

9. LIVESTOCK AND AGROPASTORAL SYSTEMS



Herd of livestock in the dry savanna of central Tanzania.

Introduction

Livestock represents an important asset for food and livelihood security throughout rural Africa. For many rural people, it is a source of food, nutrition, income, power, clothing, manure, identity and social cohesion. In particular, livestock is an indispensable productive resource for pastoral communities that dwell in the vast arid lands of Africa, where farming is limited or impracticable. Farm animals are also a supplementary agricultural resource for some poor farmers, either in the form of agropastoral systems or through farm animal management. In Africa, the management of livestock relies significantly on indigenous knowledge and traditional practices.

In Sub-Saharan Africa, livestock comprises a rich animal diversity that comprises the following categories: bovines (e.g. cattle, buffalo), camels, small ruminants (e.g. goats, sheep), poultry (e.g. chicken), pigs, and little livestock (e.g. honey bee). It provides many functions and benefits to rural livelihoods in different ways (box 38).

Box 38. Livestock and rural livelihoods in Africa

Livestock diversity is an essential component of agriculture in Sub-Saharan Africa. It is important in a wide range of environmental, socio-economic and cultural conditions. For instance, pastoral communities dwelling in arid ecosystems depend heavily, if not exclusively, on domestic animal diversity for their subsistence and livelihood, such as in the Sahel and some southern African drylands. In addition, many rural communities have developed agropastoral systems that integrate farming and the management of farm animals, such as in parts of East Africa. Furthermore, livestock is an important asset for power and labour management, such as among smallholder farmers in the Ethiopian highlands, who rely on oxen for traction and donkeys for transport. Finally, livestock can enhance the overall agricultural systems, food production and income of many farmers across Africa, yet it is an asset often difficult to attain and highly vulnerable to household economic pressures.

Multi-functionality and potential of livestock production

Livestock diversity provides many services and benefits to rural people in Africa. It represents a valuable source of food, nutrients, income, cash, soil fertility, clothing, and power. Livestock is equally an important asset in agroecological adaptation, cultural dynamics and social cohesion. However, the multiple functions of livestock at the rural grassroots level have not been duly recognised, especially in Sub-Saharan Africa, partly as a result of cultural prejudices (Lebbie, 1996). Promoting livestock production with emphasis in the wide range of values and potential of livestock in pastoral and farming communities offers good prospects for enhancing food security and sustainable rural development. Integrated livestock support can simultaneously contribute to the health and socio-economic needs of AIDS affected households, such as in diversifying their diets, providing them with alternative income sources, offering options to cope with labour constraints, and strengthening social support mechanisms.

The consideration of the multi-functionality of livestock is indispensable for effective livestock support among poor pastoralists and smallholder farmers. Key components of the multi-functionality of livestock resources are as follows:

1. **Food security and household nutrition.** Livestock is an important source of nutrition and food security. It provides high quality food in the form of meat, eggs, milk and dairy products, which can contribute significantly to diversify and improve the diets of both rural and urban populations. Livestock products are excellent sources of protein and some key micronutrients that are generally scarce in grain and root staples. In HIV/AIDS action, livestock food products are highly valuable for its nutrition and health values.
2. **Rural livelihoods and economies.** Livestock has a good potential to enhance rural livelihoods and activate rural economies. Livestock is a highly valuable income source thanks to products such as meat, eggs, milk, dairy products, wool, skins and oils. Appropriate livestock development may thus contribute to economic diversification, although poor pastoralists and farmers in Africa often lack access to markets and security for fair prices. Livestock also represents a defence against crop failure and income shocks. Raising and keeping livestock helps in asset building. In addition, livestock development can help easing gender-based economic inequalities; in fact, many poor women often gain some cash from the management of livestock, which helps them attending essential household needs (box 39). Finally, there are good prospects for livestock expansion in the developing world due to growing urban populations and their associated diet changes (Delgado *et al.*, 1999). These trends bring excellent options for food and livelihood security in rural Africa. However, it is required to formulate livestock policies and programmes that address the needs and capacities of poor pastoral and farmer communities, aiming at their integration in food processing and marketing chains.
3. **Agroecological management.** Livestock provides many environmental benefits and options for agroecological management. However, it has been unduly blamed for causing environmental degradation (Ehui *et al.*, 1998). Although livestock overpressure and the abandonment of adapted traditional livestock management practices pose environmental risks, livestock provides many environmental benefits and options for sustainable agriculture. In the first place, livestock represents a practical and inexpensive means for

