



THE ANIMAL WELFARE SCIENCE CENTRE ANNUAL REPORT

2006-2007

FOREWORD

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

The Centre's research and teaching capacity is considerable, with scientific expertise and experience in the key disciplines of animal behaviour, psychology, stress physiology and veterinary medicine. There are currently 17 scientists, 14 post-graduate students and 8 support staff operating within the Centre across the partner organisations.

There are also substantial specialised research and teaching facilities associated with the three 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.

The Centre also has a formal collaborative agreement with the Department of Animal Science at the Ohio State University (OSU). As part of this agreement, the Centre provides and delivers animal welfare teaching modules into course curricula at OSU, assists in the establishment and delivery of training programs on animal handling and welfare for the livestock industries in the US and partners OSU in collaborative animal welfare research

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

The specific aims of the Centre are as follows:

To conduct:

- Strategic animal welfare research to resolve major animal welfare issues and student training
- Targeted industry, public and tertiary education designed 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.

In order to achieve these aims, the Centre conducts research and education in 4 program areas:

1. Welfare methodology
2. Housing and Husbandry effects on animal welfare
3. Attitudes to animals and animal welfare, and farmer, consumer and community behaviour
4. Tertiary and post-graduate education and training

These programs are followed to achieve the Centre's targeted outputs:

- Develop scientifically defensible welfare methodology.
- Use scientifically defensible methodology to establish, amend or validate animal welfare standards and practices.
- Develop and support industry education and training strategies and provide scientific advice to support the modification of codes of practice and the development of quality assurance programs to introduce scientifically defensible welfare standards in the animal industries.
- Understand public and consumer attitudes to animal welfare to assist Governments and industry in
 - developing animal welfare policy
 - assuring local and international consumers, public and other governments of the sound welfare standards for Australian domestic animals.
- Ensure tertiary students entering the animal industries are better prepared to provide sound, science-based advice on animal welfare practices to industry, interest groups and the public.
- Provide high quality postgraduate and postdoctoral training for the next generation of researchers and teachers in animal welfare science.

Our Vision

“Animal welfare and its constant improvement are societal and cultural norms”

Our Mission

“To contribute to improved animal welfare as a world leading provider of expert information, advice and education underpinned by rigorous research”

Chairman's Report

The past twelve months has been a busy period as we continually plan to improve the relevance and performance of the Animal Welfare Science Centre (AWSC). A comprehensive Strategic Plan for the Centre has been prepared following extensive internal and external consultation.

We continue to focus on building relationships with key stakeholders and communicating the capabilities and outputs of the Centre.

The AWSC has now entered its tenth year of operation and the board considers that a full scientific and operational review of the Centre should be carried out in 2009 to ensure that key activities in the Strategic Plan have become "bedded down" in the Centre's operation.

The Director's Report covers the work of the Centre during the past year in considerable detail and the Centre's many achievements do not need reiteration here. A particular high-point for this year was been the appointment of Jeremy Skuse as full time Executive Officer. Jeremy's skills and enthusiasm have greatly strengthened the effectiveness of the AWSC.

Attracting able young people into careers in animal welfare research is vital to our future and the Centre has made major efforts in this respect, working with both undergraduates and graduate students and funding bodies to attract student funding. We currently have 11 PhD candidates and 3 Masters Degree students within the Centre. This provides evidence of the major contribution the Centre is making to strengthening the animal welfare research capability of Australia, as well as contributing strongly to animal welfare science and its application.

Our international collaborations are strong and it is particularly worth mentioning the extremely close relationship we enjoy with The Ohio State University in both research and teaching.

I congratulate members of the Centre on another productive year which has enhanced both the performance of the AWSC and its reputation within Australia and internationally in the field of animal welfare research and its application to improving the welfare status of animals.

Professor Mike Rickard

Chair

Board of Management

Animal Welfare Science Centre

Director's Report

The past year has been a very successful one for the Centre. Some important research, teaching and training initiatives have commenced and several important research projects have been successfully concluded and it is useful to summarise these to highlight the achievements of Centre scientists. More detail on these activities is provided in the body of this report.

The Centre continues to be recognised internationally for its leadership in understanding and improving human-animal interactions in animal agriculture. The Centre is a major partner in a collaborative European project which is part of the European Union's 6th Framework Welfare Quality program. This project, which utilised previous and current research by the Centre, is developing integrated, knowledge-based, practicable species-specific training strategies for stockpeople with the specific aim of improving farm animal welfare.

In addition to on-going research in Australia and the USA on human-animal interactions in the poultry industries, the Centre has commenced a new project studying the handling of animals in lairage at Australian abattoirs, with the aim, if necessary, of addressing skills and attitude problems by enhancing our training programs. Over the last 12 months, Centre scientists have published two full journal publications, one book chapter and six conference publications on this topic of human-animal interactions in animal agriculture.

An increasing component of the Centre's activity over the last few years has been its research on companion animals in a domestic situation. The Centre has seven projects currently underway on companion animals and many of these are studying the impact of human-animal interactions on the animal. The publication over the last year of six full journal publications, three full journal papers submitted and seven conference publications on human-animal interactions on dogs and cats demonstrate the Centre's developing scientific capability in this very important area.

There is no doubt that there is growing community and government interest in the welfare of companion animals and this developing scientific capability of the Centre positions the Centre in an ideal position to understand and provide the community and government with solutions to these important domestic animal welfare issues in the community. This important addition to the Centre's traditional capability provides the partner organizations with a research capability that is internationally at the forefront of research and training in this critical welfare topic of human-animal interactions.

Confinement of farm animals, even for short periods as may occur during transport and lairage of farm animals, is the most controversial issue internationally. The main welfare concerns raised are inappropriate social contact, the inability to exercise (space) and the restricted choice of stimuli for interaction with other animals and / or features of the physical environment. The Centre has a number of projects currently underway examining the effects of various aspects of confinement on pigs and poultry, and is reviewing developments in the confinement of other livestock and laboratory animals. Confinement housing of livestock is a traditional area of research for the Centre and the three full journal publications, one book chapter and four conference publications over the last 12 months reflect the Centre's national and international contribution to addressing these contentious welfare issues associated with confinement of farm animals.

