

Completion Report for BSAS Scholarships

Name and affiliation:

Luise Seeker, SRUC & University of Edinburgh

Award Name and value of the award:

Murray Black Award, 600£

Was any additional funding secured to support the activity?

(If yes, please state the value and source of funding): No

Start/end date of the award:

27.08.-30.08.2015

Summary of the award (Briefly describe the objectives and how was it undertaken):

(approximately 300 words)

The Murray Black Award focusses on supporting early career researcher's projects on "the role of domestic and wild animals and their science in the enhancement and maintenance of the rural environment" mostly by funding their attendance at conferences or short research projects.

In my case the Murray Black Award enabled me to present part of my PhD project on telomere length measurements in dairy cattle at the World Congress on Controversies and Consensus in Bovine Health, Industry & Economics (CoBo) in Berlin, Germany. The objectives were to present research results at an international conference and to network in an environment that brings together experts with diverse backgrounds "from farm to fork" (farmers, veterinarians, breeding societies, food industry). I presented the rationale of my PhD project and my most recent results on the effects of DNA extraction methods on telomere length measurements at CoBo in form of a poster.

Telomeres consist of repetitive DNA hexa-nucleotides (TTAGGG) and associated proteins. They cap the ends of chromosomes and shorten with every cell cycle, because the enzyme that replicates DNA (DNA polymerase) is not able to copy telomeres completely. Telomeres shorten with age, but also in the presence of different stressors, most importantly oxidative stress. Leukocyte telomere length (LTL) might be informative about past challenges of the body and its future potential to adapt, heal and survive. LTL at birth is highly variable and is likely to be partially underpinned by genetics. From studies in birds and humans it is known that individuals with long LTL at birth survive longer.

My poster demonstrated the use of LTL measured early in life as a biomarker for breeding dairy cattle with improved functional longevity which would be beneficial for environmental, economic and animal welfare reasons. I introduced a qPCR-based assay for the measurement of average LTL that delivers robust and repeatable results in cattle. I could also show that DNA extraction method may have an effect on LTL measurements, and offered a straightforward solution how to account for DNA extraction method by using a calibrator DNA that was extracted using the same DNA extraction method as for the samples.

Benefits of the Award:

This is the main part of the report and the two sections below should be approximately 1000 words in total. You may focus on benefits to yourself, to the animal science community, or both – depending on the nature of the activity undertaken.

Benefit of the award to you (e.g. new knowledge or skills, new contacts and collaborations):

The award allowed me to present my work at a large international conference that focused on the species I am working with. By attending CoBo I could improve my poster preparation and presentation skills. I found it a difficult task to prepare a clear poster for a very broad audience with a variety of academic backgrounds, because so far I usually presented at telomere or ageing meetings where I could assume more basic knowledge of the audience in my field. The presentation of my work enabled me to discuss my study design, results and future plans for the project with international experts in their fields who offered all their personal view on our ideas and their implementations so far. One new contact suggested testing a different DNA extraction method (Nexttec) that is very quick and would enable us to improve our sample throughput considerably, if we are happy with DNA purity and integrity. After the conference we were in contact with Nexttec and they sent us a test kit. We will try their method and if we are happy with the outcome we might apply this method to our future experiments.

The results I presented at CoBo have since been written up in a manuscript and submitted to a journal.

It was a pleasant and valuable experience to network with scientists from all over the world who have a common interest in cattle. It was a great opportunity to meet my former teachers from “Freie Universität Berlin” again, where I studied for my undergraduate degree. They discussed their personal career choices with me that involved both, staying in academia as well as moving onto careers in industry. This influenced my plans for my own future career.

The conference itself was really interesting because it followed an innovative concept: Most speakers were invited speakers who introduced a controversial issue to the audience, for example different strategies to battle animal diseases: “vaccinate or eradicate” and how those approaches were applied in different countries. Afterwards another speaker argued for one of the strategies and a third speaker for the other. Then, the discussion was expanded to the audience which usually resulted in a lively and

constructive exchange of knowledge and opinions. Sessions thus lasted for approximately two hours which gave the delegates the opportunity to understand a problem in more depth and to comprehend why there is often not one single perfect solution for a specific problem.

I learned a lot during those discussions about different topics. Very interesting was the presentation of delegates from the Friedrich Loeffler Institute who reported how they discovered the Schmallenberg virus and how quickly they made their results available for the public.

For me of particular interest was the discussion about genomics which showed how differently genomic selection of breeding bulls is seen in different countries both within the EU and worldwide.

Benefit of the award to the animal science community, academic and industrial:

The results of my work that I presented at CoBo are of particular interest for scientists conducting qPCR studies on telomeres. Through these studies I was made aware of methodological details that can have a big effect on the results if they are not appropriately considered in the experimental design.

Also for the broader audience it is important to know that some DNA extraction methods can influence DNA quality to an extent that could potentially also affect other study results.

CoBo was an ideal platform to introduce our idea to use a molecular biomarker for improving longevity, a trait that is difficult to improve using conventional breeding methods, because the phenotype is recorded late in life and has a low heritability. It was interesting to discuss this idea not only with scientists but also with delegates representing breed societies of different countries.

Also, during discussions I was happy to provide my own views as a vet working in science on topics promoting diverse viewpoints.

Other supporting information: