact Statement Survey" to document the attitudes held by Australian's towards the *proposed* changes to the Model Code of Practice for the Welfare of Animals – Pigs (Revised). The main proposed changes relate to the minimum standards; the most controversial of which relate to the period of confinement of sows in stalls during gestation. The public consultation process adopted here involved the collection of data from three samples, namely; web survey respondents, phone survey respondents and stakeholders.

A secondary aim was to report on the efficacy of this method of public consultation and to identify aspects that might be improved. To this end, the views expressed by respondents who completed the 'Pig Regulatory Impact Statement Survey' and representatives of stakeholder groups (such as *Animals Australia*) regarding the manner in which the public consultation was conducted, and in particular, comments pertaining to the survey have been documented.

## **2.8. Welfare methodology – APL, DPI**

There is uncertainty within science on the concept of animal welfare. This uncertainty arises basically because scientists differ in their concept of animal welfare and thus how animal welfare should be measured or judged. Scientists have basically used two methodologies to study animal welfare: the welfare of animals has been assessed on the basis of either biological

functioning or animal preferences. The first approach is an integrated one measuring behavioural, physiological, health and fitness responses to assess biological functioning on the basis that difficult or inadequate adaptation will generate welfare problems for animals. The second uses animal preference (and behavioural demand) testing on the basis that animal preferences are influenced by the animal's emotions, which have evolved to motivate behaviour in order to avoid harm and facilitate survival, growth and reproduction. An important question in addressing this scientific uncertainty is "Does depriving animals of their more preferred resource result in biological dysfunction". This series of experiments has examined this question.

Three initial experiments were conducted in which the effects of deprivation of the resources, feed, social contact and bedding, on the choice behaviour of pigs for these resources were studied in Y maze trials. It was found that overall pigs consistently chose feed over bedding and social contact over bedding, irrespective of moderate deprivation. Surprisingly, overall pigs chose social contact over feed, but there was substantial variation between pigs in their choice behaviour of feed or social contact. There were negative effects of both social and feed deprivation on average daily weight gain (ADG). While the feed effect is expected, one interpretation of the social effect is that social deprivation, through stress, may have reduced ADG. While we suggest that the feed effect on ADG is likely to be largely explained in terms of reduced feed intake, the social effect on ADG provides limited support for the notion that deprivation of a highly preferred resource may result in biological dysfunction.

In a fourth experiment, two groups of pigs were studied: those that preferred social contact and those that preferred feed in Y maze tests. Over a 6-week period, half of each group of pigs were deprived of visual and tactile social contact but had *ad libitum* feed, while the other half were placed on 70% feed restriction but allowed visual and tactile social contact. There was a significant interaction on liveweight gain with both socially preferred and feed preferred pigs showing lower gains when deprived of their individual preferred resource. There was a similar tendency for an interaction on cortisol concentrations, with animals deprived of their individual preferred resource showing had higher day time free cortisol. On the basis of changes in free cortisol and live weight, these studies provide limited evidence that deprivation of a highly preferred resource may result in biological dysfunction

## **2.9. The effects of group housing during gestation on sow welfare and reproduction - APL**

Recent changes in the Australian Model Code of Practice for the Welfare of Animals – Pigs, will restrict the duration of housing gestating sows in stalls to early gestation. As a result, the Australian pork industry is likely to consider several housing options. In addition to continuous group housing during gestation, there will be increasing interest in a combination of stall housing of sows for 6 weeks post-mating followed by group housing for the remainder of gestation.

This project will examine the effects of space allowance, group size, time of mixing and feeding system on aggression, stress, injury, lameness and reproduction in sows housed in groups during gestation.

### **3. Poultry and egg industries**

#### **3.1. The importance of nests for the welfare of laying hens - AECL**

The housing of laying hens in cages is a contentious welfare issue which has already impacted negatively on public sentiment and lead to the introduction of regulations that modify both cage size and stocking density. Further additional and expensive regulations may be introduced in the future. One key criticism of cages for layer hens has been that hens become frustrated at the time of oviposition in the absence of a nest (box). Although nests are considered by some to be important for welfare, our research has shown that for commercial Hyline Brown hens experienced with nests, only about two-thirds of the hens chose to use the nest for egg laying.

Data from Europe also indicate that fewer brown birds lay in nests (in furnished cages) than white birds; these data have been largely ignored. This raises questions as to both the welfare implications of nests and the attributes of nests that birds consider attractive. A review by Ekstrand and Keeling (1994) provides evidence to support the inclusion of nest boxes in layer cages. Duncan (1992) considered the lack of a nest site in conventional cages was the biggest welfare problem in this system of housing.

The importance of the nest box is based on evidence of preference tests and evidence of frustration in the absence of a nest box (see review by Ekstrand and Keeling 1994) and the strong motivation of hens to use a nest (Smith *et al.*, 1990). The project is assessing the importance of nest boxes for the welfare of hens in modern cages, and determining the factors that influence use of the nest box by hens.

Most hens chose a consistent site for egg laying by about the tenth egg. Over six experiments, about two-thirds of hens consistently laid in the nest box and about 27% consistently laid on the wire floor (consistent was defined as at least 80% of eggs at the one site).

There were no differences due to nest box or group size (2, 4 or 8 birds per cage) in egg corticosterone concentrations in the first 20 eggs laid.

At 23 weeks of age the presence of a nest box resulted in 33% higher plasma corticosterone concentrations, suggesting birds in cages with a nest box were more stressed. However, At 23 weeks of age, in cages with a nest box, birds that were classed as either 100% floor layers or 100% nest box layers (based on the previous 10 eggs laid) showed elevated corticosterone concentrations in egg albumen. However, the relationship was relatively short-lived and subsequently was not found at 29 or 35 weeks of age and none of the stress-related measurements were suggestive of any long-term change in HPA function and hence a chronic stress response.

Manipulation of the light-dark schedule to introduce a 3-h period of light during the night commencing at midnight, resulted in a shift in egg laying time with about three-quarters of the hens laying a proportion of their eggs in darkness (especially between 03.00 and 06.00 h), but did not alter the synchrony of egg laying times.

As most eggs laid by hens in the dark are laid on the wire floor with no impact on stress levels, this suggests that the nest box may not be important to hen welfare, at least when egg laying occurs in the dark.

### **3.2. Welfare methodology – Poultry CRC, DPI**

There is considerable uncertainty within science on the concept of animal welfare. Scientists differ in their views on how animal welfare should be measured or judged, with two prominent concepts of animal welfare in the literature: the welfare of animals is judged on the basis of (1) how well the animal is performing from a biological functioning perspective; (2) affective states, such as suffering, pain and other feelings or emotions. This scientific uncertainty in relation to animal welfare concepts does not necessarily diminish the robustness of the research utilising criteria or methodologies promulgated by these different views or concepts. However, it does raise the question of the relatedness of these concepts. In other words, is biological dysfunction associated with or does it lead to negative affective states and vice versa? To examine the relationships between two concepts of animal welfare, the biological functioning and affective states concepts, this project aimed to test the hypothesis that deprivation of a preferred resource results in biological dysfunction. A range of behavioural, physiological and fitness responses were used to assess biological functioning in this project, while bird preferences (on the basis that animal preferences are influenced by the animal's emotions) were assessed by offering the birds a choice of resources in a series of Y maze trials.

Y-maze tests were used in the first two experiments to examine preferences for feed, social contact and a dustbathing substrate (sawdust). The results of these two experiments indicate that laying hens preferred feed over social contact or dust, irrespective of moderate restriction of any of these resources. Furthermore, the hens were quicker to make feed choices compared with dust or social contact choices. The consistency of results across these experiments, together with the results of other preference methodologies in the literature, illustrate the reliability of this methodology for determining the relative choice behaviour of resources for laying hens.

The ultimate aim of this project was to study, using well-accepted stress models, the relationships between two concepts of animal welfare, the biological functioning and the affective states concepts. This was achieved by examining the question of whether deprivation of preferred resources resulted in biological dysfunction. An experiment was recently completed (and the results are currently being analysed) examining the effects of deprivation of dust-bathing or social contact on biological functioning of birds that either prefer dust-bathing or social contact. This experiment will contribute to our understanding of the effects of deprivation of highly preferred resources on

biological functioning and thus provide an insight into the relationship between these two methodologies of animal welfare assessment. The finding that deprivation of the resources most preferred by the animals results in biological dysfunction would lead to the development of a broader scientific consensus in that either of these two methodologies can be used independently or together to judge animal welfare in research settings (and in screening tools in the field).

### **3.3. Human – animal relationships in the egg industry – Poultry CRC**

The human-animal relationship consists of the behavioural interactions that occur between humans and animals, and the relevant precursors and outcomes of these interactions. One of the main precursors of human behaviour is attitude, and one of the main outcomes of human behaviour in the farming industries is the fear of humans experienced by the farm animals. Animals that are fearful of the stockpeople may experience poor welfare. Furthermore, fear through stress may lower productivity in farm animals. This project examined the human-animal relationship in the egg industry.

Field work was conducted on Australian and US egg farms. The attitudes and empathy of stockpeople in the egg industry were found to be predictive of their behaviour towards laying hens. Generally, negative attitudes were associated with more noise being made in the shed, faster speed of movement by the stockperson, more time spent in the shed, less time in certain areas of the shed and less time spent standing still. Positive attitudes and empathy were associated with less noise and less time spent in the shed. In turn, the behaviour of the stockpeople was related to the fear of humans displayed by laying hens during two behavioural tests. The hens displayed less fear of humans in sheds where the stockpeople spent more time standing still, moved more quickly, and expressed more behaviours in close proximity to the birds. In contrast, an increase in fear of humans in the hens was associated with the amount of noise that was made by stockpeople in the laying shed.

