Project update
P2f: Infectious diseases

Diagnosing scours and respiratory diseases in calves

This project aims to determine the occurrence and spread of viruses and bacteria in NSW dairy herds. The information provides a foundation for tools to help farmers and vets monitor and treat diseases such as scours and respiratory disease.

Scours and respiratory diseases are common causes of death in young calves. Currently, calves with scours or respiratory disease are often treated on the basis of symptoms, without identifying the microbe responsible.

This project aims to build a genetic catalogue that can be used by diagnostic laboratories to improve their capacity for diagnosing pathogens causing disease and determine the most appropriate treatment.

This project is closely linked with Dairy UP's P2b project – Early Alerts.

Benefits

Early treatment, with the correct therapy is a critical step in avoiding the unnecessary use of antibiotics and preventing antimicrobial resistance.

Although this work is focussed on calf scours and respiratory diseases in NSW dairy calves, the findings have the potential for broader application. For example, the diagnostic tools developed may be relevant to dairy regions outside NSW.

The work will also enable early identification of new microbial variants or non-local variants that may have a significant impact on the industry.

This may be increasingly important in a future with extreme weather events as the ecological imbalances in the environment resulting from these weather events is predicted to further affect the occurrence of infectious diseases.

Unlocking the potential of cows

Dairy UP's P2 project aims to unlock the potential of dairy cows to achieve their genetic potential under NSW conditions.

P2 is a suite of seven projects that collectively explore ways to profitably increase both productivity and wellbeing in commercial settings.

P2a: Cattle Longevity: Age and Parity & Intensive Herds*
P2a: Longevity: Future*
P2b: Early alerts*
P2c: Milk as a diagnostic tool*
P2d: Heat stress*
P2e: Calf husbandry*
p2f: Infectious diseases ('Infectome')

This document provides an update on P2f: Infectious Diseases.

Research approach

The research team is using an approach called "metagenomics" to sequence and create a reference database of bacteria and viruses found in NSW dairy cattle. They aim to work with up to 80 dairy farmers from all of NSW's dairying regions to collect nasal and faecal swabs from sick and healthy calves. The bacteria and viruses detected in the swabs will be sequenced. These genetic sequences will allow scientists to identify specific 'strains' of bacteria or viruses that cause more severe disease than others and therefore guide the focus for disease control.

In future this information will be used on samples taken from sick calves for quick and easy detection of the virus or bacteria responsible for causing disease. This will enable early treatment with the appropriate drugs, improving survival

rates and reducing overall use of antimicrobials.

A second part of this study will characterise *E. coli*, one of the most common causes of infection in animals and humans. This will help us understand the different genetic types of bacteria that infect calves, and the presence of antimicrobial resistance.

On farm monitoring

The Dairy UP team is collaborating with commercial dairy farms in NSW who have agreed to participate.

On the day the team visits, nasal and rectal samples are collected from calves up to 7 weeks old, including all sick calves and up to 10 healthy calves. In addition, samples are collected from up to 10 cows, that calved within the past 50 days.

Participating farmers are also asked to fill in a survey to gain insights into relevant management practices such as management of colostrum, bedding materials, nutrition, and calf rearing management.

Progress update (July 2023)

Pilot study

A pilot study involving two farms was completed in 2021. The results from this pilot study informed the design of the larger-scale on-farm monitoring work.

Initial analysis of samples collected from the pilot farms confirmed that scouring calves were mostly infected with pathogens consistent with their symptoms.

A variety of bacteria and viruses from the samples have been profiled. The results show the presence of known viruses, such as Rotavirus, Bovine coronavirus, Bovine torovirus and Bovine respiratory and syncytial virus. The team has also sequenced a number of viruses that have not been extensively studied, such as Kobuvirus, Hunnivirus, Norovirus, Calicivirus and Astroviruses. The next steps will determine if these viruses have a role in disease.

The sequence data in the pilot study also found some cases of high activity of bacteria such as *Campylobacter sp.* and *E. coli* in combination with viral infection.

The study will be able to estimate the prevalence of dozens of microorganisms across NSW dairy regions, and help identify the potential genetic strains that are more likely to cause disease. These results will help improve diagnostics and guide the next research to develop efficient tools to prevent diseases in calves.

Farm sampling

As at July 2023, more than 1800 swabs have been collected from about 550 cows and calves on 26 farms.

Analysis of these samples is under way, while sampling from more farms continues.

Project expansion

In early 2023, the team received an additional $434k in funding from the Australian Research Council's Linkage scheme. This funding is being used to expand the work on microbial surveillance to develop new tools for diagnosing causes of scours and respiratory disease in dairy calves. This funding allowed the enrolment of two PhD students at University of Technology Sydney (UTS) to work on the project, starting in the second semester of 2023.

Next steps

Priorities for 2023-24 include expanding the number of NSW dairy farms involved, further analysis of samples and investigating new species identified and their potential role in dairy cattle diseases. Sample collection is expected to be completed by the end of 2023, and sample processing, sequencing and data analysis and interpretation will be the priority in 2024.

Collaborators

The P2f project is a collaboration between researchers from Dairy UP, UTS, NSW DPI Elizabeth Macarthur Agricultural Institute, and Scibus.

More info

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