

26 **Pastoralism at the Crossroads: New Avenues for Sustainable Livelihoods in Semi-arid Regions**

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Abstract

Semi-arid areas are characterised by a high variability of climatic conditions, particularly spatio-temporal variation in rainfall. Many communities living in these areas depend on livestock and/or agriculture as their main sources of income. As natural resources are becoming scarcer, users are forced to adopt coping strategies. However, pastoralism is also increasingly under pressure from legal, economic, and social constraints. The main difficulty is access to resources, giving rise to issues such as securing mobility, regulating transhumance, providing social services (health, education, and market), and dealing with conflicts. Mobile pastoral communities have become increasingly vulnerable. More and more livestock-dependent households and entire pastoral communities are losing their traditional basic assets – livestock and/or their rights to grazing lands – and are frequently forced to migrate to urban centres or even abroad. This article analyses transformations and adaptations in the livelihoods of livestock-based populations in different settings in West Africa, the Horn of Africa, and Central Asia. It explores new avenues for securing the pastoralist way of life, based on the hypothesis that although the living conditions of pastoralists are degrading, there is a potential for economic gain through improved marketing of livestock products. This is possible when various social categories (nomadic and sedentary populations, women, youth, and herdsman) have equitable and effective access to pastoral resources. This access could be facilitated by ensuring a rational and fair institutional framework as well as delivery of equity-effective basic social services, particularly in health, education, and information, ultimately benefiting management of the environment as well.

Keywords: Institutions; pastoralism; pasture monitoring; social services; Central Asia; Horn of Africa; West Africa.

26.1 Introduction

The term “pastoral production systems” as used in this article refers to grassland- or grazing-based livestock production systems based solely on animal production, where animals are fed with more than 90% dry matter and where less than 10% of the total value of production comes from non-livestock farming activities (Steinfeld and Mäki-Hokkonen 1995). Pastoral production systems are based on grazing of animals on seasonal, shifting, or upland pastures, primarily found in marginal areas unfit for cropping due to high or low temperatures, low rainfall, or steep topography, and predominantly in semi-arid and highland–lowland contexts. Such grazing areas cover 26% of the earth’s ice-free land surface (Steinfeld et al 2006). Within pastoral production systems, mobile pastoralism is defined as a way of life and a production system. In semi-arid regions, it has been identified as the most viable form of livestock production and land use (Scoones 1995). Pastoralism is also understood as the use of extensive grazing on rangelands for livestock production (Blench 2001). Animal husbandry contributes substantially to the national economy of many countries, but still lacks support from government and development agencies (Fratkin 1997) compared to other production sectors. Transformation of production systems in semi-arid and highland–lowland contexts integrates diversification options, with crop production, the labour market, remittances, and tourism constituting an integrative part of pastoralism nowadays and contributing to the transformation of capital into livestock.

Rapid changes occur in contexts where pastoralism prevails and vulnerable communities adopt different strategies that integrate resilience patterns (Obrist et al 2007). These strategies combine different degrees of mobility (in space and time), social flexibility, and income and resource diversification mechanisms during periods of hardship (drought, conflict, and flood) with intensification of the production system (increased income in suburban areas). While ecological factors determine resource availability, institutional and social factors, from both the users’ and the providers’ perspectives, determine access to these resources as well as to social services. However, socio-economic factors such as the market, the health of pastoralists and livestock, and livelihood conditions in general have a great influence on the quantity and quality of production and thus on the well-being of pastoralists. An increase or decrease in the mobility of pastoralists therefore depends on environmental conditions and institutions, but also on market opportunities and health facilities. Recent transformations of pastoralism testify that this production system is at a crossroads and in need of strategic adaptation.

The research question confronted by the studies synthesised in the present article¹⁰ was how to support pastoralists and provide mobile populations with social services, while also preserving production strategies and the pastoral lifestyle, as well as encouraging more sustainable management of decreasing resources. Based on the results of multi- and transdisciplinary studies carried out in sub-Saharan Africa and Central Asia involving social, natural, and veterinary sciences, the present article postulates that securing mobility, supporting the population's resilience by enhancing their flexibility, and facilitating their access to pastures, combined with provision of social services, is likely to improve the socio-economic status of pastoralists and could sustain production systems (livelihoods) at the same time. It proposes future options and new approaches to sustainable pastoralism in the mentioned regions.

26.2 Understanding pastoral production systems

In an attempt to understand the dynamics of pastoral production systems, a transdisciplinary scientific research method developed by Schelling and colleagues (2008) was applied which combined different approaches and strategies supported by interventions within the framework of the Swiss National Centre of Competence in Research (NCCR) North-South. This article is built on systems knowledge generated from case studies in Sahelian West Africa (Chad, Mauritania, Mali), the Horn of Africa (Ethiopian Rift Valley), and Central Asia (Kyrgyzstan). These case studies were centred on analysis of the following foci: 1) legal security and institutional framework; 2) access to pastures and basic social services; and 3) capacity building and networking to generate positive experiences. Pastoralist knowledge, as well as pastoralists' adapted strategies and approaches were validated with various stakeholders during a multi-level dialogue that brought together different sectors. The full cycle of current transdisciplinary research was completed with provision of social services to nomads in the Sahel, as well as the establishment of pasture monitoring and information systems in Kyrgyzstan. Table 1 gives a brief description of interventions in the three areas.

Analysis focused on legal and institutional change, pasture management strategies in Kyrgyzstan, and options for pastoral conflict mitigation in Ethiopia. This article is also based on empirical results generated by studies in geography, veterinary and medical sciences, epidemiology, sociology, and anthropology that were discussed at multi-level stakeholder workshops, as well as on conceptual analyses. Finally, it develops the determinants of

Table 1

Intervention	Objectives	Methodology	Output	References
Advocacy supporting mobility	Improve efficiency of pastoral products market and reduce transaction costs	Validation of marketing analysis, risk analysis, and commodity strategies	Evidence and strategy to mitigate zoonoses and economic distortion (Mali, Mauritania); dairy market (Mali, Chad)	Bonfoh et al 2006; Sery 2006; Bonfoh et al 2007a
	Improve legal and institutional support for access to and sustainable use of pastures	Validation of institutional mechanisms and legal frameworks, stakeholder analysis	Pastoral law and regulatory mechanisms supportive of pastoral livelihoods without compromising ecological sustainability (Kyrgyzstan, Ethiopia, Togo)	Chinara and Bonfoh 2007; Seyum 2007; Tezike and Dewa-Kassa 2008; Grolimund 2009
Access to social services and market	Improve livestock breeds to support diversification and biodiversity	Breeding system and genetic improvement potential	Participatory breed management and breeding plan (Kyrgyzstan)	Inam-ur-Rahim et al, in preparation a
	Improve access to livestock and human health services	Joint human and animal health assessment and health systems	Model of joint health system (Chad); health care and health perception of Tamasheq women (Mali)	Schelling 2002; Münch 2007; Bonfoh et al 2007b; Bonfoh et al 2007c; Schelling et al 2007; Näscher 2008
	Develop pastoral credit scheme, market and livestock insurance	Appraisal combining savings, credit, and insurance	Establishment of microfinance and model insurance schemes (Mali, Mauritania)	Schneider et al 2007; Ould Cheikh Ahmed 2008; Inam-ur-Rahim et al, in preparation a
	Develop market and pastoral information system support	Pastoral information system	Self-sustaining information system (Kyrgyzstan, Mali)	Bonfoh et al 2006; Inam-ur-Rahim et al, in preparation b
Capacity building	Promote livestock breeders and pasture users' associations	Foster existing traditional associations and explore potential for new multi-level livestock breeders and pasture users' associations	Model for livestock breeders and pasture users' associations (Kyrgyzstan, Mali)	Bonfoh and Fokou 2007; Bonfoh et al 2007a; Schneider et al 2007; Inam-ur-Rahim et al, in preparation b
	Improve sustainable pasture use	Develop tools and methods for sustainable pasture use at model level	Training modules for herders (Kyrgyzstan)	Inam-ur-Rahim et al, in preparation b
	Improve production efficiency of herds	Mobility analysis and temporal herd feeding	Improved seasonal feed budget (Kyrgyzstan, Mali)	Inam-ur-Rahim et al, in preparation b; Wombou Toukam 2009

Intervention research to support sustainable pastoralism.

changes in the production system, the consequences for people and their environment, and responses aimed at sustaining livelihoods.

26.3 Current pastoral system transformation

Pastoralism is the best form of land and natural resource management in semi-arid and highland–lowland contexts and contributes to the livelihoods of some 20 million pastoral households (Blench 2001). In the three regions considered here, we observed that rapid ecological, political, and socio-economic changes and institutional reforms are responsible for social disparities (Shigaeva et al 2007), health stress (Zinsstag et al 2008), and unsustainable use of natural resources (Fokou 2008). Pastoralists are adapting to or showing resilience in the face of the many ongoing transformations.

26.3.1 Legal and institutional transformation

Diverse legal and property rights and management regimes for land and natural resources were observed in all three regions under study. This legal pluralism is characterised by many institutional levels coexisting, overlapping, and collaborating with a focus on the same resources (Fokou 2008). In Chad, the exclusion of pastoralists from highly productive pastures (with higher agronomic potential) by farmers and the blocking of traditional transhumance routes with ‘trap fields’ have led to significant disruption of the annual transhumance cycle, increasing tension and conflicts and heightening the economic vulnerability of pastoral systems (Fokou et al 2004). In Central Asia, socio-economic changes coupled with inappropriate political decisions and inadequate legislation have transformed the land use system (Chinara and Bonfoh 2007). The impacts of profound legal reforms and land privatisation processes have caused economic and social disruptions in the livestock sector, reducing transhumance, widening the gap in wealth distribution, and reducing state expenditures for pasture and social services (see also Robinson et al 2010). In the Sahel, the collapse of a common property regime leading to open access to pastureland constitutes a serious threat to pastoral development (Fokou 2008). This is due to legal and institutional pluralism characterised by many property rights and management regimes that coexist, overlap, collaborate, and oppose each other for the purpose of resource management (Figure 1).

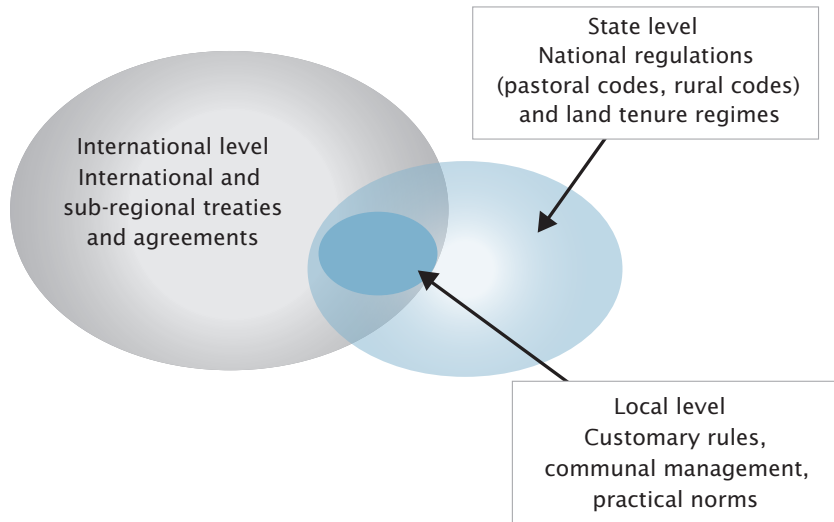


Fig. 1
Multi-level institutional frameworks for the management of natural resources and access to basic services (overlapping institutions).

In semi-arid regions in West Africa, cohabitation between pastoralists and farmers or fishermen is increasingly disrupted (Majok and Schwabe 1996; Thébaud and Batterbury 2001). Therefore, pastoralists have two options: they either settle down or change their mobility patterns and seek better living conditions, often in urban areas or beyond national boundaries, resulting in migration. Cross-border transhumance is likely to help sustain the livelihoods of pastoral populations in the Sahel, but, given the legal barriers involved, it also exposes them to many risks (insecurity, conflicts, and health). The vulnerability of transhumant pastoralists was assessed in Togo after the adoption in 2008 of a new inter-ministerial order regulating international transhumance in the country (Grolimund 2009). This order introduced two new categories of grazing taxes (national and district levels) that are considered expensive and unfair by transhumant pastoralists. If the *raison d'être* of this order – to better regulate transboundary transhumance, protect the environment, mitigate conflicts, and raise funds to supply populations with basic social services – is understandable, its impact on pastures is questionable. The order overlaps with the regional treaty of the Economic Community of West African States (ECOWAS), which advocates “the removal of obstacles to the free movement of persons, goods, services and capital” and “the right of residence and establishment” (ECOWAS 1993, Article 3). Even though member states are given the opportunity to adopt “policies, strategies and programmes at national and regional levels” and to “estab-

lish appropriate institutions to protect, preserve and enhance the environment, control erosion, deforestation, desertification, locusts and other pests” (ECOWAS 1993, Article 29), decisions are not taken in a participatory way. This duality, coupled with customary laws, contributes to an overlapping institutional framework (Figure 1).

The behaviour and discourses of transhumant pastoralists suggest that decisions such as the inter-ministerial order in Togo could be counterproductive. The new legal framework has resulted in a change in their transhumance routes: they either move to areas where taxes are lower (neighbouring countries) or illegally enter territories where they can graze their animals without being caught by the authorities. Ecologically, this produces the side effect of pastoralists concentrating in specific pockets of resources where they can afford to pay taxes; these areas are thus overused while others are underused. Socially, networks of relationships between various users are disrupted as pastoralists distrust administrative authorities and local populations. In economic terms, state revenues are likely to increase considerably with the new tax regulations in place; however, the new taxes will also cause a rise in the prices of meat, which will hardly be affordable for poor local consumers.

This example from Togo concerning the 2008 transhumance regulation illustrates how transformations affecting pastoral production systems can lead to situations where pastoralists are increasingly losing control of access to natural resources and engaging in severe competition for resources due to new regulations for access to key resources (pastures, water). Pastoral communities respond to such situations by initiating strategies to keep, revitalise, or transform traditional institutions and production systems. An interesting development is the emergence of associations of pastoralists that lobby for their rights (Bonfoh and Fokou 2007). In the context of overlapping and contradictory institutional frameworks (statutory and customary), open access to resources and privatisation of land predominate. The consequence is an increase in conflicts between different resource users, such as between sedentary farmers and mobile livestock producers. These conflicts, labelled by some authors as green wars (Bennett 1991), are escalating. A case study carried out in the Horn of Africa, in the Ethiopian Rift Valley, demonstrates that conflicts over land and resources do not concern temporary access, as previously, but are claims of ownership and permanent control (Seyum 2007). In West Africa (Lake Chad area and coastal countries) conflicts between various groups of resource users often result from dichotomies such as locals versus non-locals or indigenous people versus foreigners (Fokou et al 2004;

Fokou 2008; Grolimund 2009; Fokou et al 2010). Resource use conflicts are usually triggered by the desire of local sedentary people to safeguard their patrimony from newcomers or by migrants who justify their presence by the huge amounts of money they have been asked to pay for access to resources. In some cases, the presence-absence of the state (Fokou et al 2010) and legal pluralism combined with difficult ecological conditions have fuelled conflicts and contributed to the transformation of entire pastoral production systems. Supporting pastoral production systems with incentives such as a comprehensive pasture law is likely to secure pastoralists' access to and use of resources.

26.3.2 Transformation of pastoral production systems

In most of the semi-arid regions, internal dynamics and external interventions have forced the pastoralists to transform their livestock production systems. Political and institutional shocks at the macro level, environmental degradation, the declining role of traditional institutions, rapid urbanisation, and population growth have also contributed to this transformation. In the meantime, the pastoral economy is being subjected to several processes. Sedentarisation, land privatisation, intensified production, and income diversification have become pervasive phenomena. The main shift from resource-driven (access to resources) to product-based demand-driven production (access to market) has meant a change in strategies, characterised by actors' responses such as economic adaptation and resilience (Figure 2) (Bonfoh et al 2003).

26.3.3 Risks, social disparities, and unsustainable resource management

Pastoralists' mobility, their proximity to livestock, and their dependence on livestock and livestock products, such as milk, combined with semi-arid to arid conditions, leave pastoral societies exposed to a variety of health risks (zoonoses, e.g. tuberculosis, brucellosis, anthrax). Their marginalisation is reflected in one of the highest infant mortality rates in the world (e.g. up to 28% of children in the Azawad region of northern Mali die before their fifth birthday) (Bonfoh et al 2007c).

In semi-arid regions, pastoralists rarely have access to social services (e.g. health services and education) and are not represented in policy- and decision-making processes. They are vulnerable and susceptible to disease

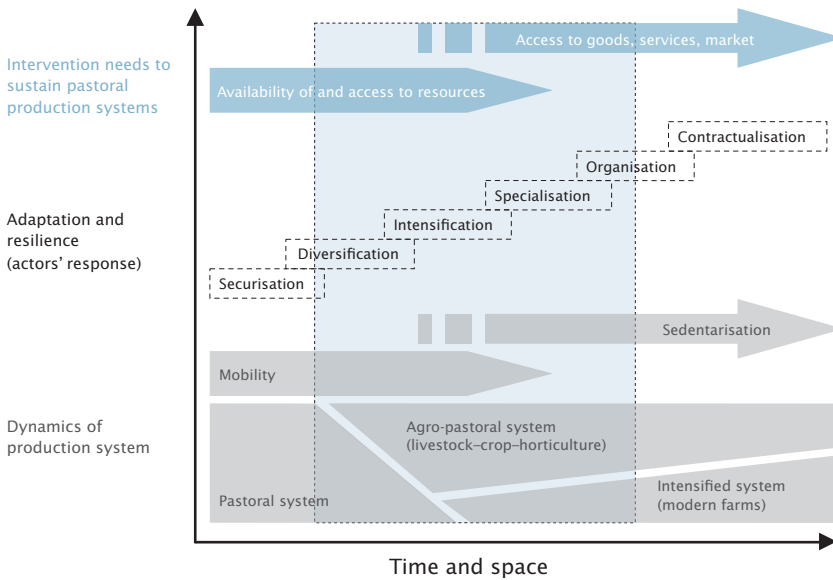


Fig. 2
Transformation of
pastoral produc-
tion systems due
to various internal
and external
changes.

(Morton 2006). Households affected by debilitating diseases such as malaria and TB (in West Africa) as well as brucellosis and echinococcosis have difficulties coping with the maintenance of herds (e.g. looking after and watering animals) as every hand is needed (Schelling et al 2007; Näscher 2008). People's health status thus influences pastoral outputs (livelihoods), and poor health reduces work performance, reducing income and productivity (Hawkes and Ruel 2006). Access to health services and their use by pastoralists is hindered by pastoralists' health perceptions, as well as their mobility, dispersion, and remoteness (Näscher 2008). In addition, in areas like Lake Chad or northern Mali, there has been little attempt to address gender bias; maternal mortality rates continue to be high, and child health care has a low priority (Zinsstag et al 2007).

In Central Asia, when the Soviet Union disbanded in 1991, the once highly developed Kyrgyz sheep-breeding industry collapsed. As a result, livestock numbers decreased drastically, creating social disparities. The remaining livestock is concentrated all year round on former winter pastures close to settlements, leading to the occurrence of brucellosis (Bonfoh 2008) as well as over-utilisation of pastures near villages, while remote summer pastures are often under-utilised (Shigaeva et al 2007; Liechti 2008).

26.3.4 Adaptation to change

Pastoralists use pastures continually and produce high-quality livestock commodities. Among actors' responses (Figure 2), diversification is a powerful tool for sustaining livelihoods as it incorporates risk-sharing and helps in coping with uncertainties in unpredictable semi-arid and highland–lowland contexts. This strategy is also important with a view to valorising the comparative advantages of each livestock species in relation to risk (Bonfoh et al 2003; Tezike and Dewa-Kassa 2008; Grolimund 2009). Specialisation and intensification make it possible to respond to high demand, especially from urban zones. These two strategies are often based on the demands of the market, leading some producers to focus on the production of high-quality products in a more professional way.

Under good ecological and political conditions, pastoralists can help to maintain biodiversity on the land through their mobility. Under less favourable conditions they are forced to migrate to cities (Kerven 2003) or hostile zones where they are threatened by wildlife, endemic diseases, and conflict. It is thus important to consider complex and highly adapted production and management strategies based on traditional ecological knowledge as a key component of environmental sustainability, and the mobile livestock production system as an important contribution to well-being and to environmental services.

Livelihood strategies in pastoral zones are in most instances flexible in managing a high degree of uncertainty. The cycles of drought in the Sahel in the 1970s and 1980s pushed pastoralists to split their herds among family members, move towards coastal countries (Benin, Togo, Ghana, Côte d'Ivoire), diversify their livestock species (increased numbers of goats and camels), embark on agriculture (in humid zones), settle in order to intensify milk production in suburban areas, and increase trade activities (Tezike and Dewa-Kassa 2008; Grolimund 2009). Income generated from these practices is saved or reinvested to build up assets such as livestock (e.g. income from the Tiviski dairy in Mauritania was used to increase the number of dairy animals) (Fokou 2008; Ould Cheikh Ahmed 2008). Diversification of livestock species within the land use system is a form of adaptation to risk in pastoral economies. Keeping different livestock species yields different products for subsistence and for external markets. It can also help to overcome seasonal shortages of dairy milk and thus make households less vulnerable to food insecurity and health risks (Bonfoh et al 2003; Ould Cheikh Ahmed 2008). To mitigate these

risks, local communities – in addition to state subsidies in terms of human resources – are increasingly organising themselves and mobilising or raising financial resources to sustain health interventions (e.g. Tamasheq leaders of northern Mali) (Münch 2007). All these adaptations require support or incentives in order to maintain and sustain the production system.

The existence of overlapping laws has one positive side effect: it opens room for negotiation. However, failure to establish a framework for negotiations in each country restricts access to resources for some categories of users. The Niger rural code is considered the tool most protective of pastoral production systems, as private property is excluded and priority, non-exclusive rights to pastures are promoted (Niger rural code, Articles 2 and 28 on land property) (RN 1993). Decisions on pastoral production systems pose problems of social equity that should be considered in strategic planning. As no society is truly equitable (Behnke and Scoones 1993), social equity must take account of the degree to which a strategy assigns costs among groups in relation to the benefits each group receives or provides. It is important to avoid putting costs on one group and providing benefits to another (e.g. imbalanced health services in the Sahel) (Schelling et al 2007). Due to ecological non-equilibrium and social inequity, pastoralists need strong support in terms of social and policy transformation.

26.4 Supporting adaptations with new approaches

26.4.1 Pastoral production systems: proposing new approaches and tools

Where pastoral development strategies are concerned, new approaches, methods, and concepts (Figure 3) are needed to secure pastoral production systems and to improve the livelihoods of pastoralists (Bonfoh et al 2007c). A comprehensive new pasture law could secure mobility and access to resources (pastures and water). The ‘one health’ approach considers human, livestock, and environmental health in an integrated way. The case studies in Togo and Chad show the potential to provide health services to mobile populations and demonstrate how legal instruments can protect (Niger) or disrupt (Togo) the pastoral system. Although recent pasture laws bring innovations to the management of pastoral resources, in some cases they contain a number of conceptual and practical problems that ultimately increase the marginalisation of pastoralists, depriving them of their land and resource-

es and exacerbating conflict between different groups of users (Hesse and Thébaud 2006). Interventions to provide legal and social services need to be assessed and monitored for equity effectiveness. However, the range of demography and health surveillance methods, tools, and approaches, for example, is often limited to settled households and hardly applicable to mobile populations. Therefore innovative, combined environmental and health impact assessments designed specifically for pastoralists are needed to assess the impact of socio-economic intervention on pastoral production systems (Weibel et al 2008).

26.4.2 Access to pasture and legal security: participatory pasture law

Pastoral communities critically depend on access to and the quality of their natural resource base. Their mobility depends on the availability of human resources, capacities for livestock herding, land tenure security, knowledge of ecosystem productivity potentials, and capacity to negotiate with hosts or enforce access to key range resources, primarily pasture, water sources, and transhumance corridors.

Today, one of the solutions to pastoralist problems is participatory pastoral institutional design; potentials for this process already exist (e.g. decentralisation processes in West African countries and pastoral codes). Decentralisation can be useful in regulating access of pastoral communities to resources. However, they will be able to benefit more fully from this process if they are given more rights to resources and if they succeed in developing their capacities to influence local government decision-making processes, particularly over land and other natural resources (Hesse and Thébaud 2006). In terms of institutional support, this will require a comprehensive pasture law that complies with statehood and livelihood norms and that could help to sustain proper management of common grazing lands. Such trends are observed in West Africa in the Economic Community of West African States (ECOWAS) regulation governing transhumance between member states at the regional level (ECOWAS 1998). The idea was to explore a basis for cooperation and collaboration in connection with transhumance between different states. The decision seeks to harmonise the regulation of transhumance between states and, thereby, to alleviate problems concerning the movement of people and their herds. Access to pastoral resources and risk mitigation at the regional level is facilitated by the International Certificate of Transhumance (ICT) (ECOWAS 1998; see also chapter on “Livestock

development: support for activities to combat animal diseases in the sub-region” in ECOWAS 2000). The integration of customary law and national legal reforms with the ECOWAS regulation could help to secure mobility and sustain transhumance.

26.4.3 Access to social services through ‘one health’

According to the ‘one medicine’ concept, there is no difference of paradigm between human and veterinary medicine. Both sciences share a common body of knowledge in anatomy, physiology, pathology, and the origins of diseases in all species (Schwabe 1984).