A series of experiments were conducted to further explore the relationship between human behaviour and fear of humans in laying hens. In these experiments, proximity of human contact was shown to be influential in reducing fear of humans in hens, with close proximity of humans resulting in lower fear. The duration of this contact appeared to have little or no impact on fear. Additional contact during rearing resulted in a persistent reduction in fear of humans in adulthood. In addition, the same treatments that reduced fear of humans in the hens were also associated with improved productivity, and a reduction in the plasma corticosterone response to human presence and handling.

From these results it is concluded that the human-animal relationship has important consequences for laying hens in the egg industry, particularly in terms of their welfare. While fear was not negatively associated with egg production in the field study, the experimental study in which fear was manipulated demonstrated that fear of humans can reduce egg production in laying hens. The development of training packages that target the key

attitudes and behaviour of stockpeople have the potential to improve the welfare of commercial laying hens by reducing their fear of humans.

### **3.4. Using machine vision to count hens and reduce egg breakage – proof of concept – Poultry CRC**

Machine vision is defined as the ability of a computer to see. In a machine-vision system, video cameras supply information to a computer, and depending on the software, objects can be recognised, tracked and measured. Machine vision has been applied in industrial situations for over 10 years to automate decision-making and to record measurements on moving production lines. Labour is one of main cost factors affecting farm profitability. For the modern cage egg industry, machine vision offers a means to reduce unit labour inputs while increasing surveillance of the birds and mechanised processes such as egg collection.

Automatic monitoring of the birds should improve their management and potentially their welfare, while other aspects such as identifying blockages on egg collection belts before the belt moves could increase eggs sold by reducing the incidence of cracked and broken eggs. Thus, rather than a large proportion of stockperson time being spent in unprofitable monitoring activities, machine vision would monitor the birds and mechanical activities within the shed. In the event that a risk event occurs, it is detected by the machine vision and the stockperson is alerted to attend to the situation.

This project tested the concept that machine vision can be used to 1) count the number of live hens per cage (with multiple hens/cage) and 2) identify potential blockages of the egg conveyor belt that may result in damaged eggs. It is feasible that in the future, this basic use of video image analysis will be coupled with other "smart sensing" technologies to enable the automatic monitoring of the health and welfare of individual birds.

Two prototype machine vision systems were developed and evaluated. Counting hens in cages had 79% accuracy, while over 90% of foreign objects were detected on the egg collection belt. Accuracy is likely to improve with further research and commercialisation

### **3.5. Implementation of Animal Welfare Standards into the meat chicken industry's company QA programs – Poultry CRC**

To increase implementation of animal welfare standards within the chicken meat industry, the Centre has formulated standards for the new 'National Animal Welfare Standards for the Chicken Meat Industry'.

These industry standards have been developed as a single industry policy document and accompanying background information for industry training and separate manuals that cover the individual industry sectors: meat chicken farming, the hatchery, breeders, pick-up and transport and processing.

The Centre has trained a number of industry trainers to assist industry participants (both broiler growers and company personnel) to integrate the information into their farm or company daily practices.

The workshops covered animal welfare legislation, public attitudes, customer requirement, the standards, recording, auditing and application of the standards and QA on farm. About 40 participants from at least 6 companies will have undertaken the training by the end of the project.

The documentation was revised into a format more familiar to the industry and was based on that developed for biosecurity at grower farms.

A training program was conducted as 'train the trainer' sessions that met the requirements of 3 competency units within the National Competency Framework. Participants were assessed and provided with certificates of competency in animal welfare.

Training was delivered to 43 company personnel and growers. The company personnel were QA and technical representative participants from 12 first and second tier companies, representing the majority of the industry. Arrangements have been made for certificates of competency in animal welfare to be issued to the participants.

These participants will then conduct further training within the companies.

### **3.6. Human-animal interactions in the turkey industry – MPC**

Behavioural responses of turkeys to humans, and relationship to bird welfare and productivity

The long-term goals of the research are to better understand human-animal relationships in the turkey industry, and the potential to manipulate these relationships through education and training programs to ultimately enhance bird welfare and productivity. The impetus for this research is the substantial body of evidence in a number of other farm animals, including laying hens, broiler chickens, pigs and dairy cattle, that these human-animal relationships have significant impact on animal welfare and productivity.

The research will specifically investigate fear of humans in commercially-raised turkeys of different ages, and the possible relationships with human behaviour and bird productivity and welfare. Stockperson behaviour, physiological and behavioural responses of turkeys towards humans, and bird productivity and welfare, will be assessed.

## **4. Beef and sheep industries**

### **4.1. Developing welfare standards for the meat processing and livestock transport industries – AMIC, DPI**

The processing sector aspect of this sub-project was initiated at the request of the Australian Meat Industry Council (AMIC), in consultation with AWSC researchers. The transport sector (rail and road) aspect of this project has been initiated as the processing sector project was being developed and indicated a need for standards for transport of livestock that integrate with the standards to be developed for processing.

This subproject applied current knowledge from existing R&D and industry practice to provide appropriate documentation on agreed standards of welfare

within the constraints of current meat processing and transport practices for incorporation into existing processing and transport sector QA programs. This will serve to reflect industries' commitment to achieving best practice in animal welfare standards to meet both current and potential consumer demands for domestic and export markets. The subproject also determined and demonstrated to industry, the advantages of implementing the sub-project, through a pilot evaluation.

The project involved identifying agreed targets for welfare, preferably based on science, but where this was lacking the targets were based on a consensus of current good industry practice. As such the project also identified gaps in knowledge and R&D opportunities.

This project followed on from others to develop national reference welfare audit documentation or standards for the chicken meat, pork and dairy industries. The pork industry is already implementing the output from the project for the on-farm sector and with the assistance of DPI staff has replaced the existing welfare standards in their industry QA program (Australian Pork Industry Quality, APIQ) with revised and more comprehensive welfare standards that were based on the audit documentation.

#### **4.2. Fear / Stress model for beef cattle – Beef CRC**

This project is to develop a fear model of chronic stress in cattle for use in subsequent experiments to develop tools for welfare assessment and thresholds, predominantly using gene expression methodologies to identify relevant biochemical pathways, both partially understood (e.g. HPA axis), and novel. The project is part of the CRC for Beef Genetic Technologies, under Program 3 of the CRC, 'Adaptation and Animal Welfare'.

Program 3 aims to develop and determine robust, scientifically defensible measures and critical thresholds that define the welfare status of cattle when exposed to conditions that elicit a sustained stress response; these thresholds (or lower levels) will be available for use by animal welfare policy makers, regulatory agencies and the beef industry by 2011.

This project evaluated the application of a combination of potential stressors, electric shock, novel object (falling bucket and ball) and flashing lights imposed individually either 3 or 5 times weekly for 4 weeks.

A combination of the novel object, flashing light and electric shocks imposed individually for a total of 5-times a week resulted in a chronic stress response, compared to the control treatment.

Evidence of a chronic stress response is based on increased daytime mean cortisol concentrations, increased cortisol response to CRH and reduced growth rate.

The successful outcome of this project resulted in subsequent stages of the project to identify gene markers of chronic stress in beef cattle being undertaken by researchers at CSIRO (Armidale)

#### **4.3. Welfare implications of alternative mulesing procedures - AWI**

Mulesing involves the surgical removal of skin adjacent to the perineum and tail in lambs. This procedure was developed to reduce the risk of flystrike (cutaneous myiasis) around the perineum. A series of experiments was conducted to examine the welfare implications of several alternatives to surgical mulesing.

In the major experiment, the welfare implications of two alternative procedures to surgical mulesing that enlarge and stretch the perineum were examined: an intradermal injection of sodium lauryl sulphate, an anionic surfactant that causes necrosis by denaturing skin proteins, and the application of plastic clips that induce ischaemic necrosis of enclamped skin. It was found that in comparison to the Control treatment, surgical mulesing resulted in increased cortisol concentrations, haptoglobin concentrations and the ratio of neutrophils to lymphocytes for 1, 2 and 2 weeks after treatment, respectively, and caused marked disruptions in feeding and lying behaviour for up to 2 weeks and gait and growth for up to 3 weeks after treatment. In contrast to the Mulesing treatment, lambs in the intradermal treatment and particularly the Clip treatment generally responded in a similar manner to those in the Control treatment for many of the variables. The main differences were in physiology: cortisol concentrations were higher at 15 and 120 min after treatment in lambs with clips than the control treatment, while lambs in the intradermal treatment had higher cortisol concentrations at 15 and 120 min and at Day 2, than those in the Control treatment. Haptoglobin concentrations were higher in the two alternative treatments on Days 3-7 and the neutrophil to lymphocyte ratio was higher in the intradermal treatment on Day 2. The finding of this experiment support previous research that shows surgical mulesing adversely affects the welfare of lambs, albeit for a longer duration. Furthermore, in comparison to surgical mulesing, both alternative procedures, and in particular the Clip treatment, substantially reduced the adverse effects on lamb welfare, based on similar responses to the Control treatment.

The effects of plastic clips were further studied in another experiment. Over 4 days, the behavioural responses of lambs to the Clip treatment were examined compared with three comparator treatments; surgical mulesing, tail docking with a rubber ring and a control.

