Institution: Canterbury Christ Church University

Unit of Assessment: Agriculture, Veterinary and Food Science (6)

Title of case study: Improving Captive Animal Welfare through Cognition-Related Research

1. Summary of the impact

Research undertaken at Canterbury Christ Church University (CCCU) studied habitat enrichment in captive coyotes (with the National Wildlife Research Center in Utah), and herd composition of donkeys, horses and mules (with the Donkey Sanctuary). These studies observed social and environmental interactions, addressing important welfare indicators in gregarious species. The work identified welfare issues in both sites and provided the necessary evidence to allow improvements to be made.

Specifically, this research has:
1) led to changes in the husbandry practice and policy in both partner institutions that have improved animal welfare;
2) improved how the Donkey Sanctuary trains international partners and undertakes welfare education.

2. Underpinning research

Please note that numbered citations refer to outputs in section 3.

The Animal Welfare Act (2006) protects 'any animal that is not living in a wild state' by prescribing the duty of care, including the need to exhibit normal behaviour patterns and to be free from suffering. It is therefore vital to correctly define, and understand, both normal and abnormal behaviour patterns and the factors that influence these.

In research initiated in 2006, Dr **Osthaus** (employed CCCU 2007 – present) has worked with a variety of partners to use cognitive and behavioural approaches to identify and assess animal welfare and stress.

The specific impact claimed here relates to work conducted in collaboration with the United States Department of Agriculture Wildlife Services National Wildlife Research Center's Predator Research Facility in Millville, Utah, and with the Donkey Sanctuary in Sidmouth, Devon. Both studies were requested by the host facilities to enhance their knowledge of animal welfare in relation to habitat enrichment and group dynamics.

Data were collected by Dr **Osthaus** in both partner organisations in the summer of 2006. Dr **Osthaus** was then, in 2007, appointed to a position at CCCU. After taking up this position, data from the studies were analysed, written-up and published in international, peer-reviewed journals [1,2]. The analysis and interpretation of the Millville coyote study [1] took place in 2008 and 2009, and that for the Donkey Sanctuary equid study took place in 2010 and 2011. Dr **Osthaus** was therefore employed at CCCU while undertaking the analysis and interpretation of both data sets, from which the impact is derived.

The results of the Millville coyote study [1] showed that, at the large scale, captive coyotes act exactly like coyotes in the field. This allowed previous criticism that captive animals were not good models for animals in the wild to be dismissed. Now, solid and reliable inferences can be made that allow research to inform conservation (allowing a greater applicability of all such research at Millville). At the small scale, however, analysis revealed differences in behaviour between captive and wild animals. Specifically, the research identified stress-linked behaviours in the captive coyotes that were subsequently addressed by habitat enrichment.

The Donkey Sanctuary equid study [2] represented the first analysis of social relationships in

mixed herds of domestic equids, with the key results published in 2012 [2]. This analysis of interactions between and within species demonstrated that the animals preferred to associate with individuals of the same equid type [2]. Hence this work demonstrated that donkeys should be provided with another donkey as a companion and that mules are best kept with other mules. This finding resulted in changes to the educational and husbandry activities of the Donkey Sanctuary and to their policy.

For both of these studies, in line with the unit of assessment's strategy for impact, stakeholders were involved in the work from the outset and, for both of the studies reported here, they have been recognised as co-authors on the resulting publications.

3. References to the research (indicative maximum of six references)

The impact claimed here specifically derives from the following research and publications:

1) Shivik, J.A., Palmer, G.L., Gese, E.M. and **Osthaus, B.** (2009) Behavioural budgets of captive versus wild coyotes: does environmental enrichment help? *Journal of Applied Animal Welfare Science* 12, 223-235. doi: 10.1080/10888700902955989 (Output listed in REF2.)

2) Proops, L., Burden, F.A. and **Osthaus, B.** (2012) Social relations in a mixed group of mules, ponies and donkeys reflect differences in equid type. *Behavioural Processes* 90, 337-342. doi: 10.1016/j.beproc.2012.03.012. (Output listed in REF2.)

