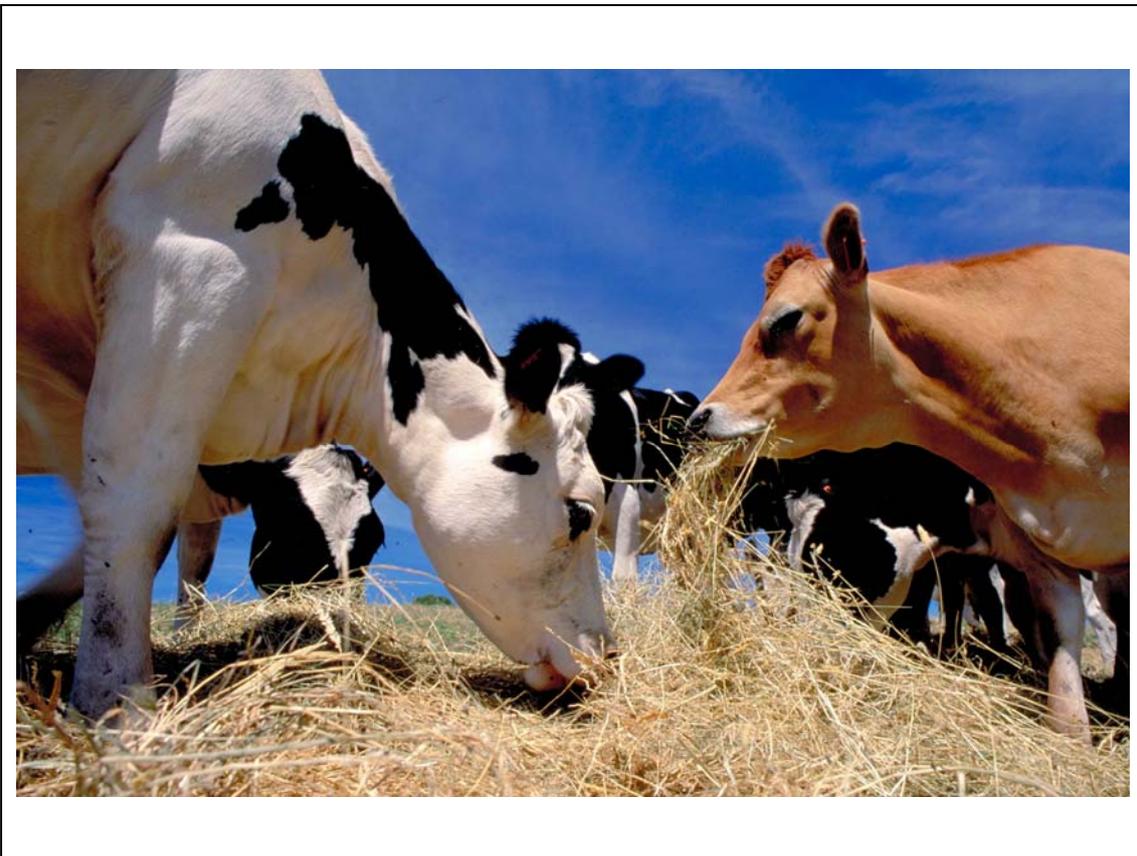# AWSC Research & Development Report

2005 &2006

The Animal Welfare Science Centre is a joint Centre of the University of Melbourne, Monash University and the Department of Primary Industries Victoria.

The Centre conducts animal welfare research and development within three major program areas:

1) Welfare methodology,
2) Environmental and human contributions to animal welfare,
3) Attitudes to animals and animal welfare, and farmer, consumer and community behaviour

All of the above programs contribute to another key area of Centre activity, tertiary and postgraduate education and training.

Background on the Animal Welfare Science Centre

Background

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 has recently entered its second 5-year term under an agreement supported by the partner organisations. As part of developing this new 5-year agreement, a review of the Advisory Committee and Board membership and a revision to the agreed Terms of Reference for each committee was conducted. The Advisory Committee as part of its new Terms of Reference have guided the development and direction of this planning process.

The Centre has considerable research and teaching capacity in animal welfare science and has made a number of national and international achievements in research, teaching and training. With the new agreement, the confirmation of the partner organisations' support and several collaborative opportunities with national and international institutions, the Centre can confidently continue to address the partner organisations' needs, to attract funding and undertake new RD&E projects and to expand its contribution to animal welfare science.

Thus the Centre intends to continue providing collaborative support and focus for each of the partner organisations' academic and research resources in animal welfare. The specific aims of the Centre continue as follows:

- To coordinate the research interests of the collaborating organisations to stimulate basic and applied research on the welfare of domestic animals, farm and companion animals.

- To provide undergraduate and graduate teaching and training in the academic programs of the Universities.

- To provide the farming community and the general community with an internationally competitive research, teaching and training resource in animal welfare.

- To play a major national and international role in the advances and understanding of the welfare of farm and other animals.

In summary the Centre will:
- Utilise the RD&E plan to establish priorities and develop, undertake and deliver a level and intensity of activity that is consistent with the objectives, core expertise and resources of the Centre.
- Aim to substantially raise its profile, strengthen its collaborations and develop new collaborations.
- Work towards creating an environment that fosters, recognises and values staff participation and the generation, sharing and utilisation of ideas and concepts.
- Ensure that the relevant expertise and experience of members of the Centre are utilised in developing large and well-planned new projects to their potential.

- Continue to foster highly skilled and well-managed teams that are recognised nationally and internationally for their leadership in animal welfare science.

