

## CURRICULUM VITAE: C M DWYER

- NAME** : Catherine Mary Dwyer
- WORK ADDRESS** : Animal and Veterinary Sciences Research Group, SRUC, Roslin Institute Building, Easter Bush, EH25 9RG, Scotland, UK
- DEGREES** : BSc (Hons) Physiology 2:1 (1988) University of Bristol, UK  
PhD '*The effect of maternal nutrition on muscle fibre number determination in the pig and guinea pig*' (1992) The Royal Veterinary College, London, UK
- POSITIONS HELD** :
- Dec 2016 – present**  
Professor of Animal Behaviour and Welfare, Team Leader Animal Behaviour and Welfare, SRUC, Edinburgh, Scotland, UK (with responsibility for 15 postdoctoral scientists, 6 technical staff) 0.6 FTE  
  
Director, Jean Marchig International Centre for Animal Welfare Education, Royal (Dick) School of Veterinary Studies, Easter Bush Campus, Edinburgh 0.4 FTE
- Dec 2011 – Dec 2016**  
Professor of Animal Behaviour and Welfare, Team Leader Animal Behaviour and Welfare, SRUC, Edinburgh, Scotland, UK (with responsibility for 15 postdoctoral scientists, 6 technical staff)
- July 2007 – Nov 2011**  
Reader in Behavioural Development and Animal Welfare, Scottish Agricultural College, Edinburgh, Scotland, UK
- February 1994 – 2007**  
Research Scientist, Scottish Agricultural College, Edinburgh, Scotland, UK
- November 1994 – February 1995**  
OECD Research Fellowship, Massey University, New Zealand
- October 1992 – February 1994**  
Post-doctoral research assistant, Royal Veterinary College, London, UK

### **RESEARCH INTERESTS:**

#### **1. Mother-Offspring Interactions:**

I have had a long standing research interest in maternal behaviour, mother-offspring interactions and offspring development since 1988 and this has involved research in a variety of large and small animal models (sheep, pigs, horses, cattle, mice and guinea pigs). This research has been focused on applied questions: initially looking at the impact of maternal undernutrition in pregnancy on muscle development, and more recently concentrating on impacts of environmental and genetic factors in neonatal survival and development. Alongside the more applied aspects of this area I have also investigated more strategic questions: the role of physiological and neuroendocrine factors in mediating individual differences in maternal behaviour; the impact of variation in maternal care on offspring development and the physiology of foetal and neonatal development.

#### **2. Welfare of extensively managed animals**

An emerging research area is the welfare of extensively managed animals that have been relatively neglected in comparison to intensively managed animals. This has focused mainly on sheep, and the ability to identify welfare problems, to understand the welfare needs of this species and to assess welfare in the extensive environment. Pain, particularly induced by management procedures, is also a significant welfare concern in all species, and opportunities to mitigate pain, either through maternal care or analgesic treatment, is also a research interest.

#### **SUPERVISED POSTGRADUATE STUDENTS:**

- PhD: 2004 Helena Pickup *Maternal Behaviour in the Ewe: Consistency in the expression of maternal behaviour during lactation and the effect of variation in dam and sire breed on the development of offspring*
- PhD: 2009 Susanne Kirwan: *Best use of labour to enhance animal welfare and productivity in extensive sheep farming systems* (2<sup>nd</sup> Supervisor).
- PhD: 2009 Hanna Miedema: *Parturition behaviour in dairy cows* (2<sup>nd</sup> Supervisor)
- PhD: 2011 Alice Barrier: *Long-term effects of parturition difficulty on dairy cows and calves* (2<sup>nd</sup> Supervisor)
- PhD: 2012 Stephanie Matheson: *Genetic effects on lamb behaviour and welfare*
- PhD: 2013 Tamsin Coombs: *Effects of muscle development of lamb behaviour*
- PhD: 2016 Susan Richmond: *Development of animal welfare assessment protocols in sheep*
- PhD: 2016 Kasia Maslowska: *Assessment of immunocastration as a means to improve the welfare and productivity of lambs*
- Current, began October 2013 Leonor Valente: *Impact of prenatal and postnatal stress on offspring behaviour and epigenetic regulation of stress axis function in sheep*
- Current, began December 2013 Nadiah Yusof: *Effects of social stress on the expression of maternal behaviour in sheep*
- Current, began in October 2013 Nicola McGrath: *Vocalisations and behaviour of chickens in anticipation of rewards.* (2<sup>nd</sup> supervisor)
- Current, began in October 2015 Panoraia Kyriazopoulou: *Stress effects on the ovine rumen microbiome* (2<sup>nd</sup> supervisor)
- Current, began October 2016 Gemma Pearson: *Stress in equids undergoing veterinary care and the development of interventions that positively influence the horses' experience.* (2<sup>nd</sup> supervisor)
- Current, began October 2016 Dwayne Shiels: *Ewe and lamb behaviour and lamb mortality during the periparturient period.*

