

A vision for the future of pastoralism

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Summary

Pastoral regions are challenged by social and ecological changes. Yet, there is increasingly robust evidence that pastoralism is a viable and sustainable livelihood and that pastoralists play a role in attaining the United Nations Sustainable Development Goals (SDGs). In this issue of the *Scientific and Technical Review* of the World Organisation for Animal Health (OIE), the authors take a broad view of pastoralism and pastoral livestock production from a number of different perspectives, taking into account societal and ecological viewpoints as well as issues of animal and human health. Thematic reviews are complemented by regional perspectives from Central Asia, China, Europe, East, Central and West Africa, and Latin America. The broader issues of pastoral livestock production and its potential for improving and sustaining animal health are of great interest to the OIE. Summarising the diverse contributions, it appears that pastoral social-ecological systems are hotspots of cultural and biological diversity. They are multifunctional in that they generate diversified sources of income and contribute to sustained natural resource management. Pastoral populations require favourable institutional and legal frameworks, so governance structures must be improved and reformed through effective participation and the empowerment of pastoralists. To sustain functional pastoral production systems, the key ingredients are decentralised governance of natural resources, better locally adapted social services, and high flexibility for maintaining mobility. Young people should be actively encouraged to engage in pastoral livelihoods, which should be supported by improved legal systems for land use by all interested parties. There is still untapped potential to optimise extensive livestock production through adapted genetic improvement and better transformation, stocking and marketing of animal-source food. Modern concepts of disease surveillance and response, combining human and animal health as 'One Health', are particularly suited to pastoral systems. The OIE's interest in pastoralism is highly justified given its economic and environmental importance and its significance for livelihoods. Sustainable improvements require understanding and discussion of diverse social and ecological interactions, and it is to this discussion which the authors and editors of this issue of the *Review* have endeavoured to contribute.

Keywords

Animal health – Development impact bond – Global fund – Institutions – Legal framework – Mobility – Multifunctional – One Health – Pastoralism – Social services – Tripartite.

Introduction

This issue of the *Scientific and Technical Review* of the World Organisation for Animal Health (OIE) provides a broad overview of pastoralism and includes contributions from authors from a range of disciplines, thus offering the reader a number of different perspectives. It looks at pastoralism as it relates to the health of humans and animals, but also considers the cultural, social, economic, ecological and climate-related aspects of pastoralism and examines the issues of governance and security, the role of pastoralists in conservation, and institutional arrangements for land use. Thematic reviews are complemented by regional perspectives from Central Asia, China, Europe, East, Central and West Africa and Latin America. Pastoralism as a livelihood and type of land use is a highly dynamic and multifaceted issue and when examining this topic we must base our mode of thinking on theories of complexity (1, 2). As the basis of their analysis, the authors of the present paper use the framework for the achievement of the Sustainable Development Goals (SDGs) (see Box 1) of the 2030 Agenda for Sustainable Development (3) and the four questions posed in the introduction of this *Review*, namely: Is pastoralism backward and unproductive or is it adaptive, sustainable and profitable? Are pastoralist areas inherently ungovernable or have they been starved of good

governance? Should social services adapt to pastoralists or should pastoralists adapt to service provision? Have pastoralists resisted modernisation or have they been failed by development schemes that assume they have? (4)

The *cantus firmus* of pastoralism is mobility, i.e. just as a single melody serves as a basis for a whole composition, mobility is what serves as a basis for pastoralists and their livelihoods, as it enables them to make use of the extensive, mostly dry, grasslands for livestock husbandry. Pastoral livestock systems that productively use the vast grasslands of the world are of great interest to the OIE. Their interest extends beyond the animal health aspects of pastoralism to the economic, social and ecological ramifications of pastoral livestock production, because these broader issues have implications for livestock and their owners even if the animals are healthy (e.g. disease-free animals can die of malnutrition if the prevailing ecological conditions are unfavourable) (5). In this synthesis of the articles in this issue, the authors argue for the sustainable use of pastoral ecosystems as a means of fostering animal and human health and well-being, drawing on innovative ideas from the contributions to this issue for livelihoods, economic development, sustained ecosystem services and social and institutional development. Rather than offering another review, the authors knit together the assembled information