Centre Mission

The Animal Welfare Science Centre will sustain and grow Australia's animal industries through (1) strategic animal welfare research and student training to resolve major animal welfare issues and 2) targeted industry and public 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.

Centre Outcomes

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.

Centre Outputs

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.

Animal Welfare Science Centre Research Programs
1. Welfare methodology 2. Environmental contributions to animal welfare 3. Attitudes to animals and animal welfare, and farmer, consumer and community behaviour 4. Tertiary and post-graduate education and training.

PROGRAM 1.
WELFARE METHODOLOGY

Animal welfare assessment is a controversial topic within science, but the two most common and probably most credible welfare concepts in science promulgate the following two approaches to welfare assessment: (1) an integrated approach 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, and (2) the use of animal preference or choice testing on the basis that the animal will choose in the best interests of its welfare. A key objective in this program will be to understand the relationship between fundamental biological requirements and preferences of animals in order to integrate these two approaches into a single animal welfare model that incorporates these two concepts of animal welfare.

Thus the major part of this program will be to compare the two main approaches to welfare assessment: "normal biological functioning" and "animal preference" approaches. Stress models incorporating key commercially-relevant challenges for animals (nutritional, social and spatial restriction, and environmental complexity) will be used to determine the animal's fundamental biological requirements (as assessed by its behavioural, physiological and fitness responses) and the animal's preference (ie. preference may reflect what is important to the animal) for these resources and the comparative findings will be used to examine the complementary nature of these two approaches.

There is evidence in some species but not others that chronic stress generally sensitises the hypothalamo-pituitary adrenal (HPA) axis to the extent that concurrent or subsequent acute stress produces a greater response than normal in the HPA axis. There is limited evidence that chronic lack of stimulation or chronic over-stimulation may also lead to reduced behavioural responsiveness to concurrent or subsequent acute stress. While behavioural responsiveness may be affected by the nature of the chronic stressor, physiological responsiveness appears to be less stimulus-specific. Nevertheless, an understanding of the effects of previous acute and chronic stress on behavioural and physiological responsiveness of animals to subsequent stimulation (such as exposure to a novel or startling stimulus) may assist in understanding and assessing the magnitude of previous stress. Thus research on the behavioural and physiological reactivity of animals under stress will be undertaken because of the potential to use such knowledge to develop additional tools to study stress and welfare.

This proposed program of research will encompass the traditional fields of animal behaviour and physiology in furthering our understanding of both fundamental animal requirements and preferences, and stress-induced perturbations within the normal biological functioning-based concept of animal welfare. With a broad consensus on an animal welfare model, welfare

measures can be utilised in both research and the field to provide scientifically-valid and defensible standards for livestock and other animal industries. Furthermore, knowledge of animals under stress can be utilised to develop additional tools to study and monitor animal welfare in both research and in the field.

PROGRAM 2.
ENVIRONMENTAL CONTRIBUTIONS TO ANIMAL WELFARE

Confinement housing of farm animals, even for short periods as may occur during transport and lairage, is a controversial issue for some sections of the general community. 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 also 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.

The research in Program 2 will utilise the results from Program 1 and address the most contentious welfare issues both across and within industries. One highly contentious issue is the confinement housing of animals and thus research will be undertaken to study current and new housing systems for pigs, poultry and companion animals. The focus will be on 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. In addition to this basic research on welfare requirements, some very specific applied issues will also be tackled. Some examples of the types of specific issues include; effects of farrowing crate dimensions for sows, developing farrowing pens for use in commercial environments, reducing aggression following mixing of sows in conventional and alternative housing systems, effects of strain, group size and space allowance on the welfare of laying hens in conventional cages, effects of group size and space in alternative housing systems (eg. barns and furnished cages) on the welfare of laying hens, effects of nest boxes on hen welfare and effects of confinement on cats and dogs.

Due to the scale and often extensive nature of Australia's animal industries, Australian practices and environments are of necessity different to that of many other trading blocs. Given that animal management practices are likely to come under increasing scrutiny, it will be necessary for Australia to demonstrate that its welfare standards for common management practices that need to be performed under Australian farming conditions are validated and scientifically-defensible.

The most serious risks to animal welfare are generally those situations involving long-term exposure or frequent exposure to a stressor that results in the animal experiencing a chronic or long-term disturbance to its homeostasis. Nevertheless, there is also the obligation 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. The magnitude of these acute biological responses to such

procedures can be used to assess the intensity of the stressor. Thus, contentious husbandry procedures will be studied from the perspective of assessing the magnitude of the acute stress and pain associated with the procedure and the opportunity to eliminate or minimise these responses.

Studies in Program 2 will provide knowledge on basic welfare requirements of domestic animals which can be utilised in the design of housing systems, transport and lairage facilities and management strategies for extensively-housed animals.

PROGRAM 3.
ATTITUDES TO ANIMALS AND ANIMAL WELFARE, AND FARMER, CONSUMER AND COMMUNITY BEHAVIOUR

Human behaviour significantly impacts on domestic 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 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.

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. There has been little research on the relationship between human attitudes and behaviour in companion animals although there is some evidence of attitudinal effects on animal welfare.

