



World Organisation
for Animal Health



Coefficient
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Animal welfare research update

Bronwyn Stevens
On Behalf of A/Prof Lauren Hemsworth

Animal Welfare Science Centre
The University of Melbourne

**Regional Animal Welfare Training Conference
25 - 26 February 2026 Vang Vieng, Lao PDR**



Presentation covers

- Overview of Animal Welfare Science Centre research
- Highlights of recent publications relating to pig welfare



Animal Welfare
Science Centre



THE UNIVERSITY OF
MELBOURNE

Animal Welfare Science Centre

Melbourne Veterinary School, Faculty of Science

The University of Melbourne

<https://www.animalwelfare-science.net/>



About the Animal Welfare Science Centre (AWSC)



- Established in 1997
- We contribute to improved animal welfare as a world leading provider of expert information, advice and education underpinned by rigorous research
- 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

Our people

Core scientists



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Our people



Maxine Rice, Research Assistant and PhD Candidate

Rutu Galea, Research Assistant and PhD Candidate

Lucy Wotherspoon, Research Assistant

Bronwyn Stevens, Research Assistant and Tutor

Dr Jessalyn Taylor, Research Assistant

Hon. Prof. Paul Hemsworth, Founding Director of the Animal Welfare Science Centre

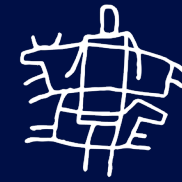
Hon. Prof. Grahame Coleman

Kym Butler, Biostatistician

Jeremy Skuse, Honorary Fellow

Graduate Students: <https://www.animalwelfare-science.net/our-students.html>

Research, development and education



Animal Welfare
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The AWSC conducts research, development and education in four program areas:

1. Welfare methodology development and validation of methods to assess animal welfare
 2. Housing and husbandry effects on animal welfare
 3. Human-animal relationship (HAR) and Attitudinal effects
 - The effects of the attitudes of stockpeople, animal handlers and animal owners on the welfare of their animals
 - The effects of attitudes to animal welfare on consumer and community behaviour
 4. Tertiary, post-graduate and industry education and training
- *research is conducted across a range of animal sectors: farm, companion, zoo/wildlife*

RD&E current and recent activities

1. Welfare methodology and assessment



Smart technologies to ensure optimal health (and welfare) of pigs

Hemsworth, L. Jongman, E., Rice, M., and Impey, S.

- Ear tag to measure a range of physiological indicators of health and welfare
- Image analysis (infrared camera and RGB) to monitor health and welfare of pigs
- “Smart” feeders and drinkers to monitor feed and water intake as indicators of health

Bird pile-up detection and prevention system on commercial farms

Zhang, J., Taylor, P., Xu, W., Rice, M., Hemsworth, P., Li, J.

- Development of a toolbox for automatic detection and dispersal of piling hens in commercial free-range layer flocks

RD&E current and recent activities

2. Housing and husbandry effects on animal welfare



Eliminating pig tail removal to improve welfare and industry sustainability (CRC-P)

Hemsworth, L., Stevenson, M., Lucas, M., Galea, R., and Hemsworth, P.

- Epidemiological investigation into risk factors of tail biting in pigs in Australian production systems
- Identifying early indicators of tail biting in pigs with tails



Early stress experiences and stress resilience and emotionality in pigs

Hemsworth, P., Lucas, M., Butler, K., Galea, R., and Hemsworth, L.

- Effects of early human contact and housing environment on short- and long-term stress in pigs