Box 1

United Nations Sustainable Development Goals

Sustainable pastoralism can particularly contribute to goals 1, 2, 3, 8, 10, 15 and 16

- Goal 1 End poverty in all its forms everywhere
- Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3 Ensure healthy lives and promote well-being for all at all ages
- Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5 Achieve gender equality and empower all women and girls
- Goal 6 Ensure availability and sustainable management of water and sanitation for all
- Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation
- Goal 10 Reduce inequality within and among countries
- Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12 Ensure sustainable consumption and production patterns
- Goal 13 Take urgent action to combat climate change and its impacts
- Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17 Strengthen the means of implementation and revitalise the global partnership for sustainable development

Source: www.un.org/sustainabledevelopment/sustainable-development-goals

in this issue of the *Review* with minimal additional references. This paper addresses the pathway towards a modern multifunctional pastoralism, locally adapted institutions and governance, livelihood diversification, sustainable livestock production and natural resource management. In addition, it looks at the role the OIE can play in supporting pastoralism and considers the future of animal health surveillance and health service delivery in pastoral areas.

Towards a multifunctional pastoralism

There is increasingly robust evidence that pastoralism is a viable and sustainable livelihood, and that pastoralists have extensive skills in productively managing uncertainty and risk in diverse arid land ecosystems (6). Furthermore, pastoral social-ecological systems are hotspots of cultural and biological diversity (7, 8, 9). Therefore, they represent human and natural resources of global interest, warranting their protection as World Heritage Sites of the United Nations Organization for Education, Science and Culture (UNESCO) (<http://whc.unesco.org/en/list/>). While such a status has been granted for many pastoral areas, there is a risk that they could be seen as ‘museums’ which must be conserved rather than as dynamic social-ecological spaces with considerable potential to contribute to development and to the achievement of the SDGs (particularly SDGs 1, 2, 3, 8, 10, 15 and 16 [see Box 1]). The contributions in this issue recognise the vulnerability of the ecosystems and the fragile economic base of pastoralism, including pastoralism in industrialised countries (10, 11, 12, 13), but they also show the extent to which pastoral communities are highly resilient and have an impressive ability to endure. They are engaged in continuous adaptive societal transformation and merit stronger support to sustain their livelihoods and their contribution to public goods. While livestock production remains at the centre of pastoral activities it can often not provide a sufficiently robust income as a single activity. Pastoral livelihoods should diversify in a multifunctional way by *i*) developing new products, e.g. yak down and baby camel wool in Mongolia, *ii*) seeking other sources of income, such as tourism and small and medium-sized industry, and *iii*) contributing to sustainable natural resource management by, for instance:

- setting aside pasture buffer zones
- preserving water resources
- protecting trees and ensuring that pasture plants have the time to set seed before allowing livestock to graze
- maintaining ecological diversity and the aesthetic scenery of rangelands

- protecting rangeland against fire
- contributing to carbon sequestration (12, 13, 14, 15).

Importantly, these often more geographically localised alternative income sources such as mining, oil or tourism should not destroy future longer-term uses of grasslands. Governments and the international community should recognise the created public goods of multifunctional pastoral systems. When governments engage with mining, oil and tourism enterprises, the latter should commission social and environmental impact assessments to check that these alternative activities do not endanger the livelihoods of pastoralists who continue to engage in traditional pastoralism. Decentralised governance, adapted social services (16), microcredit and insurance schemes, and compensation for ecological services (12) are ways forward to empower pastoralists to state their needs and demand their rights, as discussed below.

Towards locally adapted institutions and governance

Prevailing institutions and governance were and are confronted with geostrategic, societal, colonial and extremist influences and pressures (17, 18, 19), overlaid by fragile ecosystems and climate change issues (20). Even though these contextual circumstances are highly diverse, there seems to be consensus on a number of issues in most papers dealing with institutions and governance.

i) Pastoral social-ecological systems require adapted institutions and governance improvements and reforms (SDGs 8, 10, 16). It is unlikely that sustainable pastoral development can be achieved by centralised decision-making and planning (2, 21). It requires **effective participation by the local population** (17) with adequate mechanisms of **stakeholder engagement and decentralised governance**, which will strengthen pastoral capabilities and organisations (18, 22). In this way, pastoralists can secure access to higher-value dairy (23) and international meat markets (24) and negotiate types of mobility that are acceptable to both the pastoralists themselves and the wider community, e.g. the Sami pastoralists in Norway successfully negotiated to retain their right to move livestock to coastal pastures in the summer (12). Innovations for the future include new ways of paying for performance or for ecosystem services (12) and community conservation agreements for natural resource management and wildlife conservation (15). The fact that community engagement programmes have been successful, and that there are plans for more, validates Elinor Ostrom’s theory of the effectiveness of decentralised economic governance of the commons (17). However,

such endeavours must be accompanied by locally adapted legal frameworks for land use which are acceptable to all interested parties (25).

ii) Pastoral populations need **better and locally adapted social services** for education (6), human and animal health (11, 16, 22) and social security, e.g. microfinance and insurance schemes (26). Specifically, young people should be encouraged to engage in pastoral livelihoods and not increase the ranks of the impoverished in urban centres. Many pastoral zones harbour areas under extremist rule which become inaccessible to national governments (27). The re-establishment of basic security and legitimate rule with reduced corruption requires regional and international partnership efforts as a prerequisite for the provision of urgently needed social services.

iii) Pastoral social-ecological systems require a **high degree of flexibility and mobility** to remain functional. There is no greater barrier to sustainable pastoralism than fragmented landscapes and forced sedentarisation (1, 2, 13). Participatory stakeholder processes engaging communities, mining companies, industries and local and central governments can develop a mutual consensus on securing mobility, for example by securing time schedules and corridors of transhumance to move livestock seasonally to available pasture, water and mineral resources. Specifically, mining companies must actively contribute to the rehabilitation of exploited rangeland and water resources.

Towards sustainable livestock production and cultural and economic viability

In pastoral areas hardly any agricultural activity is possible apart from livestock production. This close interdependence of humans and animals is rarely observed elsewhere and is the source of a highly diverse cultural heritage. Livestock is the cornerstone of pastoral cultural identity. Raising livestock and producing milk, milk products (28), meat and meat products, hides, wool and hair are the most efficient uses of pastoral ecosystems, particularly as livestock also provide animal traction and their manure is a source of household energy and fertiliser, and we should not forget that animals also have an emotional value. There are alternatives to animals for certain purposes (e.g. modern systems of transport), but given the diversity of their uses, livestock cannot easily be replaced by new technology.

To improve livestock genetic resources in pastoral areas, modern molecular and breeding approaches should be

combined with local knowledge and methods. Given the multi-gene determinants of disease resistance and the complex resource constraints of real-world conditions in the field, breeding objectives that are only possible to achieve under maximised feed and management conditions in a research laboratory and which focus on quantitative traits alone are of limited interest. A combination of modern science and local knowledge would allow for identification of locally adapted breeding goals which are context-dependent. For example, on the shores of Lake Chad, the ideal cow would be one that grew quickly and produced large quantities of milk with a high rate of conversion of the available roughage, while resisting seasonal malnutrition, biting insects and liver fluke challenge (8, 14).

