8. Supporting Circular Economy: How Does it Affect the Breeding Goals?

Title presentation

Improving dairy feed efficiency, sustainability, and profitability by impacting farmer's breeding and culling decisions

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Abstract

Enhancing feed efficiency should improve the profitability and sustainability of dairy farming due to reduced use of feed and land resources while potentially reducing emissions of greenhouse gas (GG) per liter of milk. The selection of animals that are genetically superior for feed efficiency requires precise measurements of feed energy intake and milk energy output from enough cows to predict genetic merit for feed efficiency with reasonable reliability.

Previously, a consortium of experts in nutrition, management, population genetics, and genomics of dairy cattle from North America and Europe created a pool of data including 5,000 cows genotyped and phenotyped for feed intake and related traits (Tempelman et al., 2015; VandeHaar et al., 2016). Using this database, the researchers showed that dry matter intake and residual feed intake had sufficient heritability to enhance genetic progress for feed efficiency. Data from that study projected that the US dairy sector could save $540 million/year with maintained milk production by breeding for more efficient cows.

The project presented herein was launched in 2019 to build on previous results and is the next logical step for implementing the selection for feed efficiency in the US and to address concerns about greenhouse gas emissions. Specific objectives are to 1) increase the reliability of genomic predictions for feed efficiency, 2) develop a feed intake index that uses sensors to predict feed intake on individual cows, 3) initiate a long-term program for updating genomic predictions of feed efficiency, and 4) determine if genomic predictions of feed efficiency can decrease methane emissions. The project protocol calls for the acquisition of data related to feed intake, milk yield and composition, and body weight for 42 days in 3600 mid-lactation cows (50-200 DIM) over a 5-year period. Additionally, a subset of cows will be fitted with sensors to monitor body temperature, feeding behavior, and locomotion. Mid-infrared spectral profiles will be collected from all milk samples. Methane emission will be measured in 300 cows. Data collection is in progress at all research stations. These data will be used to develop a genomic evaluation for feed efficiency in U.S. Holsteins and support the development of management tools.