# Biosensors in dairy farming

## Cooperation between Estonian and Finnish Operational Groups: farmers, researchers and experts meet face-to-face

Over the last 20 years, Estonia and Finland have both modernised their agriculture, particularly in the dairy sector. Production and effectiveness have been optimised. However, dairy farms in the two countries have some fundamental differences. The largest Estonian dairy farms are managed like industrial enterprises with up to 2000 cows per farm. In Finland, dairy farms although very modern, are typically family run and very rarely have over 500 hundred cows. "Dairy farmers and industry in these two countries can learn a lot from each other and form an effective duo for developing dairy farming production and practices even further", says Hardi Tamm, project manager of EIP-AGRI Operational Groups (OG) MAVAS.



This OG as well as over-the-border cooperation is led by the Estonian Dairy Cluster (EDC). Since 2018 MAVAS has been working in parallel with Finnish OG SMARTFEED coordinated by the University of Oulu. They are both looking into the use of biosensors in daily dairy farming.

## MAVAS – Estonia

Earlier in 2017, the EDC commissioned the development of a technical platform for a biosensor system to detect in milk the most common pathogens which cause mastitis. The sensors can identify the pathogens within 20 minutes. The MAVAS Operational Group has been set up as a second phase of this development work and it aims to develop an express test prototype and test it on farms.
This Operational Group involves members of the EDC and scientific partners such as TorroSen Ltd, Animal Breeders Association of Estonia, the Estonian University of Life Sciences and the Competence Centre on Health Technologies.

Hardi Tamm, who is also chairman of EDC explains "The project involves comparing the biosensor results with accredited laboratory methodologies, optimising measuring methods on different farms, preparing a biosensor prototype and testing analysis equipment on farms and determining the pathogen count in mastitis-affected milk. The different types of microbes causing mastitis are identified on a farm-by-farm basis. Prototype sensor devices are placed on farms to map pathogen distribution patterns. This enables farmers to test the equipment and give feedback concerning its use under real farm conditions."

## SMARTFEED - Finland

SMARTFEED, the Finnish Operational Group, aims to develop methods, tools, analytics and data transfer to create a system for monitoring silage quality, and energy and protein nutrition balance in dairy cows on farms. "The ultimate aim is to increase efficiency, productivity and competitiveness of the farms by reducing feed costs. Rapid, semi-automated measurement systems also reduce the labour needed", explained the project manager of SMARTFEED, Pekka Kilpelainen.

The project will develop and test several tools based mostly on biosensors to monitor dairy cow wellbeing and nutritional balance. These will enable fast silage and fodder sampling and analytics for farms and also measurement data-storage and utilisation.

For the Finnish OG, it is very important to engage farmers as central actors in the project and active participants in international collaboration. Then information will be disseminated directly to them and they are given opportunity to learn from their peers.

The members of this Finnish Operational Group include The Unit of Measurement Technology at the University of Oulu, ProAgria Rural Advisory Services (Finnish network of rural consultants), Finnish companies MTech Digital Solutions and SEMES (manufacturer of silage sampling. equipment), eight dairy farms and one veterinarian.



## Two Operational Groups join forces

Eventually both sides plan to pilot their developments in farms from both countries in order to assess capability and effectiveness of the biosensors in different conditions. "We found this cooperation useful because the combination of sensors helps to find the optimal solutions. Multilateral transfer of knowledge and sharing of experience, not only between scientists, is a positive outcome of the cooperation. We strongly recommend cross-border practice to improve European competitiveness" Mr. Tamm added.

At the end of April, SMARTFEED visited their Estonian colleagues. The group included farmers, researchers, representatives of rural advisory organisation ProAgria and a municipal veterinarian. The



farmers actually were most eager to ask questions when SMARTFEED visited 3 Estonian farms: a smaller organic farm of 200 cows, a farm of 2300 cows and a medium-sized farm of 700 cows. The Finnish students of veterinarian sciences from Estonian University of Life Sciences acted as interpreters helping farmers to communicate. Scientists and administrative staff of the projects discussed future joint research and development plans. Finally they all attended largest Baltic agricultural exhibition, Maamess, in Tartu.

## Background information

**Estonian Dairy Cluster**
https://www.piimaklaster.ee/en
**MAVAS**
https://piimaklaster.ee/en/mavas2/
**SMARTFEED – Smart measurements in cattle feeding and health**
https://www.oulu.fi/kajaaniuniversityconsortium/smartfeed
https://ec.europa.eu/eip/agriculture/en/find-connect/projects/%C3%A4lyrehu-%C3%A4lykk%C3%A4%C3%A4t-mittaukset-karjan-ruokinnassa-ja

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