Matthew James Denwood
BVMS PhD FHEA MRCVS

Curriculum Vitae - June 2019

Contact Information

Department of Veterinary and Animal Sciences
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University of Copenhagen
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Academic History

University of Copenhagen, Denmark

Associate Professor in Quantitative Veterinary Epidemiology and Biostatistics	2014 - current

University of Glasgow, UK

Lecturer in Production Animal Health	2012 - 2014
Post-doctoral research assistant (Wellcome trust)	2011 - 2012
Research Fellow (EPIC)	2010 - 2011
PhD, Quantitative Veterinary Epidemiology	2006 - 2010
Bachelor of Veterinary Medicine and Surgery (BVMS)	2001 - 2006

Professional Affiliations

Royal College of Veterinary Surgeons (MRCVS)	
Member	2006 - current
Biomathematics and Statistics Scotland (BioSS)	
Associate	2010 - current
Royal Statistical Society (RSS)	
Fellow	2013 - current
Preventive Veterinary Medicine	
Associate Editor	2018 - current
Acta Vet Scand	
Assistant Editor (Statistical Reviewer)	2018 - current
Veterinary Parasitology	
Editorial Board (Statistical Reviewer)	2018 - current

Research Interests

My main research interests are in the application of quantitative epidemiology to problems affecting animal disease and production, including statistical modelling of animal disease systems, appropriate consideration of diagnostic tests for evaluation of disease, mathematical models of disease spread, and the use of stochastic modelling as a tool to understand the underlying processes of disease systems. The main focus of my work to date has been in the application of Bayesian methods to analysis of parasite distributions in order to improve the efficacy of parasite control strategies in these species, but I have also worked extensively with latent class models for diagnostic test evaluation and on statistical methods to work with large and complex datasets. I also have experience in the application of various statistical methods to applications within ecology and veterinary epidemiology, through collaboration with researchers throughout the veterinary and life sciences departments at the University of Copenhagen, University of Glasgow, University of Edinburgh, BioSS and other international institutions.

Technical Abilities

I currently possess the following technical skills:

- Broad familiarity with epidemiological principles, biostatistics, economics of veterinary disease surveillance, and population animal health
- In-depth understanding of the theory and application of Bayesian Markov chain Monte Carlo (MCMC) statistical methods
- Extensive experience with the R statistical programming language, including mathematical modelling, statistical modelling and data analysis
- Experience with C++, including documentation, unit testing, revision control, and integration with R code
- Additional familiarity with the following programming, scripting and formatting languages: C, C++, HTML, Javascript, LaTeX, R, Shiny, and UNIX shell scripting

Software

Just Another Gibbs Sampler (JAGS)

- JAGS - open-source, general-purpose software that allows a wide range of user specified models to be fit to data using Markov chain Monte Carlo (MCMC). I am responsible for building and maintaining the macOS binaries and also have an active role in co-development of the underlying C++ code base.

Authored R packages

- runjags - a package written to facilitate running user-specified models with JAGS from within R
- bayescount - functions to analyse count datasets, including feacal egg count reduction tests, and perform power analyses for faecal egg count studies and faecal egg count reduction tests
- efsabt - a general purpose Bluetongue spread model written in C++, embedded within an R package using Rcpp

Websites

- www.fecrt.com - a website devoted to sample size calculations and statistical analysis of data from faecal egg count reduction test (FECRT) studies

Funding awarded

Principal Investigator

- Fødevarestyrelsen funded project: *Index Slaughter Data: Investigation of sources of variation in slaughter recordings between farms and abattoirs in Denmark*
  Grant value: 726,600 DKK **2017-2018**
- Donkey Sanctuary funded project: *Development and quantitative validation of improved sustainable donkey parasite control programmes*
  Grant value: £96,351 (plus additional in-house laboratory costs) **2012-2018**
- Donkey Sanctuary funded research studentship: *Quantifying the comparative efficacy of sustainable parasite control programmes using robust estimates of donkey faecal worm egg count variability*
  Grant value: £34,720 (plus additional in-house laboratory costs) **2010-2011**

Work Package Leader

- COST Action CA18208: *Novel tools for test evaluation and disease prevalence estimation (HARMONY)* **2019-current**
- EFSA grant: *Review and inventory of modelling frameworks/techniques suitable for assessing the risk of pathogen introduction and establishment and the risk of pathogen transmission and spread*
  Share of grant award: €50,000 **2013-2016**

Publication List

[1] L. Gomes, M. James, C. D. Sousa, A. Batista, C. José, E. Maristela, A. Hellmeister, D. C. Nogueira, and E. D. Stefano, "Bayesian estimation of herd-level prevalence and risk factors associated with BoHV-1 infection in cattle herds in the State of Paraíba, Brazil," *Preventive Veterinary Medicine*, vol. 169, no. August, 2019.