enhancing soil fertility, improving crop productivity and saving expenses related to the use of inorganic fertilisers. That contributes to both the economic security of poor farmers and the environmental sustainability of farming. In this sense, using livestock for fertilising fields can help poor rural people to destine their scarce financial resources to medical attention for the sick and education for the children, instead of purchasing chemical fertilisers. In addition, livestock (particularly indigenous livestock) often provides the only practical means of using vast areas of natural grasslands, such as arid ecosystems, where crop production is impractical or arduous (Rege and Bester, 1998). Livestock also provides a means to use fallow lands during long dry seasons and, in general, it converts crop residues and fibre materials of no value into food and cash.

4. **Animal power and labour management.** Livestock represents an important source of power, principally draught power for farming and transport. In fact, livestock remains the most important, if not the sole form of non-human power available for poor farmers in much of the developing world (Delgado *et al.*, 1999). In this sense, the use of livestock saves enormous labour efforts and increases the production/labour ratio in farming. This potential of livestock is highly relevant for labour-constrained households, such as particularly those affected by HIV/AIDS and those holding a heavy proportion of children and aged people. In fact, the introduction or reintroduction of livestock in many rural areas of Africa would decisively change the power sources available for farming and transport, and thus improve the labour conditions. However, the introduction or reintroduction of large livestock requires due consideration of environmental impacts, financial capacity for purchase, and transfer of adequate knowledge on livestock management.

5. **Cultural values and social services.** The social and cultural functions of livestock in rural Africa is a relevant issue. For pastoral peoples, livestock is a key constituent of their cultural identity and lifestyle. In many African rural societies, keeping livestock is also connected to social status and represents an asset for social activities (for instance, exchange of livestock is often used for sanctioning marriages). In addition, livestock often plays a role of enhancing social cohesion and social support, which is relevant for food security and HIV/AIDS mitigation. In this sense, people having livestock, such as cattle or goats, belong to a "social group" of livestock keepers, a sort of "invisible" brotherhood where members support each other in livestock management and other concerns (box 40). Consequently, keeping livestock enhances social inclusion and provides access to social support mechanisms. For AIDS-affected households, raising livestock may not necessarily represent a labour burden, but may entail social dynamics that precisely relieve labour loads, whilst providing food and economic benefits. A final issue related to the socio-cultural dimensions of livestock is about the persistence of cultural barriers in the use of livestock resources. For instance, some rural societies ban women or children from the consumption of certain livestock species or animal parts, thus constraining the prospects of raising nutrition. That requires education and nutrition projects aiming at breaking these illegitimate cultural barriers and defending the best use of available animal food resources to improve nutrition of all rural people.



Farmers plowing a field with the help of livestock in central Ethiopia.

Box 39. The potential of goats in supporting rural women

Small ruminants, pigs and poultry are livestock resources easy to manage; for instance they can be raised in backyard areas. They can also improve the food and livelihood security of poor women, if adequate livestock support is provided through gender-sensitive projects. These livestock species can also be useful for farmers with land shortages. In fact, livestock enables poor and landless farmers to earn income using public, common-property or marginal areas, such as open grasslands or backyards.