RD&E current and recent activities

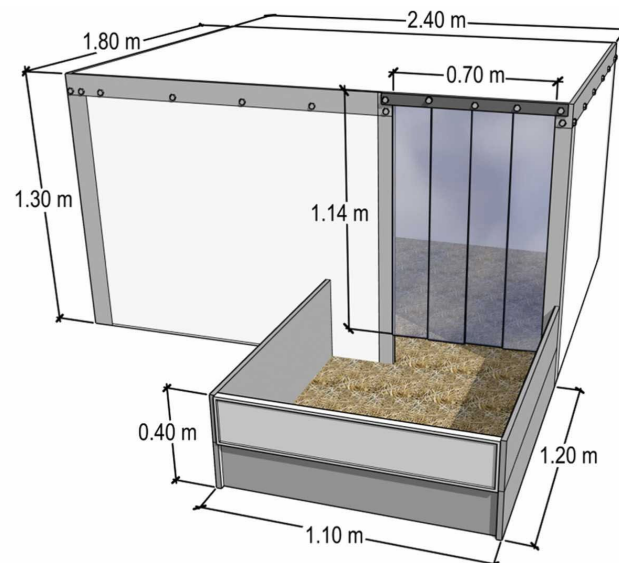
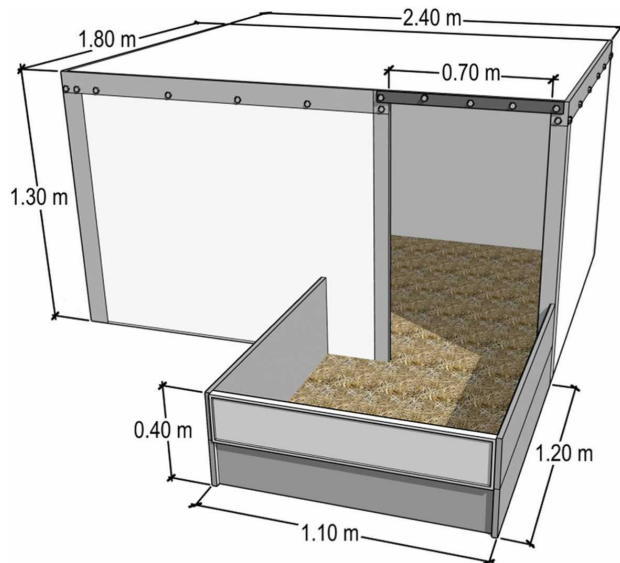
2. Housing and husbandry effects on animal welfare



Slow down and creep it cosy: Improving piglet survival in outdoor farrowing systems

Lucas, M., Hemsworth, L.

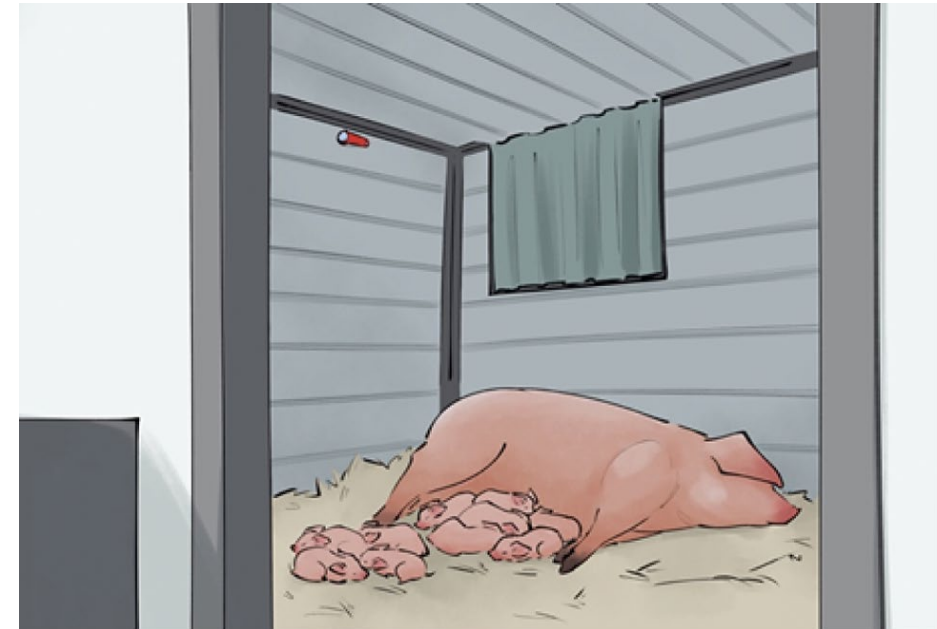
- Effectiveness of modifications to outdoor pig housing to improve thermal comfort and piglet survival



Lucas et al 2025

A

B



Sofra et al 2026

RD&E current and recent activities

2. Housing and husbandry effects on animal welfare



Effects of floor space on the welfare of growing pigs under Australian conditions

Hemsworth, P., Butler, K., Galea, R., Tilbrook, A. D'Souza, D., Hewitt, R., Plush, K., Blanche, D., Hemsworth, L.

