**Project Title:** Novel botanical alternatives for livestock pest and parasite management  

**DTP Research Theme:** Living World  

**Keywords:** environment, animal health, parasite, sustainable, botanical, welfare  

**Main Supervisor:** Professor Richard Wall, School of Biological Sciences, University of Bristol  

**Co-Supervisor:** Dr Lauren Ellse, AgriEnt Ltd  

**Co-Supervisor (CASE Partner):** Dr Faith Burden, The Donkey Sanctuary Sidmouth  

**Project Enquiries:** richard.wall@bristol.ac.uk  

**Host Institution:** University of Bristol, Faculty of Science, School of Biological Sciences  

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**Background**  
Livestock play an essential economic role; in some countries they are often the only cost-effective means of food production, since they can graze land that is unsuitable for the production of crops. They also may be the only means of providing traction for ploughing or transport of goods or materials, particularly in less developed parts of the world. However, livestock in these areas are particularly vulnerable to the impacts of pests and parasites such as ticks, mites, biting flies, fleas and lice. These can have significant direct impacts on animal health and welfare, but may also act as vectors of pathogens, many of which are zoonotic. The sustainability of reliance on neurotoxic insecticides for the control of these pests and parasites is increasingly questioned and attention is being given to the development of more ecologically and economically sustainable novel control technologies.

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**Project Aims and Methods**  
In the development of novel control technologies, an area of current and growing interest is the use of plant secondary metabolite biotechnology, particularly essential oils, as botanical insecticides. Experimental studies have shown that they may be highly effective alternatives. Such compounds are environmentally benign and may be relatively inexpensive However, their
use needs to be thoroughly evaluated and the best approaches for optimum use demonstrated for each pest/host scenario. The aim of this studentship will be to examine the control of biting flies with essential oils, to identify optimum formulations for use against flies and, in particular, to identify approaches that increase the period of residual activity of essential oil products when applied to animals. The primary focus of the project will be on equids. The work will use a combination of initial laboratory investigations followed by large scale field trials in the UK and overseas. Other approaches that complement essential oil use, for example the use of shelters in hot environments to minimize fly challenge and facilitate the persistence of essential oil applications, may also be incorporated in the work undertaken.

**Candidate:**
The preferred candidate will have a background at BSc or MSc level in ecology and/or entomology with an interest in animal welfare. The candidate should be willing to undertake periods of months in the field (either UK or overseas). Good laboratory and numerical skills would also be an advantage.

**Case Award description**
Two partners will be involved in this work. The commercial partner is AgriEnt Ltd, a small company that specializes in the development and marketing of essential oil-based products for arthropod parasite control (www.agrientlimited.com); the managing director Dr Lauren Ellse will co-supervise the work. The CASE partner is The Donkey Sanctuary, (www.thedonkeysanctuary.org.uk) an animal welfare charity dedicated to improving the quality of life for donkeys, mules and people worldwide and their Head of Research, Dr Faith Burden, will be closely involved in the project planning and management throughout.

**Training**
Training in animal handling, health and safety and animal welfare will be undertaken by the CASE partner. Training in laboratory techniques and commercial skills such as product manufacture and marketing will be undertaken by Dr Ellse. Training in biostatistics, experimental design and other generic research skills will be provided by the University of Bristol. External training will be sourced as required by the project.

**Background reading**

**Links**
School URL – http://www.bristol.ac.uk/biology/courses/postgraduate/
Email School of Biological Sciences: biol-postgrad@bristol.ac.uk
NERC GW4+ DTP Website: http://nercgw4plus.ac.uk/

Bristol NERC GW4+ DTP Prospectus:
http://www.bristol.ac.uk/study/postgraduate/2017/doctoral/phd-great-western-four-dtp/

**Application deadline:** Midnight GMT, Sunday 25 June 2017

How to apply to the University of Bristol:
http://www.bristol.ac.uk/study/postgraduate/apply/

**General Enquiries:**
Bristol NERC GW4+ DTP Administrator
Email: bristol-nercgw4plusdtp-admin@bristol.ac.uk
In addition please provide the following information which will not be published on the website but is required by the University / DTP Hub:

Telephone number for Main Supervisor: 0117 394 1205

Full contact details for all co-supervisors and partners.

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Collaboration
We have a longstanding collaboration with The Donkey Sanctuary and they have acted as research partners over the last six years for studies of lice infesting donkeys and, currently, biting flies of donkeys. AgriEnt is a company that was formed to commercialise products developed in conjunction with The Donkey Sanctuary (a proportion of its profits for one of its products - Equine NitNat - are paid back to The Donkey Sanctuary) and so there is a strong historic link between all the three organisations that will collaborate in this studentship. Communication between the partners is regular and ongoing. Because all three are based in the south west of England, face-to-face meetings are held regularly.

In terms of their respective roles in the project: Richard Wall is an ecologist and entomologist who contributes and understanding of the pests, their behaviour and ecology. Dr Ellse is, by training, a biochemist and will advise on formulation and product development, while also contributing her understanding of industry and business issues. Dr Burden is a veterinary surgeon and is Head of Research at the Donkey Sanctuary, and will contribute her practical understanding of animal welfare and health.

The student will meet the other members of the project team within the first week of the studentship and meetings will be arranged at The Donkey Sanctuary headquarters in Sidmouth. Regular project meetings will be undertaken throughout the course of the project and the student will be subject to the Annual Progress monitoring undertaken by the University of Bristol.

The proportion of the student's time to be spent at each institution will depend on the precise direction the project takes and this will be determined in discussion with the project partners and the student in the early stages of the studentship, but certainly I would expect the equivalent of
one day per week to be spent with the CASE partner, at The Donkey Sanctuary in Sidmouth, during the summer periods when biting flies are problematic. So, over the course of the project this will probably amount to 2 months per year (at least 6 months in total). Perhaps 1 day per month would be spent with AgriEnt.

**CASE Project**
At this stage, a formal letter of support has been provided by the industrial partner Agrient Ltd. E-mail agreement for the CASE partnership has been provided by the Donkey Sanctuary (a more formal letter of support can be provided as required).

This CASE studentship will deliver genuine economic impact through improved cost-effective animal welfare.

The CASE partner will supplement the studentship by paying at least £1,000 per year to the lead Research Organisation for the duration of the studentship and will meet the extra expenses incurred by the student visiting and working in their establishment. They will also contribute in kind towards necessary materials and labour when work is undertaken on site.

**Research costs**
A Research and Training Support Grant (RTSG) of £11,000 is provided with every studentship for the duration of the PhD. The RTSG can be spent on research consumables that would not ordinarily be provided by the university including IT hardware and software, lab and fieldwork costs, books and reference materials and conference-associated costs. This budget can also be used for training if the training budget is exceeded. It remains the responsibility of the supervisor to manage this budget over the PhD’s duration.

**Will this project require extra funds?**

No

**If yes, please provide details below (maximum of 1000 characters including spaces)**

**Equality & Diversity**
It is anticipated that the project will require extensive fieldwork and some animal handling, but certainly arrangements could be made to allow suitably qualified candidates with specific needs to work flexibility within these constraints.