World Organisation for Animal Health

- -

WOAH Collaborative Centre Reports Activities 2024

This report has been submitted: 11 mars 2025 22:25

CENTRE INFORMATION

***Title of WOAH Collaborating Centre**	Animal Welfare Science and Bioethical Analysis; the David Bayvel Consortium comprises:
***Address of WOAH Collaborating Centre**	Ministry for Primary Industries, 34-38 Bowen Street, PO Box 2526, Wellington 6140, New Zealand
***Tel:**	+644 831 2148
***E-mail address:**	WOAH.CC.AW@mpi.govt.nz
Website:	www.mpi.govt.nz
***Name Director of Institute (Responsible Official):**	Dr. Carolyn Guy
***Name (including Title and Position) of Head of the Collaborating Centre (WOAH Contact Point):**	Dr Carolyn Guy, Director of Animal Health & Welfare, Ministry for Primary Industries, New Zealand
***Name of the writer:**	Esther Newman

TOR 1 AND 2: SERVICES PROVIDED

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by WOAH

Category	Title of activity	Scope
		Representatives of Australian CC member

Animal welfare (true)	Support for the renewal of the Australian Animal Welfare Strategy.	organisations (CSIRO and the University of Melbourne) have contributed to consultation on the renewal of the Australian Animal Welfare Strategy (AAWS). In addition, Professor Alan Tilbrook of the University of Queensland is a member of the Strategy Advisory Group, which provides strategy development advice to support the renewal of the AAWS.

TOR 3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main fucus area for which you were designated

Proposal title	Scope/Content	Applicable Area
Consideration of WOAH standards in the development of Australian Animal Welfare Standards and Guidelines.	Sharing of relevant animal welfare standards of the Terrestrial Animal Health Code, including updated Chapter 7.5 Animal Welfare During Slaughter, to inform the development of Australian Animal Welfare Standards and Guidelines for Livestock at Processing Facilities and Establishments.	Animal Production

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOAH?

No

4. Did your Collaborating Centre maintain a network with other WOAH Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
WOAH Animal Welfare Global Forum - WOAH Collaborating Centres.	Paris, France	Asia y el Pacífico	Participation with the other WOAH animal welfare CCs in the 6th WOAH Animal Welfare Global Forum "Exploring how WOAH Collaborating Centres can support members to improve animal welfare" lead to the finalisation of the Network Terms of Reference for

			approval.

TOR 4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOAH Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Collaboration with NZ SPCA, Auckland University, WildWays, Muaūpoko Tribal Authority	New Zealand	Asia and Pacific	Avian Botulism Management in NZ
Sarah Wahltinez of Nautilus collaborations	New Zealand	Asia and Pacific	Humane electrical stunning of farmed barramundi
Alison Small, Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Australia	Asia and Pacific	Head-only electrical stunning in adult cattle (grant application being prepared)
Craig Radford of Auckland University	Auckland, New Zealand	Asia and Pacific	Investigation pain perception in cartilaginous fish (preparing Marsden Application)

TOR 6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOAH?

Yes

Name of expert	Kind of consultancy	Subject
Johnson, C.B.	Member, WOAH working group	Chapters 7.5 and 7.6 of the Terrestrial Animal Health Code

Kells, N.J.	Member, WOAH Working Group	Revision of Terrestrial Code chapters on animal transport

TOR 7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

Yes

- *Johnson, C.B. National Animal Welfare Advisory Committee, expert scientific member*
- *Beausoleil, N.J. Australia NZ Council for the Care of Animals in Research and Teaching NZ board member*
- *Beausoleil, N.J. New Zealand Veterinary Journal Editorial Board – Chair and Animal welfare expert member*
- *Beausoleil, N.J. Sentient Animal Law Foundation – Board member*
- *Beausoleil, N.J. Wellington Zoo Trust Animal Welfare Committee – Scientific member*
- *Beausoleil, N.J. Companion Animals NZ Animal Welfare Committee – Scientific member*
- *Member, Victorian Animal Welfare Advisory Committee, Victorian Government. Dr Lauren Hemsworth*
- *Invited Member, Stakeholder Reference Group Virtual Fencing Technology, Department of Agriculture, Fisheries and Forestry (2024). Dr Caroline Lee, CSIRO.*
- *Dana Campbell, contributed to the Review of the Code of Practice on the Humane Treatment of Wild and Farmed Australian Crocodiles.*
- *Ali Small, Expert Advisory Panel member: Review of the Code of Practice for the Humane Treatment of Wild and Farmed Australian Crocodiles. Department of Climate Change, Energy, the Environment and Water.*
- *Caroline Lee, NSW Government, Member, Animal Welfare Advisory Council.*
- *Caroline Lee, member, RSPCA, Animal Welfare and Ethics Committee.*
- *Caroline Lee, Expert witness, Parliamentary Inquiry Virtual Fencing, NSW Government.*

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOAH, to personnel from WOAH Members?