When differences were detected between the Clip and the comparator treatments on Day 1, the Clip treatment was similar to the Control and Tail Docking treatments but different to the Mulesing treatment. For several behaviours on Day 1, including standing immobile postures, walking and interacting with the ground, hay or feeders, the Clip treatment differed from the Mulesing treatment but not the Control and Tail Docking treatments. The Clip treatment also differed from the Mulesing treatment, but not the Control and Tail Docking treatments for locomotion score on Day 7. For the majority of other behaviours on Days 2-4, there was little evidence of differences between treatments. Thus the behavioural responses of lambs to the Clip, Tail Docking and Control treatments were similar, but the behavioural responses of lambs to the Clip and the Mulesing treatments were different. Therefore, these

results, together with the previous research, indicate that the Clip treatment improves lamb welfare compared with surgical mulesing.

#### **4.4. ProHand for the livestock processing industry: a professional livestock handling package - Mintrac**

The current training materials for managing and handling animals in lairage at Australian abattoirs have been rewritten in 2005/6 to incorporate the new National Animal Welfare Standards. It was apparent in redeveloping these materials that while they deal well with the procedural and regulatory aspects of managing and handling animals at abattoirs, they may be deficient in providing detailed advice and instruction on the attitudes and behaviours that best achieve the desired results.

The project firstly assessed the current attitudes and performance of stock handlers and secondly developed a multimedia training package to influence attitudes and behaviour of stock handlers when handling cattle and sheep in the lairage.

With the further refinement of the QA standards for the livestock processing industry, there is the need to underpin the standards on a sound basis. One important strategy to underpin these standards is appropriate training support in the area of animal handling and stockpersonship.

While there was considerable variation between stockpeople in their attitudes and behaviour, there were some significant correlations between stockperson attitudes and behaviour as well as some significant correlations between stockperson behaviour and acute stress responses in sheep and cattle at Australian abattoirs. These observed relationships indicate the opportunity to improve stockperson behaviour at Australian abattoirs by targeting attitudes (and behaviour) for improvement with appropriate educational and training material, which is the focus of the remainder of this research project.

The final stockperson training package has been delivered to Mintrac for integration into their existing training programs.

#### **4.5. Strategic labour saving and productivity technologies for livestock industries - DPI**

The Code of accepted farming practice for the welfare of sheep in Victoria requires owners and their advisers, including absentee owners and their advisers, to inspect sheep sufficiently often to maintain them in sound and healthy condition. The frequency and thoroughness of inspection should be related to the likelihood of risk to the welfare of the sheep in relation to food, water, protection against natural disasters and likelihood of diseases, e.g. flystrike. Sheep grazing under more extensive conditions require variable supervision according to the density of stocking, availability of suitable feed, reliability of water supply, age, pregnancy status, climatic conditions and management practices.

In the face of reduced skilled labour, increasing stock per unit of labour, remote properties and less family support how will future sheep farmers in the

Sheep-Wheat Zone in Victoria comply with the Code of accepted farming practice for the welfare of sheep?

This project scanned the potential for using remote sensing technology to reduce labour demands, increase labour efficiency and effectiveness for sheep farmers, and thus facilitate improved management of the entire sheep enterprise, and remote monitoring of sheep welfare. World-wide expansion in the development of remote sensing (or bio-logging) transponder devices to enable the measurement of many different variables is occurring rapidly. The livestock industries are currently interested in transponder technology to capture biometric information to facilitate the wireless monitoring of animal physiology states to assist in micro-managing the efficiency of animal production and the welfare of animals.

#### **4.6. Review national animal welfare standards for livestock processing establishments - MLA**

There are several new drivers facing the industry that contribute towards the need to demonstrate compliance with the Standards. These include higher community/consumer expectations regarding animal welfare practice, increasing customer requirements and the revision of Codes of Practice into mandated legislative Standards. All indicate the need to demonstrate adoption of and compliance with the industry Standards and developing a mechanism by which industry can report the national position on animal welfare supported by industry statistics.

This project will utilise the current Standards and revisions as they occur to assess compliance across the industry for both domestic and export establishments. The data will be analysed to determine 'critical' compliance areas for: 1) improving compliance and 2) ongoing benchmarking and monitoring.

The project will provide a framework for industry to utilise these 'critical' compliance areas for ongoing coordinated monitoring (ie annually); this will help meet consumer demands for meat products in domestic and export markets.

#### **4.7. Time budgets and abnormal behaviour of individually housed shedded sheep – Commercial, AWSC**

The aims of this research are to quantify the time budgets and incidence and type of stereotypies or redirected behaviours in individually housed, shedded sheep, in the Sharlea production system in Victoria, Australia. The data generated would provide background and the basis for considering the need for future research examining the welfare implications of this production system.

Digital cameras will be placed above approximately 10% of the sheep in a shed. 48 hours of observations of each sheep would be recorded and then the video data analysed to provide time budgets for sheep in this type of housing, and the incidence and type of stereotypies displayed by the sheep, if any. In particular, time spent, standing, moving, lying, ruminating, eating, drinking and sleeping would be recorded. In addition, stereotypical behaviour would be

classified and the percentage of time engaged in these types of abnormal behaviours would be determined using a combination of

- 15 minute scan samples of individuals over the 48 hour period to construct the time budgets; and
- continuous sampling of individuals in 3 hours blocks around the time of feeding and in the afternoon each day for the 2 day sampling period to quantify the expression and incidence of abnormal behaviour

## **5. Companion animals**

### **5.1. An evaluation of companion dog training in the community – BAW**

Evidence indicates that obedience training can significantly reduce the prevalence of misbehaviour in companion dogs. Despite this evidence, only a minority of dog owners seek formal training. There had been no attempt to evaluate present obedience training methods in order to establish whether some methods are more acceptable to the community and/or more effective in producing the desired outcome - an obedient and well-socialised dog. There were three phases of study. Part A consisted of gathering information from dog training providers via a questionnaire.

During this phase a number of training establishments were identified to take part in the second and third phase of this study. Part B involved administration of the questionnaire to members of the public attending dog training facilities. Part C of this study involved tracking a number of new dog training clients over a three month period. Dog's behaviour was evaluated before and after they commenced training. Information gained from this study assists in providing information to the industry about the needs of dog training clients and their experiences as a dog trainer.

### **5.2. A study of owner attitudes towards their dog's behaviour – BAW**

Forty percent of Australian households own a pet dog. While many dogs are highly trainable, only 24% of dog owners attend obedience classes despite the high prevalence of reported behavioural problems among pet dogs. It is believed that owner attitudes towards dogs and training may affect owner behaviour and, subsequently, dog behaviour, but there had previously been no research into this question. Research with livestock, such as pigs, has demonstrated that there is a strong relationship between attitudes and behaviour of stockpeople, and that this affects pig behaviours and productivity.

The demonstration of a similar relationship between dog owner's attitudes and their animal's behaviour could assist in the development of education programs targeting owner attitudes and behaviours. This could lead to a reduction in canine behaviour problems, with corresponding benefits for dogs, owners and the wider community.

### **5.3. The creation of a multi-dimensional human-companion bonding scale - BAW**

Since its beginnings just twenty years ago, a great deal of research has been conducted in the field of human-companion animal relationships. In order to facilitate empirical investigation in this field, researchers devised scales; however there are three main areas in which scales have been flawed. The first is that poor methodological procedures have been used to develop the scales. Second, many of the scales have poor psychometric properties. Third, all current scales attempt to measure human-companion animal relationships with all species of companion animal. This is problematic because it has been found that companion animal owners score differently on certain scales according to what species of companion animal they own rather than any difference on the construct being measured.

The aim in this research was to develop a multi-dimensional scale that could be used to assess relationships between owners and their companion dogs. The items in the scale were based on appropriate theoretical frameworks including Exchange Theory, Social Support Theory, Quality of Life and Bonding, as well as aspects of human-companion dog relationships that were identified by owners as important.

Unlike many of the other scales developed to assess aspects of human-companion animal relationships, this scale was developed using sound methodology and stringent statistical techniques. The Monash Dog Owner Relationship Scale (MDORS) has 28 items, which reflect three sub-scales, 1) Dog-Owner Interaction, 2) Emotional Closeness, and 3) Perceived Costs of Companion Dog Ownership. The sub-scales are consistent with theoretical predictions, previous scales developed and previous research in the human-companion animal relationships field. The MDORS has adequate reliability and established discriminant and convergent validity. The MDORS is the first scale to attempt to assess human relationships with an individual species of companion animal.

The results of this study show that assessing human relationships with individual species of companion animals is useful, as many of the important items in the MDORS would not be applicable to other species of companion animal. The MDORS is also the first scale in the area of human-companion animal relationships that extensively addresses the costs associated with companion dog ownership. The MDORS will be useful in future research for use in further exploring the nature of human-companion animal relationships, and has potential to be used as a tool for determining the suitability of clients for pet therapy and placement programs. We expect to use this scale in many of our research projects to come.

### **5.4. Measuring personality in dogs – BAW**

Dogs vary considerably in appearance and individual dogs can vary in how they behave. While behaviour is affected by many factors, it seems that internal factors play a significant role in behavioural dispositions. In humans, these internal factors that affect behaviour are identified as personality. Work in other dogs and other animal species supports the idea that personality

exists in animals other than humans. However, very little has been done to elucidate the structure of animal, or more specifically, canine personality. The aim of this research was to identify the factors of canine personality and develop a method of measuring them. This has the potential to aid in understanding canine problem behaviour and in the selection of dogs for various roles in society.

