Towards sustainable cows, good herd practices, and quality dairy products in the USA

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The efficiency and environmental sustainability of the dairy industry in the USA has increased greatly in the past 70 years. Milk production per cow per year has quadrupled since 1940 due to increased knowledge about management, nutrition, reproduction, herd health and genetics. The emphasis on milk production in genetic selection programs initially led to reductions in functional traits such as fertility, but inclusion of functional traits since 1994 has reversed these trends in the last 10 years. A large emphasis on transition cow management has reduced health problems after calving, but the transition period remains a sensitive time. Longevity of dairy animals has remained at approximately 5 years, including 2 years until first calving. This average longevity is the result of calving heifers that push out the worst cows in a national dairy herd of constant size. Milk quality has improved in the last decade, due to better management and motivated in part by quality premiums. Culled dairy cows account for approximately 15% of dairy farm revenue, and are approximately 15% of all processed cattle in the USA. A new trend is the emphasis on reducing the environmental footprint of dairy production. Half of the carbon footprint of retail milk is due to milk production on the farm. Compared to 1944, the same amount of milk is produced with 89% fewer animals, 65% less water, 90% less land, and a 63% lower carbon footprint. These gains are mostly realized by a much greater milk production per cow which dilutes maintenance costs. Although fluid milk production is decreasing per capita, the total volume of milk produced increases annually by approximately 2%. Drought is a major constraint in some parts of the US with some concern that the pumping of water from aquifers may not be sustainable. Rapid genetic progress through the implementation of genomics is emerging, which will results in a better cow that is producing a lot of quality milk while staying naturally healthy.

Optimization of production efficiency and environmental impact within the Austrian cattle production

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Under the condition of limited resources and increasing human population growing competition for high-quality, plant-based sources of energy and protein will increase worldwide. Disruptions in global inventories due to climate change may also encourage more emphasis on production efficiency. The presented project 'Efficient Cow' has the aim to evaluate the possibilities of genetically improving production efficiency in cattle breeding under Austrian circumstances. A key question is the definition of adequate efficiency traits. Presumably efficiency is a combination of already existing traits: milk, beef and functional traits and traits aiming at feeding efficiency and health. In addition to routine performance recording, new traits like body weight and other body measurements, health traits with emphasis on metabolism and feet and legs, and data about feed quality and feed intake are collected on about 170 farms within one year. Additionally, 2,000 Fleckvieh cows and 1000 Brown Swiss cows of these farms will be genotyped within the EU-project Gene2Farm. The farms are representing different production and feeding systems. Genetic parameters for newly defined efficiency traits and genetic correlations to other traits within the total merit index will be estimated. Further, the environmental effect of different milk production levels is modelled. One expected output is a recommendation for low-cost routine recording of traits associated with production efficiency, either as direct or as auxiliary traits. A higher efficiency is economically important and contributes to a reduction of nutrient losses and greenhouse gas emissions.