Supervised 18 MSc student dissertations to completion.  
Eight PhD theses examined.

#### **PUBLICATIONS:**

**Seventy-one papers published or in press in peer-reviewed journals. H factor = 30. More than 30 International invited scientific presentations and keynotes, 9 book chapters.**

#### **Selected Recent Refereed Publications (last 5 years)**

- KD Sinclair, K Rutherford, JM Wallace, J Brameld, R Stöger, R Alberio, D Sweetman, DS Gardner, V Perry, C Adam, C Ashworth, J Robinson, C Dwyer (2016) Epigenetics and developmental programming of welfare and production traits in farm animals. *Reproduction, Fertility and Development* (in press)
- Nicky McGrath, Oliver Burman, Cathy Dwyer, Clive Phillips (2016) Does the anticipatory behaviour of chickens communicate reward quality? *Applied Animal Behaviour Science* (in press)

- Baxter, E.M, Mulligan, J., Hall, S.A., Donbavand, J.E., Zanella, A.J. & Dwyer, C.M. (2016) Positive and negative gestational handling influences placental traits and mother-offspring behavior in dairy goats. *Physiology & Behavior* 157: 129-138.
- Dwyer, C.M., Conington, J., Corbière, F., Holmøy, I.H., Muri, K., Rooke, J., Vipond, J. & Gauthier, J.-M. (2016) Invited Review: Improving neonatal survival in small ruminants: science into practice. *Animal* 10(3): 449-459.
- Futro, A., Masłowska, K., Dwyer C.M. (2015) Ewes direct most maternal attention towards lambs that show the greatest pain-related behavioural responses. *PLoS ONE* 10, e0134024.
- Turner, S.P., Conington, J. & Dwyer, C.M. (2015) Invited opinion paper: Is there a role for breeding for welfare improvement? *Animal* 9, 1265-67.
- Rooke, J.A., Dwyer, C.M., Arnott, G.A, & Rutherford, K.M.D. (2015) The importance of the gestation period for welfare of lambs: maternal stressors and lamb vigour and well-being. *Journal of Agricultural Science* 153, 497-519
- Lu, S-J., Yang, Y., Dwyer, CM & Li, F-K. (2015) Pen size and parity effects on maternal behaviour of Small Tail Han sheep in China. *Animal* 9, 1195-1202
- Barrier, A.C., Dwyer, C.M., Haskell, M.J., Molony, V. & Goby, L. Administration of NSAID (meloxicam) alters lying behavior after caesarean section. *Applied Animal Behaviour Science* 155, 28-33
- Dwyer, C.M. (2014) Maternal behaviour and lamb survival: From neuroendocrinology to practical application. *Animal* 8, 102-112
- van Liere, D., Dwyer, C., Dušanka, J., Premik-Banič, A., Valenčič, A., Kompan, D., Siard, N. (2013) Farm characteristics in Slovene wolf habitat related to attacks on sheep. *Applied Animal Behaviour Science* 144: 46-56.
- Barrier, A.C., Mason, C., Dwyer, C.M., Haskell, M.J. & Macrae, A.I. (2013) Stillbirth in dairy calves is influenced independently by dystocia and body shape. *The Veterinary Journal* 197: 220-223.
- Barrier, A.C., Haskell, M.J., Birch, S., Bagnall, A., Bell, D., Dickinson, J., Macrae, A.I. & Dwyer, C.M. (2012) The impact of dystocia on dairy calf health, welfare, performance and survival. *The Veterinary Journal* 195: 86-90.
- Barrier, A.C., Dwyer, C.M., Macrae, A.I. & Haskell, M.J. (2012) Survival, growth to weaning and subsequent fertility of liveborn dairy heifers after a difficult birth. *Journal of Dairy Science* 95: 6750-6754.