Through fundamental and applied research, Program 3 will examine the impact of human-animal interactions in farm and companion animals, as well as public and consumer attitudes to animal welfare. The former research will provide a basis for targeted education and training of animal handlers/carers, while the latter research will provide the basis for public and consumer attitudes to be appropriately targeted by Governments and industry to assure local and international consumers, the public and other governments that the welfare standards for domestic animals in Australia are underpinned by sound science. For example, educating children and the community about animal welfare and issues associated with farming and other forms of animal use in society is an important component to an on-going well-informed debate about these issues. Failure to assure these stakeholders that the welfare standards for Australian domestic animals are underpinned by sound science will not only affect public

confidence and risk the adoption of new technology in the animal industries, but has the potential to adversely influence the profitability and viability of these industries.

PROGRAM 4.
TERTIARY AND POST-GRADUATE EDUCATION AND TRAINING

It is important that students entering the animal industries are able to provide sound, science-based advice on animal welfare practices to industry, interest groups and the public, and to be proactive in dealing with public sentiment. Teaching and training in animal welfare will be delivered in the Centre via a range of subjects and courses. The subjects 'Animals in Society' and 'Animal Welfare' will continue to be offered to undergraduate and postgraduate students in the Faculty of Land and Food Resources at University of Melbourne and the subject "Applied Animal Behaviour" will be offered from 2005. The opportunity to offer these animal welfare subjects more broadly at both universities will be considered. The "Graduate Certificate in Animal Welfare" will continue to be offered at Monash University and consideration will be given to offering a Graduate Diploma in this area.

The Centre will continue to provide high quality postgraduate and postdoctoral training for the next generation of researchers and teachers in animal welfare science.

The Centre will continue to support the development and delivery of animal welfare modules that can be incorporated into existing core subjects in Animal Science and Veterinary Science at the Ohio State University and elsewhere. The opportunity to develop animal welfare modules for specialist groups such as practising veterinarians and stockpeople in specific livestock industries will be considered.

Summary Projects

2005-06

Summary of Projects

Program 1: WELFARE METHODOLOGY

Project Title
Welfare methodology – aligning the functional and preference approaches to welfare assessment (pigs and sheep)
Welfare methodology – aligning the functional and preference approaches to welfare assessment (laying hens)
Behavioural development in dairy calves: factors affecting learning and behavioural responses to novel and startling stimuli.
Motion tracking of sows in stalls
Characterising and assessing canine personality
The effect of morphology on communication in the dog

Program 2: ENVIRONMENTAL FACTORS AFFECTING ANIMAL WELFARE

Project Title
Alternative group-housed deep-litter housing systems for breeding pigs
Studies of Cow Behaviour and the Design of Milking Sheds
The welfare of hens in furnished cages
The importance of nests for the welfare of laying hens
The welfare of mulsed sheep
Evaluation of a suture clipping alternative to surgical mulesing in sheep
Cat welfare in confinement
Electromobilisation of sheep
Manipulating body weight to reduce cannibalism
The behaviour of grazing dairy cows: effects of time away from pasture and position in the milking order
Practical farrowing pens
Stocking density of sheep in lairage
An investigation of human factors associated with obesity
Understanding how people categorise and react to pure-bred dogs
Assessment and rehabilitation of shelter dogs
Investigation of the relationships between handling-stress and productivity and welfare in alpacas
The effect of space allowance and exercise for greyhounds on welfare

Program 3: ATTITUDES TO ANIMALS AND ANIMAL WELFARE, AND FARMER, CONSUMER AND COMMUNITY BEHAVIOUR

Project Title
Human-animal relationships in the laying hen: Proof of concept and the later development of an industry training package to change attitudes and behaviour of stockpeople to improve welfare.
Developing the training program CowCare (targets stockperson attitudes and behaviours) to release to the dairy industry
Validation of selection of stockpeople
Multimedia handling training program for pig transporters
The effect of pet bonding on children's moral development
Stress-related factors in animal shelter workers and veterinary staff.
Factors affecting successful adoption of shelter dogs
Factors affecting outcomes for cats admitted to welfare shelters.
Human factors associated with successful dog ownership
Perception of dog breeds in the community
Owner attitudes associated with problem behaviours in pet cats
The effect of consumer attitudes and behaviour on the d meat industries
Education in agriculture : Livestock farming, food production and food choices in pre-adolescents
Dog and Cat Welfare Code
Farm animal welfare in Ohio: assessing public concern and implications for the food animal industry
Satisfaction and engagement with dog training
Evaluation of pet visitation programs for institutionalised persons with aged dementia
Family functioning and retention of pet dogs
Human-dog relationships as substitutes for adult-child relationships
Welfare Audit Implementation in the poultry industry
Pre-slaughter Animal Welfare Standards
Animal Welfare Standards for the livestock transport industry
The Effects of consumer attitudes and behaviour on the red meat and livestock industries

Program 4. TERTIARY AND POST-GRADUATE EDUCATION AND TRAINING

Project Title
Subject "Animal Welfare", "Animals in Society" and "Applied Animal Behaviour" to The University of Melbourne undergrad students
Graduate Certificate in Animal Welfare at Monash University
Animal Welfare modules in Animal Science and Veterinary Science at Ohio State University
'Animals in Society' Minor at OSU

Project Summaries
2005-06

Project Summaries – PROGRAM 1

Project 1.

Project title:	Welfare methodology – aligning the functional and preference approaches to welfare assessment	
Chief investigator:	Paul Hemsworth	
Investigator(s)	John Barnett, Marcus Karlen, Andrew Fisher	
Lead organisation:	Department of Primary Industries	
Collaborating organisation(s):		
1. University of Melbourne		
2. CSIRO Livestock Industries		
Funding source(s)	ORL (DPI)	
Date completed or date likely to be completed		June 2007 (pigs) June 2009 (poultry)
Summary (including aims and objectives)		

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 (eg. 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.

