

# Bursary Supplement

## Another strong year for the Connect Bursary



**The quality of applications for this, the 19<sup>th</sup> year of the Connect Bursary, was once again outstanding, with some excellent projects focusing on a very broad range of research topics.**

The Connect Bursary is designed to provide financial assistance to veterinary

students so that they can carry out research projects in their chosen subject area. This goal was certainly achieved again this year with students travelling as far afield as the Aravalli Mountains in north-western India and the Mole National Park in Ghana, as well as New Zealand, Sri Lanka and Egypt.

Closer to home, several of this year's Connect Bursary winners carried out some exceptionally technical and detailed laboratory based pathological, genetic and molecular biology research work. It was one of these candidates, Stuart Kerr from the University of Glasgow, that was selected as the

winner of the overall 2010 Connect Bursary Award and trophy.

Stuart's project, entitled 'Trypanosomiasis – monitoring CNS disease progression and its relation to relapsed parasitaemia', impressed the judges with its technical content and detailed findings.

Unfortunately, this year's Award Day, which was due to be held at Intervet/Schering-Plough's UK headquarters in Milton Keynes, had to be cancelled due to adverse winter weather conditions which made road, rail and air travel extremely testing. Nevertheless, the Connect judging panel which

consisted myself, Mike Francis (Head of Research and Development) and John Helps (Technical Manager, Companion Animal Business Unit), met to decide which of this year's students should win the overall Connect Bursary Award and an additional prize of £1,000.

After much deliberation we all agreed that Stuart was a worthy winner. His research work was truly fascinating and I would like to take this opportunity to congratulate Stuart and thank all the other Connect students for taking part in yet another very strong year for the Connect Bursary.

**David Hallas**  
General Manager UK & Ireland – Intervet/Schering-Plough Animal Health

## A view from Research and Development

The Connect Bursary Awards are designed to allow veterinary students to carry out their own small research project, experience the excitement of finding out something new and the discipline of recording the

data to share with others. Once again our 2010 Bursary Award winners achieved these objectives with style and hopefully this inspired a number of the candidates to consider a future in the field of veterinary research and development.

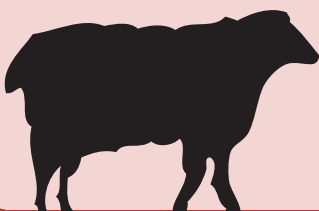
Due to the adverse weather in December, this year's judging was based solely on written reports, many of

which were of a high standard. Judging as always was difficult, with the panel members needing to very carefully consider the relative merits of each contribution, but in the end Stuart Kerr from the University of Glasgow rose to the top of the entries. His report demonstrated focus, objectivity, good use of scientific principles and an obvious enthusiasm towards the subject matter. Well



done to Stuart and all of the Connect Bursary Award winners.

**Mike Francis**  
Director, Research and Development



# The 2010 Connect Bursary award projects:

## Overall winner:

### Stuart Kerr

(University of Glasgow):

Trypanosomiasis – monitoring CNS disease progression and its relation to relapsed parasitaemia.

## Equine bursary:

### Ellen Turnbull

(University of Cambridge):

Recurrent laryngeal neuropathy – a preliminary genetic study.

## Connect bursaries:

### Rebecca Manson

(University of Glasgow):

Animal birth control in Indian street dog populations.

### Rachel Nixon & Philippa Morton

(University of Cambridge):

The role of soft ticks on Mole National Park in the persistence of African Swine Fever in Ghana.

### Charlotte Oakley

(University of Bristol):

Follow up study on vaccination status, numbers and distribution of stray dogs and cats in Hanthana district of Kandy, Sri Lanka.

### Chad Maki

(University of Edinburgh):

Regulatory mechanisms controlling mineralisation of the skeleton.

### Alice McCutchan

(Royal Veterinary College):

Histopathological evaluation of four regions of the stomach in twenty dogs with food responsive enteropathy before and after dietary therapy.

### Hana McNicholas

(University of Nottingham):

The use of behavioural indicators and urinary cortisol:creatinine ratios to assess the welfare of long-term kennelled rescue dogs.

### Ceri Tupper

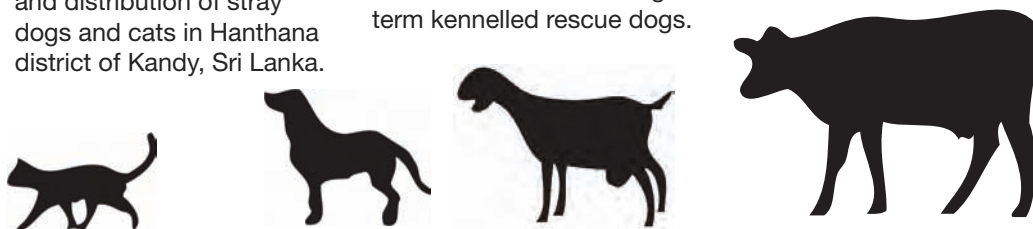
(University of Liverpool):

An investigation of the location and severity of lesions caused by harnesses in working donkeys and carriage horses in Luxor, Egypt.

### Catherine Bray

(University of Nottingham):

The efficacy of antibiotic dry goat therapy for the reduction of somatic cell count in New Zealand dairy goats.



## Connect Bursary Awards 2010 Overall Winner

● **Stuart Kerr from the University of Glasgow's School of Veterinary Medicine was awarded the overall Connect Bursary Award for his project which monitored the progression of Trypanosomiasis in the central nervous system and its relation to relapsed parasitaemia.**

Trypanosomiasis is an emergent disease that is caused by protozoan parasites of the genus *Trypanosoma*, and which represents a major threat to human life and animal health and productivity. The disease has been quoted as causing the death of 3 million cattle per year, while economic losses in cattle production are in the range of \$1.0 to 1.2 billion. Animals can also act as a reservoir of the human disease, commonly known as sleeping sickness.

In the human form of the disease, two species of trypanosome are pathogenic, *Trypanosoma brucei* (*T.b.*) *gambiense* and *T.b.rhodesiense*. In animals *T.b.brucei*, *T.congolense*, *T.vivax*, *T.evansi*, *T.equiperdum* and *T.suis* can also cause the disease.

While *T.congolense* and *T.vivax* are largely confined to the vascular system, *T.b.gambiense*, *T.b.rhodesiense*, *T.b.brucei*, *T.evansi* and *T.equiperdum* can invade the extracellular spaces and organs including the central nervous system (CNS). If CNS involvement does become apparent this raises serious problems with regard to chemotherapy of the infection due to the presence of the blood-brain barrier (BBB).

The core hypothesis of Stuart's project was that administering drugs which fail to cross the BBB will result in the relapse of the subject to



Stuart Kerr was awarded the overall 2010 Connect Bursary Award

parasitaemia and that the timing of this relapse will be related to the trypanosome load within the CNS and the severity of the neuroinflammatory response. If correct, this hypothesis would indicate the necessity for prophylactic use of the available trypanocidal drugs. In addition, the study would demonstrate the need for a detailed investigation of available and novel CNS targeting trypanocidal drugs.

Stuart tested this hypothesis using a mouse model that closely mimicked the pathology of the CNS disease, and found that treatment with diminazene

aceturate clears the systematic infection but leaves viable parasites within the CNS leading to neuroinflammation but that the severity of this reaction does not appear to rise significantly with time after treatment.

The study also showed that mice began to relapse to parasitaemia at around 4 weeks post-treatment when the trypanosome load reached 34741 parasites per 100ng brain DNA. Further experiments are now required to establish the feasibility of prophylactic treatment when administered prior to the load in the CNS reaching this critical level ■

## Connect Bursary Awards 2010

# Equine bursary

● **Ellen Turnbull from Cambridge Veterinary School was this year's Equine Connect Bursary student. Her project focused on a potential genetic aetiology for recurrent laryngeal neuropathy.**

Recurrent laryngeal neuropathy (RLN) is a neurodegenerative condition causing dynamic collapse of the equine larynx. Cases of laryngeal paralysis/paresis can be classified into two groups: those of known cause, and more prevalently, those of idiopathic RLN. This study is interested in a long-hypothesised potential genetic aetiology for the latter group, with candidate genes selected on the basis of similarities in histopathology to primary

demyelinating forms of a human genetic neuropathy, Charcot-Marie-Tooth disease. Recent developments in the field of human neurology have shown the importance of myelin not just for nerve function but for axon survival, as is shown in the primary demyelinating forms of CMT. The hypothesis of the study is that RLN arises due to genetic defect(s) in a schwaan cell-expressed gene related to those affected in CMT.

Ellen's initial study represents a preliminary investigation only, with limitations of a small sample size (7 affected, and 7 control animals) and the difficulties associated with phenotyping of RLN meaning that further



Ellen Turnbull taking a buccal swab from a horse

research is required to formulate conclusive results. Within the remit of the work carried out to date, three genes were selected for investigation, and in two of these (pmp22 and P0) no significant differences were found between affected and unaffected groups although full statistical analysis is yet to be performed. A discrepancy in results between the control and

affected groups in the third gene (CXB1) has been found but requires further investigation, which is ongoing.

