Dairy cows enabling circular production systems

The role of breeding in the transition towards circular agriculture

Transition towards circular farming

- The ministry of agriculture in the Netherlands calls for a transition towards circular farming
- To achieve a near-to-closed-loop system of resources
How can breeding ensure cows’ health, welfare and production in new farming systems related to resource availability?
Methods

- Workshop with multidisciplinary experts to define characteristics of circular dairy production systems
- Case study on research farm “De Marke”, a dairy farm where innovative measures are designed and tested to minimize nutrient losses
Results: Definitions of circular farming systems

- Not one system for all, but **tailor-made solutions** for individual farms

- Nine characteristics of circular farming systems:
  - Flexible
  - Cooperative
  - Efficient without losses
  - Healthy cows
  - Low input
  - Extensive nature and landscape
  - Multipurpose
  - Pasture based
  - Closed
Twenty-five cow traits fitting to one or more system definitions, for example:

- Resilience
- Methane emissions
- Longevity
- Roughage efficiency
- Grazing behavior
Regional **cooperation** between dairy farms, arable farms and processing companies

- **A resilient cow** that can cope with large changes in diet
Example: Multipurpose

- The cow does not only provide milk, but also high-quality meat and manure
Example: Extensive pasture based

- To reduce feed – food competition
- Improving **grazing behaviour**
Example: Extensive with focus on nature and landscape

- The cow **serves** in nature management
- The cow should be able to process **low grade feed** (nature grasses)
Methods: Case study

- Dairy farm “De Marke” with two types of cattle that are managed together
  - Holstein and three-breed rotational cross (Holstein x Viking Red x Montbéliarde)
    - Crossbreeding started in 2010
  - Analyses included 446 lactations between 2014 and 2019 of 187 cows, corrected for parity number and calving season
Results: Case study

- **Production**
  - Holsteins produced more kg milk, but crosses a higher percentage of fat and protein

- **Reproduction**
  - Crosses had a shorter time between calvings, and less time between first and last insemination

- Both types of cows performed well at “De Marke”, differences are mostly reflected by the different breeding goals
Conclusions

- The transition towards circularity and resource efficiency calls for flexibility
- Sufficient genetic variation is essential
- Breeding programs can support the performance cows in new environments

anouk.vanbreukelen@wur.nl