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Sustainable Development Goals and livestock systems

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Summary

Within the framework of the Sustainable Development Goals (SDGs), particularly those that livestock impact most significantly (SDGs 1, 2, 3, 5, 8, 12, 13, 15, and 17), this paper provides an overview of the implications and opportunities for building solutions through sustainable livestock options that are supported by robust animal health services.

The discourse is shaped by the experiences of the multi-stakeholder partnership, the Global Agenda for Sustainable Livestock (GASL), which facilitates policy dialogue and action among diverse stakeholders to make livestock systems more sustainable. The Global Agenda for Sustainable Livestock adopted the mentioned SDGs as the reference framework (1, 2) for its actions, which are organised under four domains (food and nutrition security, animal health and welfare, livelihoods and economic growth, and climate and natural resources). These domains are used to highlight the complexity and diversity of the livestock sector, its positive and negative relationships to development, the integral roles of animal health systems and thus of opportunities for livestock sector contributions towards a sustainable future. Animal health systems in this chapter are defined as: 'Animal health systems (both public and private) preserve and develop animal resources, reducing poverty and hunger worldwide through improving rural livelihoods and feeding the world. Their additional impact on global health security by addressing "risk at source" for emerging pandemic threats, antimicrobial resistance and food safety crises further safeguards the planet' (3). In the context of this paper, animal health services are also called the animal health system, encompassing public and private actors, and indicates the link to the One Health approach.

Keywords

Animal health systems – Climate and natural resource use – Food and nutrition security – Global Agenda for Sustainable Livestock – Human and animal health – Livelihood and economic growth – Livestock systems – SDGs – Sustainable Development Goals.

Introduction

The livestock sector plays multiple roles in all Sustainable Development Goals (SDGs), predominantly positive, few negative with multiple and diverse interactions and trade-offs. The Global Agenda for Sustainable Livestock (GASL) defines sustainable livestock as follows: "To be sustainable, livestock sector growth needs to simultaneously address key environmental, social, and economic challenges: growing natural resources scarcity, climate change, widespread poverty, food insecurity and global threats to animal and human health and animal welfare." Shaping sustainable livestock solutions is influenced by two significant elements – the sector's diversity and the demand for livestock commodities. Much of the multiplicity and apparent paradox regarding livestock and sustainable development stems from the diversity of the sector across the world. From large-scale, industrial production (sometimes referred to as 'capital-intensive' production), to the over half a billion small-scale mixed crop-livestock farms (sometimes referred to as 'labour-intensive' production) to extensive pastoral lands which make up at least a quarter of the Earth's land area. From parts of the world where 'livestock' means a piece of packaged meat, or a bottle of milk on the supermarket shelf, to those where 'livestock' means animals that are an integral part of managing household economy and risk. This diversity means that to enhance the positive and mitigate the negative impacts of livestock on development – to improve sustainability for the sector – requires very different actions depending on the production system, commodity, agro-climatic and socio-economic context.

The demand for livestock products will increase by more than 70% between 2005 and 2030 (4). While this demand is only growing modestly in high-income countries (HICs), it is growing rapidly in lower- and middle-income countries (LMICs) due mostly to rising incomes, such as in parts of Asia (5), as well as populations, as in much of Africa (6). This growth is expected to continue in the coming decades and livestock systems are raising production to meet this demand while adapting to satisfy the changing preferences of an increasingly affluent and urbanised population in a globalised economy, as well as – where appropriate – modifying demand to healthy levels. Such rapid, uneven growth in production and trade varies by region and production system and presents multiple risks as well as opportunities for sustainable development (6).

There are multiple ways to meet the demand for livestock products, and these will undoubtedly change over time. In LMICs where demand is rising the most, in the short-term, growth will be

met by transforming the small- and medium-scale farms that produce the bulk of meat and milk today. In HICs, addressing the challenges of large-scale capital-intensive production with often tapering demand provides the context for transition. Such transitions need to consider multiple development outcomes and trade-offs. It will be important to foster balanced growth and environmentally friendly intensification to allow for sustainable development and to learn from the already intensive agriculture in many HICs – both pros and cons.

