



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

Title presentation

Dairy cows enabling circular production systems

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Abstract

The transition towards circular agriculture is about careful management of soil, feed, animals, biodiversity and money, to achieve a near-to-closed-loop system of resources. A tailored breeding approach is an essential building block, to ensure cows' health, welfare and production in new farming systems related to resource availability. In this study, we defined circular production systems and related cow traits and compared the performance of two types of cows on a dairy farm in the Netherlands that strives to be circular. To define characteristics of circular dairy production systems and breeding goal traits required to transition towards circular production, a workshop was organized with multidisciplinary experts. In this workshop, nine characteristics of circular dairy production systems were defined: flexible, cooperative, efficient without losses, healthy cows, low input without concentrates, extensive nature and landscape, multipurpose, pasture based, and closed. Connecting to these characteristics, twenty-five traits were prioritized which fitted to one or more types of circular dairy production systems, for example, roughage efficiency, grazing behavior, coping with dietary fluctuations, and environmental footprint. A quick scan was performed at dairy farm "Knowledge Transfer Center De Marke", where innovative measures are designed and tested to minimize nutrient losses to work towards circular farming. The performance and variation in breeding goal traits of two types of cattle was investigated. Half of the in total ninety dairy cows at "De Marke" is of the Holstein Friesian breed, the other half is a three-breed rotational cross (Holstein Friesian, Montbéliarde, and Scandinavian Red cattle), which are managed together. Preliminary analysis on production and reproduction traits indicate that both types of cattle perform well within this extensive farming system. Differences in production and reproduction traits between the two breeding lines became smaller over the years. In recent years, the variation within breeding goal traits for Holstein Friesian AI bulls greatly increased and in combination with the implication of genomic selection, this helped to improve longevity and fertility traits. The quick scan highlights the importance of a large pool of genetic variation within or between cattle breeds. This variation will be essential for breeding programs when cows have to perform in a different environment, as will be the case when transitioning towards circular dairy farming.