Outcomes:
Determine the complementarity of the two approaches to welfare assessment that have the most scientific integrity

Highlights:

- This report focuses on the DPI part of the project. Resources compared to date in pigs are feed vs bedding, social contact vs. bedding and feed vs. social contact. The results indicate that Y-maze methodology appears sound in terms of measuring animal preferences for the resources tested and is suitable to use in a comparison of approaches to welfare assessment.
- This project was used to lever funds for a similar project on laying hens, funded by DPI and the Australian Poultry CRC.
- 2 PhD students have been appointed. They are both working across species (pigs and poultry) on different aspects of the hypothalamic-pituitary-adrenal axis.

Project 2.

Project title:	Behavioural development in dairy calves: factors affecting learning and behavioural responses to novel and startling stimuli.
Chief investigator:	Paul Hemsworth
Investigator(s)	Mariko Lauber (PhD student), John Barnett
Lead organisation:	University of Melbourne
Collaborating organisation(s):	
1. Department of Primary Industries	
Funding source(s)	CRC for Innovative Dairy Products
Date completed or date likely to be completed	January 2006
Summary (including aims and objectives)	

The public often perceives new reproductive technologies, such as embryo transfer, *in vitro* production (IVP), transgenesis and cloning, as having major implications for the welfare of animals. Understanding the effects of these technologies on behavioural development will assist in appreciating their effects on the welfare of domestic animals. For instance, factors that affect behavioural development may affect the ability of domestic animals to adapt to commercial conditions, ie affect their fitness, and thus have implications for their productivity and welfare. This PhD program assessed the impact of a range of population demographics and common reproductive practices on the behavioural development of dairy calves. In particular, behaviours considered to be essential to survival of cattle were investigated, specifically, exploratory behaviour, learning, and fear responses.

Outcomes:

The major aims of this project were to develop methodologies to study behavioural development in dairy calves and to use this methodology to examine the effects of several demographic variables and common reproductive practices on behavioural development. Such information can be used to appreciate the effects of these factors on the welfare of dairy calves.

Highlights:

The analyses indicate that:

- population demographics, such as, gender, parity of dam and sire, and common reproductive manipulations, such as removal of the calf from dam within 24 hours of birth and late pregnancy induction, did not affect exploratory behaviours, learning and fear responses and, as such, they may not influence behavioural development.
- however developmental changes with age, per se, in exploratory behaviours, learning and fear responses were found and thus single-point-in-time measurements for the assessment of the impact of emerging reproductive technologies may not be sufficient to detect developmental abnormalities in behaviour;
- specific factors relating to startle responses, exploration, learning and responses to a novel object are indicative of the need for a battery of behavioural tests to fully assess development change in the range of emotional, exploratory and learning responses deemed essential to survival.

Project 3.

Project title:	Possible effect of morphological change on the social behaviour of domestic dogs.
Chief investigator:	Paul Hemsworth
Investigator(s)	Keven Kerswell (PhD student), Pauleen Bennett
Lead organisation:	University of Melbourne
Collaborating organisation(s):	
1. Monash University	
Funding source(s)	Petcare Information Services
Date completed or date likely to be completed	January 2006
Summary (including aims and objectives)	

Signaling is important in nature. Social species such as the wolf (*Canis lupus*) have evolved a complex array of signals to regulate the close interactions of group living without the adverse side effects of overt fighting and group disharmony, which are disadvantageous to the survival of the group members. Signals, such as the raising of hackles, drawing of the ears forwards or backwards, changes in overall postures and various vocalisations (for a detailed description of these signals, have developed to mediate social interactions.

However, what happens if after a communication system is formed and the signals are understood, the members of the population change their morphology relatively quickly? This is the possible position of the domestic dog (*Canis familiaris*).

The research performed for this thesis is investigating whether dog breeds with different morphologies use modified forms of communication associated with their morphology.

Outcomes:

Although wolves have evolved species-specific communication systems, some of which involve visual signals that utilise morphological features such as ears and tails, selective breeding of dogs may have lead to a variety of morphologies that hinder communication. A failure of communication may result in misunderstanding between dogs or between dogs and humans and in turn lead to a range of problems such as aggression and training difficulties. This project will examine the development of investigative social behaviour in dogs and how it may be affected by breed and morphology.

Highlights:

- The findings of a study of the behaviour of littermates in 40 litters from 32 breeds suggest that as the ability to use signals is lost, with the loss of signalling structures, licking is used to compensate for the loss in information transferred, at least in the early puppy life stage.
- The results of studies on juvenile and adult dogs are being analysed to examine the effects of morphological changes on dog social behaviour.
- The results of a survey suggest that most dog owners believe they are average or above in their ability to understand their dogs' behaviour, when their knowledge would not reflect this ability. This is likely to be a major problem for owners managing the behaviour of their dogs. In particular, more education regarding the visual signals that dogs show is needed, as owners seem not to be attending to these signals, or at least do not report attending to them.

Project Summaries – PROGRAM 2

Project 4.

Project title:	The behaviour of grazing dairy cows: effects of time away from pasture and position in the milking order
Chief investigator:	Paul Hemsworth
Investigator(s)	Naomi Botheras (PhD student), Sarah Chaplin, Jeff Rushen, John Barnett
Lead organisation:	Department of Primary Industries
Collaborating organisation(s):	
1. University of Melbourne	
2. Agriculture Canada	
Funding source(s)	DPI ESAI funding
Date completed or date likely to be completed	December 2005
Summary (including aims and objectives)	

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 present series of studies 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.