Goats, in particular, represent an important, yet neglected livestock species in Africa, with good prospects to enhance food and livelihood security. Goats are easy to manage, are adapted to a wide range of agroecological conditions (including tropical areas and drylands), are short-cycle animals, provide high-value food such as meat and milk, and just require some environmental caution to avoid degradation of some grasslands. These traits are key in agricultural responses to HIV/AIDS because they are responsive to the labour, nutrition and economic security needs of AIDS-affected households: e.g. goats demand low and flexible labour efforts, provide good nutrition sources, and represent an economic asset. In general, developing countries are more efficient at producing meat and milk from small ruminants, particularly goats and sheep.

The donation of small ruminants to poor and troubled households represents an intervention that is economically feasible and that easily improves the food, nutrition and capital of beneficiaries through a labour-responsive effort. For instance, in central Uganda, the organisation Teso AIDS Project donated a few goats to female-headed households affected by HIV/AIDS. Three years later, most beneficiary households had a significant increase in their number of goats, reported no much difficulty or labour burden in managing the donated animals, and have certainly improved their diets and their economic security.

A final consideration for livestock programmes is the tendency, among poor households, of having more small ruminants, such as sheep and goats, and less cattle or camels. This trend probably results from their economic conditions, labour capacity, and livestock management aspects. Accordingly, livestock support programmes should attend those livestock resources that better suit the circumstances and needs of poor and constrained households, such as female-headed households and AIDS-affected households.

Source: Field research in Uganda and Tanzania, 2001. Delgado *et al.* (1999).

Box 40. Livestock and social inclusion: Implications for HIV/AIDS action

Field research in central Tanzania revealed that families possessing livestock often support each other in the management of livestock, as well as develop stronger social ties. For instance, a livestock keeper can entrust their herd to another livestock keeper, even for a considerable period of time. This practice optimises labour efforts (when having to bring the animals for grazing far away), or simply helps livestock herders to cope in case of having no labour capacity or time available to care for the animals. This support is arranged through non-monetary agreements, such as may be the right to use part of the milk production or receiving part of the offspring. These cooperation arrangements among livestock keepers assists the management of farm labour, since they help optimising labour destined for livestock and increase labour flexibility. They also turn livestock management into a labour-responsive activity. That is highly significant in the mitigation of labour stress, such as particularly in the context of HIV/AIDS. In this sense, AIDS-affected households can relieve labour burdens through the use of livestock-related social support mechanisms, whilst retaining the food and economic benefits of raising livestock. In some cases, the donation of livestock may help poor families to enter these "livestock groups" and therefore gain social support and inclusion.

Source: Field research among the Gogo people in Dodoma region, Tanzania, 2001.

Indigenous livestock resources and knowledge

African pastoralists and some agropastoralists typically manage a rich genetic diversity of livestock and hold a profound knowledge about animal husbandry and related aspects. In Africa, there are reported as many as 150 varieties of cattle, 60 varieties of sheep and 50 varieties of goat (McCorkle, 1999). Pastoralists and agropastoralists hold specialised knowledge around livestock management and agropastoral practices, such as genetic identification of breeds, grazing needs, animal reproduction, animal healthcare, location of water sources and grazing areas, breeding, crop-livestock integrated systems, and uses of animal resources. For instance, any 10-years-old child of the Bororo pastoralists of Niger can easily identify the pedigrees of all the animals in their herd (McCorkle, 1999).



Children leading cattle in the highlands of north Ethiopia.

The rich livestock diversity of rural Africa results from the coevolution between natural conditions and human action over hundreds of years. This has produced indigenous livestock breeds that are adapted to, and productive under the major environmental conditions of Sub-Saharan Africa. African herders actively conserve, manage and improve their livestock genetic resources in harmony with their specific environmental conditions, food needs, animal pathogenic conditions, socio-economic options, and cultural values. Recognising and strengthening this dynamic is a fundamental component of any strategy for livestock production in rural Africa. However, the livestock resources, knowledge and practices of pastoralists and other livestock keepers are often ignored in livestock policies and programmes. Many livestock programmes focus on specific exotic breeds and address the needs of medium to large-scale livestock keepers with good market prospects. Accordingly, a reconsideration of the values, roles and potential of indigenous livestock resources and knowledge is urgently required. A shift towards targeting poor pastoral communities and small-scale livestock keepers is urgently required for livestock development.

