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# Farm Animal Research Planning

Seminar – Dec 5<sup>th</sup> 2008





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# Welfare methodology

Poultry CRC, APL & DPI



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# Conceptual differences

**Scientists differ in their views on how animal welfare should be judged.**

3 prominent concepts of animal welfare. Animal welfare is judged on the basis of:

1. how well the animal is performing from a **biological functioning perspective**;
2. **affective states**, such as suffering, pain and other **feelings or emotions**; and
3. the expression of **normal or 'natural' behaviours**.

- Note - the "Five Freedoms" include elements of these concepts.



# Scientific uncertainty?

- ◆ Leads to differences in (1) methodology and (2) interpretations using similar data.
- ◆ Does not necessarily diminish the robustness of the research utilising different criteria or methodologies.
- ◆ However, it does raise the question of the relatedness of these concepts.
- ◆ That is,
  - is biological dysfunction associated with or does it lead to negative affective states and vice versa?
  - are the resultant methodologies measuring the same state(s) in the animal?

## Research question

- ◆ Does deprivation of a highly preferred resource result in biological dysfunction?



## Relatedness of concepts?

### Free cortisol

Treatment	Preference	Cortisol (ng/ml)
Feed restriction	Feed preferred pigs	<b>3.56</b>
	Social preferred pigs	1.57
Social restriction	Feed preferred pigs	1.17
	Social preferred pigs	<b>1.29</b>

*Interaction P=0.114*

### Liveweight

Treatment	Preference	Weight (kg)
Feed restriction	Feed preferred pigs	<b>155.9</b>
	Social preferred pigs	168.8
Social restriction	Feed preferred pigs	175.5
	Social preferred pigs	<b>154.9</b>

*Interaction P=0.032*



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# Poultry preference testing methodology

Sonja Laine (PhD Student)

Poultry CRC





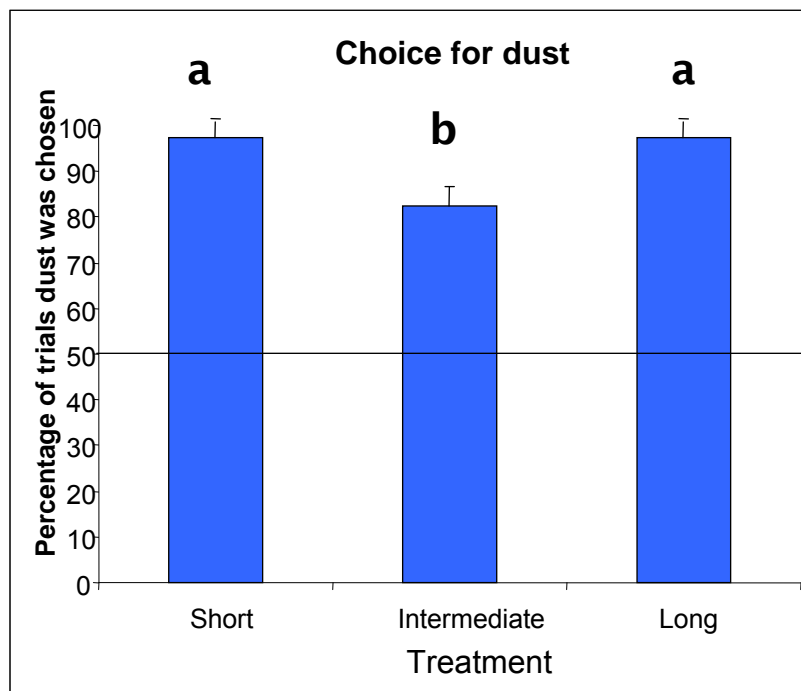
# Factors affecting animal preferences

- ◆ Animal factors
  - E.g. Experience, motivational state, social factors, stress (?)
- ◆ Factors in the preference test methodology
  - E.g. Frequency of testing, quality and quantity of reward
- ◆ Many factors appear to be ‘arbitrary’
- ◆ These factors may affect how ‘attractive’ animals perceive a resource