The ongoing COVID-19 pandemic, whose full impact is unknown at present, illustrates that the global food system is fully interconnected and at the same time fragile. Nevertheless, what we do know is that a sustainable livestock sector is needed that simultaneously responds to demand for food, contributes to development opportunities and mitigates harms. In this context, well-functioning, fully integrated animal health services are key.

Cross-sectoral integration and prioritisation of Sustainable Development Goal targets

While livestock systems are relevant to all SDGs, as a multi-stakeholder partnership, GASL recognises eight SDGs that the sector contributes to most directly with goal 17, partnerships, essential to underpin all actions (see Fig. 1):

In its current 2019-2021 Action Plan (7) and in the theory of change developed in 2020 (8), GASL concentrates on the four sustainability domains (food and nutrition security, livelihood and economic growth, human and animal health, and climate and natural resource use).

These domains were adopted by the 2018 Global Forum for Food and Agriculture in Berlin (9), to better focus its actions in support of achieving the SDGs. Noting their relationship to the four pillars of sustainable development, and the integral roles of animal health services, these domains are used to frame the present overview of improving livestock and its contributions to the SDGs (see Fig. 2).

Food and nutrition security

Corresponding directly with the GASL domain of the same name and related particularly to SDGs 2 and 3, the livestock sector has critical roles to play in food and nutrition security. Beyond providing 18% of the total calories (kcal) and 40% of the protein in people's diets at global level (5), livestock-derived foods provide critical micronutrients such as vitamin A, vitamin B-12, riboflavin, calcium, iron, and zinc, which are difficult to obtain in adequate quantities from plant sources alone (10), especially for the world's most vulnerable groups, such as children, pregnant women, and the elderly (11). Milk, meat, and eggs can help combat

micronutrient deficiencies, or 'hidden hunger', by providing people with essential vitamins and minerals. They can help reduce mortality and stunting among children. In contrast, excess consumption of livestock-derived foods is often associated with non-communicable diseases that are often spurred by obesity. Many emerging economies are now facing a 'double burden' of malnutrition, with segments of the population undernourished, and other, wealthier segments increasingly overweight and obese. In 2016, 39% of the world's population 18 years old and older were overweight and 13% were obese (12). Solutions for a balanced, healthy diet will thus for some mean eating less milk, meat, and eggs, whereas for others consuming more would benefit their nutritional status considerably.

Beyond nutrition, in many parts of the world, especially the mixed crop-livestock farms that are ubiquitous across many LMICs, livestock are integral to food security because of the intimate connection between raising animals and growing crops. Income from livestock, manure, and provision of traction and transport (within the farm and between farms and markets) all contribute to crop production to such an extent that over half the developing world's staple cereals can only be produced because livestock are integral to the system. Such integrated production means livestock can transform materials such as grass, straw, agro-industrial and household wastes – none of which are edible by humans – into high-quality protein (13). However, especially in capital-intensive systems, animal feed may be based on cereals that people do eat, and/or which are grown on land that could be used to produce food crops for humans. To enhance livestock's contribution to ending hunger, ways must be found to avoid such feed-food competition. Improved use of crop by-products (14) and improved feed conversion efficiency through as genetic improvement (15) will reduce the feed-food competition further in addition to responsible consumption and production (SDG 12).

Animal health services are indispensable to maximise livestock's contributions to food and nutrition security. Healthy, well-cared-for animals have higher productivity to meet food demands, require less land and feed per unit of product, and support healthy, balanced diets from sustainable livestock systems.

Sustainable livestock systems support healthy, balanced diets.

Animal health and animal welfare

This domain relates to all four pillars of sustainable development, especially those on human health, societal well-being (including animal welfare). It concerns mainly SDGs 2 and 3 because it addresses the crucial interface of animal health and human health, where issues of zoonoses, food-borne diseases and antimicrobial resistance are major challenges to sustainability and must