There is untapped potential to improve production by improving food hygiene, particularly in the production of milk and milk products. Modern hygiene practices for milking and for milk transport, transformation and marketing also apply to extensive pastoral systems and provide access to markets and contribute to SDGs 1, 2 and 3 (28). Implementing these practices requires community engagement, for instance milk producer associations should introduce quality control and acquire equipment that can be easily cleaned and disinfected (23). Specifically, active collaboration between pastoralists and the milk industry, such as the collaboration that is taking place in the production of camel milk in Mauritania and cow milk in Mongolia, is strongly encouraged. Similarly, meat production and meat preservation methods may be further optimised for food security management. Further improvements can be made, albeit in a limited way, by improving feed conservation and increasing the use of crop residues. Livestock genetic improvement and the production and marketing of livestock products is embedded in the broader context of the multifunctionality of pastoral livelihoods (15), rangeland management (29), improved institutional and governance conditions, sustained mobility and animal health.

Implications for the World Organisation for Animal Health

In addition to the social-ecological challenges summarised above, pastoral areas still carry the highest burden of animal diseases and are among the most poorly served areas for animal and human health services. This is one of the reasons why pastoralism is a key concern for the OIE and why it is important for the organisation to consider how to support pastoral livestock systems. Transdisciplinary processes, within a One Health context, have proved to be effective in delivering acceptable services and reaching mobile pastoralists in remote areas (16). It is essential to develop new integrated One Health surveillance systems

which make use of mobile technology and take account of the experiences, local concepts and priorities of pastoralist communities; when combined with sound field data, these systems support the development of adapted services for mobile pastoralist communities in remote areas, which allows them to maintain their mobile way of life (22). In the future, community-based syndromic (symptom-based) surveillance and response systems in pastoral areas will likely benefit from modern communication, geographical positioning systems and the use of drones for sample collection and drug and vaccine delivery (16).

Remote pastoral areas, where visits by veterinarians are costly, would benefit the most from integrated health care combining preventive services for several diseases. During one field visit, ruminants could be vaccinated against brucellosis, anthrax, peste des petits ruminants (PPR), and foot and mouth disease (FMD). Dogs could be dewormed and vaccinated against rabies. However, integrated animal health care is highly context-dependent and requires preparatory epidemiological research and operational testing to determine whether or not vaccinating against more than one disease at the same time, e.g. brucellosis and FMD, is effective (30). Such studies have been recommended for a long time; they have the potential to have a huge impact and could be assessed by committed national and international experts without extensive investments.

Compared to the World Health Organization (WHO), which has approximately 7,000 staff for eight billion people, the OIE is a small organisation – it has fewer than 200 staff members for eight billion head of livestock – but it is highly efficient and very effective in preventing and controlling animal diseases. But the leverage of the OIE, particularly in pastoral areas, could be greatly increased by federating OIE Member States to create and manage a global fund for transboundary animal diseases such as FMD, PPR and

others, analogous to the Global Fund, whose purpose is to fight AIDS, tuberculosis and malaria (www.theglobalfund.org). Such an endeavour could be a One Health output of the tripartite engagement of the OIE, WHO and the Food and Agriculture Organization of the United Nations. It is in the interest of all countries to control transboundary diseases in pastoral areas of low-income countries as it reduces the global risk of transmission. Both the engagement of high-income countries with low-income countries and regional cooperation, e.g. between Russia, Mongolia and China, is needed to eliminate transboundary animal diseases effectively. Novel financial instruments, such as development impact bonds (DIB), are helping countries to fight these diseases, as they share the risk of investment in the control of animal disease between institutional donors, national governments and private investors (a project funded by a DIB is currently being developed for the elimination of East African sleeping sickness [trypanosomiasis] in Uganda [31]). As an international organisation for animal health, the OIE's interest in addressing pastoralism is highly justified. Animal health and the provision of animal health services in pastoral areas are outcomes of complex social-ecological systems (32). Animal health status and the related status of human health are only the tip of the iceberg of interwoven human–environment interactions. Sustainable improvements require an in-depth understanding and discussion of these interactions, and the authors and editors of this issue have endeavoured to contribute to this important dialogue.

Acknowledgement

The authors thank Alexandra Moran for editing the manuscript.

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