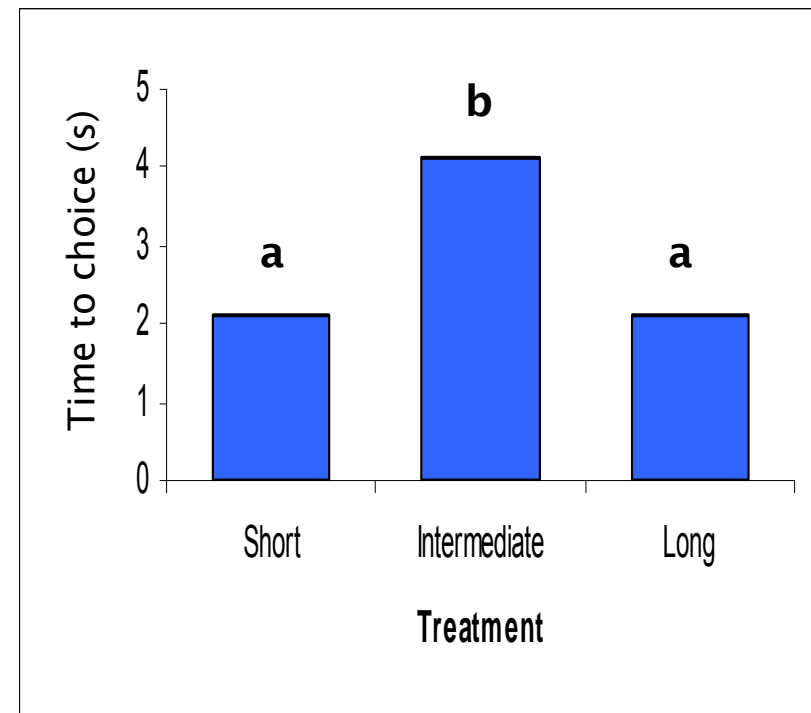


# Quantity of reward

- ◆ Does the quantity of reward affect choice behaviour/motivation?



Choice behaviour (P=0.007)



Time to choice (P=0.0015)





## Outcomes

- ◆ Results from this research may have implications for the selection of quantity of reward in future preference tests
- ◆ A rigorous methodology is necessary to clearly understand animal preferences
- ◆ Potentially, the preferences of animals may be incorporated into animal housing to improve welfare



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# The effects of group housing during gestation on sow welfare & reproduction

APL & QAF Meat Industries





## Part 1 – Space & group size

### **Space allowance – 6 levels**

- 1.4, 1.8, 2.0, 2.2, 2.4 & 3.0 m<sup>2</sup>/sow

### **Group size – 3 levels**

- 10, 30 and 80 sows

### **In each of 4 time replicates:**

- 780 sows in 24 groups (total of 3120 sows)

### **Timing of replicates (start)**

- Sept 2008, Feb 2009, July 2009, Oct 2009



# Part 1 – Measurements

## BEHAVIOUR OBSERVATIONS

- ♦ **Aggressive behaviour around feeding**
  - Days 2, 10, 24 and 52
- ♦ **Time budget of behaviour**
  - Days 1, 3, 8, 22 and 50

## INJURY

- ♦ **Scratches, abrasions, cuts & abscesses**
  - Days 2, 9, 23 and 51
- ♦ **Locomotion score**
  - Day 110

## PHYSIOLOGY

- ♦ **Cortisol and neutrophils and lymphocytes**
  - Days 2, 9 & 10, and 51 & 52



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## Benchmarking welfare indicators in the dairy industry

Ellen Jongman



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# Why benchmark animal welfare?

