



Livestock Policies, Land and Rural Conflicts in Sub-Saharan Africa

Ugo Pica-Ciamarra, Joachim Otte, Pius Chilonda

Abstract

The paper proposes a pro-poor policy framework to systematically assess livestock sector policies in Ethiopia, Kenya, Uganda and Tanzania in East Africa, and in Burkina Faso, Mali and Senegal in West Africa. Livestock policies in the countries reviewed do not consistently address the land tenure issue for farmers and pastoralists and, in response to tenure insecurity, livestock keepers may possibly increase animal stock beyond land carrying capacity, thus contributing to enhanced competition for scarce resources and, eventually, to violent conflicts. Tenure insecurity is therefore identified as an endogenous determinant of rural conflicts.

1. Introduction

Increasing population, income growth and urbanization are driving up the demand for food of animal origin in developing countries. In sub-Saharan Africa meat and milk demand are expected to grow by 3.2% and 3.9% per annum between 1997 and 2020 (Rosegrant *et al.*, 2001). This structural shift in food consumption could contribute to economic development and poverty reduction: not only several African countries boast comparative advantages in the production of animal protein, but an estimated 60% of the poor in Africa are dependent on livestock as part of their livelihoods (Thornton *et al.*, 2002). African countries, however, are not taking full advantage of the poverty reduction opportunities of the increased demand for food of animal origin: livestock production is not keeping the pace with demand trends, and a number of countries have become net importers of meat and, particularly, dairy products.

This paper proposes a framework for examining gaps and bottlenecks in the current livestock policy agenda, and reviews livestock policies in Ethiopia, Kenya, Uganda and Tanzania in East Africa, and in Burkina Faso, Mali and Senegal in West Africa. It argues that land tenure issues are largely neglected by African policy makers. The ensuing question this paper attempts to address is whether ineffective land policies, and the associated land tenure insecurity, not only make it difficult for livestock keepers to take advantage of the growing demand for animal food, but can also be considered as an endogenous determinant of rural conflicts.

Section two briefly introduces the livestock sector in the case study countries, elaborates a pro-poor livestock policy framework and assesses the current livestock policy agenda in East and West Africa. It is found that current policies do not consistently address the land tenure issue for farmers and pastoralists. Whether this is good or bad depends on the weaknesses and strengths of the current land tenure system. Section three, therefore, reviews the evolution of land policies in sub-Saharan Africa since independence, and concludes that existing laws and regulations do not provide rural dwellers with adequate land tenure security. Section four argues that inadequate and insecure access to land not only contributes to inefficient resource allocation, but might provide farmers and pastoralists with incentives to increase livestock numbers beyond the land carrying capacity, thus enhancing competition for scarce resources and contributing to violent conflicts in rural areas. The last section summarizes the main findings and identifies avenues for further research.

2. Unbalanced Livestock Policies in Sub-Saharan Africa

Ethiopia, Kenya, Uganda and Tanzania in East Africa, and Burkina Faso, Mali and Senegal in West Africa are low income economies. GDP per capita averages between US\$ 622 (Ethiopia) and US\$ 1,463 (Senegal), and about 40% of the population live below the international poverty line. These economies are largely agricultural, the primary sector contributing between 16.6% (Kenya) and 41.8% (Ethiopia) to national value added and over 60% to employment (World Bank, 2005). Growth of agriculture, therefore, could significantly support poverty reduction and economic development.

The development of the livestock sector might, in turn, contribute to agricultural growth and poverty alleviation. (i) The case study countries have a comparative advantage in livestock production, with pasture land constituting over 70% of the agricultural area, and livestock accounting for 30% to 52% of agricultural value added and up to 21.4% of GDP (FAOSTAT, 2005). (ii) Preliminary estimates suggest that most of the rural poor hold livestock, from a 'low' of 53% in Kenya to a 'high' of 69% in Uganda (Thornton *et al.*, 2002). Investing in the sub-sectors where the poor mostly work naturally has a stronger impact on poverty than growth in other

sectors. (iii) Increasing GDP per capita, urbanization and population growth are boosting the demand for animal protein in sub-Saharan Africa: total consumption of meat and milk grew annually by 2.2 and 2.9 percent in 1974-1997, and is expected to grow by 3.2 and 3.9 percent per year in 1997-2020 (FAOSTAT, 2005; Rosegrant *et al.*, 2001).

Table 1: Livestock and poverty in sub-Saharan Africa, 2003.

Country	Stock	Production		Value added		Net trade		Poverty
	TLUs* (000)	Meat (Mt)	Milk (Mt)	% of GDP	% of agricultural value added	Meat (Mt)	Milk equivalent (Mt)	% of rural poor holding livestock
Ethiopia	22,316	549,175	1,518,125	14.3	30.0	3443	-21,206	62.4
Kenya	8,548	455,732	2,853,700	9.2	46.8	-929	1,045	52.8
Tanzania	10,919	360,540	935,000	13.2	29.4	-849	-221,505	65.8
Uganda	4,528	292,751	700,000	4.7	12.6	189	-3,387	69.4
Burkina Faso	4,622	141,019	237,250	7.8	22.9	-398	-62,374	66.8
Mali	6,527	259,052	578,280	16.2	39.0	-257	-34,695	66.0
Senegal	3,250	161,993	124,852	5.4	27.9	-14055	-181,948	59.4

*TLU: Tropical Livestock Unit; conversion factors: cattle (0.70), sheep and goats (0.10), pigs (0.20) and poultry (0.01)

Source: Elaborated from FAOSTAT (2005) and Thornton *et al.* (2002).

African policy makers, however, have not taken full advantage of the poverty-reduction potentials of livestock sector. In the sample countries, in fact, meat and milk production have been unable to keep pace with the growing demand for animal food and, in some circumstances, per-capita consumption decreased. Imports of meat and, particularly, milk have increased significantly (FAOSTAT, 2005). African decision makers, therefore, should re-design livestock policies so as to direct the development of the sector towards a pro-poor path, and derive benefits from the increased demand for animal food. In the socio-economic literature, however, while macroeconomic and agricultural sector policies have been categorized under several aspects, there is a paucity of livestock sub-sector policy analyses: livestock policies are either completely overlooked or considered as a mixture of macroeconomic and agricultural sector public actions, with a few ad-hoc technical interventions in the livestock sector (e.g. animal vaccination). But livestock development requires not only sound macroeconomic, institutional and agricultural sector policies, but also public policies that respond to the peculiarities of livestock production, which is associated with specific market imperfections and public goods.