Yes

a) Technical visit : 0

b) Seminars : 0

c) Hands-on training courses: 0

d) Internships (>1 month) : 4

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
D	D (internships > 1 month) Australian Government Veterinary Internships: Students are exposed to a range of animal welfare regulatory and policy areas of the Australian Government including live export and livestock processing.	Australia	5

TOR 8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOAH?

Yes

National/International	Title of event	Co-organiser	Date	Location	No. Participants
Internationally	WOAH 6th Global Animal Welfare Forum	WOAH	2024-10-24	Mexico	3
Internationally	International Building synergies at the climate-health nexus in Asia and the Pacific	ESCAP, FAO, UN, WHO and WOAH	2024-02-20	Virtual	1
Internationally	WOAH Regional Animal Welfare Strategy (RAWS) Asia-Pacific animal welfare webinar	WOAH	2024-07-01	Virtual	1
Internationally	WOAH Whole Journey Scenario workshop on long-distance transport by land and sea.	WOAH	2024-11-08	Cartagena, Colombia	2

TOR 9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOAH that may be useful to Members of WOAH

a) Articles published in peer-reviewed journals:

55

Atkinson, L.; Doyle, R.E.; Jongman, E.C. Temperament Behaviours in Individually Tested Sheep Are Not Related to Behaviours Expressed in the Presence of Conspecifics. Animals 2024, 14, 155. https://doi.org/10.3390/ani14010155

Babington, S., A. J. Tilbrook, M. S. K., J. N. Fernandes, T. Crowley, M., L. Ding, A. H. Fox, S. Zhang, E. A. Kho, D. Cozzolino, T. J. Mahony, and D. Blache. 2024. Finding biomarkers of experience in animals. Journal of Animal Science and Biotechnology 15doi: https://jasbsci.biomedcentral.com/articles/10.1186/s40104-023-00989-

Beausoleil, N.J., Farouk, M.M., Webster, J., Johnson, C.B., Dowling, S., Sazili, A.Q., Cameron, C. 2024. Comparison of recovery of sheep, goats and calves from reversible electrical head-only and head-to-body stunning for halal meat production. New Zealand Veterinary Journal, 72(5):288-299. doi: 10.1080/00480169.2024.2367532.

Blache, D., E. A. Kho, A. J. Tilbrook, K. Tomas, K. J. Plush, D. D'Souza, S. K. Maloney, and D. Cozzolino. 2024. Near or mid-infra-red spectroscopy of the prefrontal cortex to identify previous stressful experience in an animal. Scientific Reports 14doi: https://doi.org/10.1038/s41598-024-79171-y

Boys, R.M., Kot, B.C.W., Lye, G., Beausoleil, N.J., Hunter, S., Stockin, K.A. 2024. Evaluation of ballistics euthanasia applied to stranded cetaceans using ethological and post-mortem computed tomography assessment. Veterinary Research Communications https://doi.org/10.1007/s11259-024-10537-3

Campbell (2024). Friend or foe? Early life adversity to improve farmed animal welfare. Frontiers in Animal Science, 5, 1484718. doi: 10.3389/fanim.2024.1484718

Campbell, Hewitt, Lee, Timmerhues, and Small (2024). Behaviours of farmed saltwater crocodiles (Crocodylus porosus) housed individually or in groups. Frontiers in Veterinary Science, 11, 1394198. doi: 10.3389/fvets.2024.1394198

Campbell, Cohen-Barnhouse, & Bursian (2024). Effects of simple cage enrichment and its removal on the behavior and welfare of American mink (Neogale vison). Journal of Applied Animal Welfare Science, https://doi.org/10.1080/10888705.2024.2337935

Cohen S, Foss E, Beths T, & Musk GC. (2024). An Exploration of Analgesia Options for Australian Sheep. Animals, 14, 7. doi.org/10.3390/ani14070990

Colditz, Campbell, Ingham, & Lee (2024). Review: Environmental enrichment builds functional capacity and improves resilience as an aspect of positive welfare in production animals. Animal, 101173. https://doi.org/10.1016/j.animal.2024.101173