In West Africa, intervention research on ‘one medicine’ and ‘one health’ has strengthened health systems and health services for mobile pastoralists in Chad (Schelling 2002; Béchir et al 2004; Schelling et al 2007; Schelling et al 2008; Weibel et al 2008) and improved the dairy commodity chain in Mali (Bonfoh et al 2003; Bonfoh et al 2006; Bonfoh et al 2007a; Schneider et al 2007). Nomadic children and women in the Sahel and especially in Chad are barely covered by the national immunisation programme, while livestock are routinely vaccinated; joint human and animal vaccinations have increased the national immunisation rate by 1% and have improved access to health care for pastoralists and their livestock. The transaction costs of both the veterinary and the public health sectors have been reduced by 15% (intersectoral cost-sharing) (Béchir et al 2004). Multi-disease research, multi- and transdisciplinary research, and multi-setting studies combining programmes and sectors contribute to the effectiveness and appropriateness of diagnostic tools, vaccines, and drugs as well as improved health interventions. In terms of combined social and environmental impacts, these interventions have proven cost-effective and ethically justified and show a potential for strengthening health systems and health services for hard-to-reach populations (Bonfoh et al 2007c; Zinsstag et al 2007). The challenge is to convince decision-makers at the national level to support the demand for integrated intervention by transforming the social services policy for marginalised populations.

In Central Asia, a synoptic view of the costs and benefits of animal brucellosis mass vaccination in Mongolia was established. Looking at the overall societal benefits, brucellosis control interventions in the animal sector with cost contributions from multiple sectors have helped to save costs, thereby providing economic arguments and thus opening up new options for zoonotic disease control in developing countries (Roth et al 2003). Based

on these experiences, simultaneous assessments of brucellosis in humans and animals provided evidence for public health and veterinary authorities to start cooperating in Kyrgyzstan (Zinsstag et al 2008). In the ‘one health’ approach, development strategies are becoming intersectoral, combining security and natural resource management, education, and livestock and human health interventions in order to strengthen the entire production system and thus people’s livelihoods.

26.4.4 From intersectoral dialogue to integrated approaches and interventions

The conceptual framework shown in Figure 3 provides guidance for sustaining natural resource management as well as the livelihoods of millions of pastoralists in semi-arid regions. It implies security in access to resources (new pastoral codes), new institutions (representation in decision-making processes), socio-economic services (health, education, information, market, and microfinance), and incentives or support through participatory and demand-driven actions. Table 2 describes related demands of two pastoral communities in West Africa (Chad and Mali) and highlights the need for integrated, rather than isolated, responses to pastoralists’ problems. Identification of the social demands of pastoralists is best achieved by developing transformation knowledge, in a process of knowledge co-production involving various actors (Schelling et al 2008).

Fig. 3
Different approaches to pastoralism (resource, system, and livelihoods approaches) (Bonfoh et al 2007c).

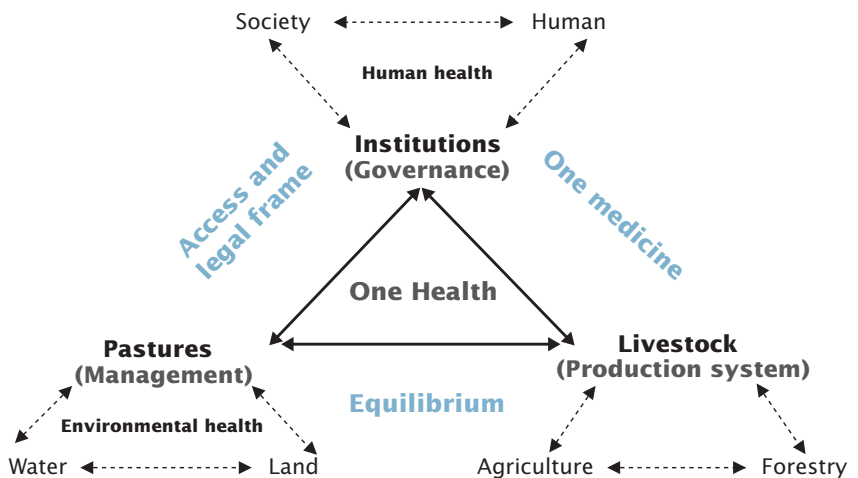


Table 2

Rank	Demand in Tin Timaghayen (Mali)	Demand in Grédaya (Chad)	Integrated intersectoral approach
1 st	Peaceful environment with regard to authorities and neighbours	Access to pastures	<i>Pastoral code</i> , security, transformation of tension and conflict, as well as dialogue among the community
2 nd		Good relations with agriculturalists on the transit zones crossed and on pastureland during dry season	<i>Legal and institutional framework</i> for transhumance, dialogue
3 rd	Access to pumped water for family consumption and for gardening	Access to water	<i>Infrastructure</i> (water, market) for humans and livestock
4 th	Education for children and access to information important for fighting poverty	Access to education for children and literacy for adults	<i>Nomadic school</i> with adapted education and training programme
5 th	Human and animal care	Health care for their livestock and for themselves	Joint intervention through ' <i>one health</i> '