Indigenous breeds are generally well adapted to local environmental conditions, such as heat stresses, water restrictions, harsh environments, poor quality feeds, and local diseases. The environmental adaptation of indigenous breeds facilitates livestock production in a wide range of agroecological conditions and constrains, such as particularly the areas that most poor pastoralists and agropastoralists inhabit and use. This adaptation equally reduces and eases the labour and management efforts required. For instance, the capacity of indigenous breeds to use local fodders and feed from low quality grasslands assists significantly animal husbandry. Compared to exotic breeds, indigenous varieties entail lower workloads, especially for women (Köhler-Rollefson, 2000). The tolerance to climatic constraints also facilitates livestock management and ensures the resilience of livestock production. In this sense, the drought resistance capacity of many indigenous breeds reduces the labour required to bring animals to water sources, or to carry water for the animals. In addition, local knowledge about indigenous breeds ensures that pastoralists and farmers can manage their animals in an autonomous way.

In general, the use of indigenous breeds provides labour and economic advantages. Compared to many modern breeds, indigenous varieties require less labour and management efforts. They are thus more responsive to labour stress, and to the conditions of many poor rural households and those affected by HIV/AIDS. In addition, the adaptation of indigenous breeds to local fodders and poor quality grasslands is also an economically responsive trait because it prevents economic costs that would be required to purchase improved feed and nutritional supplements, as it is often needed with modern livestock varieties.

Indigenous breeds and the associated indigenous knowledge have also advantages in animal healthcare, with notable economic benefits. Indigenous breeds are often tolerant to local diseases, whilst herders can easily treat their animal health problems with traditional ethnoveterinary remedies. For instance, the renowned cattle variety *N'dama*, from West Africa, is resistant to trypanosomiasis, which is one of the major cattle diseases. The *Sanga* family of cattle, in East and Southern Africa, is resistant to the East Coast Fever, a major cattle disease in that region. In this sense, the use of tolerant indigenous breeds is the basis for healthier and economically responsive practices for livestock management, as it reduces chemoprophylaxis and chemotherapy (Smith *et al.*, 1997). In addition, the use of traditional veterinary therapies

contributes to safeguarding the household economy, reducing management efforts and ensuring a resilient production among poor pastoralists and livestock keepers (box 41).

Box 41. Veterinary plant resources

For pastoralists and livestock keepers, the health of their animals is essential for their subsistence and livelihood. They hold indigenous knowledge on animal health, and therapies that enable them to prevent and treat livestock health problems. Pastoralists know and use dozens of veterinary plants to treat livestock diseases. These phytoveterinary resources are a supplementary agrobiodiversity component of relevance in livestock management.

In essence, the use of indigenous breeds and the associated indigenous knowledge entails a number of labour, economic and environmental values that are critical for livestock production among poor rural communities. In most Africa, the use of indigenous breeds and their adaptive traits is indispensable for sustainable livestock production (Rege and Bester, 1998). Furthermore, some of these traits are particularly relevant for families affected by socio-economic marginalisation and the HIV/AIDS crisis. However, the emphasis of livestock programmes on exotic breeds neglects the role and potential of indigenous genetic resources in livestock production. Accordingly, the consideration of indigenous livestock genetic resources and indigenous livestock practices is particularly useful and recommended for livestock support programmes.



Masaai herders in the drylands of Morogoro (Tanzania).

Improving livestock resources and management

Improving livestock production requires action around both livestock genetic resources and livestock management practices. For this purpose, indigenous breeds, indigenous livestock knowledge and participatory approaches are essential ingredients.