### **5.5. Identifying 'ideal' companion dogs for Australia – BAW, PIAS**

Many breeds of dog exist today which vary considerably in physical appearance and temperament. These differences have arisen primarily from selective pressures imposed by humans to create dogs suitable for various working roles. As a result around 350 different breeds of dog are recognised by Kennel Clubs around the world today. Nowadays, however, few breeds undertake the work they were once bred for; rather dogs are kept primarily as companions. Many dogs exhibit behaviours deemed unacceptable by their owners and as a consequence many owner-dog relationships fail, resulting in owner distress, community disruption and thousands of dogs being admitted to, and often euthanased in, welfare shelters and pounds each year. With differing lifestyles and an increase in urban living it is necessary to identify what constitutes an ideal dog in the present day and determine ways to accurately measure dog behaviour in order to select dogs as suitable pets or breeding animals. Previously developed behavioural assessments are inadequate. Some attempt to provide a broad overview of dog temperament using a range of subtests which may not accurately measure the desired behaviour. Others are mainly utilised to assess working dog traits, not relevant to the average pet owner. None have been designed using a systematic scientific approach.

The initial part of this study involved surveying over 800 Australian residents to determine what characteristics they considered 'ideal' in a pet dog. The results indicated that most people prefer a dog which exhibits affectionate, friendly and calm behaviour. These characteristics are related to the canine personality trait; amicability, which is well defined and can be assessed by asking owners to complete a simple questionnaire. The next component of this study involves developing a behaviour assessment protocol designed to elicit behaviour reflective of 'amicability' in pet dogs and then assessing a large sample of dogs to determine what types of behavioural variables accurately reflect amicability. This assessment has the potential to be used to assess amicability without requiring owner ratings which can be unreliable. The development of a behavioural assessment which has been scientifically tested for reliability and validity, to measure amicability of companion dogs, will be of great benefit to large range of dog-related organisations.

### **5.6. A study of factors affecting long-term retention of companion dogs – BAW**

The human - animal bond is a complex one which has evolved through time. It appears reciprocal in nature, where the adaptive needs for humans and, to a degree, animals are able to be met. However, some humans have an

ambivalent relationship with companion animals. This is particularly noticeable in the bond shared with canines. When this bond fails, the consequences for the dog involved can be dramatic, with thousands of dogs each year being euthanased in welfare shelters because their owners are no longer able or willing to assume responsibility for their care.

Several studies have examined factors associated with the decision to surrender a companion dog to a shelter, but most of these are retrospective and it is not known how accurate people are when recalling the reasons behind a decision to relinquish ownership.

In this study, owners of puppies were surveyed prospectively about a number of human factors likely to impact on the canine-human relationship (personality, parenting style, family structure and function, expectations etc). The participants were re-examined after 6 and 12 months to determine whether the dog had been retained and what difficulties had been encountered.

### **5.7. An investigation of factors affecting the success of canine adoptions from animal welfare shelters – BAW**

Several studies indicate that dogs in shelters suffer from increased levels of stress as a result of factors such as noise levels, confinement and lack of social interaction with peers and humans, disruption in routine and loss of familiar relationships. Such increases in stress can impact substantially on animal welfare, resulting in some animals developing stereotypies, attachment-related problems or undesirable behaviours that may impact upon a rescued animal's retention.

Human adoption research has identified three major reasons for adoption failure. These are a perceived lack of control by the new parent, behavioural problems and a lack of intimacy as reflected by physical contact and attachment. This formed the starting point for this study of canine adoption.

The initial stage of this study gathered archive data covering a full year from 3 metropolitan shelters, which will form a baseline for subsequent research. A telephone survey identified and quantified behavioural problems encountered in the first month post-adoption and this information was used to identify the most common behavioural problems which prejudice adoption success and enable information packages to be developed for use in the final stage of the project.

A pilot study explored the initial formation of canine-human attachment, using the SST (Strange Situation Test) to determine if rewards based obedience training (Control issue), positive handling (intimacy), or feeding from the hand influence the development of such attachment.

The final phase of the project evaluated the effectiveness of providing behavioural information to new adopters, reward based obedience training and 'attachment training' early in the adoption versus a control group.

## **5.8. Human factors affecting obesity in dogs – BAW**

Obesity is one of the most common nutritional disorders in dogs in developed nations and is one of the leading causes of health and welfare problems.

Research has indicated that obesity affects up to 40% of dogs. While obesity can, theoretically, be effectively treated by simply shifting the balance between energy intake and expenditure, owner compliance with veterinary advice is generally poor. Ongoing behavioural change is infrequent and recidivism is high with significant negative welfare implications for the canines in question.

The aim in this study is to find what factors contribute to companion dog obesity and then to develop interventions to prevent and treat obesity.

## **5.9. Behavioural problems and welfare of dogs in suburban backyards – ARC Linkage, PIAS, ACAC**

Many dogs are restricted to suburban backyards. The main aim of this PhD project was to examine the relationship between environmental conditions in suburban backyards and behavioural problems in adult dogs. Furthermore, in order to examine the welfare implications of dogs showing behavioural problems, a number of physiological measures of stress were examined.

A preliminary survey of 203 dog owners in the suburbs of Melbourne, Australia was conducted to identify common dog behavioural problems and their relationship with the manner in which dogs were kept. The questionnaire consisted of questions seeking information on demographic variables of the owners, housing and management of the dogs and dog behavioural problems.

The main behaviour problems reported by owners were over-excitement (63%) and jumping up on people (56%). Some of the factors that were significantly correlated with the occurrence of these problem behaviours included whether the dog was considered obedient, whether the owner had previously owned a dog and how much time the owner spent with the dog. Problem behaviours were not correlated with backyard size, time spent walking the dog, the presence of another dog in the household and desexing. These findings provide an interesting insight into some of the factors that may be related to the occurrence of behaviour problems in dogs and should guide further research on these behavioural problems in suburban dogs.

The major study in this project observed the behaviour of 55 closely-related Labrador Retriever dogs in suburban (Melbourne) backyards. It was found that an increase in problem behaviours in the backyard, such as digging and chewing, was related to the increased activity by the dog in the backyard, the dog being gold in colour and untrained and the owner believing that the dog showed no behavioural problems. Furthermore, increased activity by the dog in the yard was related to the number of transitions that the dog made between locations (eg moving from the house door to the yard), increased vegetation in the yard, the dog kept indoors at night but with an backyard kennel and the owner's belief that the dog was obedient. The size of the backyard, the presence of another dog, complexity of the yard or the time the

dog spent with people, on its own or out walking were not related to dog behaviour.

The occurrence of problem behaviours in dogs, such as digging and chewing, was significantly related to the concentration of the immunoglobulin IgA in their saliva, suggesting that the immunocompetence of these dogs may have been compromised by stress. One interpretation of the results is that the type of relationship with the owner may be important. The attachment between the dog and the owner may be stronger for owners who keep their dog inside at night, provide a kennel in the backyard and believe that their dogs are obedient. Dogs in such situations when left out in the backyard, may be more stressed, moving frequently between locations to try to regain contact with people.

### **5.10. Dog communication - PIAS**

Social animals such as wolves have evolved species-specific communication systems that assist in regulating social interactions including aggression.

Wolves use a range of visual, auditory and olfactory signals and many of the visual signals use morphological features such as ears and tails. Selective breeding for adherence to breed standards have led to a variety of morphotypes in dogs, with some dog breeds no longer having the lupine appearance the signal evolved under, thus lacking the morphological features required to send some signals.

If communication, both in terms of delivering species-specific signals and in recognition of these signals, breaks down, misunderstanding between dogs or between dogs and humans may lead to a range of problems such as aggression and training difficulties.

This PhD project examined the frequency of social signal that could be sent regardless of morphology in dogs and how it related to morphotype (breed) by studying the social signalling behaviour of dogs towards littermates during early rearing, towards unfamiliar dogs of either the same or different morphotypes (breeds) during in the juvenile period and towards unfamiliar dogs of the same and different morphotypes (breeds) in adulthood (> one-year old). The project also examined the self-reported comprehension ratings of puppy and dog owners, and compared these to the number of behaviours the owners reported and the morphology of the dog owned.

The study found that there was no relationship between morphotype (either overall appearance or individual features) and the studied signalling behaviours for either the young (litters) or adult dogs.

There was also no relationship found between overall morphology and the studied behaviours in the juvenile dogs. However, Coat length and Snout length were related to the frequency with which some behaviours were sent and Snout length was strongly related to frequencies with which some behaviours were "received" (sent to the dog) in the juvenile puppies.

The study also found that puppy and dog owners may overestimate their ability to comprehend their dogs and that most owners did not report the subtle behaviour seen during the early stages of anxiety and aggression.

There was no relationship found between the owner's rating and the morphology of their dogs, possibly due to owners not noticing (or reporting) the subtle behaviour that would most likely be disguised by changes in dog morphology.

#### **5.11. Tracking Cat Shelter Admission Statistics - BAW**

There is a growing body of information on the canine acquisition, surrender and re-homing process in Australia, however there has been little study of this process for domestic cats. In contrast to the population of pet dogs, the total Australian pet cat population has declined steadily over the last decade, although the numbers of registered cats has remained fairly constant.

This may imply that the more responsible cat owners are retaining their pets. This reduction in cat numbers contradicts the apparent suitability of a cat as an ideal urban pet, which does not require large amounts of exercise or regular peer group socialisation. The RSPCA of Victoria reports that less than 5% of cats are reclaimed, with the result that a much higher proportion of cats are euthanased than dogs (15% more).

This project sought to establish reliable baseline data about the shelter admission, acquisition, and relinquishment cycle for cats and quantify some of the pivotal variables.

#### **5.12. Attitudes towards cats and responsible cat ownership in suburban and Melbourne and rural Victorian residents. - BAW**

Cats are not native to Australia and, when uncontained, pose a significant threat to populations of Australian wildlife, including reptiles, insects, birds and small mammals. Research has shown strong community support for the implementation of cat management strategies which seek to combat these and other problems related to nuisance cat behaviours, including the endorsement of mandatory desexing and micro-chipping. Despite this, however, some current community behaviours, such as feeding stray cats, undermine the application of cat management strategies.

