FELLOWSHIP SUMMARY REPORT

Anne Balkema-Buschmann

Subject: Optimization of serological assays for the assessment of potential hosts and reservoir species of Henipaviruses

Host institution: Australian Animal Health Laboratory (AAHL), Commonwealth Commonwealth Scientific and Industrial Research Organisation (CSIRO), Geelong, Australia

Host collaborator: Dr. Glenn Marsh / Dr. Jennifer Barr

Dates of Fellowship: 29th May – 7th July 2017

Consent: I agree to the publication of this report on the Co-operative Research Programme's website.

1. What were the objectives of the research project? Why is the research project important?

The aim of this project was to determine an optimized diagnostic strategy for the detection of antibodies against Henda Virus (HeV) in horses. This is especially important since the certification of a Hendra negative status of horses is required for a number of export/import transactions. Moreover, since a Hendra vaccine which is based on the Hendra virus glycoprotein for horses is available in Australia, there is a need for a reliable diagnostic tool for the discrimination between vaccinated and infected horses (Differentiating Infected from Vaccinated Animals, DIVA). Such discriminatory tools are applied in the Australian National Reference Laboratory (NRL). Meanwhile, Enzyme Linked Immunosorbent Assays (ELISA) for the detection of Hendra virus infections and for the discrimination between infected and vaccinated horses have recently been developed at the Friedrich-Loeffler Institute. During this fellowship, the diagnostic performance of these newly developed assays were validated against the assays already available at the host institution, in order to identify the optimal test or combination of tests.

Another aim was to analyse the suitability of the FLI assays for the detection of Hendra virus infections in fruit bats.

The availability of reliable diagnostic tools for the analysis of horses and bats for Hendra virus infections are not only essential for the surveillance of geographical regions that are already affected by Hendra virus itself or by closely related Henipaviruses (Australia), but also for the surveillance of geographical regions where the circulation of Henipaviruses is assumed (Sub Saharan Africa) or where the status is mostly unknown.

2. Were the objectives of the fellowship achieved?

The practical experiments that had been envisaged for this fellowship were all successfully completed. Since Hendra virus infections have only occurred in Australia so far, and Hendra virus infection studies in horses have been performed at the host institution in the past, serum samples not only from vaccinated and negative horses, but also from naturally as well as experimentally infected horses are available at the host institution. Such a sample bank is an invaluable prerequisite for the validation of a new diagnostic tool.

It was therefore possible to perform a validation of the newly developed assays against the available assays (ELISA and Luminex Assay) by testing 110 negative horse sera, 110 vaccinated horse sera, 70 horse sera that were diagnostically challenging (mostly negative, some of them vaccinated), and 25 naturally and experimentally infected horses.

We observed a very good correlation between the tests, also opening new perspectives for further optimization or the possible application of a combination of individual test components in the future.

By testing the sample sets in parallel in the newly developed tests and in the tests available at the Australian NRL, I also received training in the application of a Luminex assay, which will help in establishing the same test at my home institution.

3. What were the major achievements of the fellowship? (up to three)

a) Validation of a new diagnostic test

   As mentioned above, one crucial achievement was the validation of new diagnostic tools. Due to the lack of relevant samples in Europe, this would have been impossible without the support of the host institution. After testing a set of 300 German negative horse sera for the definition of a cut-off value which is currently ongoing,

these assays can be applied in the German NRL e.g. for export/import investigations of horse samples, as well as for research purposes.

b) Strengthening of the cooperation between both involved institutions
Another very important achievement was the development of a strong scientific and personal connection between researchers of both institutions. This personal contact will distinctly facilitate future cooperation and the development of common research projects, not only in the field of Hendra virus, but also in other fields that are addressed in both the Australian and German sister institutes.

c) Since we are in the course of inaugurating a laboratory and animal facility for working with disease agents of the highest biosafety level (BSL4) at my home institution, it was extremely helpful to discuss the working processes that are applied in the facility of the same biosafety level that has been operating for decades in the host institution.

4. Will there be any follow-up work?

A publication of the results is under preparation. We are planning to finalize and submit this manuscript before the end of this year.
During my stay at the host institution, we discussed a number of topics of common interest. We agreed on the exchange of materials and reagents for common research projects. An informal cooperation has therefore already been started, and if the possibility to apply for funding of a cooperative project appears in the future this will be addressed together.
Although as a result of this fellowship a new diagnostic tool can be applied in the German NRL, we are not planning to commercialize this test at present.

5. How might the results of your research project be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?

As soon as the tests have been published, these newly developed diagnostic tools will be made available to other researchers in the field who may wish to use them for the screening of horses or bats. Independent of this fellowship we have also recently developed an assay for the screening of porcine samples. With the combination of these tests it is possible to test the most relevant animal species for the presence of antibodies against Hendra virus or other related Henipaviruses. Such studies may help to perform a profound risk assessment for geographical regions where no data concerning the presence of Henipaviruses are available.

6. How was this research relevant to:

The diagnostic tests may help to improve the Henipavirus surveillance and therefore enable a science-based risk assessment for geographical regions where no data are available on the presence of Henipaviruses so far. This may facilitate to prevent possible infections of livestock or even humans with emerging disease agents.

7. Satisfaction

This CRP fellowship was extremely helpful, not only for my current research project, but also for the development of personal contacts, which would otherwise have been very difficult to

establish over such distances. I am confident that a long-lasting cooperation will develop from this, as we discovered a number of common interests. There may also be further exchanges developing in the future.
I did not encounter any practical problems during the preparation or during the fellowship itself, therefore I have no recommendations for improvements.

8. Advertising the Co-operative Research Programme

I learnt about the Co-operative Research Programme by a colleague who was granted a fellowship last year, and I visited a conference last year where this Programme was advertised in a short presentation.
However, I have the impression that this Programme is generally not very well known. It could be considered to advertise it more regularly at scientific meetings through short presentations or by distributing flyers. Perhaps it may also be useful to contact national research societies and ask them to distribute the information among the relevant institutions.