- Matheson, S.M., Bünger, L. & Dwyer, C.M. (2012) Genetic parameters for fitness and neonatal behavior traits in sheep. *Behavior Genetics* 42: 899-911.
- Barrier, A.C., Ruelle, E., Haskell, M.H. & Dwyer, C.M. (2012) Effect of a difficult calving on the vigour of the calf, the onset of maternal behaviour, and some behavioural indicators of pain in the dam. *Preventive Veterinary Medicine* 103: 248-256.
- Dwyer, C.M. & Bünger, L. (2012) Factors affecting dystocia and offspring vigour in different sheep genotypes. *Preventive Veterinary Medicine* 103: 257-264
- Ashworth, C.J., Dwyer, C.M., McIlvaney, K., Werkman, M. & Rooke, J.A. (2012) Breed differences in foetal and placental development and feto-maternal amino acid status following nutrient restriction during early and mid pregnancy in Scottish Blackface and Suffolk sheep. *Reproduction, Fertility & Development* 23: 1024-1033.
- Molony, V., Kent, J., Vinuela-Fernandez, I., Anderson, C. & Dwyer, C.M. (2012) Pain in lambs castrated at two days with novel smaller and tighter rubber rings compared with conventional rubber rings and after local anaesthetic treatment. *The Veterinary Journal* 193: 81-86.
- Stott, A.W., Vosough Ahmadi, B., Dwyer, C.M., Kupiec, B., Morgan-Davies, C., Milne, C.E., Ringrose, S., Goddard, P., Phillips, K. & Waterhouse, A. Interactions between profit and welfare on extensive sheep farms. *Animal Welfare* 21(S1): 57-64
- Barrier, A.C., Haskell, M.J., Macrae, A.I. & Dwyer, C.M. Parturition progress and behaviour in dairy cows with calving difficulty. *Applied Animal Behaviour Science* 139: 209-217.
- Dwyer, C.M., Moinard, C., McIlvaney, K.M., Morgan, C.A. & Bunger, L. (2011) The effect of gestational undernutrition on maternal weight change and foetal weight in lines of mice selected for different growth characteristics. *British Journal of Nutrition* 105: 539-548
- Matheson, S.M., Rooke, J.A., McIlvaney, K.M., Ison, S., Jack, M., Bunger, L., Ashworth, C.J. & Dwyer, C.M. (2011) Development and validation of 'on-farm' behavioural scoring systems to assess birth assistance and lamb vigour. *Animal* 5: 776-783.

- Miedema, H.M., Cockram, M.S., Dwyer, C.M. & MacRae, A.I. (2011) The behaviour of dairy cows before, during and after calving. 1. Normal calving in multiparous cows. *Applied Animal Behaviour Science* **131**: 8-14
- Miedema, H.M., Cockram, M.S., Dwyer, C.M. & MacRae, A.I. Differences in the behaviour of dairy cows before, during and after calving with parity and calving difficulty. *Applied Animal Behaviour Science* **132**: 14-19
- Pickup, H.E. & Dwyer, C.M. (2011) Breed differences in the expression of maternal care at parturition persist throughout the lactation period in sheep. *Applied Animal Behaviour Science* **132**: 33-41.
- Stephens, B., Dwyer, C., Hyslop, J. Bell, M., Ross, D., Kwong, K.H., Michie, C. & Andonovic, I. Statistical interaction modeling of bovine herd behaviors. *IEEE transactions on Systems, Man and Cybernetics, Part C: Applications and Reviews*, **99**: 1-10.
- Hild, S., Clark, C.C.A., Dwyer, C.M., Murrell, J.C., Mendl, M. & Zanella, A.J. (2011) Ewes are more attentive to their offspring experiencing pain but not stress. *Applied Animal Behaviour Science* **132**: 114-120