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Thesis
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Evaluating the predictive power of mucin–microbiome interactions in livestock

Doctoral Candidate
Vacant position

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Infectious respiratory diseases are a major challenge for the livestock industry. They have an impact on animal health and welfare, the environment and public health.

One of the first lines of defence against respiratory pathogens is the mucus layer, a highly viscous material made up mainly of mucins and multi-kingdom microbial ecosystems. The interaction between mucins and the microbiome can be considered a robust double-edged sword: its usual function is to protect against pathogens and undesirable substances, while its dysfunction can indicate microbial infection and disease onset. However, more information about this interaction is needed when it comes to livestock.

To address this gap, this thesis project will attempt to unravel the complex mucin–microbiome interactions in ruminants, and then determine which of those interactions are essential for the health and resilience of holobionts against infectious diseases.

Using in vivo and in vitro experiments, we will explore the following main conceptual issues:

1. What are the types of mucins, their abundance and their distribution in the respiratory and digestive tracts?
2. What impact do mucin glycans have on mucosal microbiota composition and on the host immune response?
3. How do biotic stress factors (pathogens: viruses and *Mycoplasma* spp.) and abiotic stress factors (administration of antibiotics) modify mucin–microbiota interactions?
4. Which molecular mechanisms enable the mucin–microbiota system to respond to different pathogens and antibiotics?

Taken together, this work will establish a framework to characterize the protective and therapeutic character of mucins and microbiota against animal infections and diseases in livestock and how they modulate the behaviour and pathogenicity of different microorganisms.

Métaprogramme
HOLOFLUX

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