Outcomes:

To provide objective data on the effects of time off pasture and milking order position on the behaviour and welfare of grazing dairy cows. This information can be utilised by industry in developing strategies to deal with situations in which feeding and lying behaviour is influenced by new management practices.

Highlights:

- 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.

Project 5.

Project title:	Alternative group-housed deep-litter housing systems for breeding pigs
Chief investigator:	Paul Hemsworth
Investigator(s)	Marcus Karlen (Masters), Bronwyn Stevens, Harold Gonyou, John Barnett, David Strom, Rob Smits, Rebecca Morrison.
Lead organisation:	Department of Primary Industries
Collaborating organisation(s):	
1. University of Melbourne	
2. QAF	
3. CSIRO	
4. Praire Swine Centre, Canada	

Funding source(s)	Australian Pork Limited
Date completed or date likely to be completed	December 2005

Summary (including aims and objectives)

Confinement of breeding sows and gilts is a controversial welfare issue in livestock production and there is worldwide interest in finding alternative housing systems for gestating sows and gilts. There is little information in the scientific literature on the welfare of gestating sows in groups of more than 40 animals and there is no scientific literature on housing breeding sows or gilts in large groups on deep litter. With the controversy surrounding confinement of livestock and the development of housing growing pigs in large groups on litter, there is increasing interest by the Australian (and overseas) pork industry in housing pregnant gilts and sows during pregnancy in large groups on deep litter.

The research project examined the welfare of gestating sows housed in either stalls or large groups in a deep litter system with external feeding stalls ("Ecoshed"). The approach to assess animal welfare risks in this project utilised an integrated approach measuring behavioural, physiological, health and fitness responses to assess biological functioning on the basis that difficult or inadequate adaptation generates welfare problems for animals.

Outcomes:

The objective of this research project was to examine the welfare of gestating sows housed in large groups in a deep litter system with external feeding stalls ("Ecoshed" system). Such advice is important for industry, Government and other interest groups in developing welfare policy and standards on sow housing.

Highlights:

- While many may consider group housing to have welfare advantages over individual housing systems, both stall and group housing during gestation have advantages and disadvantages for the sow.
- It is concluded from the results of this project that while challenges to adapt to treatment early in gestation may have been greater in sows in the Ecosheds than in Stalls, there is some evidence that the sows in the Stall treatment may have had greater challenges adapting late in gestation.
- However, the practice of housing sows in stalls immediately after mating and delaying mixing in large groups until pregnancy is confirmed, by reducing aggression at mixing, may provide some distinct welfare advantages over housing sows either in stalls or in large groups for the entire gestation.

Project 6.

Project title:	Studies of Cow Behaviour and the Design of Milking Sheds	
Chief investigator:	Paul Hemsworth	
Investigator(s)	Adele Arnold (PhD student), Kim Ng, Ellen Jongman	
Lead organisation:	Department of Primary Industries	
Collaborating organisation(s):		
1. University of Melbourne		
2. Monash University		
Funding source(s)	Dairy Australia	
Date completed or date likely to be completed		January 2005
Summary (including aims and objectives)		

The subject of dairy shed design is clearly an important one for dairy farmers. Features of a milking shed can cause a number of problems for both cows and farmers, most of which are interrelated. For example, cows resisting entry to the milking shed increase milking time, increase the amount of handling and effort required during milking and thus decrease the ease of operation for the operator. If cows are stressed by milking or the milking environment, their productivity and milk quality can also be adversely affected. Few rigorous studies examining the behavioural response of cows to stimuli that are common in milking sheds have been conducted anywhere in the world. Rigorous advice on shed design has been previously identified as an important need for Australian dairy farmers.

Outcomes:

The major aim of this project was to understand how specific physical features of milking sheds affect the willingness of cows to repeatedly approach the feature as would be required in a commercial milking shed. Such advice is important for industry in designing new milking sheds or modifiying existing sheds to minimise cow stress and improve ease of operation for farmers.

Highlights:

- Exposure to the milking pit and the close-fronted bail are moderately aversive to the naive heifer and that familiarisation over several introductions 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.
- 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 be reduced. Failure to reduce noise will produce persistent avoidance responses in heifers and cows 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 predicability 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.

Project 7.

Project title:	Possible effect of morphological change on the social behaviour of domestic dogs.
Chief investigator:	Paul Hemsworth
Investigator(s)	Keven Kerswell (PhD student), Pauleen Bennett
Lead organisation:	University of Melbourne
Collaborating organisation(s):	
1. Monash University	
Funding source(s)	Petcare Information Services
Date completed or date likely to be completed	January 2006
Summary (including aims and objectives)	

Signaling is important in nature. Social species such as the wolf (*Canis lupus*) have evolved a complex array of signals to regulate the close interactions of group living without the adverse side effects of overt fighting and group disharmony, which are disadvantageous to the survival of the group members. Signals, such as the raising of hackles, drawing of the ears forwards or backwards, changes in overall postures and various vocalisations (for a detailed description of these signals, have developed to mediate social interactions.

However, what happens if after a communication system is formed and the signals are understood, the members of the population change their morphology relatively quickly? This is the possible position of the domestic dog (*Canis familiaris*).

The research performed for this thesis is investigating whether dog breeds with different morphologies use modified forms of communication associated with their morphology.