Following Dorward *et al.* (2004) it is argued that, given a favourable macroeconomic and institutional environment, governments should design and implement livestock policies targeted at achieving three major objectives for the poor livestock holders, including: (i) 'protecting assets / reducing vulnerability'; (ii) 'creating conditions for growth'; (iii) 'sustaining growth'.

(1) Policies '*Protecting assets / reducing vulnerability*' aims at providing the poor livestock holders with adequate and secure access to basic production inputs. This objective contains two subsidiary policy objectives, which are: (a) securing access to land, water and feed, and (b) providing risk coping mechanisms for natural disasters and price shocks. Uncertainty and market imperfections, in fact, prevent smallholder producers from having secure access to these inputs, which is a necessary condition for efficient resource allocation. For example, in mixed crop-livestock farming systems secure access to land allows farmers to use resources (such as family labour) that in many cases are underused and encourages lump-sum investments in physical and human capital, with increasing supply of crop residues and stubbles for animals. In pastoral areas, secure rights to use different patches of land allow livestock keepers to access fodder and water continuously and reduce risks associated with droughts; at the same time, high variability of returns may induce pastoralists to over-stock and use livestock as a form of insurance rather than as a means of production.

(2) Policies '*creating conditions for growth*' aim at moving markets away from inefficient equilibria by allowing all economic agents, including the poor, to fully exploit gains from livestock demand. Access to the 'basics', in fact, would not be sufficient for taking livestock keepers out of poverty because livestock production is associated with investments with high indivisible components that, coupled with imperfect intertemporal markets and limited access to output markets, force the poor into portfolios with low returns. In Ethiopia, for example, entering into simple livestock trading may require an initial investment of about 20 to 40 percent of annual per capita income (Dercon, 2004). In Sudan, over 20 types of taxes and fees are charged for transporting sheep from Darfur to Port Sudan, making it unprofitable for smallholders to access markets (Aklilu, 2002). Policies creating the conditions for growth, therefore, are necessary to provide livestock keepers with secure access to: (a) livestock services, (b) credit and secondary inputs, such as compound feeds, and (c) domestic output markets.

(3) Policies '*sustaining growth*' include all those long-term public actions that promote and support production of high quality commodities and include three main sub-objectives: (a) securing food safety and quality of livestock products according to national, regional and international standards; (b) promoting research activities in animal feeding and breeding to support the production of high quality commodities; and (c) ensuring the environmental sustainability of livestock production. These are mostly public goods and necessary elements for countries to be competitive in international markets as well as to avoid smallholders being crowded out from their domestic markets by foreign competitors. For instance, livestock research activities driven by the profit-seeking efforts of private institutions rarely serve the poor, which are thought unwilling or unable to pay for research outcomes. All countries are imposing stringent requirements on food imports which cover pesticide residues, contaminants, microbiological parameters, pests, diseases and other hygienic variables. Concerns are that

these standards may prevent poor livestock keepers, and developing countries in general, from benefiting from growing market integration.

This three-tier theoretical framework, which places livestock within the broader agricultural policy agenda, is here used to examine the Poverty Reduction Strategy Papers (PRSPs) of the case-study countries. Though PRSPs are often generic and have been criticised on several grounds, they identify and prioritise public actions over a three year horizon, and include a table summarizing the overall intervention strategy, the public expenditure program and its allocation among key areas. A review of the PRSP Priority Policy Matrices of the sample countries, such as the 'Matrix of Actions' for Mali, the 'Logical Frame for the PRSP' for Tanzania, and the 'Matrix of Objectives, Outcomes and Costs and Enabling Activities' for Kenya. It suggests that:

- Policy makers in the case study countries appear to emphasize policies 'creating the conditions for' and 'sustaining' livestock sector development vis-à-vis policies 'protecting assets / reducing vulnerability'.
- Policies aimed at increasing access to credit, extension services and markets are numerous and often detailed, such as public actions intended to favour microfinance institutions, introducing quality management systems, and promoting compliance to environmental standards. These policies appear homogenous among the various countries.
- Policies 'protecting assets / reducing vulnerability' focus on access to water and remain vague about access to land and risk-coping mechanisms. For example, Kenya plans to formulate a national land policy but neither the basic principles nor a deadline are specified; the Tanzanian government will distribute land suitable for irrigation, which is less than 5 percent of all agricultural land in the country; the policy matrices of Ethiopia and Mali do not prioritize the land question at all.
- Policies 'protecting assets / reducing vulnerability' appear biased towards settled farmers vis-à-vis pastoralists. Priority actions are investments in irrigation infrastructure (Ethiopia, Uganda, Burkina Faso, Mali, Senegal); promotion of drought resistant crops (Kenya); strengthening of meteorological services to support 'farmers' decisions' (Uganda); there are no priority actions regarding pastoral people, such as transit permits, the establishment of cattle corridors and (de)stocking programs.

A detailed review of the PRSPs does not add any new insights to the priority policy matrices, although there are three interesting findings. The 2005 Uganda PRSP refers to pastoral people, which were completely neglected in the 2000 PRSP. The question of land access is however addressed only in relation to environmental issues: 'pastoralists' needs for grazing land will be

taken into account in decisions to create and manage protected areas' (Uganda, Republic of, 2005, p.83). The Burkina Faso PRSP identifies tenure insecurity as a binding constraint to productivity for farmers, and states that 'not all conditions for proper transhumance are in place. Care must be taken to ensure that the legal and regulatory provisions on agrarian and land tenure reorganization, as well as the law orienting use of pasturelands, are properly enforced' (Burkina Faso, Republic of, 2004, p. 42). The priority action matrix, however, places 'enhanced security of land tenure' under the 'reducing vulnerability' objective rather than under the 'support to productive sector' program, and does not make any reference to pastoralists. Finally, the Ethiopian PRSP aims at making pastoral people sedentary: 'the objective is to settle the pastoral population. However, the cultural transformation and the required persuasion work would take quite a while, perhaps decades' (Ethiopia, Democratic Republic of, 2002, p.72).

In sum: '...although at least fifteen African countries have focused on developing strategic plans for poverty reduction, most of these plans provide only scant attention to the role of land access and land distribution in addressing rural poverty' (ECA, 2004, p.8). This implies that both farmers and pastoralists will inefficiently respond to market signals, i.e. to policies 'creating conditions' and 'sustaining' livestock growth, as they are expected to behave following a survival rather than a profit function.