The Centre, with funding from the Victorian government, has developed national animal welfare standards for the processing and livestock transport sectors of the meat industry to incorporate into

their industry and company Quality Assurance programs. The processing standards are already being independently audited at all export meat processing plants and the transport standards have been incorporated into the industry's QA program, TruckCare.

Over the last five years with initial and substantial funding from the Victorian government and more recent funding from the livestock industries, the Centre has invested heavily in fundamental research aimed at refining the scientific concept of animal welfare and in turn the corresponding welfare methodology. The community generally accepts the role of the scientific method to solve problems. However, the ability of science to contribute to the animal welfare debate has been limited by a lack of consensus on the scientific approach to studying animal welfare.

The Centre has and is continuing to conduct ground-breaking research on examining the relationships between various approaches to welfare assessment, particularly two common approaches involving biological functioning and animal preferences. Without an agreed methodology, progress in welfare research, development of implementation of welfare standards and development of welfare assessment tools will continue to be both arguable and lacking in a broad consensus. Two full journal publications and four conference publications highlight the Centre's international contribution to this very important topic in animal welfare science.

Animal welfare is an increasingly contributing perspective in society, strongly influencing views on animal use in society and the acceptability of various animal management options. Consumer and public attitudes to animal welfare have the potential to dramatically affect the use of animals in society, influencing for better or for worse, the operations of livestock industries, medical research, the management of feral and wild animals, and the care of recreational and companion animals.

The Centre has undertaken some unique research examining the relationships between knowledge of and attitudes towards animal welfare issues in the domestic animal industries, and the buying behaviour and community behaviours of consumers and the general public. Such research will lead to the development of reliable and valid measures for monitoring community concerns about animal welfare, and a model to assess the impact of these attitudes on consumer decisions and community responses to assist in government and industry policy development. One full journal paper submitted for publication and two conference publications highlight the Centre's international contribution to this very important topic.

The Centre has recently commenced a collaborative project in the USA with sociologists at The Ohio State University to study public attitudes to animal welfare and their implications for the food animal industry. This research, together with the Centre's previous and current research funded by the Victorian government and various livestock industries, also places the Centre in a strong position to influence international research and policy development.

A lack of awareness of factual information often means that many people are ignorant of the conditions under which domestic animals live, how they are treated and their species-specific requirements and thus public education strategies are critical in making rational progress in the animal welfare debate. The Centre has recently developed and evaluated interactive multimedia educational resources for senior primary and junior secondary students to learn about commercial farming systems. These educational programs resulted in improved knowledge in pre-adolescents, demonstrating practical and important opportunities in public education.

In addition to this very active and rigorous research, Centre scientists have also been active in 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. The staff of the Centre also teach several subjects to animal science students at the University of Melbourne and Centre staff in the three partner organisations have recently developed the course Animals in Society for The Ohio State University.

While staff from the Centre will deliver this course in late 2007, the opportunity to deliver this course simultaneously to students at The Ohio State University and the University of Melbourne and Monash University is an exciting international development that is being explored. This university course is an ideal mode to facilitate a general and balanced transfer of knowledge about the diverse roles and obvious impact that animals and humans have on each other.

The Centre continues to look for opportunities to offer and upgrade its series of stockperson training programs. The program for pig stockpeople is presently being revised with industry funding and a rollout of the program has successfully occurred in Ohio with the collaboration of The Ohio State University. The rollout of a similar program for dairy stockpeople is underway in Australia and in the USA. Centre staff have participated in a range of industry and scientific meetings in which animal welfare developments and research results have been extended. 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 developments and research. These meetings were recently extended interstate in 2007 and based on their success, similar meetings are planned in the future.

The Animal Welfare Science Centre, a joint centre of the University of Melbourne, Monash University and the Department of Primary Industries (Victoria), was established in 1997 to provide Victoria and Australia with a world class centre of excellence in animal welfare research, education and training. After a decade of development, I believe that the Centre is fulfilling this role. With its current scientific capability of both staff and students, together with the support of the Centre's Board and Advisory Committee as well as the relationships that the Centre has developed with numerous stakeholder groups, the Centre is ideally equipped and placed to influence animal welfare training, education and policy, both nationally and internationally. I look forward with enthusiasm to the next exciting decade of the Animal Welfare Centre.

Professor Paul Hemsworth

Director

Animal Welfare Science Centre

CENTRE PERSONNEL

Board of Management

Professor Mike Rickard, Chair

Geoff Kroker, Department of Primary Industries, Victoria

Professor Snow Barlow, The University of Melbourne

Professor Grahame Coleman, Monash University

Professor Paul Hemsworth, The University of Melbourne

Scientists

Prof. Paul Hemsworth (Animal Science, University of Melbourne, Parkville and DPI Werribee) – Director of the Centre: A research career studying the behaviour and welfare of farm and companion animals, particularly examining the influence of the social and physical environment on farm animal behaviour and welfare and the influence of human-animal interactions on animal welfare and productivity.

Prof. Grahame Coleman (Head of the School of Psychology, Psychiatry and Psychological Medicine, Monash University, Caulfield and Clayton) – Deputy Director of the Centre: Grahame has followed a research career in aspects of human and animal behaviour associated with biological rhythmicity and sleep and changes in stress-related and reproductive hormones. Current research interests focus primarily on human-animal interactions in farm and companion animals and public attitudes to animal welfare.

Dr. John Barnett (DPI, Werribee) – A research career in endocrinology, particularly stress physiology and its application to the welfare of farm animals. A focus has been on housing systems and their design on animal welfare.

Assoc. Professor Alan Tilbrook (Physiology, Monash University, Clayton) – A research career in endocrinology and behaviour of domestic animals. Particular interests include the endocrine and neuroendocrine control of reproduction in males, the effects of stress on reproduction and endocrine and behavioural responses to stress.

