ORAL

Technical Session 8

From Measurement to Genetics: Methane Emission and Feed Efficiency

Cattle Feed InTake – A system to identify cows, measure feed intake and body weight in dairy cattle under commercial settings using 3D cameras

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Despite feed efficiency being a complex and costly trait to measure, it became an important economic parameter incorporated into several breeding programs. However, the amount of available data still makes it difficult to conduct multitrait genetic analysis of related traits to estimate the consequences of selecting for improved feed efficiency. The CFIT system is a 3D camera-based technology that automatically measures body weight when a cow leaves the milking unit and measures individual feed intake at the feed bunk. The system is based on top-down Microsoft Kinnect v2 cameras using "time-of-flight" technology and the feed intake, animal recognition and body weight algorithms are based on AI modelling using Convoluted Neural Network algorithms. Currently the CFIT system is implemented at more than 30 commercial farms in Denmark, Finland, Sweden and Germany, providing continuous data collection from the dairy breeds Holstein, Jersey and Red Dairy Cattle.

The total data of weekly records of daily intake and body weight is currently 1.282.122 from 7158 RDC, 10914 HOL and 7542 JER cows. Mean feed intake and body weight was 61.8 kg and 689 kg for Holstein, 51.3 kg and 480 kg for Jersey and 59.2 kg and 624 kg for Red Dairy Cattle.

The data is used for both management and selection purposes. Numerous examples of using the data for improved management exist, since intake and body weight level and changes influence both efficiency, health and reproduction. Especially changes in dry cow body weight change show huge effect on performance in the following lactation. In many herds cows that either gain or lose 25 kg of body weight in the dry period has more than 10% lower milk production in the following lactation compared to cows that maintain their body weight in the dry period. Weekly averages based on daily feed intake are used for breeding value estimation for saved feed in Denmark, Sweden and Finland. Both feed intake (h2 = 0.30) and body weight (h2 = 0.65) are heritable traits when measured by the CFIT system and shows meaningful correlation to other traits like health, longevity and reproduction. The system continues to be further developed and to include more phenotypes that can be used for improved management and selection.