3. Land Tenure Insecurity in Sub-Saharan Africa

The PRSPs do not comprehensively and definitely address the question of access to land in sub-Saharan Africa. Existing land tenure systems do not provide adequate incentives for agricultural growth, make market policies ineffective to some extent and, under some respects, foster social tensions and conflicts (Cotula *et al.*, 2003; ECA, 2004; Feder and Noronha, 1987; Platteau, 1997).

Box 1: Tenure Insecurity in Contemporary Sub-Saharan Africa.

Burkina Faso is a typical example of overlapping modern and traditional land tenure systems. Especially in rural areas, the customary systems persist, whereas the modern legislation is not yet implemented (Pickardt, 2003).

Current Malian land legislation does not provide the necessary judicial framework for guaranteeing security of tenure to many producers because: (a) it does not recognize *de facto* (that is, customary) land rights at the village level, and (b) it does not give local populations the degree of ownership over resources necessary to foster rational exploitation and conservation (Bruce, 1998).

Senegal has one of the most innovative and effective national land tenure policies in West Africa. However, its implementation is erratic and sometimes discriminatory. Policy programmers should consider the degree to which rural councils are active and effective... In addition, attention should be paid to the various user groups and their rights under both national and customary laws (Bruce, 1998).

There was a consensus that the current [Ethiopian land tenure] system, because it does not guarantee security of tenure and undermines incentives, has detrimental effects on agricultural productivity and natural resource conservation... (Hoben, 2000).

The success or failure of Kenya's land tenure reform is hotly contested, though most studies tend to conclude it has failed to meet expectations. The current situation is characterized by inaccurate land registries, widening land distribution gaps, gender discrimination, shrinking food production, landlessness accompanied by swelling urban population, and threats to pastoral communities (Bruce, 1998).

Although customary land is a recognized tenure in Uganda, not much in terms of implementation of the provisions in the Land Act has happened to measure whether the provisions are progressive or not. No single certificate of ownership has been issued as yet and the status quo on the ground remains the same (Busingye, 2002).

In 1999, the legislature adopted the Village Land Act (VLA), however, in many Tanzanian villages it has not yet come into operation. [...] Lack of a proper system of land administration and tenure in the village areas where most of the resources are, would, undoubtedly, lead to serious natural resources degradation (Verplanke and McCall, 2003).

Africa has long been a land-abundant continent where the scarce resources were labour and capital. Traditional societies were thus centred on the lineage-family, and access to land was obtained by residence or by acquiring membership in an already established group. The aim of a lineage-based group was to organize itself so as to get the largest benefits from the land: outsiders (labour force) could be easily accommodated into the community, but coercive regulations and slavery were not uncommon in traditional African societies, as well as shifting cultivation and transhumance due to conventional production technology, seasonality and erratic weather conditions (Feder and Noronha, 1987; Platteau, 1997).

Between 1885 and 1910 major European nations – Great Britain, France, Germany, Portugal and Belgium – colonized Africa. Colonial administrations were largely unaware of the agricultural and livestock production systems prevalent in sub-Saharan Africa and intended to establish private / western-style property rights on land. The unoccupied land was granted to the Crown (Great Britain) or the State (France) and allocated through freehold or leasehold to merchant

capitalists; the displaced population was confined into the less fertile land. Both the British and the French made use of customary institutions to tighten their control over the colonies, as traditional leaders were requested to collect taxes and tributes; however, while the former recognized the existence of customary property rights, the latter required all farmers to register their land, with disappointing results. In both instances, freehold and leasehold land rights were treated as superior to customary rights, and African colonies were marked by a dual, hierarchical system of land tenure (ECA, 2004; Platteau, 1997).

After attaining independence between the 1950s and the 1960s, African governments approached the land issue in three different, and overlapping, ways (Feder and Noronha, 1987). (i) Some countries allowed the acquisition of individual land titles (e.g. Kenya and Malawi); (ii) others recognised different types of tenure (e.g. Senegal and Uganda); (iii) some others vested title to land in the state and granted individuals only rights of occupancy and use (e.g. Ethiopia and Tanzania). All these laws did not change the structure of land tenure significantly, although growing demographic pressure on land led to informal processes of individualization and land reallocation (Platteau, 1997).

Inefficient land tenure systems were identified as one of the determinants of the disappointing agricultural growth after independence¹. During the structural adjustment programs of the 1980s and the early 1990s, therefore, most countries embarked in comprehensive land registration or land titling programs, attempting to establish private property rights over land and abolishing customary tenure and land held in commons (Platteau, 1997; ECA, 2004). On the one hand, private property rights were deemed to provide adequate production incentives to landowners; on the other hand, common property rights were thought to favour over-exploitation of natural resources and environment degradation.

After over twenty years there is scanty evidence that titling has led to higher agricultural productivity; conversely, conflicts have been documented between formal and informal mechanisms of land allocation (e.g. Platteau, 2000). Since the second half of the 1990s, with the new institutional economics coming to the fore, a number of African countries have redesigned their tenure policies on the recognition that indigenous land tenures are not ambiguous; that they are elastic enough to handle increasing land scarcity and accompany the ongoing market driven process of individualization; that state intervention in the land market has often been more detrimental than valuable (Platteau, 1997). The distinguishing elements of current land policies are as follows.

¹ Between 1960 and 1980 cereal yield increased by 77 and 41 percent in developing Asia and Latin America and by only 21 percent in sub-Saharan Africa (FAOSTAT, 2005).

Contemporary land policies tend to recognize a variety of rights. Land laws not only protect private and customary rights and provide for or allow their registration (e.g. Uganda; Tanzania), but also recognize use/lease rights over state-owned land, which may be registered (e.g. Ethiopia); in some cases customary holders may even obtain a title for their land. In most countries, the different land rights are granted equivalent status and protection. Of course there are exceptions, such as the 1984 Burkina Faso *Reorganisation Agrarie and Foncier* (as amended in 1991 and 1996) which abrogates customary systems (Cotula *et al.*, 2004).

Recent land laws provide a framework for land administration that fits into the decentralization process. Responsibilities for land registration and maintenance of cadastral records have been in fact transferred to local authorities, particularly in Francophone Africa. There are three main concerns with the current decentralization trend: first, implementation has often been slow due to lack of human and financial capital at local level; second, in tribal societies local authorities may 'privatize' public goods and exclude some ethnic groups from accessing common land; finally, inconsistencies and ambiguities may exist between local government codes and the decentralization of land tenure management, particularly in countries where the two processes have been driven by different institutional actors (Cotula *et al.*, 2004; ECA, 2004; Platteau, 1997).