Livestock breeding is fundamental for improving livestock production. However, the effectiveness of livestock breeding programmes relies on adequate consideration of the local livestock dynamics. The majority of intensive and modern livestock production systems focus exclusively on higher productivity and cash products. Livestock research and breeding programmes respond to this focus. However, livestock development in poor rural communities requires due consideration to other factors, such as particularly: (a) tolerance to environmental conditions; (b) labour and management efforts involved; (c) economic viability of livestock management; and (d) overall products, services and benefits provided by livestock. Consequently, livestock breeding programmes need first and foremost to understand and enhance the very livestock dynamics at the rural grassroots level, including the multi-functionality of livestock and the socio-ecological values of indigenous livestock resources.

There are various reported cases where the substitution or dilution of native breeds through the promotion of exotic breeds and arbitrary crossbreeding has increased the food and livelihood vulnerability of rural communities (Köhler-Rollefson, 2000). Several breeds of West African shorthorn cattle (*Bos taurus brachyceros*) are at high risk of extinction due to interbreeding (Jabbar *et al.*, 1997). These breeds, however, are important resources because of their superior abilities to resist diseases and be productive under high humidity, heat stress, water restriction and poor quality feed. Furthermore, most promoted exotic and "improved" breeds tend to require external inputs and specific management practices. Consequently, poor communities become dependent on supplies, incur in additional expenses, and become more vulnerable to environmental conditions. New breeds sometimes have different reproductive and behavioural characteristics that confuse local people and increase their labour and management loads. Overall, the indiscriminate deployment of exotic breeds needs careful revisioning, whilst there is a need to place more attention to the values, roles and potential of indigenous breeds, indigenous livestock knowledge, and indigenous animal management practices.

Indigenous breeding practices are also relevant for improving livestock genetic resources. They are often in harmony with the multifaceted dimension of livestock, yet they are poorly understood and scarcely supported from modern technologies and practices. For instance, Tuareg pastoralists in Niger breed two types of camel: one for milk and another for transport. Accordingly, community-based and participatory breeding efforts are valuable initiatives to foster the integration between modern technologies and the knowledge, practices and criteria of local people. In particular, livestock research and breeding programmes would better benefit poor pastoralists and farmers if reoriented towards: (i) participatory approaches; (ii) support for the multi-functionality of livestock; (iii) integration of the breeding rationale of pastoralists; and (iv) support and improvement of traditional breeding practices.

Crop-livestock systems

Crop-livestock systems represent a valuable practice for efficient resource management and sustainable agriculture (Smith *et al.*, 1997). These integrated practices provide a mutually beneficial interaction between crop and livestock resources, making optimal use of scarce resources, generating synergies, and increasing the labour, economic and ecological viability of agriculture. Selected food, nutrition, labour, economic and agroecological benefits are:

- Crop-livestock systems increase food security through diversifying food, nutrition and income sources.
- Crop-livestock interactions catalyse and optimise the transfer of nutrients and energy between animals, crops and humans through the manure, forage, and animal power.
- Ruminants contribute to enhancing soil fertility in a manner that is labour, economically and ecologically responsive.
- Cover crops, crop residues and fallow land provide feed to livestock in inexpensive and ecologically sound ways.
- Crop-livestock integrated systems alleviate conflicts and pressures derived from the ongoing expansion and intensification of both farming and livestock grazing.
- Livestock represents a high-value food and cash reserve, hence contributing to the food and livelihood security of poor farming families (especially in cases of famine risks, impoverishment, crop failure, and labour scarcity).
- Animal power provides an advanced means for increasing land and labour productivity (through traction and transport).

Some farming practices improve livestock production. For instance, rangeland and forage management enhance livestock production, especially if using legume forages and cover crops. Fodder banks, which are small and intensively managed pastures of forage legumes, enhance soil fertility and provide high-quality dry-season feed for cattle (Ehui *et al.*, 1998).