Outcomes:

Although wolves have evolved species-specific communication systems, some of which involve visual signals that utilise morphological features such as ears and tails, selective breeding of dogs may have lead to a variety of morphologies that hinder communication. A failure of communication may result in misunderstanding between dogs or between dogs and humans and in turn lead to a range of problems such as aggression and training difficulties. This project will examine the development of investigative social behaviour in dogs and how it may be affected by breed and morphology.

Highlights:

- The findings of a study of the behaviour of littermates in 40 litters from 32 breeds suggest that as the ability to use signals is lost, with the loss of signalling structures, licking is used to compensate for the loss in information transferred, at least in the early puppy life stage.
- The results of studies on juvenile and adult dogs are being analysed to examine the effects of morphological changes on dog social behaviour.
- The results of a survey suggest that most dog owners believe they are average or above in their ability to understand their dogs' behaviour, when their knowledge would not reflect this ability. This is likely to be a major problem for owners managing the behaviour of their dogs. In particular, more education regarding the visual signals that dogs show is needed, as owners seem not to be attending to these signals, or at least do not report attending to them.

Project 8.

Project title:	Investigation of the relationships between handling-stress and productivity and welfare in Alpacas.
Chief investigator:	Dr. Pauleen Bennett
Investigator(s)	Prof. Grahame Coleman, Dr. Jillian Broadbear, Dr. Samia Toukhsati
Lead organisation:	Monash University
Collaborating organisation(s):	
1. Australian Alpaca Association	
Funding*	Project proposal currently being developed for consideration by Australian Alpaca Association and other funding sources
Summary (including aims and objectives)	

Summary (including aims and objectives)

The alpaca industry in Australia is growing rapidly, with the Australian herd of over 50,000 animals now being second in size only to that existing in the countries of origin of this species. Alpacas are relatively disease free, environmentally friendly, and efficient feed converters who appear to be well suited to Australian conditions. Because of Australia's existing agricultural knowledge and infrastructure, this country is well placed to become a leading producer of alpaca products. This is significant because alpaca fibre is recognised throughout the world as a luxury item, with demand traditionally exceeding supply and high prices being offered for good quality product.

Because of the economic and political climate in many South American countries, very little basic research into all aspects of alpaca breeding and husbandry has been reported. Research in more developed nations has only recently begun, with an understandable early emphasis on reproduction, nutrition and health issues. A recurring theme in the growing literature is that alpacas appear to suffer from a variety of stress related conditions. This affects not only their welfare but also their productivity, measured in terms of fleece production and reproductive success. It is not known whether, or to what extent, these animals are affected by stress associated with human handling. This may represent a significant issue due to the fact that alpacas are currently handled more frequently than most extensively farmed animals. Individual matings are usually conducted under close human supervision and shearing is carried out on an annual basis. Because alpacas have a gestation period of approximately eleven months and are usually re-mated within 2-3 weeks of parturition, potentially stressful husbandry procedures often occur when animals are newly mated or close to giving birth. In addition, because alpacas have been effectively marketed to small land owners and hobby farmers, the level of expertise in handlers is often poor. Monitoring is also reduced relative to industry-based enterprises.

The aim in this project is to ascertain whether standard husbandry procedures activate a stress response in alpacas. If so, we plan to quantify this response and investigate whether it is associated with the behaviour of stockpersons and can be ameliorated by appropriate stockperson training or procedural improvements. A combination of behavioural, immunological, reproductive and physiological measures will be used to assess stress.

Outcomes:
At the completion of the project, we will be able to provide information to the Australian Alpaca Association and its members about handling stress in alpacas and about ways to ameliorate this stress. This will have significant long term consequences for alpaca welfare, and also for the future of the Australian Alpaca Industry.

Project 9.

Project title:	The effects of space allowance and exercise for greyhounds on welfare
Chief investigator:	E.C. Jongman, P.H. Hemsworth
Investigator(s)	Adele Arnold, Greg Cronin, John Barnett, Marcus Karlen
Lead organisation:	Department of Primary Industries
Collaborating organisation(s):	

Funding source(s)	DPI	
Date completed or date likely to be completed		December 2005

Summary (including aims and objectives)

The minimum spatial need of an animal is the amount of room required to accommodate its physical size and basic movement. In addition, animals have a requirement for physical space to stretch and exercise muscles and personal space to assist in the regulation of social interactions. Within the constraints of the very limited literature, it appears that space may be less important to the dog than social contact.

To address the question of what is an adequate floor space allowance for greyhounds in individual kennels, the effects of space and routine exercise outside the kennel were evaluated since both factors may influence the dog's requirement for space and, in turn, its welfare requirements. This experiment examined the effects of these two factors on the behaviour, stress physiology and injuries of adult greyhounds.

Exercise had no significant effect on behaviour, physiology, injuries and area in which the dog was located. Overall there were no significant effects of kennel size other than more time spent in the front of the large kennels ($P<0.05$). However, there was a significant effect of housing in the last replicate. In the first two replicates dogs of about 18 months of age were used. Due to unavailability of dogs of similar age, the dogs in the last replicate were about 12 months old. There was a tendency ($P<0.1$) for the younger dogs in the large kennel to spend less time at the back, less time lying down and more time walking. Similarly when lying down, younger dogs in the large kennels were located less at the back of the kennel than dogs in the small kennels ($P<0.05$). No abnormal behaviour or stereotypic behaviour (such as excessive licking or pacing) were observed in any of the dogs during the video analysis. No significant differences in saliva cortisol concentrations and maximum cortisol concentrations in response to ACTH were observed as a consequence of housing or exercise, indicating that the welfare of the dogs was similar in all treatments. Nor were there significant differences in incidence of injuries as a consequence of kennel size or exercise.