- ◆ **To assess industry performance on animal welfare**
- ◆ **To instil trust in consumers that welfare standards are being met**
- ◆ **To protect international markets**
- ◆ **To assist and demonstrate continuous improvement**



# Welfare assessment on-farm

- ◆ **Animal based indicators**
- ◆ **Resource based indicators**
- ◆ **Management and Farmer Attitude Questionnaire**
- ◆ **Determine important risk factors**



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# Alternative Mulesing Procedures

Paul Hemsworth, Adele Arnold, John Barnett,  
Marcus Karlen, Andrew Fisher, Kym Butler







- ◆ Treatments x 4

- Control
- Mules
- Clip
  - 2 perineum (purple) and 2 tail (blue)
- Intradermal (*sodium lauryl sulphate*)



- ◆ Measurements

- Behaviour (days 1-7, 15, 22)
- Blood (15 and 120 min, days 2, 3, 4, 7, 14 and 21)
- Gait (4, 11, 18 and 25)
- Liveweight (days 4, 11, 18 and 25)

# Results



*Day 1 = day of treatment*

Variable	<u>Mules vs Other</u>	<u>Clip and Intradermal vs Control</u>
<b>Feeding</b>	↓ days 2-7 and 15	↓ day 2 (intradermal only)
<b>Lying</b>	↑ days 2-7 and 15	↔
<b>Standing head down</b>	↑ day 2	↔
<b>Gait score<sup>1</sup></b>	↑ days 4, 11 and 18	↔
<b>Liveweight<sup>2</sup></b>	↓ days 4, 18 and 25	↔
<b>Cortisol (plasma)</b>	↑ 15 and 120 min, days 1 and 3-7	↑ 15 and 120 min, ↑ day 2 (intradermal only)
<b>Haptoglobin (plasma)</b>	days 2-7 and 14	↑ days 3-7 (intradermal); clips=little change and < intradermal

*<sup>1</sup>low score = normal gait; <sup>2</sup>loss of ~1 kg liveweight by day 4 - maintained for 25 days  
Confirms findings that surgical mulesing adversely affects lamb welfare and for a longer duration than previously shown.*

*Both alternative procedures, particularly the Clip treatment, reduce risks to welfare compared to surgical mulesing.*



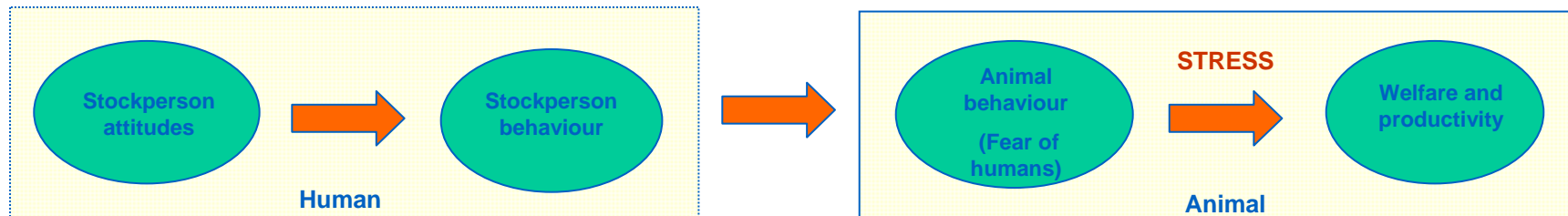
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# The human-animal relationship in the laying hen

Lauren Edwards



# The human-animal relationship



(Hemsworth and Coleman, 1998)

- ◆ The human-animal relationship was confirmed in the egg industry
- ◆ Furthermore, experimental work confirmed that human behaviour can influence fear of humans in laying hens
- ◆ Human behaviour was also found to influence stress physiology and productivity in laying hens



## Conclusions

**The existence of a sequential human-animal relationship provides opportunities to improve the relationship, and reduce fear of humans in laying hens**



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## Farm animal research planning seminar

