OIE Collaborating Centres Reports Activities

Activities in 2021

This report has been submitted : 2022-04-26 14:54:44

Title of collaborating centre:	Animal Welfare Science and Bioethical Analysis; the David Bayvel Consortium comprises:
Address of Collaborating Centre:	Charles Fergusson Building 34-38 Bowen Street PO Box 2526 Wellington NEW ZEALAND
Tel.:	+64-4 894.03.73
Fax:	
E-mail address:	kate.littin@mpi.govt.nz
Website:	www.mpi.govt.nz
Name of Director of Institute (Responsible Official):	Dr Kate Littin
Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Dr Kate Littin, New Zealand OIE Animal Welfare focal point
Name of writer:	Dr Hannah Larsen

ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

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

Animal welfare	
Title of activity	**Scope**
Contribution to Responsible Reptile Sourcing Standard (RRSS) multi-stakeholder consultation process	Input into consultation on this standard, relevant to the OIE standard for humane reptile killing Ch 7.14.
EmVetNet - Covid 19 thematic platform on Animal Welfare	Provided expertise to this Platform.
Open Philanthropy Project to support implementation of Chapter 7.3. Animal welfare and pig production systems and also Chapter 7.6 Killing for disease control purposes in ASF	Still in discussion and awaiting decision from funding body.
International Society for Applied Ethology 2021 Conference (online) “Developing Animal Behaviour and Welfare: Real Solutions for Real Problems”.	Participation in the organisation and attendance at the conference, to support the development of expertise in the region.

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
Open Philanthropy Project to support implementation of Chapter 7.3. Animal welfare and pig production systems and also Chapter 7.6 Killing for disease control purposes in ASF	Still in discussion and awaiting decision from funding body.	☐Surveillance and control of animal diseases ☐Food safety ☒Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines

ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations

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

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
International Livestock Research Institute (ILRI)	Nairobi and Ethiopia	☒Africa ☐Americas ☐Asia and Pacific ☐Europe ☐Middle East	Rebecca Doyle (Research Fellow AWSC at the University of Melbourne to Sept 2021) worked with ILRI to contribute an animal welfare perspective to ILRI's mission to ILRI's mission to improve food and nutritional security and to reduce poverty in developing countries through research for efficient, safe and sustainable use of livestock—ensuring better lives through livestock.
Discussion progressed to establish a Network of Animal Welfare Collaborating Centres		☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	

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

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose

OIE CC in Veterinary Epidemiology and Public Health	New Zealand	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East	Through research collaborations between the AWSBC and the EpiCentre, both at Massey University in New Zealand, the David Bayvel Collaborating Centre maintained a network with an OIE Collaborating Centre in Veterinary Epidemiology (OIE CC in Veterinary Epidemiology and Public Health in the Asia Pacific Region). Examples of collaborative research between the two OIE CCs include surveys of the health of working farm dogs (TeamMate Study; Isaksen et al. 2020 below) and industry-based research on the causes of mortality in bobby calves (Boulton et al. 2020 below) and validation of indicators of dehydration in young calves (Kells et al. 2020 below).
OIE Collaborating Centre Network for Veterinary Emergencies (EmVetNet)		☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Providing expertise and connection relating to animal welfare in emergencies

ToR: To place expert consultants at the disposal of the OIE.

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

Yes

Name of expert	Kind of consultancy	Subject
Prof Paul Hemsworth	Contributing to the development of OIE welfare standards	World Organization for Animal Health (OIE) ad hoc Group, Pig Welfare.
Hayley Carr	Contributing expertise to EmVet	Animal welfare emergency management

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

No

ToR: To organise and participate in scientific meetings and other activities on

behalf of the OIE

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

No

ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 70

Abolfazl Mahnani, Ali Sadeghi-Sefidmazgi, Saeid Ansari-Mahyari, Gholam-Reza Ghorbani, Hamideh Keshavarzi. Farm and cow factors and their interactions on the incidence of retained placenta in holstein dairy cows. Theriogenology 159, 87-97.

Aleri, J.W., Gogoi-Tiwari, J., Tiwari, H.K., Fisher, A.D., Waichigo, F.W. and Robertson, I.D. (2021). Prevalence of failure of passive transfer of immunity in dairy calves in a Mediterranean pasture-based production system of the south-west region of Western Australia. Research in Veterinary Science 139 121–126. https://doi.org/10.1016/j.rvsc.2021.07.020

Baptista, J., Blache, D., Cox-Witton, K., Craddock, N., Dalziel, T., de Graaff, N., Fernandes, J., Green, R., Jenkins, H., Kahn, S., Kelly, D., Lauber, M., Maloney, S.K., Peachey, B., Rodger, I., Skuse, J.M., Tilbrook, A.J., Walker, F.R., Wall, K., Zito, S. (2021). Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia. Frontiers in Veterinary Science, Vol 7, 2021, p 1219. https://www.frontiersin.org/article/10.3389/fvets.2020.621843

Bari MS, Allen S, Mesken JA, Cohen-Barnhouse AM & Campbell DLM (2021). Relationship between range use and fearfulness in free-range hens from different rearing enrichments. Animals, 11, 30. https://doi.org/10.3390/ani11020300

Barreto, M., Planellas, S.R., Yang, Y., Phillips, C.J.C., Descovich, K. (2021). Emerging indicators of fish welfare in aquaculture. Reviews in Aquaculture. doi: 10.1111/raq.12601.

Barkley, J. A., Pempek, J. A., Bowman, A. S., Nolting, J. M., Lee, J., Lee, S., & Habing, G. G. (2021). Longitudinal health outcomes for enteric pathogens in preweaned calves on Ohio dairy farms. Preventive Veterinary Medicine, 190, 105323. https://doi.org/10.1016/j.prevetmed.2021.105323

Barreto, M., Hantzopoulou, G.-C. H., & Tilbrook, A. (2021). A Retrospective Literature Evaluation of the Integration of Stress Physiology Indices, Animal Welfare and Climate Change Assessment of Livestock. Animals, 11. doi:10.3390/ani11051287

Bengsen, A. J., Hampton, J. O., Comte, S., Freney, S., and Forsyth, D. M. (2021). Evaluation of helicopter net-gunning to capture wild fallow deer (Dama dama). Wildlife Research Online early. https://www.publish.csiro.au/WR/justaccepted/WR21007

Campbell DLM & Lee C (2021). A perspective on strategic enrichment for brain development: Is this the key to animal happiness? Frontiers in Veterinary Science, 8, 720422. https://doi: 10.3389/fvets.2021.720422

Campbell DLM, Marini D, Lea JM, Keshavarzi H, Dyall TD & Lee C (2021). The application of virtual fencing technology effectively herds cattle and sheep. Animal Production Science, https://doi.org/10.1071/AN20525

Campbell DLM, Whitten J, Slater E & Lee C (2021). Rearing enrichments differentially modified hen personality traits and reduced prediction of range use. Animal Behaviour, 179, 97-109. https://doi.org/10.1016/j.anbehav.2021.06.024

Carnovale, F., Xiao, J., Arney, D., Descovich, K., Guo, W., Shi, B, Phillips, CJC (2021) Chinese public attitudes towards, and knowledge of, animal welfare. Animals. 11(3):855. Doi: 10.3390/ani11030855

Chiew, S.J., Butler, K.L., Fanson, K.V., Eyre, S., Coleman, G.J., Sherwen, S.L., Melfi, V. and Hemsworth, P.H. (2021) Effects of the presence of zoo visitors on zoo-housed little penguins (Eudyptula minor), New Zealand Journal of Zoology, DOI: 10.1080/03014223.2021.1896560

Chiew, S.J., Hemsworth, P.H., Melfi, V., Sherwen, S.L., Burns, A. and Coleman G.J. (2021). Visitor Attitudes Toward Little Penguins (Eudyptula minor) at Two Australian Zoos. Frontiers in Psychology, 12, 2021, p284 https://www.frontiersin.org/art.../10.3389/fpsyg.2021.626185

Cobb M, Otto C, Fine A. (2021) The Animal Welfare Science of Working Dogs: Current Perspectives on Recent Advances and Future Directions. Frontiers in Veterinary Science: Animal Behaviour and Welfare. doi:

10.3389/fvets.2021.666898
Costa, J.H.C., Cantor, M.C., Neave, H.W., 2021. Symposium review: Precision technologies for dairy calves and management applications. J. Dairy Sci. 104, 1203–1219. https://doi.org/10.3168/JDS.2019-17885
Edwards L.E. and Hemsworth, P.H. (2021). The impact of management, husbandry and stockperson decisions on the welfare of laying hens in Australia. Animal Production Science Review. https://doi.org/10.1071/AN19664
Fernandes, J.N.; Hemsworth, P.H.; Coleman, G.J.; Tilbrook, A.J. (2021). Costs and Benefits of Improving Farm Animal Welfare. Agriculture 2021,11, 104. https://doi.org/10.3390/agriculture11020104
Fernandez, E.J., & Chiew, S.J. (2021). Animal-Visitor interactions: Effects, experiences, and welfare. Animal Behavior and Cognition, 8(4), 462-467. https://www.animalbehaviorandcognition.org/article.php?id=1284
Ford, C., Bellward, L., Phillips, CJC., Descovich, K. (2021) Use of interactive technology in captive great ape management. Journal of Zoological and Botanical Gardens. 2, 300-315. Doi: 10.3390/jzbg2020021
Glanville Carmen, Ford Jennifer, Cook Rebecca, Coleman Grahame J. Community Attitudes Reflect Reporting Rates and Prevalence of Animal Mistreatment. Frontiers in Veterinary Science, 8, 2021, 1140. https://www.frontiersin.org/article/10.3389/fvets.2021.666727
Hall, B.A.; McGill, D.M.; Sherwen, S.L.; Doyle, R.E. Cognitive Enrichment in Practice: A Survey of Factors Affecting Its Implementation in Zoos Globally. Animals 2021, 11, 1721. https://doi.org/10.3390/ani11061721
Hampton, J. O., Amos, M., Pople, T., Brennan, M., and Forsyth, D. M. (2021). Minimising mortalities in capturing wildlife: refinement of helicopter darting of chital deer (Axis axis) in Australia. Wildlife Research 48, 304–313. https://doi.org/10.1071/WR20106
Hampton, J.O.; Hyndman, T.H.; Allen, B.L.; Fischer, B. (2021). Animal Harms and Food Production: Informing Ethical Choices. Animals 2021, 11, 1225. https://doi.org/10.3390/ani11051225
Hampton, J. O., Arnemo, J. M., Barnsley, R., Cattet, M., Daoust, P.-Y., DeNicola, A. J., Eccles, G., Fletcher, D., Hinds, L. A., Hunt, R., Portas, T., Stokke, S., Warburton, B., and Wimpenny, C. (2021). Animal welfare testing for shooting and darting free-ranging wildlife: a review and recommendations. Wildlife Research Online early. https://doi.org/10.1071/WR20107
Hampton JO, Eccles G, Hunt R, Bengsen AJ, Perry AL, et al. (2021) A comparison of fragmenting lead-based and lead-free bullets for aerial shooting of wild pigs. PLOS ONE 16(3): e0247785. https://doi.org/10.1371/journal.pone.0247785
Hayes, M.E., Hemsworth, L.M., Morrison, R.S., Tilbrook, A.J. and Hemsworth, P.H. (2021) Positive human contact and housing systems impact the responses of piglets to various stressors. Animals 11, 1619. https://www.mdpi.com/2076-2615/11/6/1619 (registering DOI)
Hayes, M.E.; Hemsworth, L.M.; Morrison, R.S.; Butler, K.L.; Rice, M.; Rault, J.-L.; Hemsworth, P.H. (2021). Effects of Positive Human Contact during Gestation on the Behaviour, Physiology and Reproductive Performance of Sows. Animals 2021, 11, 214. https://doi.org/10.3390/ani11010214 (registering DOI)
Heizmann, V., Poskoci, R., Troxler, J., Fischer, I., Coleman, G.J. and, Windschnurer, I. (2021). Einstellung gegenüber Katzen und zur Populationskontrolle sowie Haltungsbedingungen von Katzen auf österreichischen landwirtschaftlichen Betrieben. Weiner Tierarztliche Monatsschrift., 108, 144-168
Hempstead, M.N., Shearer, J.K., Sutherland, M.A., Fowler, J.L., Smith, J.S., Smith, J.D., Lindquist, T.M., Plummer, P.J., 2021. Cautery Disbudding Iron Application Time and Brain Injury in Goat Kids: A Pilot Study. Front. Vet. Sci. | www.frontiersin.org 1, 568750. https://doi.org/10.3389/fvets.2020.568750
Hemsworth Paul H. (2021) Cage production and laying hen welfare. Animal Production Science, 61, 821-836. https://doi.org/10.1071/AN19609
Hemsworth Lauren M., Rice Maxine, Hemsworth Paul H., Coleman Grahame J. (2021).Telephone Survey Versus Panel Survey Samples Assessing Knowledge, Attitudes and Behavior Regarding Animal Welfare in the Red Meat Industry in Australia. Frontiers in Psychology, 12, 1024. https://doi.org/10.3389/fpsyg.2021.581928
Hemsworth, L.M.; Jongman, E.C.; Coleman, G.J. (2021). The Human–Horse Relationship: Identifying the Antecedents of Horse Owner Attitudes towards Horse Husbandry and Management Behaviour. Animals 2021, 11, 278. https://doi.org/10.3390/ani11020278
Hewitt, Leisha; Small, Alison. Welfare of Farmed Crocodilians: Identification of Potential Animal-Based Measures Using Elicitation of Expert Opinion. Animals 2021; 11(12): 3450. https://doi.org/10.3390/ani11123450
Hitchens, P.L.; Booth, R.H.; Stevens, K.; Murphy, A.; Jones, B.; Hemsworth, L.M. The Welfare of Animals in Australian Filmed Media. Animals 2021, 11, 1986. https://doi.org/10.3390/ani11071986
Hunter, L.B., Baten, A., Haskell, M.J., Langford, F.M., O'Connor, C., Webster, J.R., Stafford, K., 2021a. Machine learning prediction of sleep stages in dairy cows from heart rate and muscle activity measures. Sci. Rep. 11, 1–10. https://doi.org/10.1038/s41598-021-90416-y
Hunter, L.B., Haskell, M.J., Langford, F.M., Connor, C.O., Webster, J.R., Stafford, K.J., 2021b. Heart Rate and Heart Rate Variability Change with Sleep Stage in Dairy Cows. Animals 11. https://doi.org/https://doi.org/10.3390/ani11072095
Hunter, L.B., O'Connor, C., Haskell, M.J., Langford, F.M., Webster, J.R., Stafford, K.J., 2021c. Lying posture does not accurately indicate sleep stage in dairy cows.
Jongman Ellen C., Fisher Andrew D. (2021) Euthanasia of laying hens: an overview. Animal Production Science 61, 1042-1047. https://doi.org/10.1071/AN20224

Jongman, E.C. (2021) Rearing conditions of laying hens and welfare during the laying phase. Animal Production Science, online early. https://doi.org/10.1071/AN20236
Jorquera-Chavez, M., Fuentes, S., Dunshea, F.R., Warner, R.D., Poblete, T., Unnithan, R.R., Morrison, R.S. and Jongman, E.C. (2021). Using imagery and computer vision as remote monitoring methods for early detection of respiratory disease in pigs. Computers and Electronics in Agriculture, Vol 187, 2021, 106283. https://doi.org/10.1016/j.compag.2021.106283
Keshavarzi H, Lee C, Johnson M, Abbot D, Ni W, & Campbell DLM. Validation of real-time kinematic (RTK) devices on sheep to detect grazing movement leaders and social networks in Merino ewes. Sensors, 21, 924. https://doi.org/10.3390/s21030924
Kleemann, D. O., Kelly, J. M., Arney, L. J., Len, J., Tilbrook, A. J., & Walker, S. K. (2021). Sexual behaviour, semen quality and fertility of young Border Leicester rams administered melatonin during spring. Animal Reproduction Science. Retrieved from https://doi.org/10.1016/j.anireprosci.2021.106804
Learmonth, M. J., Chiew, S. J., Godinez, A., & Fernandez, E. J. (2021). Animal-visitor interactions and the visitor experience: Visitor behaviors, attitudes, perceptions, and learning in the modern zoo. Animal Behavior and Cognition, 8(4), 632-649. https://www.animalbehaviorandcognition.org/article.php?id=1296
Learmonth, M.J., Sherwen, S.L. and Hemsworth, P.H. (2021). Assessing choice ability and preferences of five Leopard Tortoises (Stigmochelys pardalis) for three stimuli through a novel two-phase preference test. Journal of Zoo and Aquarium Research 9(2). https://doi.org/10.19227/jzar.v9i2.540
Lee C & Campbell DLM. A multi-disciplinary approach to assess the welfare impacts of a new virtual fencing technology (2021). Frontiers in Veterinary Science, 8, 637709. https://doi: 10.3389/fvets.2021.637709
Li, P., Cai, A., Descovich, K., Fu, T., Lian, H., Gao, T., Phillips, CJC. (2021) A comparison of rice husks and peanut shells as bedding materials on dairy cows' preferences, behaviour, and health. Animals. 11(7):1887. Doi: 10.3390/ani11071887
MacLean, E., Fine, A. H., Herzog, H., Strauss, E. G., & Cobb, M. L. (2021). The New Era of Canine Science: Reshaping Our Relationships with Dogs. Frontiers in Veterinary Science, 8, 762. https://www.frontiersin.org/articles/10.3389/fvets.2021.675782/full
Marini D, Colditz IG and Lee C (2021). Can Lambs in Pain Identify Medicated Feed? Front. Anim. Sci. 2:741631. doi: 10.3389/fanim.2021.741631
Marquette, G.A., McGee, M., Fisher, A.D. et al. Horn bud size of dairy-bred and suckler-bred calves at time of disbudding. Ir Vet J 74, 17 (2021). https://doi.org/10.1186/s13620-021-00196-0
Marquette, G.A., McGee, M., Fisher, A.D. Stanger, K. & Earley, B. (2021) Effect of age of suckler beef calves on stress indicators and growth performance in response to Burdizzo castration, Journal of Applied Animal Research, 49:1, 221-233, DOI: https://doi.org/10.1080/09712119.2021.1935266
Narayan, E., McElligott, A., & Tilbrook, A. J. (2021). Editorial: Animal Welfare Assessment: Edition 1. Frontiers in Veterinary Science. doi:https://doi.org/10.3389/fvets.2021.653422
Nash, R., Johnston, H., Robbins, A., Descovich, K. (2021) The effect of enrichment filling and engagement time on regurgitation and reingestion behaviour in three zoo-housed orangutans. Journal of Zoological and Botanical Gardens. 2, 10-20. Doi: 10.3390/jzbg2010002
Neave, Heather W, Paul Edwards, J., Thoday, Helen, Saunders, Katie, Zobel, Gosia, Webster, J.R., Edwards, J.W.; P.;, Thoday, H ;, Saunders, K ;, Zobel, G ;, 2021. Do Walking Distance and Time Away from the Paddock Influence Daily Behaviour Patterns and Milk Yield of Grazing Dairy Cows? Citation: Neave, H. https://doi.org/10.3390/ani11102903
Neave, Heather W., Webster, J.R., Zobel, G., 2021. Anticipatory behaviour as an indicator of the welfare of dairy calves in different housing environments. PLoS One 16, e0245742. https://doi.org/10.1371/journal.pone.0245742
Rana MS & Campbell DLM (2021). Application of ultraviolet light for poultry production: A review of impacts on behavior, physiology, and production. Frontiers in Animal Science, 2, 699262. https://doi: 10.3389/fanim.2021.699262
Rana MS, Cohen-Barnhouse AM, Lee C & Campbell DLM (2021). Preference testing for ultraviolet light spectrum and intensity in laying hens. Poultry Science, 101063. https://doi.org/10.1016/j.psj.2021.101063
Roadknight, N., Wales, W., Jongman, E.C., Courtman, N., Mansell, P., Woodward, A.P. and Fisher, A.D. 2021. Can calf age be estimated using a combination of serum gamma-glutamyl transferase, total protein and immunoglobulin G?, Research in Veterinary Science, Volume 141, 2021, Pages 14-18, https://doi.org/10.1016/j.rvsc.2021.10.002
Roadknight, N.W., Courtman, N.F., Mansell, P.D., Jongman, E.C., Loh, Z.A. and Fisher, A.D. (2021). Biochemistry and hematology reference intervals for neonatal dairy calves aged 5-12 days. Vet Clin Pathol. 2021; 00: 1– 9. https://doi.org/10.1111/vcp.12955
Roadknight, N.W., Mansell, P.D., Jongman, E.C., Courtman, N.F. and Fisher, A.D. (2021). Invited review: The welfare of young calves transported by road. Journal of Dairy Science. https://doi.org/10.3168/jds.2020-19346
Rodriguez-Sanchez, R., Barnaby, E., Améndola, L., Hea, S.-Y., Smith, B., Webster, J., Zobel, G., Hickman, D., 2879. Voluntary Oral Ingestion of a Sedative Prior to Euthanasia with CO 2 : Behavioural Responses of Mice 11, 2879. https://doi.org/10.3390/ani11102879
Schütz, K.E., Huddart, F.J., Cox, N.R., 2021. Effects of short-term exposure to drinking water contaminated with