- Effects of floor space allowance in the range of k values from 0.030 to 0.048 on the welfare of growing pigs under Australian conditions
- Why?
 - Space allowance contentious
 - Lack of clear research under Australian conditions
 - Other research often confounds space allowance and group size
 - Standards and guidelines to be reviewed

RD&E current and recent activities

2. Housing and husbandry effects on animal welfare



Breeder chicken stress resilience: welfare, production and progeny benefits

Taylor, P., Morgan, N., Hilliar, M., Cadogen, D., Forder, R., Stevenson, M., Hemsworth, P., Hamlin, A.,

- Reduce stress and increase stress resilience of broiler breeder chickens through dietary and enrichment changes

Identifying optimal feed withdrawal periods before transportation to safeguard meat chicken welfare under varying transport conditions

Taylor, P., Hilliar, M., Crowly, T., Cottrel, J.

- Identifying risk factors that increase death during the transportation of broiler chickens, with a specific focus on time without access to feed before slaughter



RD&E current and recent activities

3. Human-animal relationships and Attitudinal effects



Human-animal interactions during pig transport: examining relationships between transport driver attitudes and behaviour and pig behaviour to inform the development of ProHand Pig Transport

Hemsworth, L., Skuse, J., Wilhelmsson, S., Hemsworth, P.

- determine the relationships between (1) transport driver attitudes and behaviour and (2) transport driver behaviour and pig behaviour during transport
- the findings from this research will inform the development of a cognitive behavioural training program

ProHand Pig Abattoir revision

Hemsworth, L., Skuse, J., Stevens, B., and Hemsworth, P.

- Examining the relationships between (1) abattoir stockperson attitudes stockperson behaviour and pig fear behaviour
- the findings will form the basis for the revision of the ProHand Pig Abattoir program



RD&E current and recent activities

3. Human-animal relationships and Attitudinal effects

Improved animal handling in Swedish pig production through development and implementation of a training program for personnel on farms and animal transport companies - ProHand Pigs® SE

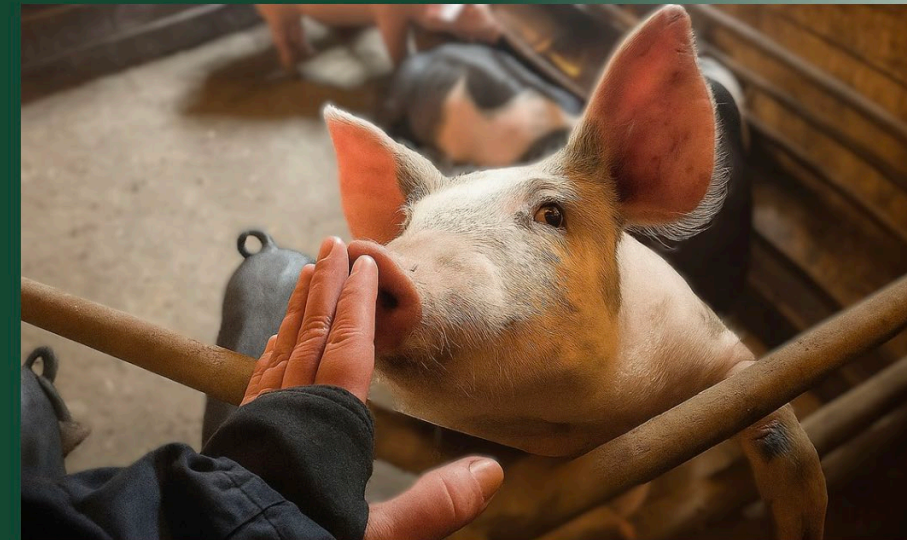
Wilhelmsson, S, Westin, R., Johansson, G., Hemsworth, P., Hemsworth, L.