Current stockperson projects





## Prototype Stockperson Training packages-EU

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



## Nature of the project

- ◆ This is a collaborative project within the EU 6th Framework Welfare quality program (Sub-project 3, Minimizing handling stress)
- ◆ Involves knowledge-based, practicable species-specific strategies to improve farm animal welfare.
- ◆ The prototype training packages are based on existing knowledge mainly coming from Australian and French research and development
- ◆ The methodology is flexible and permits simple translation into other languages





## Outcomes

- ◆ A set of cognitive behavioural training programs relevant to the European pork, egg, dairy and beef cattle industries.
- ◆ These programs will be readily adaptable into different languages and different production systems because of the generic structure adopted.
- ◆ Speech, video and graphic material is in files that are separate from the core programs and there can be easily altered to suit local conditions.
- ◆ Development of the prototypes has been completed and the final versions will be available in the first quarter of 2009.
- ◆ AWSC has a licence to use in Australia, NZ, North America and Asia.



## ProHand for the livestock processing industry

- ◆ 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.
- ◆ 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.



## Research

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



# Training

- ◆ Prototype face-to-face training program developed
- ◆ Trial training given to stockpeople in Abattoirs
- ◆ Data from the field research, feedback from face-to-face training were used to develop a multimedia training program
- ◆ This has been integrated with other training material to provide a comprehensive training program for abattoir stockpeople.



## Outcomes

- ◆ Will lead to the implementation of a training program for sheep and cattle handlers across Australian abattoirs, through existing networks and training providers
- ◆ Furthermore, this research will demonstrate to the key stakeholders the impact of improved training and animal handling on animal welfare and productivity, through obtaining data on bruising, meat quality and livestock handling following



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## Importance of space and nests for laying hens in cages

John Barnett, Paul Hemsworth, Greg Cronin,  
Jeff Downing





- ◆ Issue of housing for laying hens very likely to remain on the political agenda for the foreseeable future
  - space allowance
  - group size
  - provision of nests
- ◆ Issues are controversial in part because there is a lack of agreement on welfare assessment methodologies
  - Five Freedoms vs Animal Preferences vs Biological Functioning



## ◆ LayWel (2006)

- Using the five freedoms as a baseline for animal welfare assessment, the review considered 39 variables
- A 'traffic light' approach was used to compare welfare outcomes and risks to good welfare across systems

'Traffic light' (colour)	Risk of poor welfare
Green	Low
Yellow	Medium
Red	High





## LayWel (2006)

Frequency that each system identified in each risk category

System	Risk of poor welfare		
	Low	Variable	High
Conventional cage	18	9	10
Non-cage	6	22	6
Outdoor	4	26	4

*Conclusion:*

*“With the exception of conventional cages, we conclude that all systems have the potential to provide satisfactory welfare for laying hens.”*

*If we focus on the same data from a ‘functional perspective of welfare assessment’ it can be argued that cages perform better than alternative systems.*



- ◆ Examine the welfare implications of space allowance in cages for laying hens
- ◆ Examine the welfare implications of nests in cages for laying hens
- ◆ Further examine the relationship between two current approaches to welfare assessment, the biological functioning and animal preference approaches



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# Effects of conditions during transport on bobby calves of different ages

Ellen Jongman





## Factors that may affect welfare outcomes

- ◆ **Age**
- ◆ **Pre-transport treatment**
- ◆ **Conditions in holding yards**
- ◆ **Total duration of travel**
- ◆ **Stocking density**
- ◆ **Flooring in truck**
- ◆ **Handling during loading, unloading and at the abattoir**



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# Welfare of lambs in feedlots

Ellen Jongman





# Main welfare problems

- ◆ **Shy feeders**
- ◆ **Stocking density and group size**
  
- ◆ **Impacts on:**
  - **Social interactions**
  - **Use of feeders**
  - **Use of drinkers**
  - **Use of shade**
  - **Lying areas**



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# Welfare implications of tail docking in pigs at different ages