[2] M. Denwood, J. Kleen, D. Jensen, and N. Jonsson, "Describing temporal variation in reticuloruminal pH using continuous monitoring data," *Journal of Dairy Science*, vol. 101, pp. 233–245, jan 2018.

[3] N. N. Jonsson, J. L. Kleen, R. J. Wallace, I. Andonovic, C. Michie, M. Farish, M. Mitchell, C.-A. Duthie, D. B. Jensen, and M. J. Denwood, "Evaluation of reticuloruminal pH measurements from individual cattle: sampling strategies for the assessment of herd status," *The Veterinary Journal*, 2018.

[4] M. B. Petersen, N. K. Wawegama, M. Denwood, P. F. Markham, G. F. Browning, and L. R. Nielsen, "Mycoplasma bovis antibody dynamics in naturally exposed dairy calves according to two diagnostic tests," *BMC Veterinary Research*, vol. 14, p. 258, dec 2018.

[5] M. Petersen, J. Pedersen, D. Holm, M. Denwood, and L. Nielsen, "A longitudinal observational study of the dynamics of Mycoplasma bovis antibodies in naturally exposed and diseased dairy cows," *Journal of Dairy Science*, 2018.

[6] A. Odden, M. J. Denwood, S. Stuen, L. J. Robertson, A. Ruiz, I. S. Hamnes, L. Hektoen, and H. L. Enemark, "Field evaluation of anticoccidial efficacy: A novel approach demonstrates reduced efficacy of toltrazuril against ovine Eimeria spp. in Norway," *International Journal for Parasitology: Drugs and Drug Resistance*, vol. 8, pp. 304–311, aug 2018.

[7] L. V. de Knegt, E. Kudirkiene, E. Rattenborg, G. Sørensen, M. J. Denwood, J. E. Olsen, and L. R. Nielsen, "Combining Salmonella Dublin genome information and contact-tracing to substantiate a new approach for improved detection of infectious transmission routes in cattle populations," *Preventive Veterinary Medicine*, sep 2018.

[8] P. Sandøe, B. Forkman, F. Hakansson, S. N. Andreasen, R. Nøhr, M. Denwood, and T. B. Lund, "Should the Contribution of One Additional Lame Cow Depend on How Many Other Cows on the Farm Are Lame ?," *Animals*, vol. 7, no. 96, 2017.

[9] S. S. Nielsen, M. J. Denwood, B. Forkman, and H. Houe, "Selection of Meat Inspection Data for an Animal Welfare Index in Cattle and Pigs in Denmark," *Animals*, vol. 7, no. 94, pp. 1–20, 2017.

[10] T. V. Hansen, A. R. Williams, M. Denwood, P. Nejsum, S. M. Thamsborg, and C. Friis, "Pathway of oxfendazole from the host into the worm: Trichuris suis in pigs," *International Journal for Parasitology: Drugs and Drug Resistance*, vol. 7, no. 3, pp. 416–424, 2017.

[11] N. Takeuchi-Storm, M. Denwood, T. V. A. Hansen, T. Halasa, E. Rattenborg, J. Boes, H. L. Enemark, and S. M. Thamsborg, "Farm-level risk factors for Fasciola hepatica infection in Danish dairy cattle as evaluated by two diagnostic methods," *Parasites & Vectors*, vol. 10, no. 1, p. 555, 2017.

[12] M. Fertner, M. Denwood, A. C. Birkegård, H. Stege, and A. Boklund, "Associations between Antibacterial Treatment and the Prevalence of Tail-Biting-Related Sequelae in Danish Finishers at Slaughter," *Frontiers in Veterinary Science*, vol. 4, no. November, pp. 1–8, 2017.