Box 42. Public health and environmental considerations in livestock production

Livestock development programmes require adequate consideration of the associated risks in terms of public health and environmental sustainability. In this sense, larger concentrations of animals and the expansion of livestock activities can lead to various environmental and public health problems, such as follows: degradation of pasturelands, deforestation, reduction of crop area, diversion of grain available for human consumption to animal feed, increase in zoonotic diseases, and increase of food safety risks if there is a high use of antibiotics and other chemicals in animal care. In fact, the sedentarisation trends of some transhumant livestock keepers and the implementation of crop-livestock systems often lead towards an increase of livestock diseases (Smith *et al.*, 1997). Livestock diseases affect farm animal production and have often health effects on people that dwell close to the animals. For instance, zoonotic diseases (animal-borne diseases) are particularly troubling in a context of HIV/AIDS because people suffering from HIV have a vulnerable immune system.

These public health and environmental concerns related to livestock development are important in rural Africa because poor families are already suffering health and environmental problems, such as the HIV/AIDS epidemic and expanding land degradation. Consequently, livestock development requires the deployment of training, regulatory and appropriate management practices to restrain and minimise these potential health and environmental impacts.

Policy and programme recommendations

A number of policy and programme recommendations follow, aiming at supporting livestock production for food security among pastoral communities and small-scale livestock keepers:

1. Promote community-based conservation and breeding of farm animal resources, including support for participatory animal breeding, animal diversity fairs, and maintaining local breed records.
2. Shift towards integrated and applied livestock research, with emphasis on the multi-functionality of livestock systems among pastoral communities and small-scale livestock keepers.
3. Inclusion of livestock resources in household nutrition programmes, including education components to break cultural barriers that prevent the consumption of certain livestock species or animal parts among specific groups, such as women or children.
4. Support for dialogue and integration between poor pastoral communities and commercial actors, with increased role for the public sector as mediator between the needs of pastoralists and the dynamics of markets.
5. Promote indigenous animal breeds, which are more responsive to both local environmental conditions (e.g. climate risks, fodder types, disease prevalence) and socio-cultural conditions (e.g. food habits, labour availability, indigenous knowledge, cultural practices).
6. Stimulate livestock market niches through initiatives such as participatory research, policy incentives, public-private partnerships, rural-urban market integration, promotion of specialty and ethnic products, and expansion of "fair trade" channels.
7. Create local capacity-building for the processing, preservation and marketing of livestock products, including attention to traditional practices, deployment of food safety and quality standards, added-value initiatives, and marketing of specialty and ethnic products.
8. Provide initial livestock capital to poor families, such as those affected by HIV/AIDS, in order to help building livestock capital and create options for social cohesion.
9. Identify policy and legal support for environmental aspects around livestock management among pastoralists and poor farmers, such as particularly: access to traditional grasslands, maintenance of common property grazing resources, access to water sources for livestock, and securing land rights and rights of access for pastoral communities.
10. Promote crop-livestock systems, including transmission of best practices in terms of agricultural sustainability, labour efficiency, animal husbandry, and animal and human healthcare.
11. Promote forage crops and cover crops, including introduction of legume forages (with appropriate prior environmental evaluation) as useful crop-livestock practice.
12. Promote, improve and diffuse ethnoveterinary knowledge and practices as an economically and culturally responsive mechanism for animal healthcare.

13. Broaden livestock diversity *inter* and *intra* species, with special emphasis on large livestock as source of nutrition and power, and on small ruminants and poultry as effective resources for food security, nutrition, and women's economic development.
14. Support the role and needs of women in raising livestock, reversing gender biases that livestock is a "male" business.
15. Promote economic and social cooperation between pastoralists and farmers, including support for traditional relationships that could have been eroded through modernisation, such as in-kind product exchange, access to grazing lands and water sources, exchange of breeds, and transmission of indigenous knowledge around farm animal management.
16. Recognise the dignity of pastoral peoples and lifestyles, deploying targeted policy and programme support to: (i) reverse the unjust and detrimental discrimination of these rural societies and their livelihoods; and (ii) promote their socio-economic development through technical assistance, participatory approaches and market integration.