Colloff, A., Baker, S.E., Beausoleil, N.J., Sharp, T., Golledge, H., Lane, J., Cox, R., Siwonia, M., Delahay, R. 2024. Use of an expert elicitation methodology to compare welfare impacts of two approaches for blood sampling European badgers (Meles meles) in the field. Animal Welfare 15, 33:e17. doi:10.1017/awf.2024.16

Dalziel, J. E., G. Zobel, H. Dewhurst, C. Hurst, T. Olson, R. Rodriguez-Sanchez, L. Mace, N. Parkar, C. Thum, R. Hannaford, K. Fraser, A. MacGibbon, S. A. Bassett, J. Dekker, R. C. Anderson and W. Young. 2023. A diet enriched with Lacticaseibacillus rhamnosus HN001 and milk fat globule membrane alters the gut microbiota and decreases amygdala GABA a receptor expression in stress-sensitive rats. International Journal of Molecular Sciences 24(13): Article number 10433. https://doi.org/10.3390/ijms241310433

Deeming, L.E., Beausoleil, N.J., Stafford, K.J., Webster, J.R., Cox, N., Zobel, G. 2023. Evaluating the long-term conformation and hoof growth effects of starting hoof trimming at 5 months of age in New Zealand dairy goats. Journal of Dairy Science 106(2): 1065-1077. https://doi.org/10.3168/jds.2022-22321

Dickson, Monk, Lee, & Campbell (2024). Loss of a grooming enrichment impacts physical, behavioural, and physiological measures of welfare in grazing beef cattle. Animal, 18, 101091. https://doi.org/10.1016/j.animal.2024.101091

Dickson, Monk, Lee, & Campbell (2024). Environmental enrichment during yard weaning alters the performance of calves in an attention bias and a novel object recognition test. Frontiers in Animal Science, 5, 1364259. https://doi.org/10.3389/fanim.2024.1364259

Edwards, J. P., M. Qasim, R. H. Bryant, C. Thomas, C. Wright-Watson, G. Zobel, M. B. Neal and C. R. Eastwood. 2024. On-animal sensors may predict paddock level pasture mass in rotationally grazed dairy systems. Computers and Electronics in Agriculture 219: Article number 108779. https://doi.org/10.1016/j.compag.2024.108779

Field, L., Hemsworth, L., Jongman, E., McGill, D., & Verdon, M. (2024b). Early-life contact with non-maternal adult cows and a pasture-based rearing environment influence behavioural responses of dairy heifers to novelty. Animal Welfare, 33, e18. https://doi.org/10.1017/awf.2024.20

Field, L., Verdon, M., Jongman, E., & Hemsworth, L. (2024a). A survey of stockperson attitudes and youngstock management practices on Australian dairy farms. Animal Production Science, 64(1). https://doi.org/10.1071/AN23249

Hewitt, L., Niemeyer, D., & Small, A. (2024). The use of a penetrative captive bolt device during the killing of farmed saltwater crocodiles (Crocodylus porosus). Journal of Applied Animal Welfare Science, 1–15. https://doi.org/10.1080/10888705.2024.2357580

Hitchman, S,. Zobel, G., Schütz, K.E. Jago, J., Reed, C., Hay, E., Thomas. C. Edwards, J.P. Verhoek, K.J. 2024.Updated method of estimating heat load for grazing dairy cattle. New Zealand Journal of Agricultural Research. https://doi.org/10.1080/00288233.2024.2396970

Jago J, P Beukes, E Cuttance, D Dalley, P Edwards, W Griffiths, K Saunders, L Shackleton, K Schütz. 2023. Strategies to minimise the impact of climate change and weather variability on the welfare of dairy cattle in New Zealand and Australia. Animal Production Science. https://doi.org/10.1071/AN22359.

Littlewood, K.E., Beausoleil, N.J., Mellor, D.J. 2024. Assessing equine welfare: Operationalizing the Five Domains Model for veterinary practitioners. pp 2-18. In: Koch, W. (Ed). Equine Welfare in Clinical Practice, Academic Press.