Ellen is looking at a third group of horses to extend the research and is currently working with two equine practices that have agreed to provide blood from any suitable horses that they perform blood sampling on ■

## Connect Bursary Awards 2010

# Bursaries

● **Chad Maki from the Royal (Dick) School of Veterinary Studies in Edinburgh studied the regulatory mechanisms controlling the mineralisation of the skeleton of broiler chickens.**

Improper bone development, growth, and maintenance can be detrimental to the health of animals and humans. Research has depicted that broiler chickens that have been selected for fast growth suffer from a number of musculoskeletal disorders. An understanding of the mechanisms involved in bone mineralization is necessary before any clinical therapies can be achieved.

It is common belief that tissue non-specific alkaline phosphatase (TNAP) is

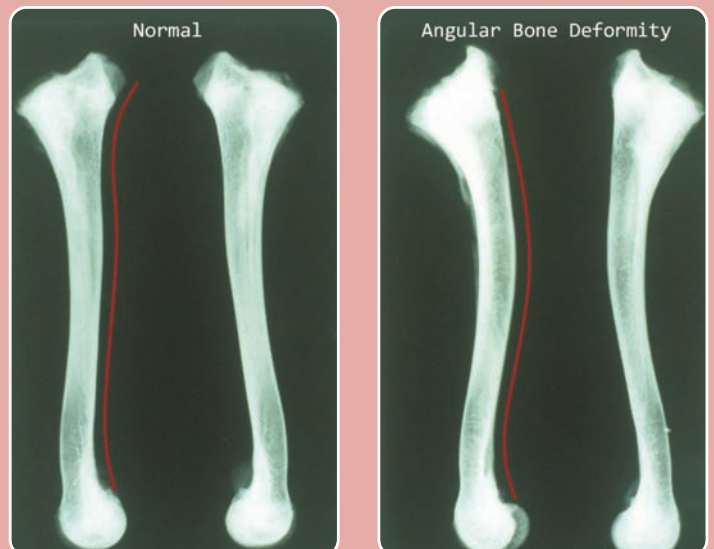
involved in hydroxyapatite (HA) formation in the extracellular matrix. However, recent research has revealed that Phospho-1 (PH1) is involved in mineralization of chick long bones and PH1<sup>-/-</sup> mice present with long bone fractures at Day 1.

In this study, murine primary osteoblasts were transduced for the first time to overexpress recombinant mouse PH1 (rmP1). Mineralization was tested *in vitro* using a known PH1 specific substrate phosphorylethanolamine (PEA). Mineralization was assessed by Alizarin Red S staining and quantification, PH1 protein was detected by western blot, TNAP activity was quantified, and PCR and qPCR were used to measure gene expression. The study found that PEA may not be a substrate for PH1 as mineralization failed with PEA,

but subsequent exposure to beta-glycerol phosphate (BGP) stimulated mineralization.

The study's finding has shown that, with the use of genetic breeding schemes that focus on Phospho1 overexpression, it may be possible to select for broiler chickens that can develop and grow bone fast enough to keep up with their abnormally

fast growth rates. It may also be possible – through the use of nanotechnology or other gene delivery systems – to deliver PH1 overexpression genes *in vivo* to sufferers of osteoporosis. This technology could also theoretically be used to genetically modify an individual's cells *in vitro* for subsequent autologous cellular transplantation therapies ■



Improper bone growth rates compared to weight gain can result in musculoskeletal disorders such as angular bone deformity.

● **Rachel Nixon and Philippa Morton from Cambridge Veterinary School spent their summer in the Mole National Park in Ghana where they assessed the role of soft ticks in the persistence of African Swine Fever.**

African Swine Fever (ASF) is a devastating haemorrhagic fever of pigs that is endemic in sub-Saharan Africa. The disease is clinically indistinguishable from Classical Swine Fever. The virus is highly contagious and during an epidemic is spread rapidly in wild and domestic pig populations by direct or indirect contact. The ASF virus is commonly carried by an intermediate host, *Ornithodoros moubata* (soft tick) which inhabits warthog burrows.

Depending on the strain, ASF mortality rates can be up to 100% with death usually occurring between

one and four weeks. There is no current vaccination or treatment and as such, the socio-economic impact can be considerable as it threatens food security and causes severe economic losses.