This work is published in high quality peer-reviewed journals and has been cited within the academic, peer-reviewed, literature.

References to related work within the group:

3) Proops, L., Burden, F. and **Osthaus, B.** (2009) Mule cognition: a case of hybrid vigour? *Animal Cognition* 12, 75-84. doi: 10.1007/s10071-008-0172-1. (Output listed in REF2.)

4) **Osthaus, B.**, Burden, F., Hocking, I. and Proops, L. (2013) Spatial perseveration by horses, donkeys and mules in a simple detour task. *Animal Cognition* 16, 301-305. doi: 10.1007/s10071-012-0589-4. (Output listed in REF2.)

These papers report fundamental research into cognition. Such work is central to linking variation in cognition to welfare and hence to the design of appropriate husbandry, training and enrichment strategies.

4. Details of the impact (indicative maximum 750 words)

Please note that lettered citations refer to evidence sources in section 5 and that numbered citations refer to outputs in section 3.

Research has directly resulted in changes in husbandry practices of both stakeholders [A,B]. It has also contributed to the body of peer-reviewed research on the specific behaviours of coyotes [1], and of donkeys, mules and horses [2-4]. Due to the fact that the research was requested by, and developed with, the partner institutions, decision makers were willing and able to implement changes and improvements as an outcome of our research. As a result, changes have been made by both organisations that have improved the welfare of the animals in their care and altered associated policy [A,B]. Results have also altered educational material, specifically with regard to the work of the Donkey Sanctuary [B].

The work on coyotes at the United States Department of Agriculture Wildlife Services National Wildlife Research Center's Predator Research Facility in Millville, Utah [1], has become extremely important relative to animal husbandry at the facility [A]. The research has resulted in an extensive environmental enrichment program that has been incorporated into animal care standards at the

site [A]. The work also dismissed previous criticism that captive animals were not good models for animals in the wild, allowing research at Millville to be more widely and easily applied. Therefore, significant improvements in both scientific integrity and animal care were made as a consequence of the research.

The work in conjunction with the Donkey Sanctuary [2-4] has allowed them to more easily demonstrate the need for donkeys not to be kept as companions to horses or ponies [B], which is a very common practice. This message is now reiterated at training courses and behavioural talks that the Donkey Sanctuary gives around the world [B]. It is also shared with the Donkey Sanctuary's centres in seven other European countries and their partners in Asia, Africa and South America [B]. The work has also been important in informing discussion about whether the Donkey Sanctuary should take ponies or horses and if they should stay long term or if another equine charity should be asked to assist [B].

The research with the Donkey Sanctuary has therefore had the following specific impacts [B]:

- The establishment of species-specific groups on specialist farms, and increased observation of bonded companions in the first few weeks of relinquishment.
- Changes to fostering rules to only allow mules to go out as companions for ponies or other mules.
- Changes to policy on the education of owners relinquishing mixed pairs or groups, dealing with an issue where previously owners had been upset when they find their donkey-pony pair have been separated once in the Donkey Sanctuary.
- Changes to international training and educational work.

In summary, research from within the 'Animal Cognition and Welfare' group of the Ecology Research Group at CCCU has changed the husbandry and animal welfare policies of two partner institutions, one a research centre in the USA, the other an international charity. As a result, the welfare of a large number of animals has been improved [A,B] and training courses and behavioural talks given by the Donkey Sanctuary around the world have changed [B]. More generally this research has improved the understanding, by carers, of the behavioural and social processes of their animals.

5. Sources to corroborate the impact (indicative maximum of 10 references)

A) The impact at the National Wildlife Research Center's Predator Research Facility in Millville, Utah can be corroborated by the Center.**(Contact ID.1)**

B) The impact on policy and welfare at The Donkey Sanctuary can be corroborated by the Head of the Sanctuary's Policy and Development Department. **(Contact ID.2)**