Dr. Pauleen Bennett (Psychology, Monash University, Caulfield) – Research career studying behavioural neuroscience related to animal learning and memory formation. Recent research interest in human-animal interactions, particularly with respect to companion animal species.

Dr. Greg Cronin (DPI, Werribee) - A research career studying the behaviour and productivity of pigs and in particular the effects of the environment on maternal behaviour and the role of maternal behaviour in piglet survival and growth. Interest also in alternative housing systems for sows during gestation and farrowing/lactation and housing systems for poultry.

Dr. Ellen Jongman (DPI, Werribee) - Research interests include pain and aversion to handling and husbandry procedures of domestic animals, and the effect of handling and training procedures on stress and fear of humans in horses.

Dr Samia Toukhsati (Psychology, Monash University, Caulfield) – Research interests include animal cognition and welfare, and her recent research has included understanding human-animal interactions, particularly with regard to companion animal owner attitudes and behaviours.

Marcus Karlen (DPI, Werribee) – Research interests include injury, lameness, stress and immunology particularly in pigs and the effects of housing systems on pig welfare.

Dr Mariko Lauber (DPI, Attwood) – Research interests include behavioural development in dairy calves and its implication in assessing animal welfare implications of new practices and technologies. Current activities focusing on industry, public and tertiary training in animal welfare.

Dr. Brian Leury (University of Melbourne, Parkville) – Research interests include animal nutrition and physiology.

Dr Linda Marston (Psychology, Monash University, Caulfield) - Research interests include human-animal interactions, particularly with respect to companion animal species.

Dr. Margaret Hay (Monash University, Caulfield) – Research focus on education and training of adults and children in agriculture and companion animals.

Dr. Sarah Chaplin (University of Melbourne, Dookie) - Research interests in the effects of management practices on dairy cow behaviour and welfare.

Dr. Anne Turner (Monash University, Clayton) – Research interests include the effects of stress on reproduction and endocrine and behavioural responses to stress and the endocrine and neuroendocrine control of reproduction in males.

Dr. Ross Young (Monash University, Clayton) – Research interests include stress physiology and endocrinology, with particular interests in acute stress and pain in animals.

Dr. Sue Hides (DPI, Maffra) – District Veterinary Officer with long standing interests in the welfare of dairy cattle. Specific areas of interest include management and transport of young calves and the use of analgesics and anaesthetics to provide pain relief for cattle undergoing husbandry procedures.

Administration

Mr. Jeremy Skuse (BAgSc hons) – Executive Officer of the Centre, significant professional livestock experience derived from operating in senior management and extension roles in Australia as well as in Asia and the United States.

Current Postgraduate students

Lauren Edwards (PhD, Melbourne)

Bronwyn Stevens (PhD, Melbourne)

Cameron Ralph (PhD, Melbourne)

Sonja Laine (PhD, Melbourne)

Keven Kerswell (PhD, Melbourne)

Ken Smith (Masters, Ohio State University)

Joanna Engel (Masters, Ohio State University)

Kate Mornament (PhD, Monash)

Vanessa Rohlf (PhD, Monash)

Lauren Hemsworth (PhD, Monash)

Jacqui Ley (PhD, Monash)

Michele Silva-Cummin (PhD, Monash)

Mia Cobb (Masters, Monash)

Bree Pierce (PhD, Monash)

Technical Staff

Alanna Sawyer, Monash Univ

Maxine Rice, Univ Melb

Judy Nash, Univ Melb

Samantha Borg, DPI

Lisa Newman, DPI

Bruce Schirmer, DPI

Tracie McCallum, DPI

Svetlana Stanojkovic, DPI

International Associates

Dr Jim Kinder, Ohio State University

Dr Naomi Botheras, Ohio State University

Dr Steve Moeller, Ohio State University

Dr Mike Lilburn, Ohio State University

Professor David Mellor, Massey University, NZ

Dr Adele Arnold, AgResearch NZ

Advisory Committee

Dr. Peter Penson, Chair, Animal welfare consultant

Dr. Robert Holmes, Animal Behaviour Clinics

Glenys Oogjes, Director, Animals Australia

Dr. Onn Ben-David, Vice- President, RSPCA, Vic

Professor Clive Phillips, Centre for Animal Welfare and Ethics, University of Queensland

Professor David Mellor, Animal Welfare Science and Bioethics Centre, Massey University

Dr. Denise Noonan, Univ. Adelaide

Dr. Michelle Jones-Lennon, DPI

Kenton Shaw, QAF Meat Industries

Noel Maughan, MLA (Ret)

Alan Bowman, Victorian Farmers Federation

Dr. Stephen Tate, Bureau of Animal Welfare

Ms. Michelle Edge, Symbio Alliance

FUNDING FOR MAJOR CENTRE RD&E PROJECTS 2006/2007

Major Research Projects (source, title, principle investigators, and amount)

Program 1 Welfare Methodology

Beef Cooperative Research Centre (Beef CRC)

Fear / Stress model for beef cattle

Barnett and Hemsworth

\$ 115,767

Our Rural Landscape (ORL)

Welfare Methodology – relationships between biological functional and preference methodologies in studying animal welfare, pigs and sheep

Hemsworth, Barnett

\$ 315,000

Poultry Cooperative Research Centre (Poultry CRC)

Welfare Methodology – relationships between biological functional and preference methodologies in studying animal welfare, poultry

Hemsworth, Barnett

\$ 82,335

Program 2 Housing and Husbandry effects on animal welfare

Australian Egg Corporation Ltd (AECL)

Importance of nests for the welfare of laying hens

Cronin, Barnett

\$ 164,301

Australian Wool Innovation (AWI)

Welfare implications of alternative mulesing procedures

Hemsworth, Arnold, Cronin, Barnett

\$ 98,580

Bureau of Animal Welfare, Victoria (BAW)

Cat welfare in confinement

Jongman

\$ 56,491

Assessment of shelter dog behaviour

Bennett

\$ 50,000

Review of the actual and potential effectiveness of compulsory desexing programs for companion animals

Bennett

\$ 10,000

Effects of an enrichment program for kennelled domestic dogs

Bennett

\$ 5,000

Department of Primary Industries, Victoria (DPI)

Evaluation of welfare issues associated with extended lactation in dairy cows

Jongman

\$ 50,176

Poultry Cooperative Research Centre (Poultry CRC)

Using machine vision to count hens and reduce egg breakage – “proof of concept”

Cronin

\$ 143,890

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

Australian Pork Limited (APL)

Revision of Pig ProHand

Coleman and Hemsworth

\$ 37,798

Field trial of pig stockperson selection

Coleman

\$ 6,924

Bureau of Animal Welfare, Victoria (BAW)

Cats and dogs that visit veterinarians: where do they come from, do they have litters, and what happens to their offspring?