manure on water and feed intake, production and lying behaviour in dairy cattle. Appl. Anim. Behav. Sci. 238, 105322. https://doi.org/10.1016/J.APPLANIM.2021.105322
Small, Ali; Belson, Sue; Brewer, Heather; Schmoelzl, Sabine. Marking to weaning production aspects of lambs provided with NSAID analgesia, compared with lambs receiving no analgesia, at the time of elastrator ring marking. Australian Veterinary Journal. 2021; 99:40-43.https://doi.org/10.1111/avj.13037
Small, A.; Fisher, A.D.; Lee, C.; Colditz, I. Analgesia for Sheep in Commercial Production: Where to Next? Animals 2021, 11, 1127. https://doi.org/10.3390/ani11041127
Small, Alison; Fetiveau, Manon; Smith, Robin; Colditz, Ian. Three Studies Evaluating the Potential for Lidocaine, Bupivacaine or Procaine to Reduce Pain-Related Behaviors following Ring Castration and/or Tail Docking in Lambs. Animals 2021; 11(12): 3583. https://doi.org/10.3390/ani1123583
Small, Ali; Marini, Danila; Colditz, Ian. Local Anesthetic Delivered with a Dual Action Ring and Injection Applicator Reduces the Acute Pain Response of Lambs during Tail Docking. Animals. 2021; 11:9. https://doi.org/10.3390/ani11082242
Taylor, R., A D , Coetsee, A.L., Doyle, R.E., Sutherland, D. and Parrott, M.L. 2021). Sniffing out danger: rapid antipredator training of an endangered marsupial. Aust Mammology. Online Early. https://www.publish.csiro.au/am/AM20048
Wilhelmsson, S., Andersson, M., Arvidsson, I., Dahlqvist, C., Hemsworth, P.H., Yngvesson, J. and Hultgren, J. Physical workload and psychosocial working conditions in Swedish pig transport drivers, International Journal of Industrial Ergonomics, Volume 83, 2021, 103124, https://doi.org/10.1016/j.ergon.2021.103124
Woodhouse, J., Carr, A., Liebergreen, N., Anderson, L., Beausoleil, N.J., Zobel, G., King, M., 2899. Conceptualizing Indigenous Human-Animal Relationships in Aotearoa New Zealand: An Ethical Perspective 11, 2899. https://doi.org/10.3390/ani11102899
Yang, Y., Wang, T., Phillips, C.J.C., Shao, Q., Narayan, E.J., Descovich, K. (2021). Knowledge of, and Attitudes towards, Live Fish Transport among Aquaculture Industry Stakeholders in China: A Qualitative Study. Animals. doi: 10.3390/ani11092678