There have been attempts, especially in West Africa, to establish pastoral codes aimed at addressing specific constraints of pastoral people. However, with the exception of the 1993 Niger code, pastoral legislation is independent of any rural development strategy; leaves vague the concept of customary tenure for pastoralists, and thus is unable to grant them land rights unequivocally and permanently; it marginally accommodates pastoralists' rights to mobility (Ly, 2004). Finally, implementation of pastoral codes is never included in the priority action matrices of the PRSPs.

Given high transaction costs to comply with formal laws, rural dwellers often resort to informal mechanisms to secure their rights to land, either individually (e.g. by planting trees) or collectively. For example, it is not uncommon in Francophone Africa that land transactions are recorded in written documents signed by the parties and witnesses and validated by customary authorities. These documents, however, rarely have legal value, though they provide farmers with some sense of tenure security and the ensuing investment incentives (Cotula *et al.*, 2004).

In conclusion, despite innovative land and agrarian laws attempting to recognize and capture all existing land rights, African farmers still gain access to land through a blend of customary and statutory, formal and informal institutions, a phenomenon referred to 'legal pluralism' that, by

itself, is a source of uncertainty and insecurity ² (see Box 1). It is thus disappointing that the PRSPs have not prioritized any significant intervention to improve land tenure legislations and implementation to the benefits of both farmers and pastoralists.

4. Livestock and Land Conflicts in Sub-Saharan Africa

Inefficient land legislation and the ensuing insecure access to resources are sources of increasingly violent disputes over land among farmers and herders and among pastoralists themselves. A number of examples for the case-study countries are reported in Box 2.

Box 2: Land Conflicts in Sub-Saharan Africa

Land conflicts caused by deterioration of natural resources and migration brought about by a rapidly increasing population and droughts are a rising issue in West Africa. [...] The sub-humid south-western part of Burkina Faso is such a region where violent land use conflicts between autochthonous farmers and Fulani pastoralists occur (Pickardt *et al.*, 2002).

Pastoral institutions are the most affected with the frequency of land conflicts and the numerous difficulties linked to the cohabitation between pastoralists and farmers in the [Niger] Delta region [of Mali] (Ba, 2000).

In Senegal, ... the seasonal movement of livestock is essential to the survival of the herds, but it is also a source of problems. The movement of herds leads to many conflicts between migrant herders and farmers in the pasture areas, and between sedentary and migrant pastoralists (Sylla, 2003).

An influx of pastoralists from Tana River district caused tension in Garissa district, eastern Kenya, particularly on the banks of the Tana, where pastoralists and agriculturists were competing for land space as a result of the prolonged Horn of Africa drought (EDC, 2001a).

Exacerbating the unstable situation in the north-eastern districts of Kotido and Moroto is drought, leaving 250,000 people in the two districts at risk. As access to pasturage decreased more than 90,000 pastoralists migrated with their cattle to other areas, including Kitgum and north-eastern Lira, resulting in conflicts between local residents and the encroaching Karamojong. Throughout 2000, the drought sparked inter-clan clashes and cross-border raids between Uganda and Kenya pastoralists (USAID, 2000).

² Participatory land use planning, where community members take the lead in devise land policies, has been proved increasingly effective for both well devised and satisfactorily implemented land laws. The 1999 Appendix to the 1997 Mozambique Land Law, for instance, provides that customary land rights should be 'assured' and delimited; at the same time, however, it does not define land rights but prescribes a participatory methodology that, if properly applied, will allow each community to define and circumscribe its own land rights thereby reflecting its peculiar ethnic, cultural and agro-ecological circumstances (Tanner *et al.*, 2005).

[In Ethiopia] the large farms have started fencing their fields to prevent stray grazing on their land; this has had the added effect of preventing the Borana from moving their herds to certain areas, often to cutting off access to traditional watering holes. The increased difficulty of moving herds, combined with the steady desertification of the land, has made life for these pastoralists much harder (Hershkowitz, 2005).

Over 400 people fled their homes in the eastern Tanzanian region of Morogoro for fear of being attacked by Maasai pastoralists after a bloody clash there on 8 December between the pastoralists and farmers left 31 people, mostly women and children, dead (EDC, 2001b).

Analyses of herder-farmer conflicts have usually been based on case studies and identify environmental issues (e.g. droughts, desertification), population growth and the intensification of agriculture as the main determinants of clashes. McCarthy *et al.* (1999) maintain that in the last 20 years extensive livestock producers have increasing difficulties to track forage resources due to the expansion of agriculture, elimination of dry-season grazing areas, and increasing population. Van den Brink *et al.* (1995) argue that the so-called 'colonisation' of the Sahel has greatly reduced the spatial mobility on which pastoralists' livelihoods are based. Steinfeld *et al.* (1997) state that the Interior Delta of the Niger and the Senegal Valleys in West Africa, which were traditionally used for wet season grazing, have been converted into cropland. In recent years, conflicts for accessing land are becoming more destructive because of the proliferation of small arms.

The more the land tenure system is unclear, the more droughts, increased population and changing agricultural practices may lead to social tensions and conflicts, as Box 2 illustrates. Sources for conflicts, however, may also be endogenous in the land tenure system itself, and are not necessarily driven by exogenous factors such as trends in population growth. In particular, insecurity of tenure may induce livestock keepers to increase their number of animals beyond the carrying capacity of land, leading to extremely high pressures on scarce resources and, eventually, to violent clashes.

In the economic literature land tenure insecurity is usually considered as promoting inefficient resource allocation, since farmers are uncertain about being the ultimate beneficiaries (the so-called 'residual claimants') of their production efforts; intuitively, if land tenure is insecure, long-term land-specific investments will be underprovided by the rational economic agent. Tenure insecurity, however, not only reduces investment incentives, but influences the portfolio of activities of farmers and pastoralists as well. Griffin *et al.* (2002), for instance, maintain that incentives are unimpaired in case of tenure insecurity: farmers will not invest in fixed assets such

as fences and irrigation canals, but in mobile assets such as livestock and farm carts; they will not plant long-gestation trees but short-term growing crops. At the same time, tenure insecurity for pastoral people is de facto equivalent to an exogenous shock of nature: it does not make any difference for pastoralists not to access fodder because of drought conditions or as a result of the establishment of enclosures on key resource sites. And, when facing uncertainty and imperfect markets, pastoralists tend to adopt consumption-smoothing strategies primarily based on animal stock accumulation, as convincingly argued by a number of studies.