- aiming to improve animal welfare in Swedish pig production through a cognitive behavioural training program for personnel on farms and animal transport companies.
 - Development
 - Implementation
 - Evaluation

ProHand 
Maximise your Positives, Minimise your Negatives



SWEDISH UNIVERSITY OF
AGRICULTURAL SCIENCES



RESEARCH PROJECT

ProHand Pigs® SE

RD&E current and recent activities

4. Tertiary, post-graduate and industry education and training



World Organisation for Animal Health (WOAH) pig health and welfare training

Hemsworth, L., Taylor, J., Stevens, B.

- Development and delivery of “Train the Trainer” workshops and eModules for pig veterinarians to support implementation of the WOAH animal welfare standards in Southeast Asia
- Workshops and e-modules focused on two Chapters of the WOAH Terrestrial Animal Health Code addressing animal welfare:
 1. Chapter 7.6: The killing of animals for disease control purposes;
 2. Chapter 7.13: Animal welfare and pig production systems.

RD&E current and recent activities

4. Tertiary, post-graduate and industry education and training



ProHand®

Hemsworth, L., Skuse, J., Hemsworth, P., Stevens, B., Rice, M., Galea, R., Coleman, G.

- Cognitive behavioural training program for stockpeople
- Targets key attitudes and behaviour of stockpeople to minimise handling stress, enhance animal productivity and welfare, and improve stockperson work motivation, performance, and job satisfaction
- Adapted for specific industry needs: ProHand Pig, ProHand Dairy, ProHand Pig Abattoir, ProHand Transport
 - >80% stockpeople completed ProHand Pigs in AUS and NZ
 - >300 stockpeople completed ProHand Pork Abattoir in AUS



RD&E current and recent activities

4. Tertiary, post-graduate and industry education and training



Subjects taught into Veterinary, Agriculture and Science degrees

Undergraduate level

- ANSC10001 Animals & Society 1: Animals & Our World (Undergraduate Level 1)
- ANSC20004 Animals & Society 2: Human-Animal Bond (Undergraduate Level 2)
- VETS20019 Frontiers in Veterinary Science (Undergraduate Level 2)
- ANSC30003 Applied Animal Behaviour (Undergraduate Level 3)
- ANSC30005 Animal Welfare & Ethics (Undergraduate Level 3)

Graduate level

- ANSC90005 Behaviour of Farm & Companion Animals (Masters Level)
- ANSC90007 Animal Welfare (Masters Level)

Doctor of Veterinary Medicine: Various subjects and classes

Scientific advice



The AWSC regularly provide scientific advice, including for:

- National and international animal welfare standards and guidelines (including cattle,
- sheep, pigs, poultry, greyhounds)
- Industry and funding advisory committees
- Community advisory groups (e.g., RSPCA)
- State government animal welfare advisory committees

The AWSC is open to advise and consult to the animal health industry on a broad range of topics related to animal welfare.

Scientific advice

Recent consultancy work



Development of RSPCA Approved Farming Scheme Standard for dairy cattle - literature review of key welfare issues

Hemsworth, L., Jongman, E., Verdon, M., Field, L.

Scientific Review of pig welfare research to inform the development of the Australian Animal Welfare Industry Standards and Guidelines for Pigs.

Hemsworth, L., Lucas, M., Galea, R., Taylor, J., Wotherspoon, L., Hemsworth, P.

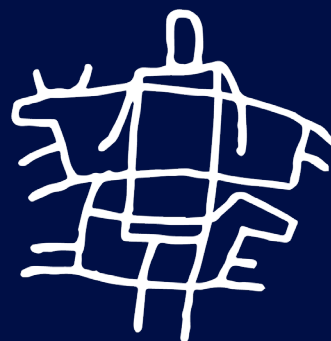
Animal Group Chapter Research and Case Studies for the renewed Australian Animal Welfare Strategy Animal Group Research.

Cobb. M., Hemsworth, L.



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Recent research

Highlight some recent publications on pig welfare:

- Welfare assessment
- Space allowance – fattening pigs
- Group gestation housing systems
- Farrowing and lactation housing
- Stock person attitudes



Recent research

Welfare assessment – Smallholder pig welfare assessment

Dang-Xuan, S., Huyen, L. T. T., Ha, T. Q., Duc, D. V., Dung, L. T., Tuan, H. A., Unger, F., Doyle, R. & Toribio, J. A. (2025). Assessing the **welfare of smallholder pigs in Vietnam using a pilot protocol**. **Tropical Animal Health and Production**, 57(8), 392. <https://doi.org/10.1007/s11250-025-04602-5>

This study piloted **a smallholder pig welfare assessment protocol** two sites in Vietnam:

- 55 farms raising predominantly indigenous pigs
- 55 farms raising predominantly non-indigenous pigs

Looked at:

- Welfare assessment protocol
- Challenges faced by farmers



Recent research

Welfare assessment – Smallholder pig welfare assessment

Dang-Xuan, S., et al (2025).

