

Institution: University of Lincoln

Unit of Assessment: UOA6 Agriculture Veterinary & Food Science

a. Context

This UoA consists of two major research groups within the School of Life Sciences: the Animal Behaviour Cognition and Welfare (**ABCW**) Group and the Evolution and Ecology (**EE**) Group. These groups work closely with each other and with others spanning a wide range of disciplines. Non-academic beneficiaries and users of our research are a broad constituency, but specifically in relation to UoA 6 have historically been involved in aspects of animal management, conservation and welfare. The following outlines the range of users and types of impact created by our research within the census period:

Industrial, land and water-based producers: examples include veterinary companies such as Ceva Animal Health (see case study) and Elanco Animal Health (European licence for fluoxetine in dogs and associated behaviour programme – Mills), animal nutrition companies such as Waltham Centre for Pet Care and Nutrition (feeding preference – Burman & Mills, dietary selection in horses – Cooper & Eady), egg producers (minimum height requirements for layers required under EU Legislation), game bird producers (environmental enrichment – Deeming & Cooper), water companies (risks posed by micro-organisms in drinking and sewer water systems – Osborn) and entrepreneurs who have commercialised the production of stable mirrors for horses (Cooper & Mills).

Policy makers: examples include international legislative authorities (e.g. EFSA's assessment of welfare priorities to the European Commission – Collins) national government (e.g. The Welsh Assembly, Scottish Parliament and Defra's decisions on the regulation of electronic training aids (see case study). The Environment Agency on habitat requirements of freshwater fish to assist implementation of EU Water Framework Directive 2000/60/EC – Eady, Deeming), national legislators (e.g. Australian Department of Agriculture advice on trapping feral cats – Soulsbury, Northern Ireland's Dept. of Agriculture and Rural Development use of Collins' work on risk scoring for evaluating welfare cases), national advisory bodies (e.g. the National Museum of Natural History, Chile for advice to their Government on the impact of climate change on national fauna and flora – Pincheira-Donoso), professional associations (e.g. BSAVA position statement on management of noise phobias; Canadian Veterinary Medical Association position statement on keeping exotic animals as pets – Soulsbury; Federation of Animal Science Societies and The National Advisory Committee for Laboratory Animal Research Guidelines, Singapore: housing requirements of horses – Mills, Cooper), NGOs and charities such as the RSPCA (space requirements for rabbits – Cooper; circus animal welfare – Soulsbury, primates as pets – Soulsbury) and Dogs Trust (welfare of dogs in shelters – Collins, Mills), commercial research organisations such as GlaxoSmithKline (housing requirements of rabbits – Cooper & Burman) and industrial associations (e.g. Electronic Collar Manufacturers' Association improvements in the design and use of e-collars – see case study).

Healthcare and welfare professionals: including the veterinary and allied professions (veterinary behavioural medicine – Mills & Zulch, farm animal welfare – Cooper & Collins, laboratory animal welfare – Burman & Cooper, wildlife health and welfare – Collins, Reyers & Soulsbury, zoo animal cognition and welfare – Wilkinson, Burman & Reyers).

Leisure, entertainment and service providers, and the general public: Public interest in our work is high with influential authors on animal care (such as Temple Grandin and Abigail Hogg) making specific reference to our research (e.g. use of mirrors to improve the welfare of horses – Cooper, Mills). Our work often stimulates public debate and change (e.g. in the use of e-training collars and the welfare of circus animals, and primates kept as pets). The research on training and behaviour problems in companion animals has been translated into practice via the clinical behaviour and training services we offer (Animal Behaviour Clinic), and wider afield through our annual international seminar – Current Research in Companion Animal Behaviour, which is specifically focused on the impact of our research. We contribute to practitioner publications (e.g. Stress and Pheromonotherapy: Mills *et al.* 2012), and bespoke training events such as the "Train the trainers" course based around the best-selling publication "Life Skills for Puppies" (Veloce, 2012 – consistent 5 star rating and number 3 on Amazon UK's list of most popular puppy behaviour books – recorded Nov. 2013): conservationists (game bird management, nest

Impact template (REF3a)

construction – Deeming, sea mammals – Pilot), riding schools (equine welfare – Mills, Cooper, “Equine behaviour” remains in the top ten equine behaviour books listed on Amazon UK- recorded Nov. 2013), zoos (dietary diseases of captive felids – Reyers).

b. Approach to impact

Both our research groups have an ongoing focus on impact, and not just on those topics which naturally generate strong public interest and debate (e.g. animal behaviour and welfare, climate change), but also our more fundamental work, for example research on the ecological features driving evolutionary change, which can be meaningfully contextualised for both the public and special interest groups. Our approach to impact includes:

