

Steps towards sustainable livestock – the balance between yield and impact

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Introduction We are at a critical juncture for global livestock production, when competing requirements for maximal production and minimal pollution have led to the concept of *sustainable intensification*. Ruminants make an important contribution to global food security by converting feed that is unsuitable for human consumption to high value protein, demand for which is currently increasing at an unprecedented rate. Sustainable intensification of ruminant livestock may be applied to pastoral grazing, mixed-cropping, feedlot and housed production systems. All these systems have associated environmental risks such as water and air pollution, carbon emissions, soil degradation and erosion, as well as issues affecting production efficiency, product quality and consumer acceptability, such as reduced animal fertility, health and welfare. These challenges necessitate multidisciplinary solutions that can only be properly researched, implemented and tested in real-world production systems (Eisler et al., 2014). Moreover, Dumont *et al.* (2014) recently highlighted a major need to ‘re-design’ livestock systems including integration of crops and livestock. To this end, we have developed a network of ‘farm platforms’ across different climatic and eco-regions as a global resource for optimising and exemplifying research on the contribution of sustainable ruminant livestock production to global food security (www.globalfarmplatform.org). The farm platforms focus on: optimising production systems, animal genetics and nutrition; improving soil, plant, animal and human health; and minimising impacts of livestock production on welfare, ecosystem services or biodiversity. Some examples of farm platforms in the network are given below:

Palo a Pique, Uruguay - Four different no-till soil use intensities: long rotation (4 years of cultivated pasture; 2 years of annual forage crop); short rotation (2 years cultivated pasture and 2 years annual forage crop); permanent oversown sward; continuous annual forage crop. The winter annual crop is a mixed pasture of oats and ryegrass, the summer annual crop is grain sorghum.

UWA Future Farm 2050, Australia - The foundation is agriculture for food production based on a profitable mixed-enterprise farm, at the cutting edge of practical technology. There are four major activities: Livestock, Conservation cropping, Management of ecosystem and biodiversity, People: happy farmers and vibrant rural communities.

Wisconsin Integrated Cropping Systems Trial (WICST) - Established in 1989 to compare six alternative farming systems with respect to productivity, profitability, and environmental impact.

Thiruvazhamkundu, India - The research farm includes a dairy, fodder and agroforestry plots, cashew, coconut and other agricultural crops. This model integrated farm grants utmost importance to sustainability, ecosystem services and biodiversity in the face of climatic change.

North Wyke Farm Platform, UK – Temperate grassland research facility which allow whole scale system research of grazing practices. Current comparisons include the use of novel grasses and mixed clover systems. Future research could include mixed cropping systems with livestock.

References cited Eisler et al. (2014) *Nature* 507:32-34; Dumont et al. (2014) *Animal* 8:1382-1393

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