For instance, in Australia, the feral cat population has been estimated to be between 5.6 and 18.4 million, a proportion of which are fed by semi-cat owners - individuals who may feed a stray/feral cat, but not register or claim ownership of them. It is likely that behaviours associated with semi-cat ownership may, ultimately, compromise the welfare of such animals.

This project explored community attitudes underlying behaviours towards cats and responsible cat ownership and was fundamental research underpinning the ["Who's for Cats?"](#) campaign.

#### **5.13. Cats and dogs that visit veterinarians: where do they come from, do they have litters, and what happens to their offspring? - BAW**

At a 2006 Australian summit on pet overpopulation, it became obvious that there is a fundamental difference in opinion regarding the advisability of mandatory desexing of companion animals, particularly cats, between welfare

organizations and veterinarians in private practice. Available veterinary statistics and Victorian council registration records indicate that the majority of pet cats are desexed, and that the population of owned cats is decreasing.

In contrast, shelters and pound operators around Australia insist that the number of cats being presented at their establishments remains unacceptably high, with 60% of all cat admissions being euthanased. Also, previous work at the Centre showed that most cats entering shelters are not desexed. Shelter operators, forced to euthanase a large number of cats and dogs each week, are promoting mandatory early-age desexing of owned cats to reduce the numbers of cats euthanased by shelters.

Any strategy used to address the issue of cat overpopulation identified by shelter statistics is likely to be costly to implement. Thus, it is essential to target efforts as strategically as possible. In order to achieve the objective of reducing the numbers of cats and kittens admitted to shelters it is essential that a consistent, well-informed, evidence-based, approach be implemented. At present, there is very little information available regarding the types of cats presented to veterinarians, and little data regarding the movement of cats between the fully-owned, semi-owned and stray populations. We do not know if fully-owned cats regularly have one or more litters before being desexed and, if so, what happens to these kittens. Do they contribute to the semi-owned cat population or are they adopted into responsible homes and desexed? Many cat owners acquire their cats passively but it is unknown where they sourced them.

The aim in this study is to further characterise the cats in our community, by surveying veterinarians and their clients and building upon existing data.

While this project was originally designed to answer specific questions about cat ownership, the project provides an opportunity to increase our understanding of dog-ownership at relatively little cost and so has been expanded to include dogs.

#### **5.14. Welfare implications of a commercial husbandry procedure for horses - Commercial**

An alternative collection procedure for pregnant mare urine (PMU) has been developed in Australia, which allows mares to be loose housed in indoor stables or outdoors in paddocks, rather than in tether stalls as is common practice in Canada and North Dakota. The present study examined the welfare risks to mares of collecting urine using this alternative procedure. The study involved 24 pregnant mares at 3–5 months of gestation. The mares were allocated to two treatments: 12 mares were fitted with the pregnant mare urine collection device and 12 mares acted as controls. All mares were housed in two large paddocks during the day, in two groups of 12. During the night, all mares were housed in six small enclosures in groups of four, while the PMU treatment mares wore the collection device.

Mares wearing the PMU collection device showed little or no behavioural change relative to the control mares. While brief bouts of forward lifting of the hind leg in the region of the PMU collection device were observed in some mares on day 1, this disappeared by day 2. Observations on the time budgets

of behaviour in weeks 3 and 6–7 indicated similar patterns of behaviour in the two treatments. The only difference in behaviour was in lying behaviour. PMU collection mares spent less ( $P < 0.01$ ) time lying during the night, with fewer horses observed lying down in the PMU collection treatment (4/11 versus 10/12). It is unclear what implication this may have on horse welfare since there was no evidence of a rebound in this behaviour when the device was removed. Based on heart rate and cortisol concentrations measured on days 1 and 2 of study, there was no evidence of acute stress associated with fitting the device. Limited measurements on salivary cortisol concentrations at weeks 6–7 of the study provided no evidence of an increase in basal cortisol concentrations or an increase in the sensitivity of the adrenal cortex to ACTH in the PMU collection mares. Therefore, it is concluded that wearing the PMU collection device at night for five nights per week for a total of 6–7 weeks does not pose a serious challenge to the welfare of pregnant mares.

### **5.15. The mental evolution of the horse and its consequences for training**

Experiments were devised to investigate the existence of specific higher mental abilities in the domestic horse that have been unexplored but are important in determining what the horse is capable of comprehending in its interactions with humans. The first experiment examined short-term spatial memory in the horse by examining the ability of horses to recall a feeding event in a 2-point choice apparatus when food was released immediately or after a ten-second delay. Results showed that while horses were able to achieve the correct feed goal choice in the immediate release trials, they were unsuccessful with the ten-second release trials. This suggests that there are limitations in short term recall abilities in horses, in that they may not possess a prospective type of memory.

The next experiment investigated observational learning of novel behaviour in horses by examining whether horses can learn to reduce their fear of naturally aversive places by observing conspecifics going to those places. Therefore in this experiment of the observational learning of fear reduction of two aversive places, tutor horses were used that were familiar to the experimental horses. No evidence was found that horses were able to learn to reduce their fear of aversive places by observing tutors familiar to them doing so. It should be remembered that observational learning of novel behaviour is just one of many facets of higher mental abilities in animals and the presence or absence of these abilities does not prove or preclude higher mental processes in horses. It provides, however, another indication of equine mentality. This adds to the existing published research in this area that implies that horses may not understand their training as an anthropomorphic mindset might assume. There are welfare and training implications concerning the effects of overestimating the mental abilities of horses during training and the effects of delays in reinforcements.

The final experiment investigated the relationship between various conflict behaviours (problem behaviours) and the quality of correct training, recording the horse's various responses to acceleration and deceleration signals, both in-hand and under-saddle. The experiment involved isolating three important

qualities of correct trained response in equitation: offered a basic attempt at the correct response or not; whether it initiated the response immediately and from a light signal; and whether it maintained the response or faded its responding. The results showed that the presence or not of these qualities of responses correlate with behaviour problems. Results also suggested there were few differences between in-hand and under-saddle testing of responses, and that there were more dysfunctions in deceleration than acceleration responses. Of all qualities of responses, the most consistently dysfunctional was shown to be that of timing of responses and the subsequent transference of pressures to light unobtrusive signals. The results imply that rehabilitating horses with problems in negative reinforcement responses should involve retraining aspects of the three qualities of responses tested.

This thesis highlights the importance of teaching horse trainers the precise mechanism of learning theory as well as making them aware of differences between human and equine learning abilities. Currently horse training is seen as an art rather than a science. It is proposed that if learning theory were taught to horse people as basic knowledge tools, the wastage rates would decline.

#### **5.16. The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare - BAW**

In Australia, the number of horse welfare problems investigated by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) relative to other domestic animal problems remains high, with significant time and resources utilised in dealing with these problems. Research by Pearson (2004) found that owner attributes that were specifically correlated with reduced horse welfare were lack of commitment to horse ownership, the belief that horses made good companion animals, the belief that horses were difficult to care for, a low education and residing in the outer metropolitan area or the outer-fringes of the city. While this study highlighted the opportunity to reduce welfare issues in domestic horses by understanding owner characteristics, this study provided little information on the extent of animal welfare problems in recreational horses or indeed the extent of this relationship between owner characteristic and horse welfare in the broader and larger horse recreational group.

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

There is therefore an obvious need to identify horse numbers in Victoria and the circumstances surrounding their ownership such as participation in horse clubs and activities, foals produced, and surrender and euthanasia. Furthermore, understanding the occurrence and extent of horse welfare problems, as well as factors associated with these welfare problems would

provide valuable information for the development and implementation of state and local government policy on responsible horse management.

#### **5.17. A summary of Australian research pertaining to cat ownership and overpopulation - BAW**

To date many separate pieces of research have been conducted either commissioned by, or conducted by the Bureau of Animal Welfare, Victoria. Each piece of research has been targeted at answering specific questions relating to reducing the levels of cat-over-population and euthanasia, whilst increasing desexing and registration rates. Currently there is no framework linking this research together in an easily accessible manner.

This was the objective of this summary, which included, in addition, any relevant research which has been conducted elsewhere. This document identified where gaps exist in current knowledge, which will shape future research directions and priorities.

In order to improve the accessibility of this research to the many stakeholders, the summary was organised by topics such as ownership practises, barriers to increasing registration, identification and desexing rates and public perception of cats and the inter-relationships between these factors will be explored.

#### **5.18. Cat welfare in confinement - BAW**

Although most cat owners perceive that cats have a need to roam outdoors and this would benefit the welfare of the cat, being allowed to roam also carries welfare risks for the cat. If councils want to promote 24hr confinement of cats it is paramount that owners are convinced that confinement will not harm the cat's welfare or the interaction with the cat. Collecting information on welfare and health and behavioural problems of cats in different environments will contribute to this debate. To identify those features of the environment that are important to cats, promote natural behaviour and minimise problem behaviour is important if owners are to accept 24hr confinement of cats.

This project examined the relationship between the level of confinement and behaviour and welfare of domestic cats. A survey of 400 cat owners included questions on general management, health, general behaviour and behavioural problems (soiling, scratching, vocalisations, fear, lack of interaction, time spend near door/escape etc) was performed and the environment (both indoors and outdoors) was described in terms of features and observed interactions of the cat with the environment.

Major conclusions from the study were:

1. Confinement did not appear to affect behaviour of the cat to a large extent. While cats that were more confined were also somewhat more destructive, this is probably more related to opportunity than a change in behaviour. Similarly, hunting behaviour was reduced in cats that were more confined. Aggression was also seen less in cats that were more confined, again possibly due to less opportunity to fight with other cats outside, but increased socialisation to people and other animals

indoors may play a role. Behaviour that may be indicative of stress and mal-adaptation was not affected by level of confinement.

2. Cat safety appears to be the most important driver of level of confinement. In particular most owners that cite safety as a reason for where the cat is kept do not have unsupervised outside access at night for their cat, while most owners that do not cite safety as a reason for where the cat is kept do have unsupervised outside access at night for their cat.
3. A concern for wildlife has little effect on the level of confinement the owner places on the cat.

### **5.19. Assessment of shelter dog behaviour - BAW**

Pet dogs sometimes behave in ways that cause personal injury, property damage, community disputes and owner dissatisfaction. In Australia, thousands of dogs are relinquished to animal shelters and pounds every year. Before these dogs are made available for adoption, they are typically screened for adoption suitability by way of a “temperament test” or behavioural evaluation. Unfortunately, many such tests lack standardisation and objectivity. This may result in unsuitable dogs being adopted out or conversely, dogs that are suitable for adoption may be euthanased. This has welfare implications for both the Australian community and the dogs in the shelter/pound system.

Currently, there is no scientifically validated canine behavioural assessment protocol available for use by Australian shelters and pounds to assess the behaviour (and adoption suitability) of the dogs in their care.

The first aim of this project is to develop the Behavioural Assessment for Re-homing K9s (B.A.R.K.) protocol based on a comprehensive review of current assessment practices in Australia and overseas. The second aim is to validate the B.A.R.K. protocol so that it may be used nationally to evaluate the behaviour of adult dogs held in welfare shelters. It is anticipated that this research will greatly improve the welfare of shelter dogs and the community at large.

### **5.20. Review of the actual and potential effectiveness of compulsory desexing programs for companion animals - BAW**

There is a strong push from certain groups within the community for regulators to enforce compulsory desexing of companion dogs and cats. This is viewed by some people as the solution for a perceived pet over-population problem. However, little is currently known about the long-term effectiveness, community acceptance and compliance, sustainability, costs, resource requirements and enforcement issues that pertain to such regulation.

This review documented available scientific literature describing previous attempts to introduce compulsory desexing programs, highlighting any reported costs and benefits. In the absence of a significant body of knowledge

being available, a research proposal will be formulated with the aim of addressing identified limitations in existing knowledge relevant to this issue.

#### **5.21. Effects of an enrichment program for kennelled domestic dogs – BAW, GDV**

The study measured the impact of a structured enrichment program on the behaviour and physiological parameters of dogs. The study involved Guide Dogs during their first few weeks after returning from the puppy raising program.

One group of dogs was exposed to a structured enrichment program comprising elements such as free running, massages, grooming and music. They had visual and social contact with other dogs, interaction with staff and supervised toy play. A second group was cared for in the standard fashion, without exposure to the enrichment program.

During the sixteen day study period, dogs from both groups had their behaviour monitored in a neutral environment. The presence of stress indicators cortisol and immunoglobulin A (IgA) in both groups was measured at intervals throughout the study. In-kind support for this project was received from IDEXX Laboratories (physiological sample processing), Canon (digital video cameras) and Aussie Dog (dog toys).

#### **5.22. Characteristics of pets and owners who visit veterinarians - BAW**

Little information is available regarding the types of cats and dogs presented to veterinarians, particularly with regard to their reproductive behaviour and the degree of movement that may exist between the fully-owned, semi-owned and stray populations. Nor do we know the extent that the progeny of owned animals contribute to shelter admissions?

The aim in this study is to further characterise the pets in our community, by surveying veterinarians and their clients and building upon existing data. This information will inform community discussions about mandatory desexing and early-age desexing and clarify the dynamics of pet animals moving between the postulated sub-populations of feral, stray and semi-owned animals.

#### **5.23. Post-adoptive interviews conducted with people who have adopted cats from welfare shelters - BAW**

Currently a far greater number of cats are admitted to welfare shelters than can be re-homed, resulting in almost half of all cats admitted to welfare agencies being euthanased. One way to reduce shelter admissions is to increase the retention of owned cats.

Recent research has identified that a large percentage of those cats admitted to shelters with implanted microchipped (who formed a very small percentage of total admissions) had been implanted in a shelter within a few months prior of their current admission. This suggests that, at least some of the animals re-homed by shelters may be prone to straying after re-homing, yet there is little post-adoptive data available to either support or refute this hypothesis. Previously a survey of people who adopted shelter dogs identified many

factors that affected the success of the adoption and high-lighted the problems experienced.

The information gained from this study enabled some shelters to increase the rate of adoption, strategically target problem behaviours in pre-adoptive rehabilitation and provide post-adoptive training. This has resulted in fewer returns and greater owner satisfaction. It is possible that similar benefits could be identified for cats. During a recent cat tracking study, permission was obtained from 435 people who had adopted a cat, enabling us to collect post-adoptive information from them.

#### **5.24. Characteristics of successful human/dog relationships - PIAS**

Dog owners are often advised to purchase certain breeds or types of dogs believed to have characteristics that will make them suitable companions. Very little research, however, has examined exactly what canine characteristics are important in determining the success of the human/dog relationship, what dogs display these characteristics and also, whether different types of owners are more or less satisfied with different types of dogs.

The aim is to use the internet to collect and collate, from a large number of dog owners, information about the relationship they have with their dog and how satisfied they are with this relationship, information about their own characteristics, and information about the dog's personality and behaviour. This will allow us to describe different types of owners and the personality and behavioural profiles of those dogs that make the best companions for these different owner types.

At the end of the study we should have a much clearer understanding of how owner and dog characteristics interact to influence the strength of the dog-owner relationship and owner satisfaction.

#### **5.25. A review and evaluation of strategies to manage unwanted cats and dogs in Queensland - QDPI**

This project was undertaken to provide an extensive review of strategies to control the population of unwanted cats and dogs, including mandatory identification, mandatory registration, mandatory desexing, mandatory containment, and trap, neuter, release programs. Interviews will be conducted with key stakeholders in Australian states where urban animal management legislation has been enacted and with key stakeholders in Queensland. An analysis of the public submissions received by the Queensland government in response to a Discussion Paper will be used to ensure that this review is aligned with local conditions and perspectives. A report will be generated summarising all available information and providing recommendations.

## **6. General/Other**

### **6.1. Public attitudes to animal welfare – AECL, MLA, APL, DPI**

Welfare attitudes of the general public and the consumer may affect the sustainability of a livestock industry through the actions of these people. This project will examine the relationships between the general and behaviour-specific attitudes of the general public and consumers to farm animal welfare and their behavioural outcomes for these people that may impact on livestock production.

The attitudes of the general public to farm animal welfare may affect future livestock production practices directly through consumer buying behaviour and indirectly through public and consumer influences on regulatory legislation and international trade policy set by governments and the standards set for the livestock products by processors and retailers. An understanding of these attitudes to livestock production and their effects on behaviour of the public and the consumer, together with an on-going awareness of changes in these attitudes to specific issues, will provide an appreciation of the likely impact of specific attitudes on an individual livestock industry and will also provide a basis for strategies to moderate negative attitudes that may impact on the industry.

Furthermore this knowledge can be used by government to assist in formulating animal welfare policy in relation to public education and industry and science policy.

### **6.2. Education in agriculture: livestock farming, food production and food choices in pre-adolescents – WBF, ARC, APL, DPI**

Two educational programs have been developed on livestock farming. These are the Pork Industry Education Program (PIEP) and the Dairy Industry Education Program (DIEP). The PIEP and DIEP are interactive multimedia educational resources that have been developed as a virtual reality farms, giving senior primary and junior secondary students the opportunity to be actively engaged in learning about the commercial farming systems.

The programs allow students to visit an operating commercial piggery and dairy farm to extending their current limited knowledge about livestock farming and the processing of foods from pork and dairy cows. Flexibility in delivery means that the programs can be completed as stand-alone lessons or as a 10 week comprehensive program. Whole class, small group, individual and collaborative approaches to learning are all supported.

### **6.3. “Minimising Handling Stress” - Development of a prototype training package for farmers to improve their human-farm animals relationship - EU**

Multimedia-based cognitive behavioural approaches to stockperson training have been shown to produce a high level of behaviour change, to be appropriate for people with limited formal education and to be the preferred method of learning for stockpeople. Such training has been shown to improve

stockperson animal handling, improve farm animal production and improve farm animal welfare.

This is a collaborative project within the EU 6th Framework Welfare quality program (Sub-project 3, Minimizing handling stress) will develop integrated, knowledge-based, practicable species-specific strategies to improve farm animal welfare. This prototype training package will be based on existing knowledge mainly coming from Australian and French research and development as well as information obtained from research in the EU.

This project will deliver a set of cognitive behavioural training programs relevant to the European pork, egg, dairy and beef cattle industries... These programs will be readily adaptable into different languages and different production systems because of the generic structure adopted. Speech, video and graphic material is in files that are separate from the core programs and there can be easily altered to suit local conditions.

#### **6.4. Farm Animal Welfare in Ohio: Assessing Public Concern and Implications for the Food Animal Industry - OARDC**

The livestock industries are facing new public pressures on a wide range of issues including animal welfare, but little is known about the US population's views and behaviour regarding the welfare of farm animals. A few opinion surveys have been used to collect information on animal welfare concerns, but questions about perceived treatment of food animals are even rarer. Because public attitudes have potential to dramatically affect use of animals, it is critical that we identify and understand these attitudes in a scientific and unbiased manner before making decisions. This project consists of two parts.

