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Rangeland-based livestock production systems in the arid and semi-arid tropics: Challenges and opportunities

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Perceptions about arid and semi-arid pastoral regions are rapidly changing. They are no longer seen as livestock enterprises but as multiple use systems with important consequences for the global environment and for more diversified livelihood strategies. They are crucial for the production of ecosystems goods and services, for tourism and for mitigating climate change. They have many functions and some alternative development options. Some of these options, while important for households and communities are also of global and regional interest and might turn into economically viable livelihood strategies if the right systems of incentives and policies are put in place. For poor households this will mean alternatives beyond traditional livestock production such as the payments for ecosystems good and services like water, carbon sequestration and others, tourism, biofuel production and the development of niche markets.

Research agendas need to take into account the trade-offs and synergies arising from these multiple uses so that the poor are able to reap the multiple benefits provided by these ecosystems.



Low rangeland biomass in the early wet season

Rangelands – the largest land use system

Rangelands constitute some 35 million km² of the earth's surface, with most in developing countries and some 65% (almost 22 million km²) of in tropical Africa. Over 180 million people in the developing world depend for their livelihoods on these systems. Rangelands predomi-

nate in dryland areas where they may be defined as regions where there are less than 20 persons/km² and where the length of the growing period (LGP) is less than 60 days/annum and does not permit significant crop growth.

Pastoral systems are the dominant livestock-based systems in arid and semi-arid tropical rangelands. These systems are heterogeneous with marked differences between pastoral groups, between communities, and their access to livelihood assets. In some, people depend entirely on livestock for their livelihoods; others feature mixed agro-pastoral systems where there is close integration of pastoral resources with cropping (FAO, 2001). In some cases, off-farm income plays a significant role in the subsistence of pastoral households. In parts of Maasailand (Kenya) for instance, income diversification and remittances can account for more than 50% of the family's income (Nkedi-anye et al. 2008).

Pastoral systems use natural vegetation and other natural resources and play a key role in protecting and maintaining of ecosystems goods and services. They have a limited primary biomass production with considerable, and increasingly unpredictable, temporal and spatial variation, and climatic variability. In this respect, a key feature of these systems is the movement of animals to take advantage of variations in feed and water resource availability.

Worldwide, pastoral and agro-pastoral systems are undergoing unprecedented changes, and combined with the uniqueness of such systems, they present particular development challenges. Research cannot be conducted as 'business as usual', but must be tailored to ensure that the changing multiple service roles of these ecosystems are taken into consideration and have positive impacts on livelihoods and the environment.

Drivers of change in pastoral regions

Pastoral systems are undergoing enormous changes due to demographic pressure, climate change and variability, government policies to settle pastoralists, and conservation measures.

Increasing human population density is a major driver of change for many livestock production systems, including

pastoral and agro-pastoral systems. Such increases have serious consequences on pastoral regions. First, land use changes can be significant leading to increased competition between rangelands and marginal cropping. Second, increases in cropping and sedentarisation have led to land fragmentation, which decreases the grazing ranges and mobility of pastoralists and reduces the buffer dry season grazing reserves. Nevertheless, livestock numbers in these regions are slowly increasing, due to the increases in demand for livestock products caused by the increases in human population densities and economic growth (Delgado et al. 1999).

Climate change and variability is also a driver, though its effects will be most severely felt in the coming decades. Its key effects will be increased dryness and higher temperatures, reductions in primary productivity, land use changes, changing animal disease distributions, land degradation in some cases, changes in species composition (and thereby animal diets and feeding strategies), livestock productivity, incomes and food security.

Development challenges

These trends have resulted in several development challenges and opportunities. For pastoral and agro-pastoral systems, the overarching development challenge is to reduce poverty and vulnerability through livelihood strategies that provide sustainable pathways out of poverty. Challenges include:

Low population density and low carrying capacity of the ecosystem: The key constraint of dryland pastoral regions is their low biomass productivity. Low biomass productivity and high climatic variability makes these regions food insecure and forces inhabitants to follow semi-subsistence livelihood strategies. Recurrent droughts exacerbate the vulnerability and poverty of these pastoral societies, mainly due to loss of their livestock assets.

Linking poor pastoralists to national economies: The lack of investment and infrastructure in dryland pastoral regions leads to poor market access. This, and high transaction costs, makes it difficult to integrate these regions with the rest of the national economy. Despite this, pastoral systems contribute significantly to national economies. The mobility of pastoralists presents chal-

allenges for the transfer of quality information on market prices. However, with recent advances in communication technologies (i.e. mobile phones) this constraint is rapidly disappearing. Further, the lack of infrastructural development makes it difficult for pastoralists to meet the hygiene and food safety demands required to have access to regional and global livestock markets. Projected increases in global demand for livestock products do present opportunities for increased marketing of livestock by pastoralists.

