

Project information

Project title

Climate-dependent infectious agents and diseases in reindeer (Wildlife Diseases)

Year

2011/2012

Project leader

Morten Tryland, NVH

Participants

- Leader: professor Morten Tryland, NVH, Section of Arctic Veterinary Medicine, Tromsø
- I. Other project participants at NVH, SAV: associate professor Kjetil Åsbakk, professor Jacques Godfroid, post doc. Carlos das Neves, post doc. Anett K. Larsen.
- Other participating institutions:
 - I. NVH, Tromsø: Laboratory veterinarians Terje D. Josefsen and Torill Mørk.
 - II. UiT: Associate professor Willy Hemmingsen, professor Arne C. Nilssen (Tromsø Museum).

Flagship

Terrestrial, Theme: Ecosystem effects of extreme climate events and season

Funding Source

Fram Centre

Summary of Results

A. Field work

Insects: During July 2011, blood sucking insects (midges and mosquitos) were collected from 25 different geographical sites in Finnmark, Nordland and Troms, from Lakselv (Finnmark) to Kobbelv (Nordland), mostly along the coast. Insects were caught using mosquito-collecting machines, killed and stored for species determination and analysis for pathogens. A protocol for collection and sample treatment is developed, to secure that species determination is possible, and that both DNA and RNA will be conserved in an optimal manner.

Reindeer: Samples from reindeer were collected during slaughter at a large-scale reindeer slaughterhouse in Karasjok (September 2011) and from a small-scale slaughterhouse in Lødingen (December 2011). Further reindeer sampling will be conducted during the remaining slaughter season 2012.

B Laboratory work:

General (all agents): DNA extraction kits and reagents, equipment and other lab reagents have been purchased, and the procedures are initiated.

The parasite *Setaria tundra*: PCR work for detection of DNA specific to the parasite *Setaria tundra* has been implemented.

The parasite *Elaphostrongylus rangiferi*: Terrestrial snails (several species) which can serve as intermediate hosts for the reindeer parasite *Elaphostrongylus rangiferi* (brain worm) were collected during summer 2011. It is one species with shell (*Arianta arbustorum*) and one naked species (to be defined), both shown to be good intermediate hosts for the parasite. These are kept in indoor terraries where they mate and produce eggs which hatch and are cultivated further as uninfected individuals for subsequent infection with *E. rangiferi*.

Currently, we have appr. 200 offspring, about 0,5 – 2,0 mm long, from the naked snails, and appr. 100 offspring from the *Arianta* spp. snails. Larvae for infection of snails are collected from reindeer feces from areas with brain worm- infected reindeer. As a pilot-study 8 offspring of the naked snails (slugs) are infected with L1 primo jan 2012. The expected time for development of L1 to L3 in the slugs is 21-33 days post infection. Larvae from feces propagated in snails to sufficient numbers, developed from L1 to L3, will be isolated and kept in cell culture medium at 37 degrees C. The supernatant will be used for preparation of ES-antigen (one or more *E. rangiferi* proteins recognized by antibodies in infected reindeer), which will be used to establish a serological method for diagnosing exposure to *E. rangiferi* in live reindeer (currently, diagnosis is based on findings of larvae in dead animals, together with clinical signs, if present). The work is currently ongoing.

Published Results/Planned Publications

Two scientific manuscripts, related to the reindeer parasite *Hypoderma tarandi*, are in preparation:

- *Hypoderma tarandi* in Finland and factors affecting infestation rate (Åsbakk, Kumpula, Hautaniemi, Oksanen, Laaksonen) (manus in prep.).
- Myiasis in young tourists to reindeer habitats, av B. Kan, D. Otranto, K. Fossen, K Åsbakk (manus in prep.).

One manuscript regarding parapoxvirus, based on previous investigations, are in preparation:

- Tryland M, Klein J, Berger T, Josefsen TD, Åsbakk K, das Neves CG, Larsen HJ, Oksanen A. Experimental parapoxvirus

infection (contagious ecthyma) in semi-domesticated reindeer (manus in prep).

From the work with *E. rangiferi*, at least two articles are expected:

- I) One describing the development and evaluation of an ELISA to detect antibodies against the parasite *E. rangiferi*.
- II) One on the association between climate changes/weather conditions and the presence and prevalence of *E. rangiferi* in intermediate hosts and reindeer.

Communicated Results

We have not been able to summarize and communicate the results from this specific project so far. However, 4 international presentations on infection biology in reindeer were given at Wildlife Disease Association Meeting (Quebec City, Canada) and Arctic Ungulate Conference (Yellowknife, Canada) in 2011.

Interdisciplinary Cooperation

The disciplines involved are veterinary medicine and biology (participating researchers). We would like to seek more cooperation with people working with climate changes and with epidemiology, statistics and modeling, especially so for the project applications to be submitted in 2012.

Budget in accordance to results

The funding from Fram Centre has been fundamental for starting and running this project, and will be so also for the two coming years (2012-2013), from which the main data are expected.

An application has been submitted to Reindriftens utviklingsfond (RUF), who decided to evaluate it for the budget year 2012, so it will be resubmitted in January 2012. That project will link very well with the Fram Centre project and represent a prolongation of the timeline of sampling and analysis, increasing the chances to reveal trends over time. The RUF application achieved a very good evaluation score in 2011 (NFR). Thus, the Fram Centre project has already given us a good activity and platform to be able to get additional funding. The Fram Centre project will also be extremely important for the two coming years, to secure that the laboratory methods are built, being available for other activity.

It would be interesting to discuss further cooperation with other members of the Fram Centre for future and possibly synergistic activity.

If Yes

We have no data that for the time being points at commercial interests, in terms of utilizing them for making new products and benefits (patents etc.). However, the results from the project is in general interesting for the reindeer herding industry, in terms of creating knowledge and competence on important reindeer diseases, how these might change due to climate change, and, possibly, how these changes can be mitigated in the best way. The research on *E. rangiferi*, in particular, may be of interest and relevant to farming and animal household, since this parasite is infecting goats and produce severe disease in these animals. The ELSIA under development can be used to check presence or previous exposure to the parasite in reindeer. Also diseases like pasteurellosis and contagious ecthyma (parapoxvirus) is transmitted between reindeer and livestock, and have relevance for both the reindeer and livestock animal husbandries.

Conclusions

Since the allocation of money was conducted close to the summer season 2011, we were not able to plan and conduct the field work according to the original schedule. This is also reflected in the use of money, since more money have been used on lab reagents and equipment than planned, and less money on field work expeditions. However, we have now a very good starting point for the two upcoming field seasons. We have identified spots for collection of insects and reindeer, from which also climatic data are available. We have also tested some methods of insect capture, and purchased necessary equipment for the field and the lab. For the field seasons of 2012 and 2013, we will focus on these sampling sites and improve the sampling and conservation of samples for these and future studies.

b) New methods and techniques:

- 1) Capture of mosquitos, midges and ticks – adjustment of methods and use of new technology (mosquito machines) and conservation techniques.
- 2) Collection and cultivation/propagation of snails and offspring, to be infected with parasites.

3) ELISA-techniques established for reindeer to detect reindeer pathogens, such as *E. rangiferi*.

4) PCR protocols for several reindeer pathogens; some has been established (parapoxvirus, herpes- and pestivirus, *Setaria tundra*), some has yet to be established.