The first part is studying public attitudes and behaviour regarding farm animal welfare by identifying the range of attitudes about farm animal welfare that exist in the population and among key stakeholders and the social, economic, and demographic determinants of these attitudes, as well as investigating the degree to which attitudes affect consumption behaviours and community behaviours, such as political action for/against livestock farming.

The second part is studying the livestock industries' responses by determining the extent to which public and organizational pressures are affecting industry practices concerning animal welfare and the extent to which producers in these industries will adopt new protocols for animal treatment.

Part I has been completed and preliminary analyses have been carried out.

#### **6.5. Dissecting the impact of stress on reproduction: Novel peptide mediates inhibitory effects of stress on female reproduction – ARC Discovery**

This research proposal offers a pioneering opportunity to develop treatments that overcome the negative impact of stress on reproduction. Specifically, knowledge generated in this project will be vital in the development of strategic defences against the impact of stress on reproduction.

This project fundamentally addresses ARC Research Priority 2: *Promoting and maintaining good health*. Given that suppression of reproduction by stress

occurs in all mammalian species including humans, domestic animals and wildlife, being able to prevent or overcome stress induced reproductive dysfunction will generate significant health, social, economic and ecological benefits.

#### **6.6. Design and delivery of “Animals in Society” as part of the “Human and animal interactions” cluster at The Ohio State University - OSU**

“Animals in Society” (AIS) is an introductory course designed to introduce students to the social, cultural, economic and legal frameworks within which current human-animal relationships exist.

The course was developed by the Animal Welfare Science Centre in collaboration with the Department of Animal Sciences at OSU. AIS fulfils a Social Science elective and was offered for the first time during the autumn 2007 quarter.

Students in this course, explore a wide range of current animal roles with a view to broadening their understanding of how integral our relationships with animals are in maintaining human physical, social and psychological health and well-being. Currently, there is a wide range of views about animals, often based on misinformation and poorly informed value-based judgments.

AIS is designed to equip students with the knowledge and critical thinking skills necessary to address questions concerning how animals can best co-exist with human societies.

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

#### **6.7. Animal welfare performance measures: a model to monitor and benchmark the welfare of animals in research - AAWS**

This study will develop a model to monitor and benchmark the welfare of animals in research. The model will be evaluated using sheep and an emphasis will be place on how the animal is coping with its physical and social environment. The model is intended to identify the expected welfare outcomes for the animal as well as the actual welfare outcomes in order to consider what may have been an accepted welfare outcome for that specific experiment. This will allow for earlier identification and, potentially, remediation of welfare problems associated with the work. Competency of scientists will also be considered in risk management and a potential area for improvement in animal welfare.

Successful completion of the project will allow for implementation of processes that will facilitate national benchmarking of animal welfare outcomes in the research institutions within this sector. It will thus allow for ongoing improvements in the welfare of animals used in research. However, a national interpretive framework will be needed to maximise the potential for benefits accruing from the project outcomes.

Key stakeholders will benefit as follows:

1. Commercial companies and funding organisations – will allow for identification of internal risks plus highlight ‘best practice’ approaches.
2. Companies, funding organisations, research providers – improve reliability of research outcomes and optimise animal-related costs of research.
3. General Public – increased information and transparency of sectoral performance re. animal welfare should help improve confidence in the ethical status of the research sector.
4. Government – general ability to ‘drive’ better outcomes through tied funding requirements related to national benchmarking. For the Australian Government and research providers in the global context the outcomes if applied would allow for demonstration of Australia’s animal welfare credentials as an ethical provider of high quality animal research

#### **6.8. Animal welfare education package - AWSC**

The aim of the package is to introduce key concepts and animal welfare considerations and provide field tools, for staff who work directly with animal owners and carers, to identify certain animal welfare problems in a range of species.

The package will provide comprehensive training in animal welfare and welfare assessment to underpin the assessments in existing further education certificates; such as the Animal Management and Control Certificate IV and the Animal Welfare Inspector Certificate IV.

The package will provide participants with a series of modules/units that can be configured to suit the demands of the group being trained.

## APPENDIX II

### AWSC SCIENTIFIC SEMINARS TITLES AND SPEAKERS (as reported on [website](#)) 2002-2009

#### 2002

##### January '02

*Theme: Dairy Cattle.*

“Tail-docking and de-horning of dairy cattle.”

“Pain relief with these procedures.”

“Lameness in dairy cows.”

Speakers:

- Drs Jeff Rushen and Anne Marie de Passille, (Dairy and Swine R&D Centre, Agriculture and Agri-Food Canada).
- David Mellor, (Massey University, NZ).
- Dr. Lindsay Matthews, (Animal Behaviour and Welfare Centre, Ruakura, NZ).
- Dr. Jacob Malmo, (Maffra Vet Clinic).

##### May '02

*Theme: Plant toxins and their effects on livestock.*

Speakers:

- Dr Steven Colegate, (Plant Toxins Research Group, CSIRO, Geelong) – “Plant-associated toxins: blindness, liver damage, convulsions, respiratory distress and death.”
- Dr Kevin Reed, (Pastoral and Veterinary Institute, Hamilton) – “Do the perennial ryegrass endophyte alkaloids lower the value of production of Australia's dairy, meat, wool and seed industries?”
- Dr Colin Scrivener, (University of Melbourne, Werribee) – “Ryegrass staggers - more than just a case of the jitters.”
- Dr Katrina Rainsford, (Pastoral and Veterinary Institute, Hamilton) – “What do Socrates, Sherlock Holmes and sheep farmers have in common? They have all been affected by alkaloids.”

## **2003**

### **June '03**

*Theme: Fish.*

Speakers:

- Dr Steve Tate (Director, Bureau of Animal Welfare) – “Fish Legislation – Victoria.”
- Dr Neville G. Gregory (Research Scientist, SARDI) – “When do we stop worrying about animal suffering? - Do fish feel pain?”
- Mr Ray Page – (Executive Officer, VRFish) – “Fish Care.”

### **November '03**

*Theme: Welfare QA and public attitudes to animal welfare.*

Speakers:

- Dr. John Barnett (AWSC, DPI, Victoria) – “Welfare QA in the pig industry.”
- Professor Grahame Coleman (AWSC, Psychology, Monash University) – “Public attitudes to animal welfare, their influence on the individual and how do we assess them.”

## **2004**

### **May '04**

*Theme: Dogs.*

Speakers:

- Dr. Pauleen Bennett (AWSC, Monash University) – “Introduction: dog welfare.”
- Lauren Hemsworth (Honours student, The University of Melbourne) – “Dogs in shelters - effects of the initial 8 day isolation period.”
- Kevin Kerswell (PhD candidate, The University of Melbourne) – “Dog morphology, communication and behaviour .”
- Linda Marston (PhD candidate, Monash University) – “An investigation of factors affecting the success of canine adoptions from animal welfare shelters.”

### **July '04**

*Theme: Welfare assessment.*

Speakers:

- Dr Laura Green, (Ecology and Epidemiology Group, Department of Biological Sciences, University of Warwick) – “Use of epidemiology to assess animal welfare - advantages and disadvantages.”

- Professor Paul H. Hemsworth. (Director, Animal Welfare Science Centre, DPI).

### **September '04**

*Theme: Dairy cow behaviour, productivity and welfare.*

Speakers:

- Adele Arnold (PhD candidate, The University of Melbourne) – “The effect of milking shed noise on dairy cow behaviour using a Y maze.”
- Naomi Botheras (PhD candidate, The University of Melbourne) – “Time budgets of Australian dairy cows on pasture.”
- Professor Clive Phillips, (Cambridge University, UK).

*Theme: Horse Welfare.*

Speakers:

- Naomi Pearson (Masters student, The University of Melbourne) – “Horse welfare.”
- Dr Ellen Jongman, (AWSC, DPI, Victoria).
- Dr Andrew McLean (PhD candidate, The University of Melbourne).

*Theme - Tail docking in dairy cows.*

Speaker:

- Dr Ian Duncan, (University of Guelph, Canada) – “The costs and benefits of tail docking dairy cows.”

### **November '04**

*Theme: Housing and the welfare of gestating sows.*

Speakers:

- Dr John Barnett (AWSC, DPI, Victoria) – “Evaluation of sow stall dimensions.”
- Marcus Karlen (Masters student, The University of Melbourne) – “The welfare of gestating sows in conventional stalls and in large groups on deep-litter.”

## **2005**

### **February '05**

*Theme: Public perceptions.*

Speakers:

- Professor Grahame Coleman (AWSC, School of Psychology, Monash University,) – “Public perceptions and animal welfare.”

- Emma Coath (DPI, Victoria, Food Industry Project Manager, Agribusiness) – “Understanding the relative importance of animal welfare as a credence attribute of food products in International markets.”

### **March '05**

*Theme: Conflict and compatibility: issues in animal production in relation to housing.*

Speakers:

- Professor Lee Johnson (QAF Meat Industries) – “Animal housing, nutrition, health, welfare and food safety.”
- Professor Kevin Stafford (Applied Ethology and Animal Welfare, Director of Postgraduate Studies, Massey University, New Zealand) – “Organic farming and animal welfare.”

### **April '05**

*Theme: Pain assessment.*

Speakers:

- Professor David Mellor (Animal Welfare Science and Bioethics Centre, Massey University, NZ).
- Dr Ross Young (Senior Lecturer - Department of Physiology, Monash University).