Lucas, M. E., L. Hemsworth, K. L. Butler, R. S. Morrison, A. J. Tilbrook, J. N. Marchant, J. L. Rault, R. Y. Galea, and P. H. Hemsworth. 2024a. Early human contact and housing for pigs - part 2: resilience to routine husbandry practices. Animal 18:101165. doi: https://doi.org/10.1016/j.animal.2024.101165

Lucas, M. E., L. Hemsworth, K. L. Butler, R. S. Morrison, A. J. Tilbrook, J. N. Marchant, J. L. Rault, R. Y. Galea, and P. H. Hemsworth. 2024b. Early human contact and housing for pigs – part 3: ability to cope with the environment. Animal 18(6):101166. doi: https://doi.org/10.1016/j.animal.2024.101166

Lucas, M. E., L. Hemsworth, K. L. Butler, R. S. Morrison, A. J. Tilbrook, J. N. Marchant, J. L. Rault, R. Y. Galea, and P. H. Hemsworth. 2024c. Early human contact and housing for pigs – part 1: responses to humans, novelty and isolation. Animal 18(6):101164. doi: https://doi.org/10.1016/j.animal.2024.101164

McDowall, S., Hamilton-Bruce, A., Cobb, M., & Hazel, S. (2024). Evaluation of current practices for dogs engaged in assistance and therapy support programs within Australia. Journal of Veterinary Behavior. 73:1-9. https://doi.org/10.1016/j.jveb.2024.03.002

Merridale-Punter, M.S., Wodajo, A.L., Elias, B., Bakos, A.M., Zewdu, H., Tesfaye, R., Hailegebreal, G., Sori, T., El-Hage, C.M., Wiethoelter, A.K. and Hitchens, P.L., 2024. Equipment-related wounds and associated risk factors in working equids of the Oromia national regional state in Ethiopia. Animal Welfare, 33, p.e42. doi:10.1017/awf.2024.52

Merridale-Punter MS, Wiethoelter AK, El-Hage CM, Patrick C, Hitchens PL (2024) Common clinical findings identified in working equids in low- and middle-income countries from 2005 to 2021. PLOS ONE 19(6): e0304755. https://doi.org/10.1371/journal.pone.0304755

Merridale-Punter, M.S., Elias, B., Wodajo, A.L. et al. Putting the cart before the horse: mixed-methods participatory investigation of working equid harnessing practices in three selected towns of the Oromia national regional state in Ethiopia. BMC Vet Res 20, 113 (2024). https://doi.org/10.1186/s12917-024-03967-3

Moss, A.F.; Northey, R.; Sukirno; Nawab, A.; Akter, N.; Taylor, P.S.; Dao, H.T. Evidence-Based Recommendations for Effective Enrichment to Improve the Welfare of Caged Hens Used for Research and Teaching Purposes. Poultry 2024, 3, 354-363. https://doi.org/10.3390/poultry3040027

Muller, M., E. Van Liefferinge, A. Tilbrook, R. van Barneveld, and E. Roura. 2024. Excess dietary Lys reduces feed intake, stimulates jejunal CCK secretion and alters essential and non-essential blood AA profile in pigs. Journal of Animal Science and Biotechnology 15:24. doi:

https://doi.org/10.1186/s40104-023-00971-9

Musk, G.C. and CB Johnson (2024). Comparison of methods of pre-slaughter stunning of cattle in Australia - mechanical, electrical and dielectric (electromagnetic). Animals https://doi.org/10.3390/ani14213141

Ospina Riosa., Caroline Lee, Sarah J. Andrewartha and Megan Verdon. 2024. Temperament of the dairy cow relates to her maternal behaviour in a pasture-based extended suckling system. Applied Animal Behaviour Science, 279, 106400. https://doi.org/10.1016/j.applanim.2024.106400.

Pan, Y., Cohen, S. Reporting practices of anesthetic and analgesic use in rodent orthopedic research. Sci Rep 14, 26225 (2024). https://doi.org/10.1038/s41598-024-76750-x

Rana, Lee, Walkden-Brown, & Campbell (2024). Effects of ultraviolet light supplementation on hen behaviour and welfare during early lay. Applied Animal Behaviour Science, 273, 106235. https://doi.org/10.1016/j.applanim.2024.106235

Sahebjam, F., Chambers, P., Kongara, K., Zhang, Y., Lopez, N., Jacob, A., Singh, P., Prabakar, S., 2024. Minimizing pain in deer antler removal: Local anaesthetics in ZnO nanoparticle based collagen dressings as a promising solution. Euro. J. Pharm. Biopharm. 197, 114237

Salvin, H.; Monk, J.E.; Cafe, L.M.; Harden, S.; Lee, C. 2024. Influences on Perceived Feasibility of Animal-Based Measures in a Producer-Driven Welfare Benchmarking System. Animals, 14, 2666. https:// doi.org/10.3390/ani14182666

Salvin, Lees, Cafe, Morris and Lee. 2024. Startle magnitude is a repeatable measure of reactive temperament in sheep. Applied Animal Behaviour Science, 279, 106404.