In a classical article on production relations in tropical agriculture, Binswanger and McIntire (1987) maintain that animal husbandry has lower production risk than cropping because during minor droughts vegetative growth may provide fodder for animals, while crop production may entirely fail; also, animals can be moved to distant areas; Rosenzweig and Wolpin (1993) demonstrate that bullock sales and purchases are used as a consumption-smoothing strategy in India; Dercon (1998) provides convincing evidence that in Tanzania investment in cattle occurs because it assures somewhat high returns and livestock are enough liquid to play the role of buffer in case of destructive shocks; models of storage based on risk-aversion and maximisation of survival functions have been also developed. Livestock, therefore, acquire an insurance value additional to its normal contribution to income; and this creates an efficiency loss as it induces a bias in resource allocation towards livestock stock. Of course, the optimal number of animals depends on a multiplicity of factors, including rainfall variability, access to animal health services, credit facilities, input/output markets and non-farm labour opportunities; but tenure insecurity might well contribute to a sub-optimal over-stock disequilibrium.

In the case-study countries farmers and pastoralists are progressively keeping more and more livestock, and apparently do not behave purely as profit-maximizers. Since 1995, growth in livestock production has been almost entirely achieved by increased animal numbers, with no efficiency gains in terms of productivity (kg per animal slaughtered) and off-take rate (proportion of animal slaughtered). This increasing number of animals exercises growing pressures on land. Table 2 displays some production parameters for cattle.

Table 2: Cattle production, population, productivity and off-take rate, 1995-2003

	Cattle population (000.000)								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ethiopia	29.8	31.2	32.6	35.3	35.1	33.0	35.4	35.5	35.5
Kenya	12.8	11.5	11.4	11.7	12.8	11.7	11.7	11.5	11.5
Uganda	5.2	5.3	5.4	5.7	5.8	6.0	6.1	6.1	6.1
Tanzania	15.7	14.0	13.7	13.8	17.2	16.2	17.0	17.3	17.7
Burkina Faso	4.3	4.4	4.5	4.6	4.7	4.8	4.8	4.9	5.0
Mali	5.8	5.9	6.0	6.2	6.4	6.6	6.7	6.9	7.3
Senegal	2.8	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0
	Beef production (000 mt)								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ethiopia	235.0	267.0	270.0	274.0	290.0	294.0	303.5	304.0	304.0
Kenya	239.0	252.0	260.8	270.0	279.0	287.0	295.0	295.0	295.0
Uganda	86.4	87.5	88.5	93.0	96.0	96.8	101.4	106.0	106.0
Tanzania	246.0	194.0	193.0	198.0	215.0	225.0	230.3	246.3	246.3
Burkina Faso	40.2	47.3	50.1	50.6	51.7	55.0	55.0	60.5	61.6
Mali	84.5	85.8	88.4	91.1	88.7	75.7	84.6	103.5	113.0
Senegal	45.5	46.6	47.1	47.4	47.6	49.8	48.4	45.1	43.3
	Proportion of cattle slaughtered (off-take rate)								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ethiopia	7	8	8	8	8	8	8	8	8
Kenya	13	15	16	21	20	22	19	16	16
Uganda	11	11	11	11	11	11	11	12	12
Tanzania	15	13	13	13	13	13	13	13	13
Burkina Faso	8	10	10	10	10	10	10	11	11
Mali	11	11	11	11	11	9	10	12	12
Senegal	13	13	13	13	13	13	13	12	11
	kg / cattle slaughtered (productivity)								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ethiopia	106.8	112.2	110.2	106.2	108.2	108.3	108.4	108.4	108.4
Kenya	144.8	144.0	141.0	110.2	110.0	110.0	131.0	159.1	159.5
Uganda	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	149.0
Tanzania	107.0	107.8	107.2	107.0	107.5	107.1	107.1	107.1	107.1
Burkina Faso	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
Mali	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Senegal	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0

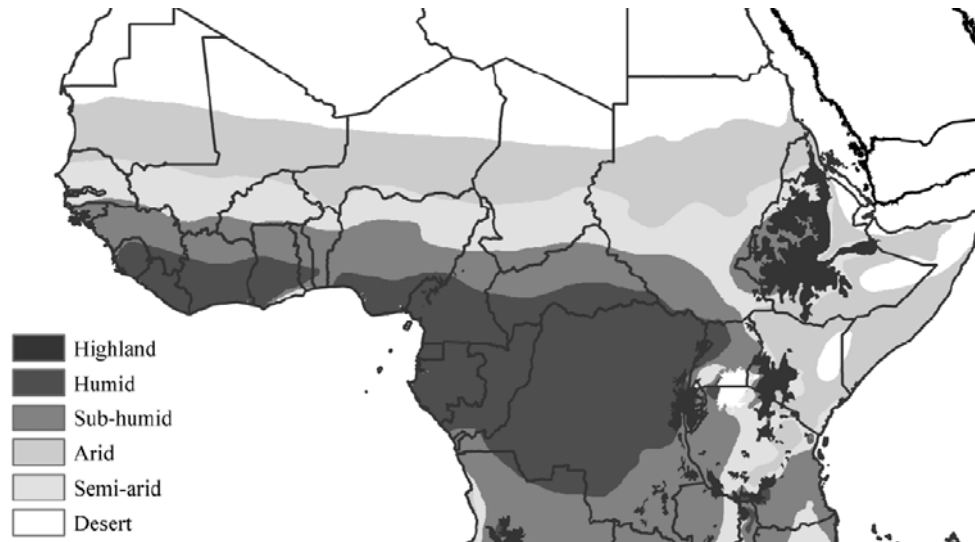
Source: GLIPHA (2005)

The number of ruminant livestock is increasing to levels so high that in some countries livestock stock appear to have exceeded the carrying capacity of land, this leading to exceptionally high pressures on limited resources, and contributing to social tensions and, eventually, to overt conflicts. Carrying capacity (CC) is defined as the maximum number of animals that an area of agricultural land can support on a sustainable basis; it is therefore different according to agro-ecological zones. Figure 1 displays the distribution of agro-ecological zones³ in sub-Saharan

³ The basic hypothesis in the estimation of CC is that a standardised livestock unit of 250 kg require a daily dry matter intake of about 2.5% of their bodyweight. CC is therefore calculated by estimating the total amount of forage at the end of the

Africa; while Table 3 presents the maximum estimated carrying capacity for tropical livestock units (TLUs)⁴ in the five productive agro-ecological zones, namely arid, semi-arid, sub-humid and humid zones, and the highlands.