Working in collaboration with the Wildlife Services in the Ghanaian Forestry Commission and the Ghanaian Veterinary Service, Rachel and Philippa spent two weeks collecting over 800 ticks from multiple locations within the Mole National Park.

As each tick was collected, it was stored for future analysis and its location noted using a GPS reference. The ticks will subsequently be speciated and sequenced for the presence of the ASF virus. It is hoped that this will enable a preliminary epidemiological profile of the vector role of the ticks to be built. It is



African Swine Fever has the potential to cause severe socio-economic effects in many rural African communities.

hoped that this information will provide new information on the role of *Ornithodoros* soft ticks in the spread of

ASF in Ghana and that it may assist in the future control of virus transmission ■



Rebecca carrying out one of her first castrates at TOLFA

● **Rebecca Manson, a fourth year student at Glasgow University Vet School, travelled to the Aravalli Mountains of north western India to visit the 'Tree of Life for Animals' (TOLFA) hospital in Ajmer where she evaluated the effectiveness of the**

**hospital's animal birth control programme in the fight against the spread of rabies to humans.**

The animal birth control programme at TOLFA is designed to prevent rabies transmission to humans by stabilizing the street dog

population through mass sterilisation and rabies vaccination.

The premise of the study was to assess trends of rabies transmission from dogs to humans by collecting data from the region's main hospital, specifically looking at the number of dog bites seen in a given year.

Due to the non-uniform nature of healthcare in India, only a limited amount of data could be obtained. Despite this however, the study showed that during the last three years there had been a slight downward trend in the number of dog bites. Of these, 75% of bite victims were male and only 25% were female. Additionally, there was a 50:50 split between bites to children aged under 15 years and those to adults.

As TOLFA has only been operating in the Ajmer district for five years, a delay

should be expected between dog sterilisation/vaccination and a statistically significant drop in the number of dog bites and potential human infections with rabies.

Since opening in October 2005, TOLFA has sterilised and vaccinated approximately 11,800 dogs. Whilst the current downward trend in dog bites to humans does not yet appear to be statistically significant, the mere achievement of carrying out such a high number of sterilisations and vaccinations within five years represents a very significant achievement.

Rebecca hopes to return to Ajmer in 2014 to collect similar data for 2010-2013 in order to compose a comprehensive epidemiological picture of the transmission of rabies and to provide further assistance to the staff at TOLFA ■



Lesions are a common problem for working horses and donkeys throughout the developing world.

● **Ceri Tupper** travelled from the University of Liverpool to Luxor in Egypt where she investigated the location and severity of lesions caused by harnesses to working donkeys and carriage horses.

Carriage horses, known as caleches are one of the main sources of revenue for local people working in the Luxor tourist trade, and are used to take tourists to their destinations. Luxor also relies on donkey and carts to transport heavy loads for

farming and trade. These donkeys are often overloaded with sugar cane and other agricultural products.

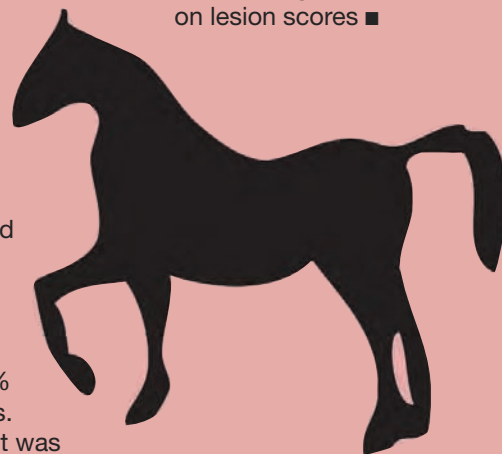
The region's horses and donkeys are often ill-shod, malnourished and frequently have badly fitting harnesses. However, they are regarded as prized possessions by the people of Luxor, and it is ignorance rather than malice that leads to poor welfare.

Ceri worked with the Animal Care Egypt (ACE) veterinary centre to identify where harnesses cause lesions in order to determine how to educate owners and improve harness design in order to prevent suffering.

By recording the location and severity of lesions on 117 equids, Ceri found that 89% of working donkeys had harness lesions compared to 78% of caleche horses. For both groups it was

found that there was a significant increase in the severity of lesions as the animal's body conditioning score fell and that donkeys were most likely to suffer lesions at the point of the shoulder whereas caleche horses suffered most lesions at the point of the thoracic and lumbar spine.