Welfare assessment protocol: 14 animal-based and 4 resource-based indicator

Animal based indicators			
Panting	Huddling	Tailbiting	Scouring
Lameness	Skin lesions	Coughing	Exploration
Fear of humans	Positive social behaviours	Stereotypic behaviour	Negative social behaviours
Sick/injured pigs		Body condition score	

Resource based indicators	
Enrichment	Water supply
Feeder space	Distance to water



Recent research

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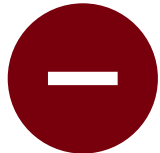


Welfare assessment protocol is feasible



Welfare Pigs on > 90% of farms did not exhibit:

- panting, tail biting, scouring, negative social behaviour, stereotypic behaviour, coughing or lameness



Restricted access to feed and water, and fear of humans are concerns

- body condition of most pigs was thin or very thin among the sows on 31% of farms and among the grower pigs on 32% of farms



Recent research - Space allowance and stocking density

Coutant, M., Michel, J., Pedersen, L. J., & Larsen, M. L. (2026). Space density affects resting location and proximity of fattening pigs at night. *Livestock Science*, 1059. <https://doi.org/10.1016/j.livsci.2026.105913>

Night rest :

- Important for welfare
- May be compromised by high stocking density in fattening pigs

This study

- Varied space density by reducing the number of pigs per pen
- looked at resting location and proximity to other pigs at night throughout the fattening period.





Recent research

Space allowance and stocking density

Coutant, M., Michel, J., Pedersen, L. J., & Larsen, M. L. (2026).

- **Proportion of rest at night did not depend on space allowance**
- **Less space per pig increased the probability of lying on the slatted floor**
 - solid flooring area is the preferred resting place for pigs;
 - lying on less preferred areas such as slatted flooring may compromise comfort and rest quality
- **Less space per pig increased the probability of lying in full contact with others**
 - forced proximity/contact may disturb rest and/or sleep quality, impacting welfare
- **More space per pig allowed pigs to lie alone on the solid floor**
 - findings suggest lying in full contact is not preferred if space permits (thermoregulation strategy)

Recent research

Group gestation housing systems

Sylvén, K. R., Wallgren, T., Almerheim, P., Selling, L. E., Jacobson, M., & Wallgren, P. (2025). A comparison of two systems for group housing of gestating sows-effects on productivity, removal, and treatments. Porcine health management, 11(1), 1. <https://doi.org/10.1186/s40813-024-00410-9>

Retrospective comparison of two group gestation housing systems that differed in :

	System I	System II
Group size	40	8-10
Space allowance	3.9m ²	2.9-3.1m ²
Quantity of enrichment	Deep litter straw	Daily delivery of straw
Feeding management	Individual stall fed	Group fed



Recent research

Group gestation housing systems

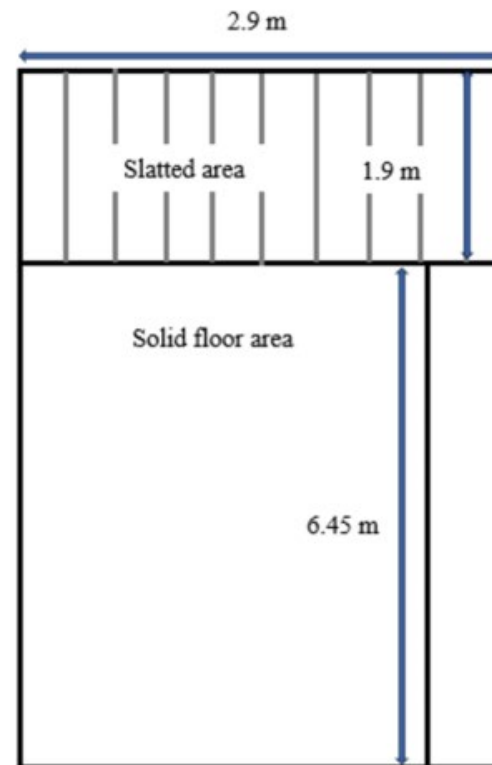
Sylvén, K. R., Wallgren, T., Almerheim, P., Selling, L. E., Jacobson, M., & Wallgren, P. (2025).