### **May '05**

*Theme: Latest research in the poultry industry (animal behaviour and welfare).*

Speakers:

- Dr John Barnett (AWSC, DPI, Victoria) – “Welfare of birds in furnished cages.”
- Dr Phil Glatz (Senior Research Scientist, PIRSA, South Australia) – “The latest developments in relation to beak trimming.”
- Dr Greg Cronin (AWSC, DPI, Victoria) – “An understanding of nesting behaviour.”

### **July '05**

*Theme: Ethical dimensions of animal use.*

Speakers:

- Dr John Hodges (Author and speaker on food and agriculture, genetics and ethics) – “Animal ethics and livestock production - Where are we going with our livestock?”
- Dr Neil Levy (Research Fellow with the Centre for Applied Philosophy and Public Ethics).

## **2006**

### **June '06**

*Theme: Welfare Methodology.*

Speakers:

- Berry Spruijt (University of Utrecht) – “Anticipation cognitive aspects and awareness.”
- Paul Hemsworth (AWSC, DPI, Victoria) – “Welfare methodology – aligning the functional and preference approaches to welfare assessment.”

### **July '06**

*Theme: Animal Welfare in the extensive Sheep Industries.*

Speakers:

- Andrew Thompson (DPI, Victoria) – “Lifetime Wool Project.”
- Adele Arnold (AWSC, The University of Melbourne) – “Mulesing.”
- Angus Campbell (The University of Melbourne) – “McKinnon Project.”

### **August '06**

*Theme: International Developments in Animal Welfare.*

Speakers:

- Dr. Jim Kinder (The Ohio State University) – “Animal Welfare Developments - research and extension at Ohio State.”
- Dr. Peter Bailey (DPI, Victoria) – “Animal Health and Welfare Developments Overseas: Recent USA/UK tour.”
- Paul Hemsworth (AWSC, DPI, Victoria) – “Welfare methodology – aligning the functional and preference approaches to welfare assessment.”

### **September '06**

*Theme: Dairy Cattle Welfare.*

Speakers:

- Dr. Naomi Botheras (The Ohio State University) – “Time Budgets for Dairy Cattle - welfare impacts.”
- Dr. Mariko Lauber (AWSC, DPI, Victoria) – “Behavioural development in dairy calves.”

## **October '06**

*Theme: Sheep Welfare in Australia.*

Speakers:

- Dr. Angus Campbell (The University of Melbourne) – “Quantified estimates of risk factors for post-weaning mortality in merinos.”
- Dr. Ralph Behrendt (DPI, Victoria) – “Lifetime wool project.”

## **November '06**

*Theme: AWSC Cattle Science Meeting.*

Speaker:

- Andrew Fisher (CSIRO) – “Road transport of cattle - effects of journey duration and loading practices.”

*Theme: AWSC Pig Science Meeting.*

Speakers:

- Bronwyn Stevens (PhD candidate, The University of Melbourne) – “The welfare of gestating sows in conventional stalls and in large groups on deep litter.”
- Marcus Karlen (AWSC, DPI, Victoria) – “Injuries in breeding sows.”
- Dr Steve Tate (Bureau of Animal Welfare) - "National Pig Code - current situation."

*Theme: Animal welfare monitoring systems and audits.*

Speaker:

- Prof. Linda Keeling (Swedish University of Agricultural Sciences) – “Animal welfare monitoring systems and audits.”

## **2007**

### **February '07**

*Theme: Foetal Awareness.*

Speaker:

- Prof. David Mellor (Animal Welfare Science and Bioethics Centre, Massey University, NZ) – “Birth and hatching: key events in the onset of awareness in the lamb and chick.”

### **March '07**

*Theme: Personality.*

Speakers:

- Bob Kilgour (NSW Ag) – “Towards an understanding of animal personality.”

- Jacqui Ley (PhD candidate, Monash University) – “Measuring Personality in dogs.”

### **May ‘07**

*Theme: West Australian pig welfare science seminar*

Speakers:

- Jeremy Skuse (AWSC) – “Introduction to The Animal Welfare Science Centre”
- Bronwyn Stevens (PhD candidate, The University of Melbourne) – “The welfare of gestating sows in conventional stalls and in large groups on deep litter.”
- Paul Hemsworth (AWSC, The University of Melbourne) – “Measuring the welfare of pigs.”

### **June ‘07**

*Theme: Preference Testing.*

Speaker:

- Ken Smith, (Masters student, The Ohio State University) – “Preference testing and the Y-maze.”

*Theme: Industries’ philosophies, priorities and programs on animal welfare.*

Speakers:

- Kathleen Plowman (Australian Pork Ltd) – “APL Animal Care.”
- David Witcombe (Australian Egg Corp Ltd) – “Layer Hen Welfare: a challenging and complex issue.”
- Helen Dornom (Dairy Australia) – “Dairy Industry Perspective and Approach to Animal Welfare.”
- Joan Lloyd (Australian Wool Innovation) – “Animal Welfare Priorities and Programs for Extensively Raised Sheep.”

### **July ‘07**

*Theme: Animal welfare groups’ philosophies, priorities and programs on animal welfare.*

Speakers:

- Hugh Wirth (RSPCA Vic) – “RSPCA animal welfare philosophy and policies.”
- Glenys Oogjes (Animals Australia) – “AA’s philosophies, priorities, plans.”
- Carole De Fraga (Compassion in World Farming) – “CIWF’s philosophy, priorities and programmes.”

## **August '07**

*Theme: Human-animal interaction in the research setting.*

Speaker:

- John Barnett (AWSC, DPI, Victoria) – “Policy on the care and use of sheep for scientific purposes.”

## **September '07**

*Theme: Animal welfare research groups' philosophies, priorities and programs on animal welfare.*

Speakers:

- Paul Hemsworth (AWSC, The University of Melbourne) – “AWSC’s philosophy, priorities and programs.”
- Clive Phillips (Centre for Animal Welfare and Ethics) – “CAWE’s philosophies, priorities and programs.”
- Andrew Fisher (CSIRO) – “CSIRO animal welfare research - philosophy, priorities and programs.”

*Theme: Current Animal Welfare Research at The Ohio State University.*

Speakers:

- Dr Naomi Botheras (The Ohio State University) – “Welfare Research at The Ohio State University.”

## **November '07**

*Theme: Government agencies' philosophies, priorities and programs on animal welfare.*

Speakers:

- Steve Tate (Bureau of Animal Welfare) – “BAW’s philosophy, priorities and programs.”
- Robert Baker (Primary Industries and Resources SA) – “Animal welfare in SA.”
- Allan Sheridan (DAFF) – “The Australian Animal Welfare Strategy.”

## **December '07**

*Theme: AWSC Companion Animal Research.*

Speakers:

- AWSC Scientists and students

## **2008**

### **March '08**

*Theme: Livestock export.*

Speaker:

- Prof Clive Phillips (Centre for Animal Welfare and Ethics) – “Welfare aspects of the live export of sheep and cattle.”

*Theme: Duty of Care.*

Speakers:

- Alistair Lawrence (Head of Animal Welfare, Scottish Agricultural College, Animal Welfare and Behaviour, SAC) – “Improving public attitudes and behaviour to animals.”
- Grahame Coleman (AWSC, Monash University) – “Public education.”

### **May '08**

*Theme: Remote sensing.*

Speakers:

- Ian McCauley (DPI, Victoria) – ‘Remote monitoring of livestock: Wireless and the Wii - improving livestock welfare.’
- Andrew Bubb (Desert Knowledge CRC) – “Remote management of cattle in central Australia. Current applications and opportunities for the future.”
- Tim Stockman (Stockman Electronics) – “The physical limitations of wireless sensing technologies to monitor livestock.”
- Greg Cronin (AWSC, DPI, Victoria) – “Using machine vision (automatic video image analysis) to monitor hens in cages.”

### **July '08**

*Theme: Dairy cow welfare: Solutions for current problems.*

Speaker:

- John Webster (Emeritus Professor of Animal Husbandry, The University of Bristol, UK) – “Dairy cow welfare: Solutions for current problems.”

### **August '08**

*Theme: Animal Companions for Life.*

Speakers:

- AWSC Scientists and students

## **October '08**

*Theme: Pain and consciousness.*

Speakers:

- Craig Johnson (Massey University) – “The role of electroencephalography in animal welfare research.”
- David Adams (Consultant) - “Physiological aspects of humane killing in animals.”

## **December '08**

*Theme: AWSC Farm Animal Research Planning Day.*

Presentations:

- Animal Welfare Science Centre
- Australian Wool Innovation
- Dairy Australia
- Australian Egg Corporation Ltd
- Australian Pork Ltd
- Bureau of Animal Welfare
- Animals Australia
- RSPCA (Vic)

## **2009 (to June)**

### **March '09**

*Theme: Pig transport.*

Speaker:

- Prof. Tina Widowski (University of Guelph, Canada) - “Effects of Handling Procedures and Transport Conditions on Welfare and Meat Quality of Pigs.”

### **May '09**

*Theme: Welfare of the laying hen.*

Speakers:

- Prof. Tina Widowski (University of Guelph, Canada) – “Urges, needs, preferences and priorities – coming to terms with the welfare of the laying hen.”
- Philip Szepe (Kinross Farm, Victoria) - “An Australian perspective on EU layer hen housing.”

## **June '09**

*Theme: Assessing Animal Welfare.*

Speakers:

- Prof Berry Spruijt (University of Utrecht, Netherlands) - "What cognitive abilities are indispensable for experiencing welfare?"
- Dr Don Lay, (Research Leader, Livestock Behavioural Research Unit, USDA, USA) - "Using physiology and behaviour to assess welfare in farm animals: research of the United States Department of Agriculture."