Although not observed from the video, kennel staff commented on problems of dogs defecating in the large kennels, which create problems for hygiene and management.

From this study it can be concluded that housing adult greyhounds in kennels with a floor area of 3 m^2 does not impose any greater welfare risk then housing in kennels with 10 m^2, regardless of exercise. However, younger dogs are often brought in for initial training and handling for several weeks. Considering the changes observed in behaviour, these dogs may have more problems adapting to a small kennel of 3 m^2, and increasing the size of their kennel or provide more exercise may possibly contribute to their welfare.

Outcomes:
To provide an evaluation of what is an adequate floor space allowance for greyhounds in individual kennels, and an assessment of the effects of space and routine exercise provided for greyhounds and consequent impact on animal welfare.

Highlights:

Project 10

Project title:	The importance of nests for the welfare of laying hens.
Chief investigator:	Greg Cronin
Investigator(s)	John Barnett
Lead organisation:	DPI Victoria
Collaborating organisation(s):	
1.	
2.	
3.	
4.	
Funding source(s)	AECL and DPI Victoria
Date completed or date likely to be completed.	February 2008
Summary (including aims and objectives)	
To examine the implications for hen welfare of location of egg laying (nest box compared to outside the nest box), nest design features (such as solid walls, overhead cover, position, etc), illumination level at oviposition, and their interaction on the responses of hens to environmental stimuli pre-laying.	
Outcomes:	
The experimental work for this project has been in progress for one year. The project is using a unique approach to identifying hens housed in groups (of up to 8 birds) in cages, so that the activity of each bird can be monitored on digital video records. This technique allows us to identify every egg that each hen lays, and provides the information on the time and location where each egg was laid. Each egg can therefore be collected and the egg albumen assayed for corticosterone concentrations, as a reflection of the stress response experienced by each hen during the 6 hours prior to laying. Furthermore, hens are blood sampled at 5-week intervals. The blood samples are assayed for plasma corticosterone concentrations and blood immunology measurements to contribute to the assessment of welfare status of the birds. From the digital video records we are also able to determine the pattern of pre-laying behaviour for each hen.	
Highlights:	
Too early to comment.	

Project Summaries – PROGRAM 3

Project 11.

Project title:	Human-animal relationships in the laying hen: Proof of concept and the later development of an industry training package to change attitudes and behaviour of stockpeople to improve welfare.	
Chief investigator:	Paul Hemsworth	
Investigator(s)	Grahame Coleman, John Barnett	
Lead organisation:	Department of Primary Industries	
Collaborating organisation(s):		
1. University of Melbourne		
2. Monash University		
Funding source(s)	Poultry CRC	
Date completed or date likely to be completed		September 2007
Summary (including aims and objectives)		

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.

Outcomes:

Understanding stockperson behaviour appears to be the key to manipulating these human-animal interactions to improve poultry welfare. Appropriate strategies to train stockpeople in the egg industry are the desired outcome of this research.

Highlights:

Eleven Victorian farms, nine US farms and six NSW farms have been studied to date. A number of experiments are currently being planned to provide both more rigour to the thesis and an understanding of the time involved to develop fear of humans in hens and how long this may take to reverse. This has practical application to the development of a training program.

Project 12.

Project title:	Welfare QA for the processing sector and during transport - Road and Rail transport	
Chief investigator:	John Barnett	
Investigator(s)	Michelle Edge	
Lead organisation:	Department of Primary Industries	
Collaborating organisation(s):		
1. AMIC (Australian Meat Industry Council)		
2. ALTA (Australian Livestock Transporters Association)		
Funding source(s)	NVI (DPI)	
Date completed or date likely to be completed		October 2006
Summary (including aims and objectives)		

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 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 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 R&D opportunities. The conduct of the project and the development of standards and targets involves a close cooperation industry groups with an interest in the livestock processing and transport and with animal welfare groups.

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.

Outcomes:
The key deliverable will be both a booklet and CD-rom versions of welfare standards and associated reference documentation for processing and transport companies, respectively, to incorporate into their QA programs.
Highlights (over page) :

- Processing sector documentation nationally launched at AMIC conference in September 2005.
- There is an underpinning regulatory process for the animal welfare standards for the meat processing industry as they have been incorporated by AQIS into the 'approved arrangement' for livestock processing establishments. This will result in AQIS staff at export plants auditing the welfare standards.
- Both processing and transport sectors have requested underpinning training based on ProHand training packages for each industry sector.
- Linkages developed with other sectors, including feedlot and transport industry.
- Linkages developed with major customers, including McDonalds, Burger King and Yum Brands.
- Documentation built into the AQIS Approved Arrangement for export plants
- AusMeat utilising the documentation for background as required for welfare audits
- Material developed into competencies in animal welfare for processors and training being delivered to processing sector representatives within each State from over 200 plants around the country.

Project 13.