System I

- ✓ higher number of liveborn and weaned piglets
- ✓ Lower incidence of antibiotic treatments



System II





Recent research

Group gestation housing systems

Sylvén, K. R., Wallgren, T., Almerheim, P., Selling, L. E., Jacobson, M., & Wallgren, P. (2025). A comparison of two systems for group housing of gestating sows-effects on productivity, removal, and treatments. *Porcine health management*, 11(1), 1.

This study retrospectively compared two group gestation housing systems that differed in group size (40 vs 8-10 sows), space allowance (3.9m² vs 2.9-3.1m²), quantity of enrichment material (deep litter straw vs delivery of daily straw) and feeding management (individual vs group fed)..

Sows housed in larger groups provided with a larger floor space, with individual feeding and deep straw had:

- a higher number of liveborn and weaned piglets
- lower incidence of antibiotic treatments



Recent research

Farrowing and lactation housing systems

The **Maternity Ring** was developed as a free farrowing alternative to crates that preserved space (farrowing crate footprint) whilst providing the sow with unrestricted movement

A



B





Recent research

Farrowing and lactation housing systems

Plush, K., Lines, D., Staveley, L., D'Souza, D., & Van Barneveld, R. (2024). A five domains assessment of sow welfare in a novel free farrowing system. *Frontiers in Veterinary Science*, 11, 1339947.

Using the Five Domains Model, this study examined the welfare of lactating sows housed in a farrowing crate in comparison to a free farrowing alternative, the Maternity Ring.

Results indicate that sows housed in the Maternity Ring had:

- **improved lactation efficiency**
- **greater ability to observe and interact with the environment within and outside the pen**
- **reduced injuries**
- **greater performance of more species-specific behaviours such as nesting and piglet interaction**
- **improved response to a startling test**



Recent research

Farrowing and lactation housing systems

Plush KJ, Chidgey KL, Young N, D'Souza DN and van Barneveld RJ (2026) First lactation performance of sows in Maternity Ring housing is comparable to that in farrowing crates. *Front. Vet. Sci.* 12:1717512.

This study aimed to compare the performance of first-parity sows housed in a Maternity Ring to those in a farrowing crate, with a specific focus on the timing and causes of piglet mortality.

- **the number of piglets born and weaned was comparable between FC and MR**
 - tendency for greater pre-foster mortality in MR than FC
- **when the causes of piglet death were examined, there was significantly more piglets crush in MR than in FC (0.6 more piglets per litter were crushed in MR than in FC)**



Recent research

Farrowing and lactation housing systems

Staveley, L. M., Plush, K. J., Lines, D. S., Hemsworth, L. M., D'Souza, D. N., & van Barneveld, R. J. (2025). Stockperson attitudes towards Maternity Rings and farrowing crates. *Frontiers in Veterinary Science*, 12, 1579263.

This study aimed to examine the attitudes of stockpeople employed on pig farms with experience working in both free-farrowing (MR) and farrowing crate (FC) systems.

- **stockpeople ranked the welfare of sows higher in the MR when compared to the FC**
- **stockpeople that viewed sow welfare positively in a MR were confident in their knowledge of sow behaviour and felt this contributed to a safer working environment compared to those that viewed sow welfare positively in a FC**
- **stockpeople that believed FC would always be necessary were more likely to avoid interactions with difficult pigs, and more likely to rate piglet welfare as more important than sow welfare**



Summary

- Decisions need to be evidence based
- Welfare assessment needs to use multiple indicators
- All systems have strengths and weaknesses
- When trying to optimize welfare: system design matters
- BUT so does management, AND stock person attitudes

Thank you

Regional Animal Welfare Training Conference
Feb 25-26 2026