[13] J. S. Bakuza, M. J. Denwood, G. Nkwengulila, and B. K. Mable, "Estimating the prevalence and intensity of Schistosoma mansoni infection among rural communities in Western Tanzania: The influence of sampling strategy and statistical approach," *PLOS Neglected Tropical Diseases*, vol. 11, no. 9, p. e0005937, 2017.

[14] N. R. Weber, J. P. Nielsen, S. E. L. Jorsal, S. Haugegaard, M. Denwood, and K. S. Pedersen, "Comparison of antimicrobial resistance in E. coli isolated from rectal and floor samples in pens with diarrhoeic nursery pigs in Denmark," *Preventive Veterinary Medicine*, vol. 147, pp. 42–49, nov 2017.

[15] G. B. Nielsen, J. P. Nielsen, J. Haugegaard, M. J. Denwood, and H. Houe, "Effect of vaccination against sub-clinical Porcine Circovirus type 2 infection in a high-health finishing pig herd: A randomised clinical field trial," *Preventive Veterinary Medicine*, vol. 141, pp. 14–21, 2017.

[16] N. R. Weber, K. S. Pedersen, C. F. Hansen, M. Denwood, C. K. Hjulsager, and J. P. Nielsen, "Batch medication of intestinal infections in nursery pigs - A randomised clinical trial on the efficacy of treatment strategy, type of antibiotic and bacterial load on average daily weight gain," *Preventive Veterinary Medicine*, vol. 137, no. 2017, pp. 69–76, 2017.

[17] A. Herrero-Fresno, S. Ahmed, M. H. Hansen, M. Denwood, C. Zachariasen, and J. E. Olsen, "Genotype variation and genetic relationship among Escherichia coli from nursery pigs located in different pens in the same farm," *BMC Microbiology*, vol. 17, no. 1, p. 5, 2017.

[18] M. Peña-Espinoza, S. M. Thamsborg, M. J. Denwood, M. Drag, T. V. Hansen, V. F. Jensen, and H. L. Enemark, "Efficacy of ivermectin against gastrointestinal nematodes of cattle in Denmark evaluated by different methods for analysis of faecal egg count reduction," *International Journal for Parasitology: Drugs and Drug Resistance*, vol. 6, no. 3, pp. 241–250, 2016.

[19] S. Love, F. A. Burden, E. C. McGirr, L. Gordon, and M. J. Denwood, "Equine Cyathostominae can develop to infective third-stage larvae on straw bedding," *Parasites & Vectors*, vol. 9, p. 478, dec 2016.

[20] T. V. A. Hansen, M. Hansen, P. Nejsum, H. Mejer, M. Denwood, and S. M. Thamsborg, "Glucose Absorption by the Bacillary Band of Trichuris muris," *PLOS Neglected Tropical Diseases*, vol. 10, no. 9, p. e0004971, 2016.

[21] M. J. Denwood, "runjags: An R Package Providing Interface Utilities, Model Templates, Parallel Computing Methods and Additional Distributions for MCMC Models in JAGS," *Journal of Statistical Software*, vol. 71, no. 9, 2016.

[22] L. Viora, M. Denwood, K. Ellis, M. M. Carmichael, and T. Geraghty, "Comparison of two oestrus synchronisation protocols administered to dairy cows during routine reproduction services," *Cattle Practice*, vol. 23, pp. 33–38, jan 2015.

[23] K. L. Perrin, M. J. Denwood, C. Grøndahl, P. Nissen, and M. F. Bertelsen, "Comparison of Etorphine-Acepromazine and Medetomidine-Ketamine Anesthesia in Captive Impala (Aepyceros Melampus)," *Journal of Zoo and Wildlife Medicine*, vol. 46, pp. 870–879, dec 2015.

[24] J. K. Fischer, B. Hinney, M. J. Denwood, D. Traversa, G. von Samson-Himmelstjerna, and P.-H. Clausen, "Efficacy of selected anthelmintic drugs against cyathostomins in horses in the federal state of Brandenburg, Germany," *Parasitology Research*, vol. 114, no. 12, pp. 4441–4450, 2015.

