

Master thesis projects in enzootic and zoonotic virus infections within Section for Clinical Microbiology, Department of Veterinary and Animal Sciences



Zoonotic aspects of swine influenza viruses

Some strains of swine influenza viruses have the capability to cross the species barrier and infect humans and by that provide a risk of starting a new human influenza pandemic as seen in 2009. We have received a major grant from Novo Nordisk Foundation to a project with the primary aim to identify and validate reliable molecular and/or immunological markers for the zoonotic potential of swine influenza viruses. In the frame of this project, there are a number of attractive master project available that will be performed in cooperation with PhD students and post docs at SSI, DTU and St. Jude Childrens Hospital in Memphis, USA..ie. a research stay in the US may be offered. The projects will involve laboratory work within virology, molecular biology, bioinformatics, immunology or pathology; or practical work with animals though participation in experimental trials in ferrets and swine. These projects are especially interesting for Biomedicine students that wants to work with research or in the medical industry after graduation. Examples of projects - in headlines - are listed below:

- Deep sequencing and bioinformatics analyses of influenza A virus strains collected from humans and swine
- Determination of receptor preferences of different swine influenza isolates
- Establishment of *ex vivo* organoids (trachea, lungs etc) of swine and humans for the study of influenza virus pathogenesis
- Participation in experimental infection of swine and ferrets with influenza virus and test of samples for virus and immunological mediators
- Participate in generation of genetic modified influenza virus Contact: Lars Erik Larsen; lael@sund.ku.dk



Comparative study of influenza A virus infection in different animal species such as mink, swine and seals.

The aim of this project is to compare the pathology of influenza A infections in different animal species, and establish immunohistochemical methods for detection of influenza virus and receptors in tissues from a range of influenza A susceptible animals including swine, poultry and mink and wildlife species such as seals, wild birds and whales. The project is cooperation between the virus and pathology groups at IVH. Contact: Lars Erik Larsen; lael@sund.ku.dk



Avian influenza.

In the frame of a PhD project we are analyzing the diversity and pathogeneses of HPAIV . We have planned experimental infections in Pheasants to study the transmission dynamics, viral pathogeneses, immune responses etc. A range of master

projects are available focusing on different aspects of the infection by the use of virological, pathological and immunological methods. The project is cooperation with SSI and a research group in the UK.

Contact: Lars Erik Larsen; lael@sund.ku.dk



Characterization of Newcastle disease (ND) viruses from wild birds.

The purpose of the project is to clarify which variants of Newcastle disease (ND) virus, are circulating in wild birds in Denmark. ND viruses are causing devastating disease in poultry in unvaccinated populations world-wide. Different variants of the virus are known to cause varying degrees of disease, and new variants emerge as the result of the high mutation frequency of RNA viruses.

Characterization of ND viruses is an ongoing activity in many of our surrounding neighbouring countries, while there is only a sparse knowledge about the ND viruses, circulating in Denmark. In this project, newer Danish ND viruses will be characterized by means of PCR, sequence analysis and phylogenetic analysis.

Contact: Lars Erik Larsen; lael@sund.ku.dk



Vaccination responses to Newcastle Disease Virus (NDV)

The purpose of the project is to investigate if the present, mandatory vaccination program against NDV provide sufficient protection during the lifespan of layers. Layers are vaccinated against NDV prior to the start of laying and are expected to be protected against NDV infection throughout the laying period. The lifespan of layers has, however, increased considerable during the last ten years, but there is a lack of studies that have documented the duration of immunity under these conditions. In this project, blood samples will be collected from layers at different ages and tested for antibody against representative isolates of NDV using hemagglutination inhibition assays and serum neutralization tests. Contact: Lars Erik Larsen; lael@sund.ku.dk



Vaccination strategies of horses against influenza virus

Most horses in Denmark are vaccinated against Influenza A virus using commercial available vaccines. In addition to the primary three vaccinations spanned by 3-5 months most vaccine companies recommend booster vaccination once yearly. In general, the duration of immunity after parental vaccination with an inactivated vaccination are shortlasting so it is not know if annual revaccination against influenza virus in horses are adequate. The aim of this project is to analyse the level of antibodies in horses one year after the last vaccination. In cooperation with horse practisioners, blood samples will be collected from horses in connection to their booster vaccination. The samples will be tested for antibodies against influenza A virus by ELISA, hemaagglutination test and serum neutralization tests

Contact: Lars Erik Larsen; lael@sund.ku.dk



Virus in dogs, cats and horses in Denmark

Only very limited diagnostics and research are performed on cats, dogs and horses in Denmark and therefore there is a profound lack of data on the prevalence and diversity of circulating viruses in these animals. Each master project may focus on one of the animal species and on a selected number of viruses such as parvo virus in dogs and cats, herpesvirus or equin arteritis virus in horses. The student will be involved in the establishment of real time PCR assays for detection of the viruses and methods for sequencing by either SANGER or on one of our NGS platforms. Samples will be collected from the small animal clinic at KU SUND, from other ongoing projects and/or from other veterinary practices. Contact: Lars Erik Larsen; lael@sund.ku.dk



Virus in chickens in Denmark

Only very limited diagnostics and research are performed on commercial chicken herds in Denmark and therefore there is a profound lack of data on the prevalence and diversity of circulating viruses in this segment. Each master project may focus on a selected number of viruses such as infectious bronchitis virus, Gallid herpes virus 2 (Mareks disease virus) or one of the retroviruses. The student will be involved in the establishment of real time PCR assays for detection of the viruses and methods for sequencing by either SANGER or on one of our NGS platforms. Samples for testing will be collected from commercial herds or from archived samples stored at KU-SUND. The project will be a cooperation between the virus group and the avian disease group (Professor Jens Peter Christensen)
Contact: Lars Erik Larsen; lael@sund.ku.dk



Important viruses in Danish swine

We have several ongoing projects on important viruses in Danish swine, including PRRSV, swine influenza virus, PCV2, rotavirus etc. The projects are focusing on characterization of viruses by molecular techniques (PCR, sequencing), experimental trials, optimized vaccination protocols, transmission dynamics, but are also open for new ideas. The project may either be focused on laboratory work or field studies according to the interest of the student.
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Important viruses in Danish cattle

We have several ongoing projects on important viruses in Danish cattle. Specific planned projects include studies on a rather new virus in Danish cattle – influenza D virus, but we are also interested in studies on BRSV, Bovine coronavirus and rotavirus in the frame of a larger project – Rubuste kalve. The projects are focusing on characterization of viruses by molecular techniques (PCR, sequencing), optimized vaccination protocols, transmission dynamics, but are also open for new ideas. The project may either be focused on laboratory work or field studies according to the interest of the student.
Contact: Lars Erik Larsen; lael@sund.ku.dk