John Barnett, Craig Johnson, Christine Lunam





- ◆ Surgical procedures in farm animals are a welfare issue because of pain and the lack of use of anaesthesia and/or analgesia
- ◆ Profile of surgical procedures likely to increase:
  - ‘mulesing’ campaign likely to continue
  - less painful procedures likely to be more acceptable to the community
- ◆ Tail docking is done to prevent tail-biting
  - can be learned by other pigs
  - can cause considerable damage (and perhaps chronic pain) – even death
  - causes are largely unknown
  - outbreaks are sporadic
  - no current alternative procedure





- ◆ EEG responses in animals are not fully developed at birth
- ◆ Some evidence that EEG responses and pain mechanisms are dependent on the animal's stage of development at birth
  - altricial vs precocial
    - *takes longer to develop full EEG response in altricial species (eg. rats {after 12 days}) than precocial species (eg. lambs {after 3 days})*
- ◆ Amputation prior to development of full EEG responses can increase subsequent sensitivity to painful stimuli (*hyperalgesia ie. stimuli feel more painful*)
  - lambs castrated at 1 day of age show hyperalgesia at 1 month old compared to castration at 10 days of age
  - *circumcision in human infants (~1st week of life) causes increased pain related behaviour to vaccination at 3 months of age*



- ◆ Behaviour and endocrinology
- ◆ Neurophysiology -EEG
- ◆ Neuroanatomy - histology for neuromas at different ages (*young, juvenile and adult*)
  - neuromas are associated with chronic pain in humans
    - *microneuromas develop after all amputations and either resolve with time or develop into neuromas*



- ◆ Develop the methodology to measure electroencephalograms in piglets to determine the level of pain, initially to electric shock, as a painful stimulus
- ◆ Determine if responsiveness to tail docking in piglets is age dependent and if there is an optimal age that minimises both pain and subsequent hyperalgesia
- ◆ Depending on findings develop recommendations on timing of tail docking and/or research use of analgesics/anaesthetics



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# Human-animal relationships: Preliminary examination of fear responses and ease of handling of ewes in response to handling.





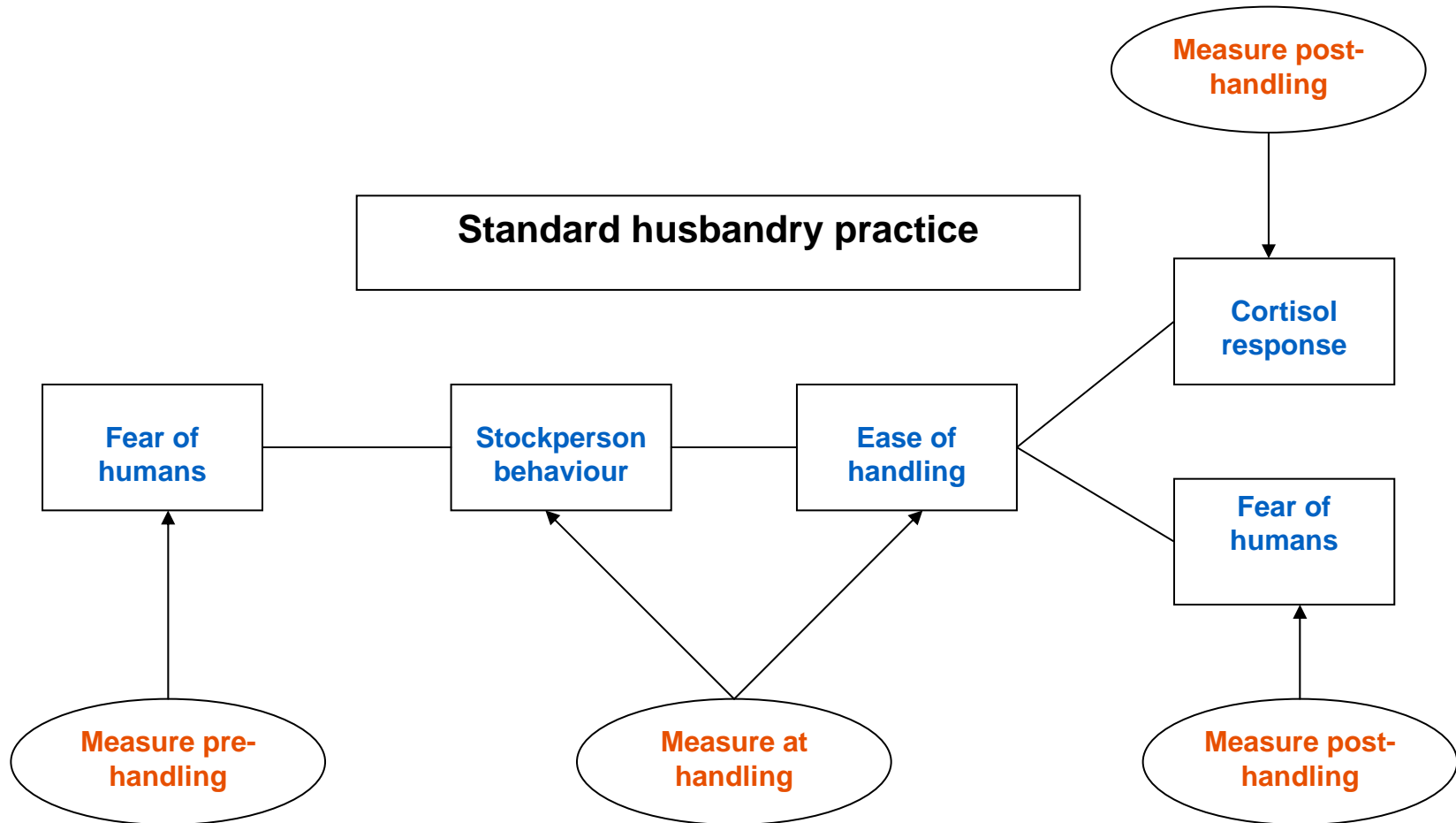
## AIMS

- ◆ Identify individual animal variation in fear responses to humans (avoidance behaviour and cortisol response) and variation in ease of handling
- ◆ Examine relationships between handling and subsequent fear responses to humans (avoidance behaviour and cortisol response).



## METHODS

- ◆ 6 sheep wool farms.
- ◆ 50 ewes per farm.
- ◆ Use a common husbandry practice to study handling and fear responses.
- ◆ Measure (1) behaviour of the stockperson (and dogs) and (2) the behavioural response to humans, stress response to handling and ease of handling of sheep.





## Pearson correlation coefficients between cortisol concentrations and some of the independent variables of interest.

Variables	Sheep (n=378) <i>r</i>	Cattle (n=331) <i>r</i>
<b><i>Handling variables</i></b>		
Dog use score	0.57**	-
Touches and pushes	-0.39**	-0.19**
Electric goads	0.10*	0.11*
Hits	-	0.29**
Waves	-0.50**	-0.12*
Whistles	-0.36**	-
Shouts	-0.10*	0.30**
Artificial noise	-0.19**	-

\* and \*\* : significant correlations at  $P < 0.05$  and  $P < 0.001$ , respectively  
 All handling variables transformed  $\log_{10}(y+1)$  prior to statistical analysis





# OUTCOMES

Identify:

- ♦ variation in fear responses of sheep and their relationship to ease of handling
- ♦ stockperson (and dog) behaviour related to behavioural and physiological responses of sheep to handling

This will provide an understanding of:

- ♦ impact of handling on ease of handling and fear responses to humans,
- ♦ the stockperson behaviours that are related to these fear responses, and
- ♦ thus implications of these human-animal interactions (and thus training programs) on behavioural and stress responses of sheep to stockpeople.



