Organic Livestock Husbandry Towards More Sustainability

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Abstract

Major environmental concerns are associated with livestock systems including climate change, water depletion and pollution, land degradation and soil erosion, deforestation, threats to biodiversity and impacts of materials and energy use. The aim of this presentation is to advance the sustainability of consumption and production of livestock products through organic agriculture. It is argued that organic standards require strengthening of livestock feeding strategies in order to both provide food for the 2050 population while conserving environmental resources.

Introduction

Livestock contributes up to 40 percent of agricultural gross domestic product across a significant portion of South Asia and sub-Saharan Africa and one billion poor people, mostly pastoralists depend on livestock for food and livelihoods. Globally, livestock provides 34 percent of protein intake and 15 percent of dietary energy. With rising incomes in the developing world, demand for animal products will continue to surge; 68 percent for meat, 58 percent for dairy products and 53 percent for eggs. However, meeting this increasing demand is a major challenge in our context of planet boundaries. This article introduces the challenges brought by: livestock systems to natural resources; efficiency and consistency of animal feeding strategies; and human consumption of livestock products. It argues that “organic plus” strategies for animal husbandry can potentially meet both environmental conservation and human development objectives.

Results of the analysis

Business-as-usual

The livestock sector is one of the key drivers of land-use change. Each year, 13 billion hectares of forest area are lost due to land conversion for agricultural uses as pastures or cropland, for both food and livestock feed crop production. This has detrimental effects on regional water availability, soil fertility, biodiversity and climate change; livestock contribute to seven percent of the total greenhouse gas emissions through enteric fermentation and manure. Furthermore, 20 percent of the world grasslands are degraded; this trend is increasing, mainly due to intensified animal density per area. Ever-increasing intensification of livestock production based on concentrate feed adversely affects animal health. In industrial livestock production systems, mortality increases, longevity decreases and disease outbreaks and pandemics are more frequent. Animal welfare and health are key to steadily improving livestock production as diseases can decrease livestock production efficiency by up to a third. As livestock density increases and is in closer confines with wildlife and humans, there is a growing risk of disease that threatens every single one of us: two thirds of the emerging diseases in humans have animal origins and one or two new diseases emerge every year. Hormones and antibiotics used in industrial meat production and excess meat consumption also affects human health. Improving livestock husbandry increases animal efficiencies and protect human health and livelihoods. Globally, there is enough cropland to feed 9 billion in 2050 if the 40 percent of all crops produced today for feeding animals were used directly for human consumption, while available grasslands were more efficiently used as the basis for livestock feed. Grassland-based and mixed crop-livestock systems optimize nutrient and energy cycles, while encouraging the use of rare livestock breeds that are adapted to low input and harsh environments. This is crucial in a context of climate change and increasing variability.

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Organic livestock management

The Sustainability and Organic Livestock Model (SOL-m) is a global land use and food systems model capable of analysing the impacts of different production scenarios on land use, food availability, material flow and other environmental impacts. We modelled the potential impacts of a global conversion of animal husbandry to organic agriculture on food availability and the main global environmental challenges in 2050. SOL-m calculations revealed that sufficient calories and protein could be produced in 2050 through a global conversion to organic livestock management. Furthermore, many positive environmental impacts could be achieved, including lower GHG emissions and energy use, lower N and P surpluses and toxicity potentials. However, organic livestock production as practiced today (i.e. utilizing organically produced concentrate feed) will need more land (hence deforestation) in order to satisfy global food demand. According to SOL-m preliminary calculations, about 450 million additional hectares of arable land would be needed globally for an organically produced food supply. If global conversion to organic agriculture is combined with a reduction of concentrate feedstuff by 50%, about 250 million additional hectares would be needed. The organic option, however, becomes a win-win if it refrained from using concentrate feeds, as in this case no additional cropland would be needed. Although to different extent, what is certain is that none of the development scenarios (e.g. business-as-usual or organic) could ever be sustainable without a global shift to sustainable diets, that is, a decreased consumption of livestock products. Therefore, if consumption shares of livestock products would decrease by three or four as compared to the expected trend, organic livestock production without concentrate feed becomes a feasible proposition. In such a scenario, all environmental indicators become positive, including deforestation pressure, and food availability (in terms of global calories and proteins) becomes more than sufficient for the 2050 population, as land freed from concentrate feed production would be used for plant-based food.

