Defining the key attributes of resilience in pasture-based dairy farm systems in temperate regions

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Abstract. Over the coming decades, population growth, urbanisation and income growth, especially in developing countries, will result in a significant increase in demand for food. The increased production must be obtained with an increased efficiency and respect for the environment. Grasslands cover a significant part of the earth and provide an important source of global food supply, particularly for ruminant animals. The sustainable intensification of pasture-based food production systems provides an opportunity to align the ever increasing global demand for food with the necessity for environmentally efficient ruminant production. The challenge for production scientists is to find innovative ways to improve pasture-based production processes to maximise resource use efficiency based on improved management practices. Biophysically and financially resilient grazing systems are designed to harvest a large amount of the pasture grown directly by the cow, while minimising the requirement for machinery and housing, and exposure to feed prices. This is primarily achieved by matching the feed demand of the herd with the annual pasture supply profile (i.e., seasonal milk production). Ideally, the entire herd is calved before pasture growth equals herd demand; breeding and drying-off policies facilitate this. The type of cow is also important; she must be highly fertile and have good grazing behaviour characteristics.
Pasture species are chosen to best suit the predominant climate, and pasture management aims to maximise the production and utilisation of chosen species. Purchased supplementary feeds support biophysical resilience and can be successfully incorporated into grazing systems, if stocking rate (SR) is increased to achieve high pasture utilisation. However, industry databases indicate that, on average, profitability declines with increasing purchased supplementary feed usage, because of reduced pasture utilisation and lower than expected marginal milk production responses. In this paper we outline the characteristics of resilient pasture based dairy systems in the context of the necessity for the sustainable intensification of global food production.