be addressed. The present COVID-19 pandemic has both highlighted and exacerbated such challenges and drawn the world's attention to the interdependence of animals, people, and the environment, raising again the need for a One Health approach to tackle such complex problems. The Tripartite Alliance between the Food and Agriculture Organization of the United Nations (FAO), World Organisation for Animal Health (OIE) and World Health Organization (WHO) (16) calls for a stronger focus on the One Health approach as optimal for preventing and responding to zoonotic disease outbreaks and pandemics. The One Health approach as well as the One Welfare approach (17) go far beyond the boundaries of infectious disease control and need to be integral towards achieving the SDGs. A recent assessment of opportunities to mitigate future pandemics (18) also highlighted One Health as a key solution. Adopting a One Health approach, which unites medical, veterinary, and environmental expertise, will help governments, businesses and civil society achieve enduring health for people, animals, and environments alike. As major consumers of antibiotics, livestock are important contributors to global antimicrobial resistance (AMR) – a rapidly emerging threat to human health. Addressing this challenge requires an integrated One Health approach, one that is nuanced for the diverse production systems. To avoid or ban the use of antibiotics as growth promotors and to focus on better animal care and welfare are mandatory to reduce the threat of AMR (19).

Animal health systems that ensure animals are healthy must underpin the solutions to these multiple challenges and require greater investments, especially in LMICs. Stronger and better-resourced animal health systems will ensure diagnosis and mitigation of animal diseases that can prevent them becoming zoonoses; supporting good animal husbandry, good animal welfare and access to relevant vaccines can likewise limit the unrestrained use of antimicrobials in animal production. Healthy animals are also inherently associated with reduced food-borne diseases. Veterinary personnel (both private and public) 'on the ground' need to be able to work with public and environment health officers in a seamless way to prevent future pandemics. Continuous access to professional advice to all livestock farmers is key and needs to be made available both by public and private animal health services (20).

Sustainable livestock systems support healthy, well-cared-for animals that provide safe food and ensure healthy people and ecosystems.

Livelihoods and economic growth

This domain relates to the pillars on economic development and societal well-being and to SDGs 1, 8 and 12. At the beginning of 2020, about 10% of the world's population was estimated to live on less than US$ 1.90/day, 60 million more people than in 2014. The COVID-19 crisis may push another 120 million people into poverty in a very short time (16). About half of the world's poor

people depend directly on livestock for their livelihoods. Even for many not-so-poor people, livestock are essential for their livelihoods (although it may look very different across the world). In multiple ways, farm animals are a major asset – providing capital, a (often regular) source of income, supporting resilience and insuring against risks. For the poor, livestock often provide a route to move out of the sector and into prosperous alternate livelihoods (21).

On average, globally, livestock contributes 40% of agricultural gross domestic product (GDP). Livestock production and merchandising in industrialised countries account for 53% of agricultural GDP (22) and ranges between 15% and 85% of agricultural GDP across the developing world. Economically, livestock is one of the fastest-growing sectors (2.5% per year during the last two decades) in developing countries (23). Capturing the economic benefits of the expanding livestock market can help to sustain overall economic growth. Increasing the currently marginal productivity of labour in the livestock sector through training, technological upgrading and innovation can produce substantial and sustained value creation in developing country livestock supply chains. Employment returns to investment in livestock are higher than average, because of the sector's high growth rate, and labour intensity, with more diverse recruitment, including of women. This is true not only in rural livestock production, but also in urban processing and marketing. The development of national livestock master plans to support effective investment planning to optimise livestock's contribution to national economic growth is key to achieve this goal. Good examples are Ethiopia (24), Bihar, India (25) and the Animal Health Strategy for Africa of the African Union Inter-African Bureau for Animal Resources (26).

In LMICs, livestock have particularly important roles for women, who often provide much of the labour for animal care. Women's access to land, finance, information, and markets is, however, very uneven, particularly in extensive and labour-intensive systems (27, 28). There are also instances where, as labour-intensive systems transition to be more capital-intensive systems, and livestock activities become more lucrative or formalised, women's roles and access to income benefits can become marginalised (29). To help achieve gender equality in agricultural populations, gender concerns need to be integral to every solution, including access to animal health systems. Especially in LMICs, partly because of cultural sensitivities, women veterinarians and women animal health workers are needed to support women involved in livestock production (30).

Ensuring that livestock contributions to livelihoods and economic growth at every level – from farm to nation – are fully realised demands that the animals are healthy and productive and animal health services are key in this regard. The role of farm animals in mitigating risk for the poor will be negated if animals are lost to disease. According to the OIE, 20% of the world's

livestock are lost to disease (31) and at present, animal health services – public and private in LMICs are limited (32).