Source: Data compiled by Bonfoh from conclusions of two multi-stakeholder workshops held in Chad (2005) and Mali (2006).

During implementation research, the conceptual framework shown in Figure 3 provided an opportunity for the communities to validate strategies and for the researchers to facilitate provision of support from authorities. The following examples illustrate this evolution towards integrated approaches. In the dairy sector, integrated approaches based on private interventions (by individuals or through a cooperative) involving technical innovation, microfinance, and training in milk hygiene have helped to improve access to markets for dairy products and increase farmers' revenues. At the same time, the new dairy commodity chain has enhanced the livelihoods of producers, facilitated their access to basic social services (health, information), and is a powerful tool for mitigating zoonoses in the milk consumed (Ould Cheikh Ahmed 2008). From this experience one could draw the conclusion that social (diversification of incomes) and environmental adjustments (pasture monitoring) prior to an intervention are preconditions to achieving sustainability of dairy production systems within pastoral production systems.

In Mali, during validation of research on health care and the health perceptions of Tamasheq women in northern Mali, nomads suggested an integrated intervention linking the municipality to regional health services. A combined service was demanded, coupling water pumps with the establishment of gardens, a pastoral product market, and periodic mobile clinical examina-

tions as well as an immunisation programme in their vicinity. In order to analyse these integrative dynamics not only at a small scale (community level) but also at a larger scale (national level), intersectoral social services for nomadic people were developed in Chad from local to national level. After a national workshop involving twelve ministries, a national programme was drafted and adopted in 2008 as a strategic plan for pastoral development. These interdisciplinary and intersectoral approaches were adapted to the study in Kyrgyzstan on “Comprehensive Brucellosis in Kyrgyzstan”. There, the public health and the veterinary public health sectors, together with livestock owners and researchers, assessed the prevalence of brucellosis and analysed patterns of transmission between animals and humans in the country. Findings were validated during a national workshop with a view to participatory development of control strategies based on a comprehensive economic evaluation (Roth et al 2003).

If mobility is supported by appropriate public health services taking the ‘one health’ approach, development strategies become intersectoral in terms of sustainable livestock production. At the same time, following the ‘one health’ approach, interventions should not only be evaluated in terms of performance and direct social-health impact indicators (e.g. reduction in mortality), but also from a broader systemic point of view that includes their impact on production and ecosystems. Therefore, evaluation designs must consider a combination of performance, health, social, and environmental (natural resources) impact assessments (Weibel et al 2008).

26.5 Outlook and new approaches

Analysis of the social and environmental interface confirms that incentives that secure mobility and diversification are a key element in supporting livelihood strategies and sustainable pastoralism. Mobility, while helping to balance or regulate interactions of needed inputs (resources) and required outputs (livelihoods), also has the effect of marginalising pastoral communities vis-à-vis decision centres and with regard to social services and markets. Political and socio-economic reforms also directly impact the mobility of livestock keepers and their animals. We postulate that supporting resilience and promoting equitable and effective social interventions in pastoral production systems will foster socioecological equilibrium. There are good indications that the proposed approaches and tools (see also Bonfoh et al 2007c) are effective in providing adapted, integrated, and sustainable social

services and provide evidence for the equity effectiveness of interventions to promote sustainability. By using the ‘one health’ approach, ‘participatory pasture monitoring’, and the ‘human and livestock demography surveillance system’, social interventions are not only evaluated with regard to their performance in terms of direct social-health impact indicators (e.g. reduction in mortality), but also from a more holistic point of view that includes their effective impact on production and ecosystems. The shift from ‘one medicine’ to ‘one health’ (Zinsstag et al 2007) with the development of systems knowledge to support future pastoral livelihoods is one of the outcomes of this research that will be used to build the capacity of stakeholders in the years to come.

Endnotes

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