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# Farm animal research planning seminar

New stockperson projects





## Welfare audits in the pig industry: stockperson attitudes and behaviour

- ◆ Positive attitudes towards animals and towards working with animals are good predictors of the stockperson's behaviour and performance.
- ◆ Also, attitudes may affect other important stockperson characteristics such as work motivation.
- ◆ These should also be a requirement in a welfare monitoring scheme.
- ◆ It is proposed to develop a tool for measuring those stockperson attitudes that can be used to audit stockpeople.



## Human variables for audit

- ◆ De Passille and Rushen (2005) proposed that the most cost-effective way of monitoring or auditing stockmanship in on-farm visits is to ask whether or not the stockperson has followed a suitable training course.
- ◆ The key stockperson attitudes that should be targeted for training, attitudes to animals and working with animals, should also be central indices in any on-farm welfare monitoring scheme that aims to measure stockmanship.
- ◆ In addition to attitudes, there is evidence that a measure of attitude towards work, the PDI performance score (Johnson 1991; Paajanen *et al.* 1999), is a good predictor of the stockperson performance in many areas, work motivation, behavior towards the animals under his or her care and technical knowledge (Coleman 2001; Carless *et al* 2007).



## Human variables for audit (cont)

- ◆ Recent research (Coleman, 2004) found that empathy towards animals was a good predictor of technical knowledge, behaviour towards pigs and intention to remain in the job.
- ◆ Beveridge (1996) also found that empathy towards animals was positively associated with positive attitudes towards interacting with cows and positive beliefs about cows but not directly with stockperson behaviour towards cows
- ◆ Coleman *et al.* (1998) found that empathy towards animals was associated with positive beliefs about pigs and about handling pigs. In other words, empathy appears to be one of the factors that underlies the stockperson's attitudes towards animals.



## Aim

- ◆ In part this will entail
  - validation of some of the measures that have previously been developed
  - some broader measure that assess motivation and willingness to learn new skills.
- ◆ The aim will be to validate these tools by tracking stockpeople over time to show that changes brought about by training (eg ProHand), feedback provided from the audit and experience in the industry are reflected in changes in the attitudes measured by the audit tool.



## Benefits

- ◆ Outcomes: The outcome will be the development of a set of tools that can be used throughout the pig industry to audit welfare-relevant stockperson attitudes and behaviour and a set of normative data that can be analysed over time to indicate industry-wide changes.



## Prohand for the livestock transport industry

- ◆ Substantial development already achieved in on-farm and abattoir interventions to improve animal welfare
- ◆ Need to incorporate welfare into industry quality assurance program for the pre-slaughter handling and management of farm animals at Australian abattoirs.
- ◆ Cognitive-behavioural interventions offer the industry good opportunities to improve the welfare of their animals.
- ◆ Such improvements may also reduce injury and limitations on meat quality, such as bruising, arising from poor handling.
- ◆ Such a program for pig transporters would be effective in improving animal welfare by improving animal handling in situations where poor handling reduces animal welfare.





## Aims

- ◆ Assessing the attitudes and behaviours of animal handlers/transporters involved in the loading and unloading of animals and the effects of handling on ease of handling and fear responses in the animals
- ◆ Using this information to develop of cognitive-behavioural training program for livestock transporters.



## Outcomes

- ◆ The development of a cognitive-behavioural training program for livestock transport drivers.
- ◆ An improvement of the key attitudes and behaviour of livestock transport drivers
- ◆ Reduction in the animal's fear of humans and improve the animal's welfare post-farm gate.
- ◆ A reduction in injury and limitations on meat quality, such as bruising, arising from poor handling.
- ◆ A response to increasing pressure from Governments, processors/wholesalers/retailers, consumers and/or the general public to safeguard the welfare of farm animals post-farm gate.
- ◆ A contribution to industry profitability and sustainability which will be supported by such training programs that address animal welfare issues.