Sustainable livestock systems support men, women, and youth worldwide to benefit from economic opportunities, to mitigate livelihood risks and contribute to national economies.

Climate and natural resource use

The intersection of livestock with climate and natural resource use needs to be integral to all four pillars of sustainable development and relates directly to SDGs 12, 13 and 15. On the one hand, a growing number of studies (33, 34) argue that reducing the share of animal-source food in diets could bring important environmental and health benefits. On the other hand, there is also scientific evidence that animal source food is essential for infants up to 1,000 days of age (35).

The livestock sector contributes significantly to climate change – globally (although estimates vary depending on the life-cycle analysis used) it is reported to be responsible for 14.5% of human-induced greenhouse gas (GHG) emissions (36) and like all agricultural sectors, faces the challenge of improving efficiency, including reducing morbidity and mortality through improved animal health systems. Climate change mitigation options can lead to large environmental benefits with some technical interventions potentially reducing livestock's impact by between 14% and 41% (37, 38). Such interventions usually include improving resource use efficiency and thus simultaneously lessen the GHG emissions per unit of output and make a substantial contribution to food security.

Addressing animal health challenges through robust animal health services is one of the key ways of improving animal production efficiency, and healthier animals emit less greenhouse gases (39). The biggest opportunities for such approaches are where productivity is currently low – across the small and medium farms of Africa and Asia, where implementation requires, on the one hand, a transfer of technology and knowledge, together with the right incentives and a conducive regulatory framework and on the other hand, participatory and context specific solutions that integrate traditional knowledge and practices and build upon local integrated livestock production systems.

Almost one-third of all food produced in the world is lost or wasted between farm and fork, with the livestock sector showing considerable variation in terms of the part of the value chain where greatest losses occur. In the capital-intensive systems of HICs, most losses occur at the consumer and retail parts of the chain. In LMICs, losses are predominantly at production (40) stages, often because of poor animal health. The OIE reports that up to 20% of livestock is lost to diseases

(31), which again points to the essential roles of animal health systems. Limiting waste and losses along the supply chain can contribute to improved efficiency and sustainability and thus reduce the environmental impacts per unit of livestock commodity (41). To combat food waste, multi-stakeholder action spanning large and small industries and every actor from producer through trader, retailer, and consumer, will be key. Livestock also have the potential to play greater roles in waste reduction through their contributions to a 'circular bioeconomy', which is common (but not necessarily the most efficient) in the ubiquitous mixed crop-livestock farms across LMICs, but far less so in the developed world (circular bioeconomy includes: bio-based products, utilisation of organic waste streams, resource efficient value chains, organic recycling, and nutrient cycling) (42).

In addition to contributing to climate change, the livestock sector is impacted by climate change globally including impact on animal performance, feed availability, access to water, animal health and welfare (2) and biodiversity, particularly in rangelands, which make up 26% of terrestrial land. Livestock keepers in LMICs, particularly pastoralists, are among the most vulnerable to climate change. Resilience to climate change in livestock production can be enhanced through water and grazing management, breeding of both animals and forage crops for drought and heat resistance and more broadly incorporating animals into national and regional disaster response planning (Livestock Emergency Guidelines and Standards) (43). For many pastoral communities, climate-smart interventions include options for income diversification, insurance, and early warning systems. Providing animal health services to such often remote and mobile communities is challenging but vital and new business models such as Sidai (a fully vertically-integrated company supplying quality livestock and crop inputs and training to farmers and pastoralists across Kenya) may help here (www.sidai.com). These vulnerable pastoral systems often play important roles in environmental stewardship when their risks are mitigated so they can manage their animals in ways that contribute to carbon sequestration and biodiversity conservation. The livestock sector (through both animals and feed production) exerts pressure on biodiversity through conversion/conservation of natural habitats and land use change, through impacts on water quality and quantity as well as climate change. Improving grazing management can contribute to grassland restoration and carbon sequestration in soils, and in addition reduce deforestation. Finely balanced approaches to integrate animals, trees, and vegetation, such as agro-silvo-pastoralism can prevent soil erosion, facilitate water infiltration, and decrease damage to production from extreme weather (44). Agricultural biodiversity and well-adapted livestock are essential, particularly in harsh environments where crop farming is difficult or impossible. Genetically diverse livestock populations are a precious resource to address future challenges and should be conserved (45) and in LMIC countries, the close link of livestock breeding services with animal health services should not be overlooked. Furthermore, organisations like

Vet Sustain engage in a holistic approach of animal health services towards sustainable development including climate action (https://vetsustain.org/).