Figure 1: Agro-ecological zones in sub-Saharan African countries.



Source: GLiPHA (2005)

Table 3: Carrying capacity of agro-ecological zones in sub-Saharan Africa.

Agro-ecological zone	Annual rainfall (mm)	Area (%)	Max Carrying Capacity (ha/TLU)	Max Carrying Capacity (TLU/sqkm)	TLU (%)
Arid	0-500	38.2	10	10	23.8
Semi-arid	500 - 1000	18.1	4	25	29.4
Sub-humid	1000 - 1500	21.2	3	33	21.2
Humid	1500 +	17.9	n.a.	n.a.	6.7
Highlands	n.a.	4.7	2.5	40	18.8

*mean daily temperature during the growing period = 20°C

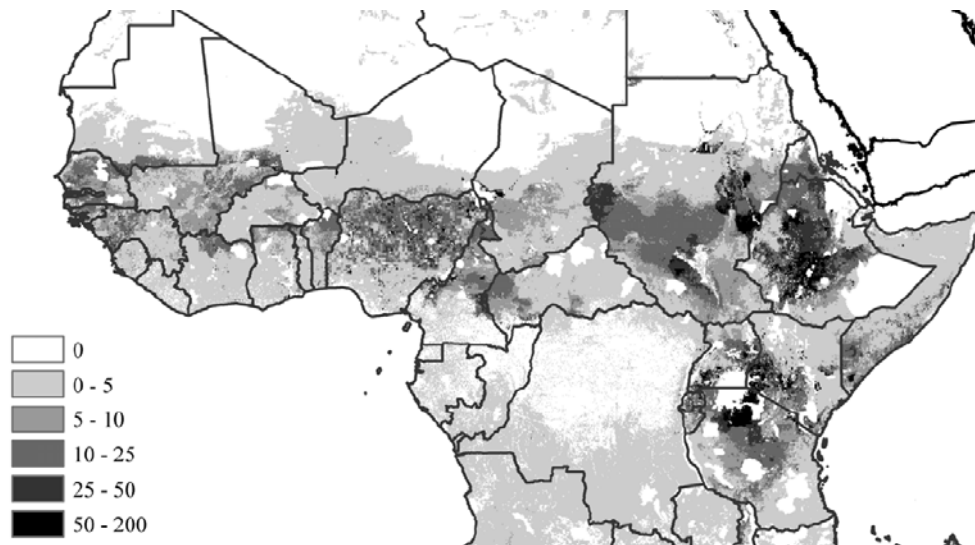
Source: Jahnke (1982); Otte and Chilonda (2002); Winrock (1992)

growing season, multiplying this by a correction factor, and then dividing by the average feed requirements of a livestock unit. Correction factors are grazing inefficiency, losses and proper use; as a result of different correction factors, estimates of CC widely vary. Even though an old-established notion of range science, CC is still a widely used concept. There are however debates over the validity of the concept itself, on the measurement methodologies and on the context of application. CC was in fact developed for improving management of commercial ranches in North America, and it is often questioned whether it is a concept applicable to African rangelands as well.

⁴ The TLU (250 kg live weight) is a common unit in which different kinds of livestock (cattle, small ruminants etc) can be compared. The TLU conversion factors used are as follows: cattle (0.70), sheep and goats (0.10), pigs (0.20) and poultry (0.01).

The highlands are estimated to have the highest carrying capacity of up to 40 TLU per km², followed by the sub-humid and semi-arid areas. Given the size of agro-ecological zones, however, most livestock are located in the semi-arid zone, followed by the arid and sub-humid zones; only 18.8% percent of animals being raised in the highlands. Few ruminant livestock are kept in the humid agro-ecological zone due to widespread animal diseases (trypanosomiasis) (Figure 2).

Figure 2: Estimated ruminant density (TLU/km²) in sub-Saharan Africa, 2000.



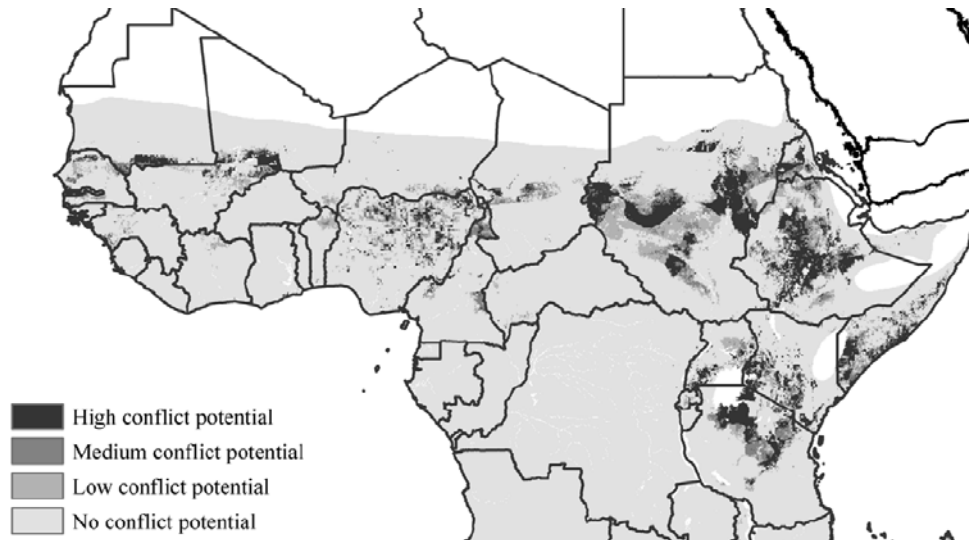
Source: GLiPHA (2005)

Based on the estimated livestock density within agro-ecological zones, it is possible to compare the actual pressure exercised by animals on land vis-à-vis the carrying capacity thresholds, and thus derive a measure of the risk of conflict due to land constraints in East and West Africa, where production technology is traditional (see Table 2) and use of compound feeds limited. Such estimate would be less meaningful in Southern Africa where ranching is common, although ranches are also present in some areas of East Africa (e.g. the highlands of Kenya and Tanzania) (Otte and Chilonda, 2002).