Bennett

\$ 45,878

The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare

Coleman, Jongman and Hemsworth

\$ 35,167

A summary of Australian research pertaining to cat ownership and overpopulation

Bennett

\$ 4,700

Department of Primary Industries, Victoria (DPI)

Development and analysis of survey data for public consultation on the Code of Practice for Pigs Regulatory Impact Statement (RIS)

Toukhsati, Coleman

\$ 15,000

EU 6th Framework

“Minimising Handling Stress” - Prototype training packages for dairy, cattle, pigs and laying hen

Coleman, Hemsworth

\$ 192,000 approx (EUR 123,000)

Mintrac/Meat Livestock Australia (MLA)

ProHand for the livestock processing industry: a professional livestock handling package

Hemsworth and Coleman

\$ 88,259

Ohio Agricultural Research and Development Centre (OARDC)

Farm animal welfare in Ohio: Assessing public concern and implications for the food animal industry

G.Coleman, P.Hemsworth

\$ 49,590

Poultry Cooperative Research Centre (Poultry CRC)

Human – animal relationships in the laying hen

Hemsworth, Coleman, Barnett

\$ 107,321

Program 4 Tertiary and post-graduate education and training

Naturally Victorian Initiative, Victorian Government funding initiative (NVI)

Developing welfare standards for the meat processing and livestock transport industries.

Barnett

\$ 77,928

William Buckland Foundation

Education in agriculture: livestock farming, food production and food choices in pre-adolescents

Hay

\$ 98,274

Total Competitive Funding (*Major Projects*) \$ 1,850,379

SUMMARY OF CENTRE RD&E PROJECTS

Program 1 Welfare Methodology

Fear / Stress model for beef cattle

Barnett and Hemsworth

Beef CRC Funded

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.

Welfare Methodology – relationships between biological functional and preference methodologies in studying animal welfare, pigs and sheep

Hemsworth, Barnett

ORL Funded

This project addresses the key area of developing objective measures of animal welfare. There are, in general, two major approaches used by scientists to study animal welfare: functioning and preference approaches. The first is an integrated approach measuring behaviour, physiology and health and the consequent fitness responses to assess biological functioning on the basis that difficult or inadequate adaptation will generate welfare problems for animals. The second is the use of animal preference (and behavioural demand) testing on the basis that these preferences are either influenced by the animal's emotions, which have evolved to motivate behaviour in order to avoid harm and facilitate survival, growth and reproduction, or reflect important biological requirements of the animal. While generally considered separately, the functioning and preference approaches nevertheless show considerable convergence that is not widely recognised. For example, it is animals are likely to be motivated to choose those resources (or behaviours) that maintain homeostasis to optimise their fitness and maintain normal biological functioning.

Therefore an obvious 'next step', and this is the aim of the ORL project, is to compare these two main approaches to welfare assessment, the functioning approach and the preference approach. Such knowledge is essential to the development of a well-accepted methodology or methodologies to study animal welfare. The finding that the resources that are the most preferred by animals are the same resources that animals, when deprived of them, show the most extreme coping attempts (e.g. a chronic stress response), would indicate that both approaches are measuring the integrated physical, physiological and psychological states of the animal. If this can be demonstrated it would assist in achieving a wider consensus on welfare assessment through progressing a single, and more encompassing, scientific concept of animal welfare.

Welfare Methodology – relationships between biological functional and preference methodologies in studying animal welfare, poultry

Hemsworth, Barnett

Poultry CRC Funded

The specific objectives of this project are (1) to develop a suitable methodology for choice (or preference) testing to measure the animal's longer term choice for specific resources and then (2) compare the two main approaches to welfare assessment: "normal biological functioning" and "animals choices" approaches. This will enable us to study the relationship between these two approaches, that is whether or not the resources that are the most preferred by animals are the same resources that animals, when deprived of them, show the most extreme attempts to cope and adapt.

This research will thus provide an understanding of the relationship between fundamental biological requirements and preferences of animals with the opportunity to integrate these two approaches into a single animal welfare model that incorporates these two concepts of animal welfare. Such knowledge is essential in the development of a well-accepted methodology or methodologies. The finding that the resources that are the most preferred by animals are the same resources that animals, when deprived of them, show the most extreme attempts to cope and adapt, would indicate that both approaches are valuable and complementary in assessing welfare.

Program 2 Housing and Husbandry effects on animal welfare

The importance of nests for the welfare of laying hens

Cronin, Barnett

AECL Funded

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.

Welfare implications of alternative mulesing procedures

Hemsworth, Arnold, Cronin, Barnett

AWI Funded

The operation of sheep mulesing has received considerable public attention in recent years, with claims of unacceptable welfare costs. The mulesing operation involves surgical removal of wool and skin from the breech region of the lamb. This results in permanent enlargement of bare and stretched areas of skin around the perineum which provides good life-time protection against fly strike. Breech strike is the major form of flystrike in Merino sheep in most years in Australia even though body strike can cause major problems in wet seasons or during prolonged periods of warm wet weather.