Low priority for public investment: Marginal arid and semi-arid areas are usually low priority for national governments and the private sector. This means that pastoralists in many sub-Saharan African countries have weak voices in national politics. The general weak representation of pastoral organisations in many regions has not helped advocacy of pastoral cause before the national governments. Beside the weak pastoral organisations, pastoralists generally have an inbred distrust of national government. The marginalization of pastoralists is beginning to change with increasing interest by international organizations.

Natural resource degradation: Rangeland resources are widely perceived to have become heavily degraded, although objective measurement of vegetation degradation is relatively rare and the overstocking paradigm is controversial. Some degradation has undoubtedly occurred, and various factors contributed to the process of degradation of pastoral lands. Results from ILCA's long-term monitoring studies in East and West Africa (Ellis, 1992; Hiernaux, 1993) challenged the assumption that livestock is responsible for rangeland degradation. They provided evidence that climate is the main culprit, and that rangelands are resilient and capable of recovery.

Conflict in managing common resource: The use of common property resources by pastoralists inevitably leads to two types of conflict. On one hand, there are substantial conflicts related to access rights and the management of common grazing lands. The poorer sectors of society are largely excluded from the benefits of these common lands. Second, conflicts also arise with other forms of land use such as agriculture, forestry and wildlife. Conflicts over natural resources have occurred for millennia but rising population pressure, demarcation of national boundaries, increased incidence of drought and increasing urbanisation have all increased the potential for conflict.



Livestock market in Niger

Opportunities for research

Due to the heterogeneity of pastoral systems, there is no one-size-fits-all solution, but a complex of inter-connected dimensions that need to be addressed.

Some key lessons we have learned from our work in these systems are:

- There is a generally good knowledge base on rangeland-based livestock production systems in arid and semi-arid tropics; the challenge is how to mainstream the available information into decision making at local, national and regional levels.
- Technical interventions have had a limited impact on overall development of pastoral and agro-pastoral areas. Hence, there is need for focus on how to translate technical information into policy options.
- Demographic pressure and climate change are creating important changes in land use, access to resources and on livelihood strategies of pastoralists.
- There is need for a holistic research paradigm for rangeland management which looks beyond increasing the primary productivity but addresses the new role rangeland ecosystem can play in providing environmental services and promoting environmental stewardship.
- Pastoralism is no longer seen as a tragedy for common grazing areas but rather as having the potential as a viable part of complex livelihood strategies.

The main research challenge is to support the transitions in livelihoods that are taking place, in particular mitigating risk and grasping the potential to implement new livelihood strategies that include new market opportunities and engaging in other sectors of the economy.

Potential transition routes for pastoralists include: 1) continuing as usual; 2) continuing as pastoralists but implementing new management strategies for their animals and the environment (to address markets for livestock or ecosystem services); 3) settling and combining livestock raising with new diversified livelihood options; and 4) exiting from pastoralism. While there are still some pastoralists who continue as usual, many are settling down and combining livestock husbandry with new diversified livelihood options. Others have exited pastoral production.

Key issues to address through research include:

- Increasing need to provide more people with food;
- Livestock mobility to access key resources, pasture and water, especially in period of droughts;
- Improving access to inputs and services for livestock production systems that are already intensifying;
- Improving the resilience of pastoral and agro-pastoral systems in response to climate change and variability;
- Risk management, such as the Index-based Livestock Insurance (IBLI) scheme to give pastoralists protection against climate related risks such as drought-induced livestock losses;
- Promoting a more efficient use of existing natural resources;
- Building marketing infrastructure to link pastoralists and agro-pastoralists to regional and global livestock markets;
- Co-generation and co-sharing of knowledge and information;
- Building local capacity and institutions, and facilitating community-based initiatives, especially indigenous management of natural resources;
- Strengthening pastoral safety nets as primary means of dealing with drought in sub-Saharan Africa;
- Promotion of alternative sources of employment without losing cultural identities.

References

- Delgado, C. et al. 1999. Livestock to 2020: The Next Food Revolution. Discussion Paper 20. Int. Food Policy Res. Inst., Washington, DC
- Ellis, 1992. ILCA's Rangeland Research program in the Arid and Semi-arid Zones: Review and Recommendations. International Livestock center for Africa, Addis Ababa, Ethiopia.
- FAO, 2001. Pastoralism in the new millennium. FAO Animal Production and Health Paper 150. Rome, Italy.
- Herrero, M. Et al. 2008. Systems dynamics and the spatial distribution of methane emissions from African domestic ruminants. Agriculture Ecosystems and Environment, in press, doi 10.1016/j.agee.2008.01.017.
- Hiernaux, P. 1993. The crisis of Sahelian pastoralism: Ecological or economic? International Livestock Center for Africa, Addis Ababa, Ethiopia.
- Nkedianye, D. et al. 2008. Assessing returns to land and changing livelihood strategies in Kitengela. IN: Homewood, K. Et al. Changing Land Use and Livelihoods in Maasailand. Springer.
- Thornton, P.K. et al. 2002. Mapping poverty and livestock in the developing world. International Livestock Research Institute, Nairobi, Kenya.

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