Ceri hopes that her findings will help horse and donkey owners to have a greater appreciation of the importance of body condition in preventing lesions, and suggests that future research could include a trial of harness modifications to see if this makes a significant impact on lesion scores ■



Catherine taking a sample of milk for SCC measurement

● **Catherine Bray** from the University of Nottingham investigated the efficacy of dry goat therapy for the reduction of somatic cell count in New Zealand dairy goats.

Commercial dairy goat farming is an expanding sector of both the New Zealand and UK dairy

industries, with demand for goat's milk increasing significantly. However, mastitis in dairy goats is causing large economic losses.

The intra-mammary infusion of antibiotics at the end of the lactation cycle is an effective and common practice in the bovine dairy industry and, despite a limited amount of

comprehensive research, has also been shown to deliver promising results in the goat sector.

Catherine's objective was therefore to measure the efficacy of antibiotic intra-mammary infusion at lowering the somatic cell count (SCC) of goats with existing subclinical mastitis over the non-lactating period and to make a comparison with untreated goats in the same herd.

The study investigated 82 goats from a herd in New Zealand, all of which had a SCC test of at least 1,000,000 ml<sup>-1</sup> along with no signs of clinical infection or visible evidence of udder or teat-end damage. The goats were split into two groups:

- **Group A** – received no treatment
- **Group B** – received a commercial antibiotic

consisting of 300mg procaine penicillin, 100mg dihydrostreptomycin and 100mg of nafcillin

Milk samples from each goat were collected aseptically at 0-3 days and 3-6 days post-kidding and tested for SCC.

The trial results indicated that there was no significant difference in SCC levels between the treatment groups at dry-off, but that goats in Group B had much lower SCC levels at both post-kidding sample dates than those in Group A. The intra-mammary infusion of antibiotics at dry-off was also found to reduce the establishment of new intra-mammary infections over the dry period.

Catherine also trialled a novel non-antibiotic treatment, the efficacy of which is still being assessed ■

● **Charlotte Oakley from Bristol University School of Veterinary Science carried out a follow up study on the vaccination status, numbers and distribution of stray dogs and cats in the Hanthana district of Kandy, Sri Lanka.**

According to the Sri Lankan Ministry of Health, there were 58 cases of human rabies in 2009 and 820 reported cases of rabid animals. In the same year, more than 1.1million animals were vaccinated against rabies through the work carried out by a number of independent charities.

In addition, approximately 730,000 individuals are given post exposure rabies treatment each year at a cost of 600 million Sri Lankan rupees (£3.4 million). 95% of human rabies cases are attributed to bites from infected dogs and it is estimated that Sri Lanka has a stray dog population of 2.5 million. There is little published literature on the effectiveness of vaccination and sterilisation programmes.

For six weeks, Charlotte worked with the Dogstar Foundation in the rural Kegalle district of Sri Lanka, to help in the charity's ongoing fight against rabies and to assist in a study to assess the effectiveness of such



The Dogstar Foundation in Sri Lanka works to reduce the incidence of rabies in dogs

programmes in reducing dog numbers and preventing both human and canine rabies.

The study has shown that the human population is well educated on the importance of vaccinating dogs against rabies, with the majority of owned dogs already vaccinated. However, there still

remains a large number of unvaccinated owned-cats and stray dogs. There is also concern that of those stray dogs that have previously been neutered, as many as 25% do not demonstrate protective levels of rabies antibody.

A larger scale follow-up to the study to further analyse the

effectiveness of vaccination and sterilisation may help to develop more effective protocols to minimise the incidence of rabies. Future education programmes must also emphasise the importance of vaccinating cats as well as dogs to further reduce the incidence of rabies ■



● **Hana McNicholas from the University of Nottingham investigated the use of behavioural indicators and urinary cortisol:creatinine ratios to assess the welfare of long-term kennelled rescue dogs.**

In the UK, many re-homing kennels are adopting non-destroy policies in order to increase the chances of longer-term dogs finding a suitable home. However, the number of dogs needing homes has increased by at least 8% in the last two years.

This in turn means that more dogs are spending longer in re-homing kennels which can result in increased levels of stress and undesirable behaviour, although increased human contact and environmental enrichment has been shown to improve welfare.

Hana analysed behavioural patterns and urinary cortisol:creatinine ratios to

assess the impact of long-term housing on a group of 16 dogs kennelled for at least six weeks. The dogs were housed in two separate facilities: the first housed the dogs individually while the second housed dogs in pairs.