Several alternative non-surgical methods to mulesing are being developed in Australia with the aim of tightening the skin around the breech area and consequently stretching the bare breech area. These alternative procedures include intradermal injections of collagenase and other products, which cause skin necrosis and contraction of adjacent bare areas (Rothwell et al., 2005), and the use of skin clips that draw together loose skin on the lateral sides of the perineum so that the pressure imposed on the folds of skin enclosed between two clips results in atrophy of the skin folds due to the restricted blood flow.

This project will investigate the welfare implications of several alternative mulesing procedures that have been identified by AWI.

Cat welfare in confinement

Jongman

BAW Funded

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.

A current project examines 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). The environment (both indoors and outdoors) is described in terms of features and observed interactions of the cat with the environment.

Assessment of shelter dog behaviour

Bennett

BAW Funded

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 euthanised. 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.

Review of the actual and potential effectiveness of compulsory desexing programs for companion animals

Bennett

BAW Funded

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.

In this review we will document any available scientific literature describing previous attempts to introduce compulsory desexing programs, highlighting any reported costs and benefits. It is expected that very few scientific reports will be available, in which case we will attempt to identify areas around the world where such legislation has been enacted and to access any data available from such areas. 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.

Effects of an enrichment program for kennelled domestic dogs

Bennett

BAW Funded

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

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

During the sixteen day study period, dogs from both groups will have their behaviour monitored in a neutral environment. The presence of stress indicators cortisol and immunoglobulin A (IgA) in both groups will be measured at intervals throughout the study.

Evaluation of welfare issues associated with extended lactation in dairy cows

Jongman

DPI Funded

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.

Using machine vision to count hens and reduce egg breakage – proof of concept

Cronin

Poultry CRC Funded

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 is testing 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.

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

Revision of Pig ProHand

Coleman and Hemsworth

APL Funded

Training of stockpeople as professional managers of pigs has, in the past, been largely ignored. In recognition of the vital role that stockpeople play in the overall productivity, welfare, and health of the livestock under their care, the Animal Welfare Science Centre (AWSC) developed a stockperson professional handling training program - ProHand pigs.

This program was developed over 10 years ago and is being revised to take into account some of the major technological changes which have occurred in the pork industry.

Field trial of pig stockperson selection

Coleman

APL Funded

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 is designed to test the utility of the SSA in a commercial environment. It has been put on the web by EPredix, USA. The Over the next 18 months, several large pig producers will use the SSA to assist in stockperson selection and the usefulness of it will be assessed.

Cats and dogs that visit veterinarians: where do they come from, do they have litters, and what happens to their offspring?

Bennett

BAW Funded

At a recent Australian summit on pet overpopulation, held in June 2006, 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.

The welfare of recreational horses in Victoria: the occurrence of and factors associated with horse welfare

Coleman, Jongman and Hemsworth

BAW Funded

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.

A summary of Australian research pertaining to cat ownership and overpopulation

Bennett

BAW Funded

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 is the objective of this summary, which will include, in addition, any relevant research which has been conducted elsewhere. This document will identify where e 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 will be 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.

Development and analysis of survey data for public consultation on the Code of Practice for Pigs Regulatory Impact Statement (RIS)

Toukhsati, Coleman

DPI Funded

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.

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

Coleman, Hemsworth

EU 6th Framework Funded

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.

ProHand for the livestock processing industry: a professional livestock handling package

Hemsworth and Coleman

Mintrac / MLA Funded

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 proposed project will firstly assess the current attitudes and performance of our stock handlers and, if necessary, secondly address skills and attitude problems by enhancing out training programs.

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.

Farm Animal Welfare in Ohio: Assessing Public Concern and Implications for the Food Animal Industry

G.Coleman, L.Lobao, M.Eastridge, P.Hemsworth, J.Sharp, N. St-Pierre

OARDC Funded

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.

Human – animal relationships in the laying hen

Hemsworth, Coleman, Barnett

Poultry CRC Funded

This project focuses on the critical role of stockpeople to layer hen welfare. Research in a number of livestock industries has shown that interactions between stockpeople and their animals can limit the welfare of the animals (Hemsworth and Coleman, 1998). While these interactions may appear quite benign, this research has shown that the frequent use of some of these routine behaviours by stockpeople can result in farm animals becoming highly fearful of humans. It is these high fear levels, through stress, that limit animal welfare and productivity. While this research on human-animal interactions in the livestock industries has generally focused on the dairy and pig industries, there has been some limited research conducted on meat chickens and laying hens that indicate that high fear levels may limit the productivity and welfare of poultry (Barnett *et al.*, 1992, 1994; Cransberg *et al.*, 2000).

This project will utilise environmentally controlled cage layer farms in both Australia and the USA. The project will i) determine whether previous findings on fear-productivity links are still valid in modern production facilities using current strains of birds; ii) determine the human behaviours that regulate fear of humans in laying hens, following preliminary studies on an ethogram of human behaviours in the poultry shed and developing methodologies to observe human behaviours; and iii) determine the human attitudes that regulate fear provoking behaviours in humans towards laying hens.

Program 4 Tertiary and post-graduate education and training

Developing welfare standards for the meat processing and livestock transport industries.

Barnett

NVI Funded

The processing sector aspect of this sub-project has been 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 applies current knowledge from existing RandD 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 will also determine, and thus be able to demonstrate to industry, the advantages of implementing the sub-project, through a pilot evaluation.

The project involves identifying agreed targets for welfare, preferably based on science, but where this is lacking the targets will be based on a consensus of current good industry practice. As such the project will also identify gaps in knowledge and RandD opportunities.

This project follows 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.

Education in agriculture: livestock farming, food production and food choices in pre-adolescents

Hay

William Buckland Foundation and APL Funded

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.

CENTRE RD&E COMMUNICATIONS

1. Books

Hemsworth, P.H. and Cronin, G.M. (2006). Behavioral problems. In "Diseases of Swine" 9th Edition, Chapter 51. B.E. Straw, J.J. Zimmerman, S. D'Allaire and D.J. Taylor (eds.). *Blackwell Publishing Professional, Ames Iowa*, pp. 847-859.