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[26] C. Mair, M. Stear, P. Johnson, M. Denwood, J. P. Jimenez de Cisneros, T. Stefan, and L. Matthews, "A Bayesian generalized random regression model for estimating heritability using overdispersed count data," *Genetics Selection Evolution*, vol. 47, no. 1, p. 51, 2015.

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[28] S. S. Nielsen, G. B. Nielsen, M. J. Denwood, J. Haugegaard, and H. Houe, "Comparison of recording of pericarditis and lung disorders at routine meat inspection with findings at systematic health monitoring in Danish finisher pigs," *Acta Veterinaria Scandinavica*, vol. 57, no. 1, pp. 1–8, 2015.

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[31] A. E. Mather, L. Matthews, D. J. Mellor, R. Reeve, M. J. Denwood, P. Boerlin, R. J. Reid-Smith, D. J. Brown, J. E. Coia, L. M. Browning, D. T. Haydon, and S. W. J. Reid, "The diversity of antimicrobial resistance is different in Salmonella Typhimurium DT104 from co-located animals and humans," *Proceedings of the Royal Society B: Biological Sciences*, vol. 279, pp. 2924–2925, may 2012.

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[33] V. Busin, F. Kenyon, N. Laing, M. J. Denwood, D. McBean, N. Sargison, and K. Ellis, "Addressing sustainable sheep farming: Application of a targeted selective treatment approach for anthelmintic use on a commercial farm," *Small Ruminant Research*, pp. 11–14, dec 2012.

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[35] A. E. Mather, L. Matthews, D. J. Mellor, R. Reeve, M. J. Denwood, P. Boerlin, R. J. Reid-Smith, D. J. Brown, J. E. Coia, L. M. Browning, D. T. Haydon, and S. W. J. Reid, "An ecological approach to assessing the epidemiology of antimicrobial resistance in animal and human populations," *Proceedings of the Royal Society B: Biological Sciences*, nov 2011.

[36] A. E. Mather, M. J. Denwood, D. T. Haydon, L. Matthews, D. J. Mellor, J. E. Coia, D. J. Brown, and S. W. J. Reid, "The Prevalences of Salmonella Genomic Island 1 Variants in Human and Animal Salmonella Typhimurium DT104 Are Distinguishable Using a Bayesian Approach," *PLoS ONE*, vol. 6, p. e27220, jan 2011.

[37] K. M. O'Reilly, J. C. Low, M. J. Denwood, D. L. Gally, J. Evans, G. J. Gunn, D. J. Mellor, S. W. J. Reid, and L. Matthews, "Associations between the presence of virulence determinants and the epidemiology and ecology of zoonotic

Escherichia coli," *Applied and environmental microbiology*, vol. 76, pp. 8110–6, dec 2010.

[38] M. J. Denwood, A. E. Mather, D. T. Haydon, L. Matthews, D. J. Mellor, and S. W. J. Reid, "From phenotype to genotype: a Bayesian solution," *Proceedings of the Royal Society B: Biological Sciences*, vol. 278, pp. 1434–40, may 2011.

[39] M. J. Denwood, S. W. J. Reid, S. Love, M. K. Nielsen, L. Matthews, I. J. McKendrick, and G. T. Innocent, "Comparison of three alternative methods for analysis of equine Faecal Egg Count Reduction Test data," *Preventive veterinary medicine*, vol. 93, pp. 316–23, mar 2010.

[40] M. J. Denwood, *A quantitative approach to improving the analysis of faecal worm egg count data.* Doctoral thesis, University of Glasgow, 2010.

[41] J. Heller, G. T. Innocent, M. J. Denwood, S. W. J. Reid, L. Kelly, and D. J. Mellor, "Assessing the probability of acquisition of meticillin-resistant Staphylococcus aureus (MRSA) in a dog using a nested stochastic simulation model and logistic regression sensitivity analysis," *Preventive veterinary medicine*, vol. 99, pp. 211–24, may 2011.

[42] M. J. Denwood, V. H. M. Dale, and P. Yam, "Development and evaluation of an online computer-aided learning (CAL) package to promote small-animal welfare," *Journal of veterinary medical education*, vol. 35, pp. 318–24, jan 2008.

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