b) International conferences: 14

Dana Campbell. Outdoor production systems and exposure to extreme weather conditions: implication on animal welfare. International Society for Applied Ethology 54th Congress, Virtual Workshop, August 4.
Dana Campbell. California Rangeland Conservation Coalition Annual Summit. Virtual, January 26

Cobb M. Animal welfare: how to assess and why it matters. Digital Technologies in Nature Workshop. 8th International Conference on Animal-Computer Interaction. 9-11 November 2021, hosted online by Indiana University Bloomington, USA, in-cooperation with ACM SIGCHI. [Spoken presentation]

Cobb M. (2021) Working Dog Welfare: Where are we and where are we going? 12th International Working Dog Conference. October 12-14, virtual. [Spoken presentation]

Cobb M & Webber S. (2021) Digital innovation for working dogs. 12th International Working Dog Conference. October 12-14, virtual. [Spoken presentation]

Hayes, M., Hemsworth, L.M., Morrison, R.,Tilbrook, A. Hemsworth, P. Piglets' fear of novelty and humans is influenced by housing systems and human interaction. Proceedings of the 54th Congress of the ISAE 2021. P72

Hunter, L., Baten, A., Langford, F., O'Connor, C., Webster, J.,Haskell. M., Stafford, K. 2021. Using machine learning to predict sleep stages from muscle activity and heart rate in dairy cows.
ISAE virtual meeting, July 2021.

