BENEFITS OF LOW-INPUT RUMINANT SYSTEMS

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AFFILIATIONS

Many livestock systems are highly dependent on inputs, leading to deleterious environmental impacts along a range of metrics. Healthy, diverse grasslands play a key role in biodiversity preservation, carbon storage, erosion control, water and nutrient cycling and regulation. Pasture for Life (PfL) is a non-profit organisation that supports ruminant livestock farmers in transitioning towards more sustainable grazing practices, including agroecological, conservation, and regenerative approaches. Our certification standard certifies 100% pasture-fed ruminant products such as dairy, beef, and lamb. These standards are updated annually in line with both updates in farming practice and in research. Some of the research underpinning the latest set of standards is summarised in this poster. Multispecies pastures are a practical, farm- scale response to issues such as nutrient use efficiency, feed self-sufficiency and forage quality, and biodiversity.

EFFICIENCY

The production of concentrate livestock feed has significant environmental impacts both at the production stage in terms of land and resource use, but also in terms of oversupply of nutrients such as nitrogen and phosphorous at the farm stage. Not only does this contribute to pollution, it also negatively impacts soil health and pasture diversity, and reduces the resiliency of the farm business.

A 2011 paper found that if accounting for the proportion of *human-edible feed* within diets, upland beef and lowland sheep had a lower (and therefore more efficient) Feed Conversion Ratio than pigs or poultry (Wilkinson 2011).

Integrating livestock into arable rotations has been demonstrated to reduce pest, weed, and disease burden without relying on biocides, and can reduce dependence on inorganic fertilisers. The problems of many current tillage-based cropping and feedlot-based livestock production systems may be avoided by ecologically sensitive management of ruminants in mixed crop and grazing agroecosystems (Delgado *et al.*, 2011). The benefits could include; increased carbon (C) sequestration, improved soil nutrient cycling, increased soil stability, enhanced watershed function, increased production of healthy food, and enhanced biodiversity and wildlife habitat populations. Integrating livestock into mixed agricultural systems and grazing management to increase soil organic carbon (SOC), biodiversity, and soil quality could enhance resilience of soil and agroecosystems against climate change and extreme events. Reducing arable and livestock farmers dependence on inputs improves their resilience to supply chain disruption as a result of socio-economic or environmental stressors.

BIODIVERSITY

The intensification of agriculture has increased the homogeneity of landscapes, reducing forage and habitat opportunities for a range of wildlife species and classes (Hester 2007; Vickery *et al.*, 2001; Woodcock *et al.*, 2014) . Managing grazing to increase sward heterogeneity provides increased forage and habitat opportunities for insects, and therefore the wider food web (Vickery *et al.,* 2001). The collapse of invertebrate populations is documented even in protected areas, suggesting that land-sparing approaches on their own may not be sufficient to reverse their decline (Chowdhury *et al*, 2023). Low-input livestock grazing can provide important year-round sources of food for invertebrates and aids in the maintenance and diversity of habitats such as meadow, moorland, woodland, saltmarsh, and dune habitats.

Find out more from the UK Centre for Ecology and Hydrology Project SEEGSLIP: "Sustainable Economic and Ecological Grazing Systems - Learning from Innovative Practitioners"

Photo of Village Farm by Rebecca Hosking @apartyofjays

NUTRITION

If ruminants consume a 100% pasture-based diet containing a variety of plant species, it is reflected in the quality of their meat and milk which contains a superior nutrient profile. Regardless of the genetic makeup, gender, age, species or geographic location, direct contrasts between grass and grain finishing rations consistently demonstrate significant differences in the overall fatty acid (FA) profile and antioxidant content found in the lipid deposits and body tissues. A recent review of the nutritional benefits of fatty acids from organic and grass-fed beef found that the most notable differences in fatty acids between pasture-based, organic, conventional and intensive grain fed beef are for total omega-3, α- linolenic acid (ALA), EPA and DHA, which diet and nutrition literature suggest are fatty acids that should increase in the human diet (Van Vliet *et al* 2021; Butler *et al.,* 2021; Davis *et al.,* 2022 Davis *et al*., 2020)

A 2019 review reported that milk derived from cows fed pasture-based diets, has a higher fat and protein content with improved nutritional status (higher polyunsaturated (PUFA) concentrations and better omega-6: omega-3 ratio) compared to milk that is derived from a TMR feeding system (Alothman *et al*., 2019). The nature of forage impacts carotenoid and tocopherol (Vit E) levels in meat and milk, with highest concentrations found in animals grazing diverse pastures (Dunne *et al*., 2009)

Pasture feeding increases the content of some beneficial nutrients such as omega-3 PUFA, vaccenic acid, conjugated linoleic acid (CLA) and ß-carotene, while reducing levels of omega-6 fatty acids and palmitic acids. Significantly higher percentages of health promoting FA have been recorded in milk fat derived from pasture feeding (O'Callaghan *et al*., 2016)

BENEFITS OF MULTI-SPECIES SWARDS

Recently published research by Norton *et al.,* (2022), demonstrated that PfL approaches can be beneficial for grassland and wider ecosystems. Results demonstrated that PfL plots were more species rich and contain more legume and forb species and lower proportions of Lolium perenne than those on improved grassland.
Higher species richness in grasslands was associated with positive measures of soil health, such as soil moisture content, carbon (C) and nitrogen (N) content and biodiversity, including soil invertebrate abundance. Increased vegetation height was observed on PfL farms, which is known to be beneficial for biodiversity ranging from invertebrates, such as butterflies and bees, to mammals and birds. Vegetation height was also positively associated with soil moisture, C, N and total invertebrate abundance. Higher species richness is also associated with lower parasite burdens and reduced anthelmintic use, improved fatty-acid profiles, and reduced nitrogen loss, suggesting that multispecies swards carry a range of benefits as part of an agroecological transition. From a productivity standpoint, multiple studies demonstrate a correlation between livestock productivity when grazing more diverse pastures (Jordan *et al.,* 2022) Diverse swards have been shown to improve environmental performance, without reductions in productivity, even with a reduction in inputs (Weigelt et al.,2009) .

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