- Recognise and capitalise upon the widespread public interest inherent in our research and encourage public engagement.** For example, our local pet participant management system (www.lincolnpetscando.co.uk) has over 500 volunteers, and includes regular feedback on ongoing activity to maintain engagement. Specific impact-related projects have been run. The Royal Society Summer Science Exhibition 2012 (with over 11,000 visitors and nearly 100,000 hits from 72,000 unique users of the associated website). Nationally and internationally, our research also features in leading scientific broadcasts such as BBC “Horizon” (Secret Life of the Dog 2009-2010, Secret Life of Cats 2013: the latter attracted over 5m viewers), “Springwatch” (2012), “Hatching Eggs Live” (2013), and popular science publications such as National Geographic (Montealegre-Z), New Scientist (Deeming, Mills, Ruta, Wilkinson), Scientific American (Pincheira-Donoso), as well as more general news media.
- Encourage and recognise engagement with stakeholders.** By playing significant roles in non-academic organisations and business, we are fully equipped to engage with them, drawing upon wider networks of expertise and responding to current issues of importance to industry and the wider society. For example, specific recognition and encouragement is given towards membership of relevant advisory groups such as the Companion Animal Welfare Council (Mills), Dog Advisory Group (Collins), Boards of Trustees (e.g. Parrot Zoo – Wilkinson, Jerry Green Foundation – Wright), professional bodies, (ASAB committee for the certification of Clinical Animal Behaviourists - Mills) and *ad hoc* advisory groups (e.g.; Defra/BIAZA Elephant Welfare Group (EWG) - Burman, The Cat Group – Mills & Ellis; Lincolnshire Wildlife Trust Education Committee - Soulsbury). This lets us recognise the need to produce outputs that are of practical value to end-users (e.g. pet press features, professional publications such as BSAVA Manual of Canine and Feline Behavioural Medicine, BSAVA Formulary, Vet Visuals Behaviour Faculty - www.vetvisuals.com/en_US/canine-medicine/feline-medicine-2/behavioural-medicine) There are numerous presentations at and organisation of professional meetings such as the International Veterinary Behaviour Meetings - Mills).
- Aim to maintain an impact culture.** We provide individual development through bespoke training for individuals (e.g. “Handling the press” training by our Press Office) and groups (at Research Awaydays), as well as mentorship by more experienced academic staff and our Dean of Public Engagement. Our central Press and Media team includes a dedicated Public Relations Officer to enable and support staff with media engagement. The teams monitor (using services such as “Gorkana” and “Meltwater”) and feedback to individual academics and through School Team Meetings on impact achieved. For example, Wilkinson’s research on social cognition in reptiles featured on national and international broadcast and print media ranging from Breakfast TV to BBC News and CNN, and from New Scientist to The Sun. The effectiveness of their work is illustrated by our twenty most recent press releases (up to end of Oct. 2013) reaching an estimated global audience over 400m. Our impact culture is strengthened further by recognising how our activities can bring further research returns from previously unknown stakeholders. For example, we recently received an initial donation (£100k) and subsequent grant (£400k) from the charity Feline Friends in support of our cat welfare research following the public interest generated by our work on e-collar training in dogs.

- **Enable and encourage bilateral engagement with potential stakeholders.** The production of visibly impactful research relies on the development of quality engagement with stakeholders at all stages of the research process. Also, by bringing together the needs of participants, advisors, investors and researcher, we can help to ensure high quality and rapid dissemination, adoption and commercialisation of our findings. Our Research and Enterprise Office team includes a scientific officer who proactively assists with the identification and engagement of such stakeholders. Examples include, a consortium of Dogs for the Disabled and National Autistic Society which led to an award of £250k by the BIG Lottery Fund to examine the effects of pet dogs on families with autistic children, and a relationship with Greater Manchester Police Dog Section led to an award of £120k on working dog temperament from DSTL.

c. Strategy and plans

Our increased strengths in anthrozoology and human health will lead to new impact opportunities, in part relevant to the RC-UK's priority areas of lifelong health and wellbeing, and this is an area that we have identified as being of strategic importance. Our research in this domain is at differing stages of maturity, for example, several current projects relate to the benefits of companion animals to the health of society (Mills, Ellis, Wright with Fuller; Lincoln Business School), while the exploitation of an invertebrate model of the human cochlea (Montealegre-Z) is part of a longer term biomedical and bioengineering project. Our expertise in understanding the evolutionary and ecological impacts of environmental change will offer new opportunities for impact on the strategically important topic of living with change, through working with biotechnologists interested in minimising anthropogenic effects on the environment at both a global and local levels.

Our specific goals are:

- Deepen and extend the impact culture: e.g. through the encouragement of placements and sabbaticals with end-users, and support from staff who produce our Science and Environmental Journalism MA course.
- Improve public understanding and use of our research findings: e.g. by strengthening our links with a much wider audience by using a wider range of interfaces e.g. Science Media Centre and social media e.g. our YouTube Channel.
- Ensure we maximise opportunities with beneficiaries of our research to develop practice and policies that are evidence based: e.g. Research Groups will establish user forums and develop specific strategic routes to impact relevant to their disciplines.
- Increase the economic impact of our research: e.g. by capitalising on the opportunities provided by the new **LSIP** and wider afield, including the provision of licences and the development of spinout companies.
- Continue to monitor and adapt our strategy so we can learn from our and others best practice.

d. Relationship to case studies

Our case study on the development and innovation of pheromonotherapy reflects our ability to build sustainable relationships with industry, to solve their problems and help them grow commercially. This case study also illustrates the effectiveness of our ability to execute an impact strategy focused on the needs of stakeholders and users that has transformed practice internationally both within the veterinary profession and public – together with the creation of a new industry with a scientific foundation.

The other case study on electronic training devices highlights our ability to respond in a timely way to the needs of stakeholders (including national governments), and engage even with those having opposing interests to deliver research that can underpin policy and public action. The flexibility of our approach and academic integrity allowed us to gain the confidence of an industry subject to pressure from the use of biased evidence and scientifically unsubstantiable claims. The subsequent impact of the findings is still at an early stage and will develop further as more extensive publication and related impact activities occur.