Hemsworth, P.H. (2007). Behavioural Principles of Pig Handling. In "Livestock Handling and Transport", 3rd Edition, edited by T. Grandin, *CAB International, Oxon, UK*, pp. 214-227.

2. a. Research publications in refereed journals

Arnold, N.A., Ng, K.T., Jongman, E.C. and Hemsworth, P.H. (2007). Avoidance of tape-recorded milking facility noise by dairy heifers in a Y maze choice task. *Applied Animal Behaviour Science* (in press, accepted March 2007).

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*. (in press, accepted March 2007).

Barnett, J.L., Cronin, G.M. and Scott, P.C. (2007). Behavioural responses of poultry during kosher slaughter and their implications for the birds' welfare. *Veterinary Record*, 160: 45-49.

Bennett, P.C., Cooper, N., Rohlf, V.I., and Mornement, K. (in press) Factors influencing owner satisfaction with companion dog training services. *Journal of Applied Animal Welfare Science*.

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, 65-84.

Dwyer, F., Bennett, B., Coleman, G., (2006) "The Development of a Multi-Dimensional Human-Canine Relationship Questionnaire: The "Monash Dog Owner Relationship Scale", *Anthrozoos*, 19, 243-256.

Hemsworth, P.H. (2007). Ethical stockmanship. *Australian Veterinary Journal*, 85 (5): 194-200.

Hemsworth, P.H. and Tilbrook, A.J. (2007). Sexual behaviour of male pigs. *Hormones and Behavior*, 52, 39-44.

Karlen, G.A., Hemsworth, P.H., Gonyou, H.W., Fabrega, E., Strom, D. and Smits, R.J. (2007). The welfare of gestating sows in conventional stalls and large groups on deep litter. *Applied Animal Behaviour Science*, 105: 87-101.

Kobelt, A.J., Hemsworth, P.H., Barnett, J.L., Coleman, G.J. and Butler, K.L. (2007). The behaviour of Labrador Retrievers in suburban backyards: the relationships between the backyard environment and dog behaviour. *Applied Animal Behaviour Science*, 106, 70-84.

Lauber, M.C.Y., Hemsworth, P.H. and Barnett, J.L. (2006). The effects of age and experience on behavioural development in calves. *Applied Animal Behaviour Science* 99: 41-52.

Ley, J., Coleman, G.J., Holmes, R., Hemsworth, P.H. (2007). Assessing fear of novel and startling stimuli in dogs. *Applied Animal Behaviour Science* 104(1-2), 71-84.

Lund, V., Coleman, G., Gunnarsson, S., Appleby M.C., and Karkinen, K., (2006). Working at the Interface between the Natural and Social Sciences, *Applied Animal Behaviour Science* 97 (2006) 37-49

Roussel, S., Hemsworth, P.H., Leruste, H., White, C., Duvaux-Ponter, C., Nowak, R. and Boissy, A. (2006). Repeated transport and isolation during pregnancy in ewes: Effects of the reactivity to humans and to their offspring after lambing. *Applied Animal Behaviour Science* 97: 172-189.

Roussel, S., Hemsworth, P.H., Boissy, A. and Duvaux-Ponter (2007). Repeated transport and isolation during pregnancy in ewes: Differential effects on emotional reactivity and weight of their offspring *Applied Animal Behaviour Science* (in press).

Toukhsati, S.R., Bennett, P., Coleman, G.J., (2007) "Behaviours and Attitudes towards Semi-owned cats, *Anthrozoos*, 20, 2, 131-142

2. b. Research papers submitted to refereed journals

Carless, S.A., Fewings-Hall, S., Hall, M., Hay, M., Hemsworth, P., 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 as an Information Exchange Article*.

Coleman, G.J., "Animal Well-Being in the Public Mind - Can We Change Perception?" *Journal of Animal Science*, April 2007

Ley, J., and Bennett, P.C. (in press). Understanding personality by understanding companion dogs. *Anthrozoos*

Ley, J., Bennett, P., Coleman, G. (2006) "Personality dimensions that emerge in companion canines", *Applied Animal Behaviour Science*

Volant, A., Gullone, E., Coleman, G., (2008) The Relationship Between Family Violence and Animal Abuse, *Violence Against Women* MS# 05-0305

Wooten, A.C., Burney, S., Foroudi, F., Frydenberg, M., Coleman, G.J., Ng, K.T., (2007) "Psychological Adjustment of Survivors of Localised Prostate Cancer: Investigating the Role of Dyadic Adjustment, Cognitive Appraisal and Coping Style". *Psycho-Oncology*.

Wooten, A., Burney, S., Foroudi, F., Frydenberg, Ng, K.T., Coleman, G.J., (2007) "Long term experience of residual symptoms post treatment", *Asia-Pacific Journal of Clinical Oncology*

3. Conferences publications

Arnold, N.A., Ralph, C., Petherick, J.C. and Hemsworth, P.H. (2007). The choice behaviour of laying hens for feed and dustbathing. *Australian Poultry Science Symposium*, 19: 32.

Bennett, P.C., Cooper, N., Rohlf, V., and Mornement, K. (accepted). Factors influencing owner satisfaction with companion dog training services. *Animals and Society II: Considering Animals, Hobart, Australia*. 3-6 July, 2007

Bennett, P.C., Mornement, K., Coleman, G.J., Toukhsati, S., "Caring for Australian alpacas: preliminary data from the Monash University Alpaca Husbandry Survey". *Alpaca Conference 2006*

Coleman, G.J., "Public perceptions of animal pain and animal welfare" – *Proceedings of the Australian Animal Welfare Strategy (AAWS) Science Summit, May 2007.*

Coleman, G.J., (July 2006) Keynote Speaker: "Animal Well-being in the Public Mind - Can we Change Perception?" *American Dairy Science Association/American Society of Animal Science (ADSA/ASAS), Symposium in Minneapolis, USA.*