The potential for livestock driven-conflict is rated as 'high' if the ratio between the actual stocking rate and the estimated maximum CC is greater than one, i.e. if the actual number of livestock exceeds the carrying capacity of land; 'medium', if the ratio falls 0.75 to 0.99; and 'low' if it is between 0.5 to 0.74. It is assumed that there is no risk of livestock-driven conflict if the ratio is below 0.5, i.e. when the actual stoking rate is less than 50 percent of the carrying capacity. For the humid zone, for which no carrying capacity has been estimated and where livestock are

sparse, the CC of the sub-humid agro-ecological zone is applied. These thresholds are arbitrary and, given the multiple determinants of conflicts, a perfect correlation between the calculated index number and number/intensity of conflicts is not anticipated. Figure 3 displays the estimated risk for livestock-driven conflicts in sub-Saharan Africa.

Figure 3: Estimated risk of livestock-driven conflicts in sub-Saharan Africa, 2000.



Source: authors' calculation.

Figures 1, 2 and 3 show a degree of correlation between agro-ecological zones, number of animals and the potential for conflicts as measured by the ratio livestock density and CC. The risk of livestock-driven conflicts is the highest at the border between the arid and semi-arid zones, and in some parts of the highlands. The expansion of the agricultural frontier towards the arid zone, therefore, might be associated with the expansion of livestock numbers in mixed livestock production systems, making a peaceful interaction between farmers and pastoralists more difficult. On the other hand, in humid and sub-humid zones livestock numbers could be largely expanded. In the case study countries, conflict potential is evident in the semi-arid border between Mali and Burkina Faso, in semi-arid areas of Tanzania and Senegal, in the Ethiopian highlands, and at the highland borders between Tanzania and Kenya and Uganda and Kenya.

Livestock numbers, therefore, are often exercising an extremely high pressure on rural land and might well contribute to social tensions and conflicts. Compared to the typical determinants of land conflicts, such as population growth, intensification of agricultural practices and droughts, the number of livestock is endogenously influenced by an inefficient land tenure system, which provides livestock keepers with incentives for accumulating animals. Functional land legislation

is anticipated not only to promote long-term land-fixed investments and agricultural productivity increases, but may also reduce the risk of violent conflicts in rural areas, as far as these are associated with livestock density and livestock production technology. In theory, making use of ratios between CC and actual stocking rates, it would be possible to build indicators / sub-indicators to monitor the probability of conflicts between herders and farmers or among pastoralists themselves in selected regions. CC, therefore, would not only be useful for anticipating environmental degradation, as it has been long done with unsatisfactory evidence in the African context, but towards building a theory of land conflict in rural areas as well. In the economic literature, in fact, while indexes, and theoretical and empirical models have been developed to identify the root causes of civil wars, livestock conflicts have only been examined on a case-by-case basis.

5. Concluding Remarks

The paper reviewed the livestock sector performance over the last decade in East and West Africa, and elaborated a pro-poor livestock policy framework to identify potential gaps and inconsistencies in sector policies. This broad analytical framework places livestock within the wider development policy agenda; too often, in fact, policy makers in the livestock departments tend to design livestock sector policies in isolation with minimal consultation with other ministries or representatives of the livestock sector, and mainly focus on technical issues, such as the eradication of animal diseases.

The proposed framework is used to examine livestock policies in Ethiopia, Kenya, Uganda and Tanzania in East Africa, and in Burkina Faso, Mali and Senegal in West Africa. It is found that, despite land tenure insecurity being widespread in sub-Saharan Africa, the current national endas largely neglect the land issue. This not only negatively affects livestock production, which has been shown to fall short of the growing demand for animal protein, but is likely to contribute to social tensions and conflicts in rural areas. The paper argues, in fact, that inefficient land tenure systems provide farmers and pastoralists with incentives to increase their livestock numbers beyond the carrying capacity of land. FAO statistics show that livestock pressure on land is in effect increasing in all the case-study countries and that livestock are exceeding the estimated carrying capacity of land in regions of Ethiopia, Kenya and Uganda in East Africa, and in Burkina Faso, Mali and Senegal in West Africa. This leads to a mounting pressure on land, which enhances competition for scarce resources and may lead to conflicts in rural areas.

The arguments presented in the paper are very preliminary and mostly intuitive. First, there is the need to develop an intertemporal model correlating tenure insecurity, the dynamics of livestock numbers and carrying capacity, which have been here a priori assumed to be inter-

connected. It should be noted that, even though tenure insecurity contributes to enhanced pressure on land and conflicts, the conflicts themselves are expected to reduce the number of animals, and hence the competition for scarce resources. There is also the need to collect detailed information about the dynamics of the livestock sector and on rural conflicts at local rather than country level.

Whatever the underlying causality between tenure insecurity and livestock numbers, effective land policies are essential for the sustainable development of the livestock sector, to poverty alleviation and the achievement of the Millennium Development Goals. They should be given adequate priority by policy makers; only then, in fact, will livestock policies be more balanced and input and output market policies be effective, sustainable and pro-poor.

References

- Aklilu J. (2002). *An Audit of the livestock marketing status in Kenya, Ethiopia and Sudan*. Nairobi, Interafrican Bureau for Animal Resources.
- Ba B. (2000). *Natural resources and decentralization: local institutions role in co-management and local conflicts resolution in the Mopti region*. Paper presented at the 2000 IASCP Conference, Bloomington.
- Binswanger H.P., McIntire I. (1987). Behavioral and Material Determinants of Production Relations in Land-Abundant Tropical Agriculture. *Economic Development and Cultural Change*, Vol.36, No.1, pp.73-99.
- Burkina Faso, Republic of (2004). *Poverty Reduction Strategy Paper*. Ouagadougou.
- Bruce J.W. (ed.) *Country Profiles of Land Tenure: Africa, 1996*. Madison: University of Wisconsin, Land Tenure Center.
- Busingye H. (2002). *Customary Land Tenure Reform in Uganda; Lessons for South Africa*. Johannesburg, International Symposium on Communal Land Tenure Reform,
- Cotula L, Toulmin C., Hesse C. (2004). *Land Tenure and administration in Africa : Lessons of Experience and Emerging Issues*. London, International Institute for Environment and Development.
- Dercon S. (1998). Wealth, risk and activity choice: cattle in Western Tanzania. *Journal of Development Economics*, Vol. 55, pp. 1-42.
- Dercon S. (2004). Growth and Shocks: evidence from Rural Ethiopia. *Journal of Development Economics*, Vol. 74, No. 2., pp. 309-29.
- Dorward A. Kydd J. Morrison J. Urey I. (2004). A Policy Agenda for Pro-poor Agricultural Growth. *World Development*, Vol. 32, No.1, pp. 73-89.
- ECA (2004). *Land Tenure Systems and their Impacts on Food Security and Sustainable Development in Africa*. Addis Ababa, United Nations Economic Commission for Africa.