Hunter, L. Measuring sleep for dairy cow welfare. Online Animal Welfare conference in association with science week, 21 July 2021.

Khan, A. Burggraaf, V., O'Connor, C., Jonker, A., Craigie, C. 2021. NZ dairy-beef production systems. International symposium: Dairy beef production systems. Global start point.

Neave HW. 2021. Understand the feelings, likes and wants of livestock and their application in management. Livestock Care Conference, Alberta Farm Animal Care, Canada. Mar 16.

Neave HW. 2021. Managing for the individual: personality of dairy animals can inform tailored feeding management. Farm animal cognition and its implementation into animal husbandry and management, Germany. Mar 25-26.

Neave, HW, K Schütz, and D Dalley. 2021. Lying behaviour of dairy cattle managed in muddy conditions in a

pasture based system. ISAE virtual meeting, July 2021.

Redfearn, A., McNally, J., Brewer, H., Hutchinson, D., Doyle, R., Doyle, R., Cowley, F. and Schmoelz, S. Fewer steps to a better ewe: behavioural transitions (BT) and activity monitors to measure lambing activity in Merino ewes. Proceedings of the 54th Congress of the ISAE 2021. P27

Schütz K, F Huddart, N Cox, and C Tucker. 2021. Heat stress mitigation by different farm management practices in New Zealand. Online Animal Welfare conference in association with science week, 21 July 2021.

Small, Ali. DTIS: Diathermic Syncope® - a new technology for pre-slaughter induction of reversible unconsciousness. North American Meat Industry Animal Care Conference 2021, Kansas and online. October 2021

c) National conferences: 17
Caroline Lee: John Barnett Memorial Lecture. Welfare impacts of virtual fencing technology. Australian Association of Animal Science. 33rd Australian Association of Animal Sciences Conference, 1-3 February 2021, Perth, Australia.
Dana Campbell. Virtual fencing for cattle: Understanding applications and animal impacts. Precision Agriculture Symposium, Precision Agriculture Laboratory, University of Sydney, Virtual seminar, Sept).
Hamideh Keshavarzi, Caroline Lee, Jim Lea, and Dana L.M. Campbell. Leadership and Social facilitation of a Virtual Fence in Beef Cattle. Presented in: 33rd Australian Association of Animal Sciences Conference, 1-3 February 2021, Perth, Australia.
Small, Ali. Pain relief in practice. In: Sheep Camelid and Goat Veterinary Society 2021; 29 Jun 2021 to end of 02 Jul 2021; Wagga Wagga and Online. Australian Veterinary Association; 2021. 1.
Juliet Cayzer & Neil Ward. Animal Tissue Sharing Database. Australia and New Zealand Council for the Care of Animals in Research and Teaching Conference, July 26-28, 2021, Queenstown, NZ.
Neil Ward & Juliet Cayzer. Can we make better use of animals sacrificed for RTT? Australian and New Zealand Laboratory Animal Association, August 31, 2021, Virtual Conference.
Kat Littlewood. One Domain to Five: Advancing veterinary duty of care. Australian and New Zealand College of Veterinary Scientists Scientific Series Online, 21 July 2021.
Kat Littlewood. The vet's role in end-of-life management of older and chronically ill cats in NZ. MPI Animal Welfare Journal Club presentation, August 2, 2021.
Dinakaran Venkatachalam. Basis of topical and transdermal drug delivery. Australian and New Zealand College of Veterinary Scientists Scientific Series Online, July 22, 2021.
Craig Johnson. The Minimal Anaesthesia Model: Development and refinement of the concept and subsequent practical applications (Cam Reid Oration). Australia and New Zealand Council for the Care of Animals in Research and Teaching Conference, July 26-28, 2021, Queenstown, NZ.
Craig Johnson. The Minimal Anaesthesia Model: Development and refinement of the concept and subsequent practical applications. Australia and New Zealand College of Veterinary Scientists Science Week, July 8-10, 2021, Australia.
Craig Johnson. For which animals is the concept of welfare important? (Webinar). VetFest, May 11-27, 2021, https://vetfest.ava.com.au/
Craig Johnson. Social license for use of animals in production, research, sport and as companions (Webinar). VetFest, May 11-27, 2021, https://vetfest.ava.com.au/
Preet Singh, Neil Ward & Antony Jacob. Virtual learning experiences utilizing digital technologies. ASCILITE webinar conference, August 25, 2021.
Ngaio Beausoleil. What is it like to be a rat in the Porsolt's Forced Swim Test? Australia New Zealand Council for the Care of Animals in Research and Teaching Conference, July 26-28, 2021, Queenstown, NZ.
Ngaio Beausoleil. The 'Five Domains' model for animal welfare assessment: Applications and value in the veterinary context. Australian Veterinary Association Virtual Conference (VetFest), May 11-27, 2021.
Ngaio Beausoleil. Applying the Five Domains Model to assess sow and piglet welfare impacts and enhancements in farrowing systems. National Animal Welfare Advisory Committee Subcommittee on Pig Code of Welfare, February 25, 2021, Wellington, NZ.