Sustainable livestock systems mitigate the detrimental impacts of the livestock sector on the environment and climate and support improved production efficiency and resilience outcomes.

Multi-stakeholder partnership to address complexity and diversity

Given the complexity and diversity of the livestock sector, ensuring that potential sector harms are mitigated, its potential to contribute to development ambitions is realised and the rising demand for livestock commodities is addressed has no single solution. Solutions vary depending on the production system, stakeholders involved and different parts of the world and their economic context. Finding solutions that fit each context requires partnerships between public and private sectors, governments, non-governmental organisations, civil society, community-based organisations, research, academia, and intergovernmental organisations, with the animal health services represented in each stakeholder group. The Global Agenda for Sustainable Livestock provides such an inclusive partnership, at all levels, from local to global, builds upon a shared vision with agreed goals and principles that hold people and the planet as central (46) while recognising the diversity of routes towards improving sustainability (47). This multi-stakeholder partnership mobilises and shares knowledge, provides robust evidence, develops cutting-edge tools, and promotes an integrated approach to enhance policy coherence for sustainable livestock.

The integral role of animal health services to support livestock contributions to Sustainable Development Goals

The present COVID-19 pandemic emphasises even more the essential role of animal health services as highlighted in the preceding chapters. The discourse above has also emphasised how robust and focused animal health services are integral to achieving positive development outcomes through improving sustainable livestock solutions in every sustainability domain. The multiple roles of animal health services need to be prioritised based on scientific evidence. These services must be supported by comprehensive capacity development actions across all stakeholders to enable them to recognise and engage the animal health sector in developing and implementing solutions. Use of the One Health approach including professional and science-based communication to all stakeholders (with special emphasis on the consumers) will further give animal health services the attention and investment needed to help prevent the next pandemic and to contribute to improving the role of livestock in sustainable development (48). In

the GASL's multi-stakeholder approach, the role of action networks (AN) is crucial. Action networks and their associated experts such as the Animal Welfare AN and the Livestock Antimicrobial Partnership (LAMP) AN assure that GASL's multi-stakeholder dialogue assigns due importance to measures related to veterinary and animal welfare issues towards sustainability in the livestock sector (7).

Conclusions

This brief overview of the opportunities and challenges that must be addressed for the livestock sector to improve its role in sustainable development has highlighted that because of the sector's diversity, the actions towards sustainable development vary by production system, national economy and changing demand context. A complex mixture of trade-offs, positive and negative impacts of policies and practices concerning livestock management, production and consumption all need to be factored in. The solutions differ, even if they are supporting progress towards common goals. Despite such immense variation, several common elements have also been highlighted. These include the essential and integral roles of animal health and veterinary services, the need for multi-stakeholder approaches, such as the Global Agenda for Sustainable Livestock and many other multi-stakeholder platforms as outlined in the High Level Panel of Experts Report 2018 and incorporation of the context for ongoing changes that are responding to demand for livestock commodities (49). The COVID-19 pandemic has further emphasised that unilateral approaches will not solve the present or prevent future pandemic catastrophes and that One Health supported by other multi-stakeholder approaches is key (18). In spite of the fact that the explicit mentioning of livestock, animal health and animal welfare in the SDGs is weak, the SDGs of the United Nations Agenda 2030 provide the globally accepted reference frame and have a good potential to guide us towards more sustainability in general and specifically in the livestock sector.

Résumé français : titre

Résumé

Mots-clés

Resumen español: título

Resumen

Palabras clave

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Fig. 1

The Global Agenda for Sustainable Livestock (GASL) and the Sustainable Development Goals (SDGs). GASL is enhancing livestock stakeholders' commitment and investments in support of the United Nations' Agenda 2030 with its 17 SDGs. GASL identified the above nine SDGs with strong direct links to the livestock sector

Fig. 2

Relationship between Sustainable Development Goals and sustainability domains