Project title:	The effects of consumer attitudes and behaviour on the red meat and livestock industries
Chief investigator:	Prof. Grahame Coleman
Investigator(s)	Dr Samia Toukhsati, Prof. Paul Hemsworth, Dr John Barnett
Lead organisation:	Monash University
Collaborating organisation(s):	
1. Melbourne University	
2. Department of Primary Industries	
Funding	Meat and Livestock Australia
Summary (including aims and objectives)	

While it appears that welfare issues account for some aspects of buying behaviour, these issues currently do not seem to be the major concern of consumers. A recent survey of Queenslanders' attitudes towards buying meat ranked humane treatment of animals near the middle of a range of issues ranging from taste (most important) to packaging (least important). Further, humane treatment of animals was only marginally ahead of price. Generally, research does not identify the relationship between these attributes and actual purchasing behaviour. A survey of 320 fresh meat consumers in Belgium found that 26% of respondents reported that they had decreased their total meat intake over 1995-97. The order of consumer concerns was quality, taste, freshness, free of hormones and healthiness. "Animal friendly" was not high but did rate as relevant to poultry. "Animal friendly" was a significant predictor of intended decrease in consumption only for poultry. It was concluded that the most important factor to beef consumption was perceived safety while perceived level of fat, taste, quality and price were the important factors to pork consumption.

An interview of 20 consumers in Denmark about their thoughts and practices relating to food and eating, found that negative attitudes towards meat were frequently expressed, and with more emotion, than comments about any other food. Critical attitudes centred around suspicions associated with meat production and processing practices, animal welfare and the perceived unhealthiness of meat. Almost all of the negative comments on livestock welfare were made with reference to pork or poultry. Despite their critical attitudes, respondents reported consuming meat on a daily basis, suggesting that their reported negative attitudes had limited impact on their reported consumer behaviour. Previous studies have suffered from several weaknesses: 1. No distinction between community and consumer behaviours has been made; 2. Community behaviours have not been measured; 3. Direct measures of consumer behaviour have rarely been made

There is virtually no research on the antecedents of community behaviours such as petition signing or public expressions of opinion. Research needs to focus on assessing consumer and public attitudes and knowledge of the livestock industries in these areas, with the aim of developing education programs which inform the public on these issues and developing industry strategies to proactively influence industry practices, the direction of community opinion and government regulation.

The aim of this research is to identify industry-specific and generic public perceptions and attitudes towards the red meat industry that predict consumer and community behaviours. A second aim of this study will be to compare current perceptions and attitudes towards animal welfare with those held by Australians in 1994 and 2000 (Roy Morgan Research).

Outcomes:

- Identification of industry-specific and generic public perceptions and attitudes towards the red meat industry that predict consumer and community behaviours.
- A comparison of the recent and current perceptions and attitudes towards animal welfare.

Project 14.

Project title:	Farm animal welfare in Ohio: assessing public concern and implications for the food animal industry
Chief investigator:	Prof. Grahame Coleman
Investigator(s)	Dr Linda Lobao, Prof. Paul Hemsworth
Lead organisation:	Monash University
Collaborating organisation(s):	
1. The Ohio State University	
2. The University of Melbourne	
Funding	OARDC (OSU)
Summary (including aims and objectives)	

The welfare of farm animals has increasingly concerned researchers, the livestock industry, and public at large. Animal scientists, traditionally interested in welfare of animals in delivering quality and safe products, have developed recent interest in understanding public acceptance of production and processing practices. In the social sciences, the American Sociological Association newly created section, "Animals and Society" reflects this discipline's growing interest in animal welfare. Across the globe, pressure from consumer and animal welfare and rights groups is reshaping standards for animal treatment. The European Union now has strict new accreditation rules establishing minimum standards for animal welfare to be adhered to during production (Bindon and Jones, 2001), and there are ongoing moves to place animal welfare on the World Trade Organization (WTO) agenda. Producers in the US as well as other nations with large livestock sectors, such as Australia, are on the cusp of a massive wave of changes brought about by global public concerns with animal welfare and the new regulatory environment ushered in by these concerns. The United States Department of Agriculture (USDA) is already anticipating dramatic changes, hosting a September 2005 workshop with the Scientists Center for Animal Welfare in Research Triangle Park, North Carolina. on the future status of farm animal welfare.

Despite wide recognition, the animal industry is facing new public pressures, but little is known about the US population's views and behavior regarding the welfare of farm animals. A few opinion surveys (can we cite references?) have been used to collect information on animal welfare concerns, but questions about perceived treatment of food animals are even more rare. In the food animal industry, decisions tend to be driven by special interest groups that put pressure on different segments (e.g. quick service restaurants, grocer's organizations, national restaurant consortia, food animal commodity groups, etc.) without true understanding of public concerns. 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. In the past decade, U.S. Congress has passed more than 15 laws to protect animals (Pacelle, 2005). State laws specifically to protect welfare of farm animals were recently pasted in California to ban future production of foie gras and in Florida to ban gestation crates. The lack of studies on farm animal welfare in the US means that research lags behind the EU nations and Australia scientists who are systematically conducting research on public perceptions and behavior regarding animal welfare (Coleman and Hay, 2004).

Objectives Part I: Public Attitudes and Behavior Regarding Farm Animal Welfare: 1) Identify the range of attitudes about farm animal welfare that exist in the population and among key stakeholders, 2) Identify the social, economic, and demographic determinants of these attitudes, and 3) Investigate the degree to which attitudes affect consumption behaviors and community behaviours, such as political action for/against livestock farming.

Objectives Part II: Animal Welfare Concerns and the Animal Industry: 1) Determine the extent to which public and organizational pressures are affecting industry practices concerning animal welfare, particularly use of animal welfare audits (i.e. protocols for animal treatment), with a focus on poultry, dairy, and swine, and 2) Determine the extent to which producers in these industries will adopt new protocols for animal treatment.

Outcomes:
1 The first detailed information on public attitudes and behavior regarding animal welfare and industry response within the U.S. population.