Two 30 minute video recordings were made of each dog with a 6-9 day interval between recordings and urine samples were collected from each dog on these days to assess the cortisol:creatinine (C:C) ratio. The videos were then used to measure a range of behavioural variables which can indicate levels of stress.

The results of the study showed that there were no

clear indicators to suggest that the welfare of long-term kennelled dogs is consistently compromised. However, due to the small sample size available to the study and the numerous variables within it, very few definitive conclusions have been drawn – each dog showed very different results. There were some high C:C ratios present within the population and this shows that it would be beneficial to carry out more work. Most importantly, further behavioural comparisons should be made between breed types in order to standardise behavioural indicators, as what is normal for one breed may be abnormal and a potential welfare issue for another ■



● Alice McCutchan from The Royal Veterinary College conducted a histopathological evaluation of four regions of the stomachs in twenty dogs with food responsive enteropathy before and after dietary therapy.

Histopathological evaluation of biopsies is essential in the diagnosis of canine inflammatory bowel disease, which is characterised by

infiltration of the lamina propria of the gastrointestinal tract with inflammatory cells. However, its severity may not relate to the clinical picture.

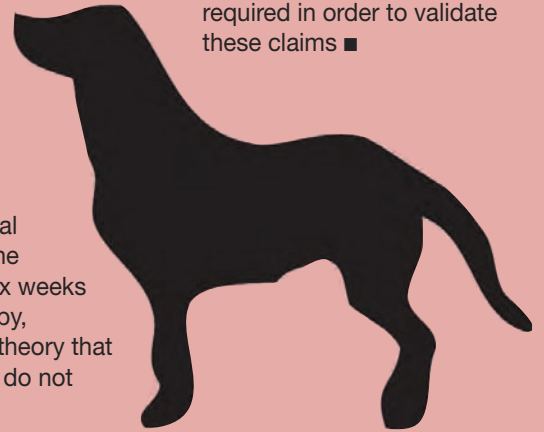
Using the recently published WSAVA histopathological standards, Alice's study quantitatively and subjectively assessed cellular populations within the lamina propria of biopsies in twenty dogs diagnosed with IBD. Samples were taken from four regions of the gastric mucosa via endoscopy under general anaesthesia at initial presentation and then repeated again six weeks later. In the interim, all cases were fed a hydrolysed veterinary diet.

Given that in equine reproductive medicine, provided no focal lesions are apparent, a single endometrial biopsy is considered to be representative of the whole

endometrial mucosa, it was hypothesised that excluding the pylorus, examination of a single specimen of gastric mucosa is representative of the whole mucosa.

Additionally it was hypothesised that prior to dietary therapy the pylorus would display a significantly greater proportion of inflammatory cells than the other regions of the stomach. Despite all cases showing a clinical improvement, there was no change in the severity of histopathological lesions within the mucosa after six weeks of dietary therapy, supporting the theory that the two indices do not often correlate.

Quantitative analysis of cellular populations showed that the pylorus did not have a significantly greater proportion of inflammatory cells compared to the other regions of the gastric mucosa before or after treatment. Separate analysis performed on all regions except the pylorus using a Friedman test does suggest that sampling one region is representative of the whole gastric mucosa. However, further work is required in order to validate these claims ■



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The scheme incorporates a number of benefits which include:

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**Education Support** – Intervet/Schering-Plough plays an active role in sponsoring clinical club meetings and continues to positively receive requests for presentations and lectures to be made to these clubs.

**Bursary Awards** – The annual Connect bursary provides financial assistance to students enabling them to undertake research in new and exciting areas of veterinary work.

#### Your University Contact...

For more information about Connect from Intervet/Schering-Plough, please contact your appropriate University Contact:

University of Bristol  
University of Cambridge  
University of Edinburgh  
University of Glasgow  
University of Liverpool  
Royal Veterinary College  
University of Nottingham

Philip Duffus  
Katheryn Ayres  
Antonia Robb  
Maureen McNulty or Lesley Nicholson  
Gina Pinchbeck or Elizabeth Laird  
Oliver Garden  
Malcolm Cobb

#### 2011 Connect Bursary submissions...

To submit your proposal for the 2011 Connect Bursary simply contact the staff representative at your university or Paul Jennings at ABC Limited on 01694 731914 or email [paul@abccomms.co.uk](mailto:paul@abccomms.co.uk)

You will need to submit a synopsis of your proposed project covering the aims, objectives and hypothesis of the research project. Successful applicants will be invited to attend the Intervet/Schering-Plough Bursary Award Day to present their research findings and to compete for the Connect Trophy.

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