Sapkota, Sujan, Richard Laven, Shanker Raj Barsila, Nikki Kells, Kristina Ruth Mueller, and Dhurba Dc. 2024. "Assessment of Welfare in Transhumance Yak Hybrids (Chauris) in the Lower Himalayan Region of Nepal." Ruminants 4 (1): 136–51. https://doi.org/10.3390/ruminants4010009.

Schütz, K. E., L. R. Saunders, F. J. Huddart, T. Watson, B. Latimer and N. R. Cox. 2024. Effects of shade on the behaviour and physiology of sheep in a temperate climate. Applied Animal Behaviour Science. https://doi.org/10.1016/j.applanim.2024.106185

Schütz, K. E., B. Latimer, N. McDonald, L. B. Hunter, F. J. Huddart, T. Watson, L. R. Saunders, N. J. Kells, N. R. Cox and R. M. Monaghan. 2024. Effects of two wintering practices on behavioral and physiological indicators of welfare of non-lactating, pregnant dairy cattle in a pasture-based system. Journal of Dairy Science. https://doi.org/10.3168/jds.2023-24441

Sapkota, Sujan, Richard Laven, Shanker Raj Barsila, Nikki Kells, Kristina Ruth Mueller, and Dhurba Dc. 2024. "Assessment of Welfare in Transhumance Yak Hybrids (Chauris) in the Lower Himalayan Region of Nepal." Ruminants 4 (1): 136–51. https://doi.org/10.3390/ruminants4010009.

Serres, A., Boys, R.M., Beausoleil, N.J., Platto, S., Delfour, F., Li, S. 2024. The first standardized scoring system to assess the welfare of free-ranging Indo-Pacific Humpback Dolphins (Sousa chinensis). Aquatic Conservation: Marine and Freshwater Ecosystems, 34:e70004 https://doi.org/10.1002/aqc.70004

Shorten, P. R. and K. E. Schütz 2024. Development of a heat load index and risk map for grazing sheep. New Zealand Journal of Agricultural Research. https://doi.org/10.1080/00288233.2024.2347934

Shorten, P.R., Hunter, L.B. 2024. Acoustic sensors to detect the rate of cow vocalization in a complex farm environment. Applied Animal Behaviour Science 278: 106377. https://doi.org/10.1016/j.applanim.2024.106377

Singh, P.; Venkatachalam, D.; Kongara, K.; Chambers, P. 2024. Pain Mitigation Strategies for Disbudding in Goat Kids. Animals, 14, 555. https://doi.org/10.3390/ani14040555

Tomas, K., J. Savaglia, R. J. E. Hewitt, K. J. Plush, D. N. D'Souza, K. L. Butler, P. H. Hemsworth, and A. J. Tilbrook. 2024a. Effects of maternal contact and positive human contact during lactation on pork quality: Positive human contact to piglets during lactation improves pork loin muscle pH. Meat Science 219:109650. doi: DOI:10.1016/j.meatsci.2024.109650

Tomas, K., J. Savaglia, K. J. Plush, D. N. D'Souza, K. L. Butler, P. H. Hemsworth, and A. J. Tilbrook. 2024b. Maternal contact and positive human interactions during lactation impact on pig stress resilience post-weaning. Applied Animal Behaviour Science 276doi: https://doi.org/10.1016/j.applanim.2024.106326

Tomas, K., J. Savaglia, K. J. Plush, D. N. D'Souza, K. L. Butler, P. H. Hemsworth, and A. J. Tilbrook. 2024c. Maternal contact and positive human interactions during lactation impacts piglet performance and behaviour during lactation. Frontiers in Animal Science 4doi: https://doi.org/10.3389/fanim.2023.1289518

Wahltinez, Sarah J., Shari Cohen, Paul Hardy-Smith, Christine Huynh, and Nikki J. Kells. 2024. "Evaluation of Insensibility in Humane Slaughter of Teleost Fish Including the Use of Electroencephalogram with a Case Study on Farmed Barramundi (Lates Calcarifer)." Aquaculture, April, 740993. https://doi.org/10.1016/j.aquaculture.2024.740993.