- EDC (2001a). *Land Competition in Garissa*. EDC News 2001-02. Stockholm, Environment Policy Division, Swedish International Development Cooperation Agency.
- EDC (2001b). *Cattle Clash Sparks Bitter Feud*. EDC News 2001-02. Stockholm, Environment Policy Division, Swedish International Development Cooperation Agency.
- Ethiopia, the Federal Democratic Republic of (2002). *Ethiopia: Sustainable Development and Poverty Reduction Program*. Addis Ababa.
- FAOSTAT (2005). <http://faostat.fao.org/faostat/>
- Feder G., Noronha R. (1987). Land Rights Systems and Agricultural Development in Sub-Saharan Africa. *The World Bank Research Observer*, Vol.2, No.2, pp.143-169.
- GLiPHA, *Global Livestock Production and Health Atlas*. (2005). Rome, Animal Production and Health Division (AGAL), Food and Agriculture Organization of the United Nations (FAO). <http://www.fao.org/ag/aga/glipha/index.jsp>
- Griffin K., Khan A.R., Ickowitz A. (2002). Poverty and the distribution of land. *Journal of Agrarian Change*, Vol. 2 (3), pp. 279-330.
- Hershkowitz A. (2005). *Violence in Southern Ethiopia: The Borana and Farmers Clash over Land Use*. ICE Case Studies. The Inventory of Conflict & Environment (ICE). Washington D.C., American University.
- Hoben A. (2000). *Ethiopian rural land tenure policy revisited*. Paper presented at the Symposium for Reviewing Ethiopia's Economic Performance 1991-1999. Addis Ababa.
- Jahnke H.E. (1982). *Livestock production systems and livestock development in tropical Africa*. Kiel: Kieler Wissenschaftsverlag Vauk.
- Ly I. (2004). *Essai de Presentation des Tendances d'Evolution du Droit Pastoral en Afrique de l'Ouest*. Etude Juridique en Ligne de la FAO, No.13. Rome, FAO.
- Mafeje, A. (2003). *The Agrarian Question, Access to Land, and Peasant Responses in sub-Saharan Africa*. Paper No.6 Civil Society and Social Movements Programme. Geneva, United Nations Research Institute for Social Development.
- Otte, M.J., Chilonda P. (2002). *Cattle and small ruminant production systems in sub-Saharan Africa. A systematic review*. Rome, FAO.
- Pickardt T. (2003). *The dynamics of land tenure in the Poni and Nounbiel Provinces, Burkina Faso*. Unpublished paper, Giessen, Justus-Liebig-Universitat.
- Pickardt, T., Brockhaus M., Schliephake S., Kambire H., Hoffman I. (2002). Conflict Management Related to Natural Resources in South-West Burkina Faso. *Deutscher Tropentag*, October 9-11, Witzenhausen.
- Platteau J.P. (1997). *Reforme agraire et ajustement structure en Afrique subsaharienne: controverses et orientations*. Etude Fao Développement Economique et Social, No.107. Rome, FAO.
- Platteau J.P. (2000). Allocating and Enforcing Property Rights in Land: Informal versus Formal Mechanisms in Sub-Saharan Africa. *The Nordic Journal of Political Economy*, Vol.26, pp.54-81.

- Rosenzweig M., Wolpin K. (1993). Credit market constraints, consumption smoothing and the accumulation of durable production assets in low-income countries: Investments in bullocks in India. *Journal of Political Economy*, Vol. 101, No.22, pp. 223–244.
- Rosegrant M., Paisner M.S., Meijer S., Witcover J. (2001). *Global Food Projections to 2020. Emerging Trends and Alternative Futures*. Washington D.C. IFPRI.
- Steinfeld H., de Haan C., Balckburn H. (1997). *Livestock & The Environment. Finding a Balance*. Rome, FAO; Washington D.C., USAID and The World Bank.
- McCarthy N., Swallow B., Kirk M., Hazell P. (1999). *Property rights, risk, and livestock development in Africa*, Nairobi, International Livestock Research Institute (ILRI) and Washington D.C., International Food Research Institute (IFPRI).
- Sylla C. (2003). *Cyber Shepherd at work in the Sahel*. IDRC Report 17/11/03. Ottawa, International Development Research Centre.
- Tanner C., de Wit P., Madureira S. (2005) Land reform in Mozambique : practice and potential. *Land Reform, Land Settlement and Cooperatives*, No.2, pp. 102-113.
- Thornton P.K., Kruska R.L., Henninger N., Kristjanson P.M., Reid R.S., Atieno F., Odero A.N. and Ndegwa T. (2002). *Mapping poverty and livestock in the developing world*. Nairobi, International Livestock Research Institute (ILRI).
- Uganda, Republic of (2005). *Poverty Eradication Action Plan (2004/5 – 2007/8)*. Kampala.
- USAID (2000). *Information Bulletin*, no.1. Bureau for Humanitarian Response (BHR), Washington D.C., USAID.
- Van den Brink R., Bromley D.W., Chawas J.P. (1995). The economics of Cain and Abel: Agro-pastoral property rights in the Sahel. *Journal of Development Studies*, Vol.31, No.3, pp. 373-399.
- Verplanke J.J., McCall M.K. (2003). *Boundary dispute settlement using Mobile GIS*. Paper presented at the ESRI User Conference, San Diego.
- Winrock International (1992). *Assessment of Animal Agriculture in Sub-Saharan Africa*. Arkansas, Winrock International Institute for Agricultural Development.
- World Bank (2005). *World Development Indicators*. Washington D.C., World Bank.

Contact

Joachim Otte

Project Coordinator

Pro-Poor Livestock Policy Initiative (PPLPI)

FAO - Animal Production and Health Division

Viale delle terme di Caracalla, 00153, Rome, Italy

E-mail: Joachim.Otte@fao.org

PPLPI website at: www.fao.org/ag/pplpi.html

Or visit the PPLPI website at: www.fao.org/ag/pplpi.html