Discussion

SOL-m results suggest that a continued trend of current livestock husbandry practices will most likely lead to problematic trends for most environmental indicators, undermining the very base of food production. On the other hand, a conversion to organic livestock management, while resolving many environmental challenges, remains problematic as more land would be needed. The analysis reveals that animal feeding strategies are key to sustainability. Great synergies can be achieved between food availability and environmental health by improving organic standards regarding the use of human-edible feed. About 60% of the agricultural land worldwide is covered by grasslands. Within the agricultural sector, grasslands play a major role in maintaining food production and fulfilling crucial ecological functions such as soil carbon sequestration, maintaining soil fertility, biodiversity and other ecosystem services. Improving grassland management constitutes a powerful lever for boosting food production without jeopardizing natural resources. An increasing number of consumers acknowledge these functions and are willing to pay higher prices for foodstuffs produced in grass-based systems. This development may enhance the economic viability of grassland-based milk and meat production systems, as compared to concentrate feeding. Global environmental impacts can be mitigated if ruminant production was grassland-based and monogastrics were fed with agricultural residues and food waste. Achieving sustainable food security in 2050 is only possible if the projected global demand for animal products in 2050 was reduced as our planet resources cannot sustain the expected demand, whether livestock is raised conventionally or organically. To be fully sustainable, the organic livestock sector will need to reduce the use of concentrate feed.

Deepening research on feed sources

Feed is a key element in livestock production, often representing up to 70 percent of total production cost. Feed is commonly the main driver of livestock production systems and can determine the financial viability of the livestock enterprise. Feed production and use do impact animal health and welfare, reproductive efficiency, land use and land use change, water use, greenhouse gas emissions and product quality and safety.

Food conversion efficiency. Human-edible protein output/input ratio varies among livestock systems. For example, a recent FAO study in Asia revealed that intensive poultry production and pigs are the least efficient food converters (respectively, 0.8 and 2.1) while cattle/buffalo and sheep/goat systems fare best (respectively, 15.1 and 24.4); this is because the first group is fed on human-edible grains while the latter group feeds primarily on grass.
Local feed supply. Feed availability - whether crop residues, grain and oilseed by-products, or pasture lands - varies among countries. Given the importance of feed for animal production, accurate assessments of livestock feed supply from all sources and for different livestock types are needed, including different feed ingredients within countries at different times of the year. Livestock numbers and species, as well as breed mix, should be adjusted in relationship to local feed supply.
Alternative feed sources. With rising animal-derived food demand, there is need to explore alternative sources of feed, especially for monogastrics: innovative technologies are needed for agroindustrial by-products, as well as recycling of food waste, in animal diets.
Rational biomass use. National feed assessments need to be improved by better data collection systems. These assessments are the basis for: estimating nutrient balances, identifying potential surpluses or deficits; making better use of available feeds; making spatial and temporal assessments of current and forecasted feed resources; generating an optimum livestock-feed relationship; and balancing trade-offs in biomass use. Equally important is the proper management of the data generated on feed systems, chemical composition and nutritional value of feed ingredients, export and import of feed ingredients and price variations.
Grasslands knowledge. While grassland-based livestock systems could globally meet global calorie and protein requirements, a shift away from concentrate feeding requires better knowledge of: the nutritional value of different types of grasslands as livestock feed, in different regions and for different ruminant species; the suitability of species and varieties of livestock to different grassland types; and the carrying capacity of grasslands in terms of output and sustainable stocking densities.
Determining feed demand involve numerous variables, such as energy demand, protein demand, herd composition and number of animals, among others. For a more sustainable livestock sector, feed sources must also be considered in relation to predominant natural and agricultural resources assets, and choices should be made so as to minimize human-edible foods in animal nutrition. Ultimately, any recommendation (or choice) on animal feeding will necessarily be location-specific.

Suggestions to contribute towards an Action Plan for the development and strengthening of Organic Animal Husbandry

Organic animal production has so far focused on input substitution at all stages of the supply chain in order to safeguard people and the environment, as well as on animal welfare and health. Although organic standards cover animal dietary requirements adequately, including also prohibition on unhealthy feeding practices (e.g. feeding slaughter products or excrements), no provision exists on rational use of resources and imported concentrate feeds are common in organic systems. It is therefore proposed that the Action Plan considers animal feed sources, with specification for grass-fed ruminants and residues-based monogastrics. Protein conversion efficiency, rational use of local biomass and of global landscapes (e.g. pastures), and ethical utilization of food will need to guide decisions on feed sources.

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