d) Other
(Provide website address or link to appropriate information): 9
Doyle, R. and Alders, R. (2021). The role of One Welfare in development and nutrition security. In One Welfare in Practice The Role of the Veterinarian. Ed Stephens, T. ISBN 9780367904067. Published October 26, 2021 by CRC Press.

Hardy-Smith, P. and Roadknight, N. (2021). Fish welfare and One Welfare - A veterinarian's perspective. In One Welfare in Practice The Role of the Veterinarian. Ed Stephens, T. ISBN 9780367904067. Published October 26, 2021 by CRC Press

Hemsworth, P.H. (2021). Optimising pig welfare in breeding and gestation. In S. Edwards (Ed.). Understanding the behaviour and improving the welfare of pigs. Burleigh Dodds Scientific Publishing. ISBN-13: 9781786764430

Hunter, L. and O'Connor C. 3 July 2021. Udderly important new technology shows quality of cows' sleep. https://www.tvnz.co.nz/one-news/new-zealand/udderly-important-new-technology-shows-quality-cows-sleep

Hunter, L. and O'Connor C. 3 Juy 2021 The researchers who want to know if cows are getting a good night's sleep. https://www.stuff.co.nz/business/farming/125622215/the-researchers-who-want-to-know-if-cows-are-getting-a-good-nights-sleep

Mallard, B., Emam, M., Cartwright, S., Altvater-Hughes, T., Livernois, A., Wagter-Lesperance, L., Hodgins, D.C., Atalla, H., Hine, B., Aleri, J. and Fisher, A. (2021). Advances in understanding immune response in dairy cattle. In: Improving Dairy Herd Health. Ed. E. Bouchard. Burleigh Dodds Science Publishing, Cambridge, UK. http://dx.doi.org/10.19103/AS.2020.0086.06

Who's who in the zoo: uncovering animal social networks (CSIRO blog). https://blog.csiro.au/whos-who-in-the-zoo/.https://twitter.com/CSIRO/status/1460487804169957378

Zobel, G. 2021. Invited: Young goat management – everything is growing! Ontario Ministry of Agriculture, Food, and Rural Affairs Goat Producer Information Day. Canada (via Zoom). February 15.
Zobel, G. 2021. Invited: Can goats naturally help us with their management? University of Guelph Small Ruminant Meeting. Canada (via Zoom). February 4.

9. Additional comments regarding your report:

Tena koe, Please see below additional information for questions 6 and 7. Thank you for receiving the 2021 annual report for the OIE Collaborating Centre for Animal Welfare and Bioethical Analysis (the David Bayvel Consortium) against the terms of reference (ToRs) for OIE Collaborating Centres. Once again, the activities of the OIE Collaborating Centre have been significantly impacted by measures taken by governments to manage COVID-19. In particular, were unable to conduct all the usual training and teaching activities, and much research activity has been restricted. The collaborating centre intended to focus on coordinating funding for these activities in support of the OIE intentions in 2021, but the impacts of COVID-19 have continued. This will be a focus for the proposed OIE Network of animal welfare collaborating centres, and a focus for our centre for 2022 and the following years. Additional information for questions 6 and 7 6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries? No. There was no training delivered specifically for OIE Members. The Collaborating Centre partners delivered their usual teaching and training opportunities, including activities that are open to attendees from other countries including OIE Member countries, but additional activities were restricted by COVID. 7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE? No. The Collaborating Centre organised and participated in scientific meetings that were open to OIE members and that support the implementation of OIE standards, but did not organise or participate in any meetings on behalf of the OIE. See scientific meetings below. Thank you for your understanding and consideration. Naku noa, na Dr Kate Littin, on behalf.