Precision dairy farming – A Phenomenal opportunity with SLU Gigacow

Oral Presentations

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In a modern dairy farm, machines and sensors will automatically collect data on milk composition, activity, and cows' feeding behaviour to ensure good animal health and high productivity. Genotyping of calves for the estimation of genetic breeding values is now also a routine procedure at many farms, and genotyping with a 45K SNP-chip is available as a commercial service[1] at the cost of approximately 35 € per calf. In a farm, each cow's pedigree is known, and the herd structure ensures that between 60 and several hundred individuals will be exposed to the same environment, which means that collaboration with dairy farmers or research farms can yield extensive data on phenotypes and genotypes for a large number of animals living in the same environment.

SLU Gigacow[2] is an infrastructure by the Swedish University of Agricultural Sciences (SLU) to collect large-scale data collection from dairy farms. With the SLU Gigacow infrastructure, we aim to collect as many measurable characteristics as possible from cows on farms participating in the network. We then supplement these measurements with genetic information from each animal using a commercial 45K SNP-chip and other information about the farms to create a state-of-the-art infrastructure for genotyping and phenotyping. We currently collaborate with 17 commercial dairy farms and two research farms to provide daily data collection from over 5000 dairy cows in the network. The data is available to researchers at SLU and by agreement with external stakeholders working to improve the productivity, profitability and sustainability of the dairy farming industry.

For fundamental research, the unique production characteristics of dairy farms offer many opportunities yet to be fully exploited. With SLU Gigacow, we can combine genomic information with detailed phenotyping through automated or semi-automated monitoring systems to create large cohorts of individuals in a shared environment to study phenotypes, complex social behaviour as well as host-microbiome studies.

The presentation will cover the development of the Gigacow infrastructure and the research opportunities presented to researchers at SLU and international collaborators.
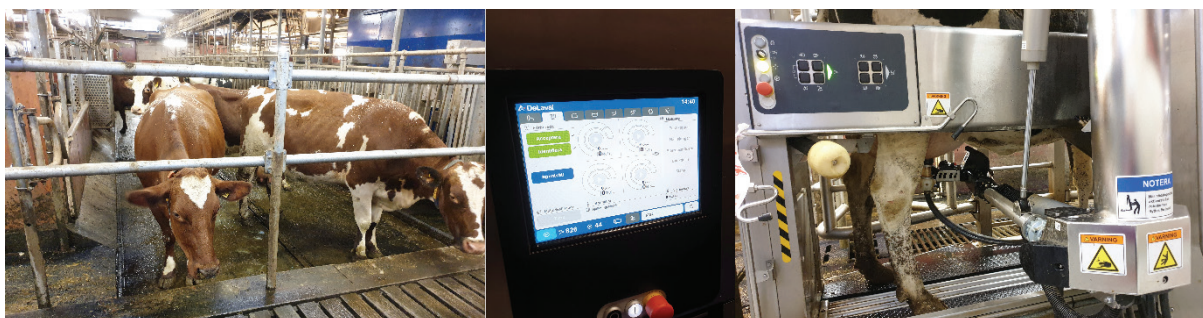
Figure 1. Swedish Red and White Cattle, the information dashboard mounted on the DeLaval Voluntary Milking System and the milking robot itself.

[1] https://www.eurogenomics.com/actualites/eurogenomics-new-eurog-md-beadchip.html
[2] https://www.slu.se/institutioner/husdjursgenetik/forskning/gigacow/