Coleman, G.J., "Cattle production: The Effects of Handling on Livestock Productivity and Welfare – ProHand Dairy" - *Proceedings of The Cattle Chapter Australian College of Veterinary Scientists, Science Week, July 2007*

Coleman, G., Hemsworth, P., (February 2006) Keynote Address: "Knowledge, Attitudes and the Impact on Human Behaviour in Livestock Settings" *American Meat Industry (AMI) Foundation, IMAWRC Conference in Kansas City, MO.*

Cronin, G.M., Borg, S.S., Fourdin, S.P., Storey, T.H. and Barnett, J.L. (2007). Consistent site selection for egg laying in cages with a nest box. *Australian Poultry Science Symposium, 19: 37-40.*

Cronin, G.M., Desnoyers, M.A. and Barnett, J.L. (2006). Pre-laying behaviour and nest-box use by hens. Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M.Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, *Cranfield Uni. Press, Bristol; p. 142.*

Edwards, L. E., Hemsworth, P. H. and Coleman, G.J. (2007) "Human contact and fear responses in laying hens." *Proceedings of the Australian Poultry Science Symposium, Vol. 19. p 33-36*

Edwards, L.E., Hemsworth, P.H. and Coleman, G.J. (2007) "Proximity of human contact influences fear of humans in laying hens." *Proceedings of the Australasian Society for the Study of Animal Behaviour 2007, p. 25*

Edwards, L.E., Hemsworth, P.H., Barnett, J.L., and Coleman, G.J., (2006). "Position effects on the fear response of laying hens in commercial conventional cage systems", *Australian Poultry Science Symposium, Volume 18, pp 101_104*

Hemsworth, P.H. (2006) Animal welfare - emerging trends, issues and technologies. *III Annual Congress of Latin American Swine Science (Anais do III Congresso Latino Americano de Suinocultura) Iguacu Falls, Brazil, pp 121-126.*

Hemsworth, P.H. and Arnold, N.A. Mulesing: can the acute stress and pain associated with the procedure be minimised? *Australian Veterinary Association Conference 2006, Hobart.*

Hemsworth, P.H. and Arnold, N.A. Animal welfare and how it relates to cattle. *Australian Veterinary Association Conference 2006, Hobart.*

Hemsworth, P.H., Stevens, B.H., Morrison, R., Karlen, G.M., Strom, A.D. and Gonyou, H.W. (2006). Behaviour and stress physiology of gestating sows in a combination of stall and group housing. Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M.Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, *Cranfield Uni. Press, Bristol; p. 111.*

Jongman, E.C., Dybkjær, L. and Holst, S. (2006). Aversion of finisher pigs to CO₂ and other gasses. Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M.Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, *Cranfield Uni. Press, Bristol*; p. 63.

Karlen, G.M., Hemsworth, P.H., Strom, A.D. and Gonyou, H.W. (2006). Aggression, stress and immune responses of gestating sows in stalls and in large groups on deep litter. Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M.Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, *Cranfield Uni. Press, Bristol*; p. 110.

Laine, S., Arnold, N.A. and Hemsworth, P.H. (2007). Choice behaviour of laying hens: Effects of deprivation of feed and dustbath substrate. *Australian Poultry Science Symposium*, 19: 28-31.

Lauber, M.C.Y., Hemsworth, P.H. and Barnett, J.L. (2006). Behavioural responses to novel and startling stimuli in dairy calves. Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M.Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, *Cranfield Uni. Press, Bristol*; p. 106.

Ley, J. and Bennett, P.C. (accepted). Understanding differences in canine temperaments. Australian Veterinary Association National Conference, Melbourne 2007. Accepted November 2006

Marston, L. C. (2007). (accepted). Cat Populations and what do they mean to overpopulation. *National Summit to End Pet Overpopulation. Gold Coast, Australia*. October 1-2, 2007.

Marston, L. and Bennett, P.C. (2007). Dogs and cats are not equal when it comes to welfare shelter statistics. *Animals and Society II: Considering Animals, Hobart, Australia*. 3-6 July, 2007

Marston, L. C. and Bennett, P. C. (2007). (accepted). Do dogs and Reminiscence improve the efficacy of volunteer visitation programs for institutionalized persons with aged dementia?. *11th International Conference on Human-Animal Interactions. Tokyo, Japan*. Accepted April, 2007

Marston, L. C., Bennett, P. C., and Toukhsati, S. R. (2007). (accepted). An investigation of Australian shelter cat admissions. *11th International Conference on Human-Animal Interactions. Tokyo, Japan*. Accepted April, 2007

Marston, L. C. (2006a). Ensuring a sustainable pet population: Our challenge for the future. *In Proceeding of the Inaugural National Summit to End Pet Overpopulation* (pp. 77-83). Gold Coast, Australia: National Desexing Network 15-17 June, 2006.

Marston, L. C. (2006b). Environmental Enrichment for Shelters. *In the Proceedings of the First Regional Environmental Enrichment Conference*. Melbourne Zoo, Victoria, Australia. 1-2 November 2006.

Mornement, K.M., Bennett, P.C., Coleman, G.J., and Toukhsati, S.R. (accepted). Issues surrounding the assessment of shelter dogs for adoption suitability. *Animals and Society II: Considering Animals, Hobart, Australia*. 3-6 July, 2007

Payne, H. and Cronin, G.M. (2006). Evaluation of Werribee Farrowing Pens in a low-cost shelter. *Proc. Uptake 2006, Canberra, 21-22 August 2006; Australian Pork Limited, p. 20.*

Roberts, N., Laborie, J., Kerr, C.A., Hinch, G.N., Matthews, L.R., Barnett, J.L., Hemsworth, P.H. and Fisher, A.D. (2006). Absence of variation between sheep in motivation to feed. *Proc. 40th International Congress of the ISAE, Bristol, August 8th to 12th, 2006. Editors M. Mendl, J.W.S. Bradshaw, O.H.P. Burman, A. Butterworth, M.J. Harris, S.D.E. Held, S.M. Jones, K.E. Littlin, D.C.J. Main, C.J. Nicol, R.M.A. Parker, E.S. Paul, G. Richards, C.M. Sherwin, P.T.E. Statham, M.J. Toscano and P.D. Warriss, Cranfield Uni. Press, Bristol; p. 38.*

Rohlf, V.I., Bennett, P.C., Coleman, G.J., and Toukhsati, S.R. (accepted). Obesity in dogs: Just more to love or a modern welfare concern? *Animals and Society II: Considering Animals, Hobart, Australia. 3-6 July, 2007*

Waiblinger, S., Mülleler, C., Menke, C. and Coleman, G., (5-6 October 2006). „How do farmers' attitudes impact on animal welfare? The relationship of attitudes to housing design and management on dairy cow farms In: The Importance of Attitudes, Values and Economy to the Welfare and Conservation of Animals,” *Proceedings of the 15^h Annual Conference of the International Society for Anthrozoology, Barcelona, Spain, 28.*

4. Research Reports

Arnold, A. and Hemsworth, P.H. (2007). The effects of a modified tail docking technique on lamb behaviour and physiology. *Final report to Australian Wool Innovation. (Feb.)*

Barnett, J.L. and Edge, M.K. (2007). Welfare QA for the processing and transport (road and rail) sectors of the livestock industries. *Final report to Naturally Victorian Initiative, Project No. 07311(May)*

Barnett, J.L. and Hemsworth, P.H. (2007). Welfare methodology – aligning the functional and preference approaches to welfare assessment. *Final report to Our Rural Landscape, Project No. 05197.*

Bennett, P. C. and Marston, L. C. (2007). The compulsory desexing of companion animals. A review of the issues. *A report to the Bureau of Animal Welfare, DPI, Victoria.*

Bennett, P.C., Mornement, K., Toukhsati, S., and Coleman, G.J. (2006). Caring for Australian alpacas. *A report to the Australian Alpaca Association.*

Marston, L. C., Bennett, P. C., and Toukhsati, S. R. (2006). Cat admissions to Melbourne shelters. *A report to the Bureau of Animal Welfare, DPI, Victoria.*

Marston, L. C. and Bennett, P. C. (2007). Volunteer visitation programs for institutionalized persons with aged dementia: are benefits increased by the inclusion of companion dogs and reminiscence techniques? *A Report to the Vincent Fairfax Family Foundation.*

Hemsworth, P.H., Arnold, A. Barnett, J.L, Cronin, G.M, Karlen, G.M. and Fisher, A.D. (2007). Welfare Implications of alternative mulesing procedures. *Final Report to Australian Wool Innovation. Project No. EC872 (May).*

Hemsworth, P.H., Arnold, A. Barnett, J.L, Cronin, G.M, Karlen, G.M. and Fisher, A.D. (2007). Re-run of phase II welfare trial. *Final Report to Australian Wool Innovation. Project No. WP153 (Jun.)*

5. Theses

Lauber, M.C. (2006). Behavioural development in dairy calves: Factors affecting learning and behavioural responses to novel and startling stimuli. *PhD Thesis, University of Melbourne.*

Botheras, N.A., 2006. The behaviour and welfare of grazing dairy cows (*Bos Taurus*): Effects of time away from pasture and position in the milking order. *PhD Thesis, University of Melbourne.*

ANIMAL WELFARE SCIENCE CENTRE SEMINARS

July 2006

Animal welfare in the extensive sheep industries

Speakers:

- Dr. Andrew Thompson - "Lifetime Wool Project"
- Dr. Adele Arnold - "Mulesing"
- Dr. Angus Campbell - "McKinnon Project"

August 2006

International developments in animal welfare

Speakers:

- Dr. Jim Kinder - "Animal Welfare Developments - research and extension at Ohio State University"
- Dr. Peter Bailey - "Animal Health and Welfare Developments Overseas: Recent USA/UK tour"

September 2006

Dairy cattle welfare

Speakers:

- Dr. Mariko Lauber - "Behavioural development in dairy calves"
- Dr. Naomi Botheras - "Time Budgets for Dairy Cattle - welfare impacts"

October 2006

Sheep welfare in Australia

Speakers:

- Dr. Angus Campbell - "Quantified estimates of risk factors for post-weaning mortality in merinos"
- Dr. Ralph Behrendt - "Lifetime wool project"

November 2006

Animal welfare monitoring systems and audits

Speaker:

- Prof. Linda Keeling - "Animal welfare monitoring systems and audits"

Centre pig science seminar

Speakers:

- Bronwyn Stevens - "The welfare of gestating sows in conventional stalls and in large groups on deep litter"
- Marcus Karlen - "Injuries in breeding sows"
- Dr Steve Tate - "National Pig Code - current situation"

Centre cattle science seminar

Speakers:

- Dr. Andrew Fisher - "Road transport of cattle - effects of journey duration and loading practices"
- Prof. Clive Phillips - "The perceptual world of cattle"

February 2007

Foetal awareness

Speaker:

- Prof. David Mellor - "Birth and hatching: key events in the onset of awareness in the lamb and chick"

March 2007

Personality

Speakers:

- Dr. Bob Kilgour - "Towards an understanding of animal personality"
- Dr. Jacqui Ley - "Measuring Personality in dogs"

May 2007

Centre West Australian pig science seminar

Speakers:

- Bronwyn Stevens - "The welfare of gestating sows in conventional stalls and in large groups on deep litter"
- Prof. Paul Hemsworth - "Measuring the welfare of pigs"
- Mr. Jeremy Skuse - "Introduction to The Animal Welfare Science Centre"

June 2007

Preference testing

Speaker:

- Ken Smith, Ohio State University - "Preference testing and the Y-maze"

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"

Copies of the Animal Welfare Science Centre Annual Report 2006 – 2007 are available on request from:

Executive Officer
Animal Welfare Science Centre
The University of Melbourne
Victoria 3010

An electronic version is available from:
www.animalwelfare.net.au

For more information phone 03 8344 8933



Animal Welfare Science Centre
Annual Report 2006 - 2007