Wilhelmsson, S., Hemsworth, P. H., Andersson, M., Yngvesson, J., Hemsworth, L., & Hultgren, J. (2024). Training of transport drivers improves their handling of pigs during loading for transport to slaughter. animal, 101115. https://doi.org/10.1016/j.animal.2024.101115

Williams, N., Hemsworth, L., Chaplin, S., Shephard, R., & Fisher, A. (2024). Are there risk factors commonly observed on Australian farms where the welfare of livestock is poor? Animal Welfare, 33, e34. https://doi.org/10.1017/awf.2024.27

Williams N, Chaplin S, Hemsworth L, Shephard R, Fisher A. Can an animal welfare risk assessment tool identify livestock at risk of poor welfare outcomes? Animal Welfare. 2024;33:e32. https://doi.org/10.1017/awf.2024.28.

Williams, N., Hemsworth, L., Chaplin, S., Shephard, R., & Fisher, A. (2024). Analysis of substantiated welfare investigations in extensive farming systems in Victoria, Australia. Australian Veterinary Journal. http://doi.org/10.1111/avj.13342

Yang Y, Narayan E, Rey Planellas S, Phillips CJ, Zheng L, Xu B, Wang L, Liu Y, Sun Y, Sagada G, Shih HY. Effects of stocking density during simulated transport on physiology and behavior of largemouth bass (Micropterus salmoides). Journal of the World Aquaculture Society. 2024 Apr;55(2):e13054.

Yang Y, Narayan E, Phillips CJ, Planellas SR, Zheng L, Ruan X, Tegomo AF, Shih HY, Shao Q, Descovich K. Effects of simulated motion frequency related to road quality on the welfare and recovery of transported largemouth bass (Micropterus salmoides). Applied Animal Behaviour Science. 2024 Aug 1;277:106342.

b) International conferences:

6

Beausoleil, N.J. The Five Domains: Where did it come from and where could it take us together? [Keynote], American Zoological Association Animal Wellbeing Summit, New Orleans, USA, November 12-13, 2024.

Beausoleil, N.J. How can new poisons kill more humanely? Incorporating animal welfare into pathways for developing selective toxins to control introduced animals. Universities Federation for Animal Welfare/Swiss Federal Food Safety and Veterinary Office 'Humane Endings for Animals Conference', Bern, Switzerland March 6-7, 2024 [online presentation due to COVID].

Berry, Campbell, Flanagan, Kadel, Wade, Lee, Coman, Rombenso. Behavioural metrics of individual broodstock Penaeus monodon:

baseline development and response to husbandry interventions. Pp 113. AQUA 2024, Copenhagen, Denmark, Aug 26-30 2024.

Campbell, Hewitt, Lee, Timmerhues, and Small. Behaviours of farmed saltwater crocodiles (Crocodylus porosus) housed individually or in groups. International Society for Behavioral Ecology Congress, Melbourne, VIC 29 Sept – 4 Oct, 2024.

Rombenso, Berry, Flanagan, Kadel, Wade, Lee, Coman, and Campbell. Feeding behaviour of individual broodstock Penaeus monodon: optimising feeding and nutrition for reproduction. Pp 853. AQUA 2024, Copenhagen, Denmark, Aug 26-30 2024.

Small, A. Pain Management in Sheep (2024) New Zealand Veterinary Association Conference; Christchurch, New Zealand. 19-21 June 2024.

c) National conferences:
5
Beausoleil, N.J. Teaching the next generation of change-makers for animals. ANZCCART Conference, Christchurch, NZ, September 9-11.

Beausoleil, N.J. The Five Domains Model. Auckland Zoo Staff Symposium, Auckland, April 3, 2024

Campbell and Colditz. Invited Speaker: Enrichment of early environments to improve laying hen resilience and welfare. Australian Poultry Science Symposium, Sydney, NSW, February 19, 2024

Hitchman,S., Zobel, G. Schütz,K.E., Jago, J.G., Reed, C., Hay, E., Thomas, C., Edwards, J.P., Verhoek K.J. 2024. An updated heat load index for grazing dairy cattle
Proceedings of the Australasian Dairy Science Symposium 2024. Pp 59-61.

McDonald, A. Painting, C Phyn, C., Pinxterhuis, I., Schutz,K.E.. 2024. Behaviour and liveweight of Holstein-Friesian calves with different milk allowances. New Zealand Veterinary Association Annual Conference.

d) Other (Provide website address or link to appropriate information):

11. What have you done in the past year to advance your area of focus, e.g. updated technology?

12. Additional comments regarding your report: