LIVESTOCK SECTOR REPORT
HORN OF AFRICA

REVIEW OF THE LIVESTOCK SECTOR IN THE HORN OF AFRICA (IGAD COUNTRIES)

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Introduction

The focus of this review lies on the livestock sector of the countries in the Horn of Africa, namely the member countries of the Intergovernmental Authority on Development (IGAD): Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda. IGAD is a regional organisation aiming at the promotion of joint development strategies and the harmonisation of national policies in many areas that affect livestock development.

The Horn of Africa is one of the poorest regions in the world, with high population growth rates and chronic food security problems. With continuing population growth, just to maintain the current food supply levels, which are already insufficient, agriculture will have to grow at least at the same pace as the population does.

In the Horn of Africa the rural poor depend heavily on income from livestock production, but can seldom afford to eat animal products; they must trade them for staples with lower costs per calorie. This is reflected by the fact that even though all IGAD countries have large livestock herds and high numbers of ruminants per capita, average annual per capita consumption of animal products is extremely low even by developing country standards.

Furthermore, the poor depend most heavily on livestock income, not where trade is easy and cheap, e.g. in densely populated areas or near urban centres, but in sparsely populated drylands where trade involves high transaction costs.

Growth in livestock production has barely kept pace with the growth in demand for food of animal origin, and per capita production is either declining or only marginally increasing. Improvement in the supply of meat and milk depends critically on increases in livestock productivity, which is generally poor across the region's various production systems.

The economy and the livestock sector

Economic performance has been extremely weak in the IGAD[1] region over the last decade. With the exception of Sudan and Uganda, economic growth rates were very low (3.8 percent per year on average) in the last decade and barely kept pace with population growth (2.4 percent per year) leading even to falling per capita incomes in Djibouti and Kenya (Annex Table A1). This is a particular reason for concern seeing that per capita GDP in the IGAD region's countries is already among the lowest even within the low income countries group.

Agriculture remains the core sector of the IGAD countries' economies and societies[2], it contributes a major share to GDP and employs about three quarters of the population. Consequently, performance of the agricultural sector is the main determinant of year-to-year changes in poverty levels and food security. Within the agricultural sector a large contribution, on average 57 percent, comes from livestock. Livestock's contribution to overall GDP ranges between 10 to 20 percent

[1] The Intergovernmental Authority on Development (IGAD) comprises Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda.
[2] Djibouti is an exception in this respect, having only a very small agricultural sector due to the virtual absence of arable land areas within the country. However, the country possesses extensive pastures and, in consequence, within agriculture livestock production strongly dominates.

(Table 1). Looking at the development of the shares of agricultural GDP and livestock GDP in the seven countries between 1980 and 2000 it is hard to identify any clear trends. Agricultural GDP has significantly declined in Kenya and Uganda over this period whereas within the agricultural sector livestock kept its importance. For the other countries the share of agricultural in total GDP has remained roughly constant and the same applies to the contribution of livestock within agriculture.

The importance of the livestock sector in the IGAD countries can partly be explained by the fact that the major proportion of the land area in the region is classified as arid[3] (Map 2), with highly variable rainfall making it unsuitable for crop production. This leaves livestock production as the only viable form of land use. In agro-ecological zones where crop production is possible it is mostly practised in mixed systems with livestock providing important inputs into the farming system.

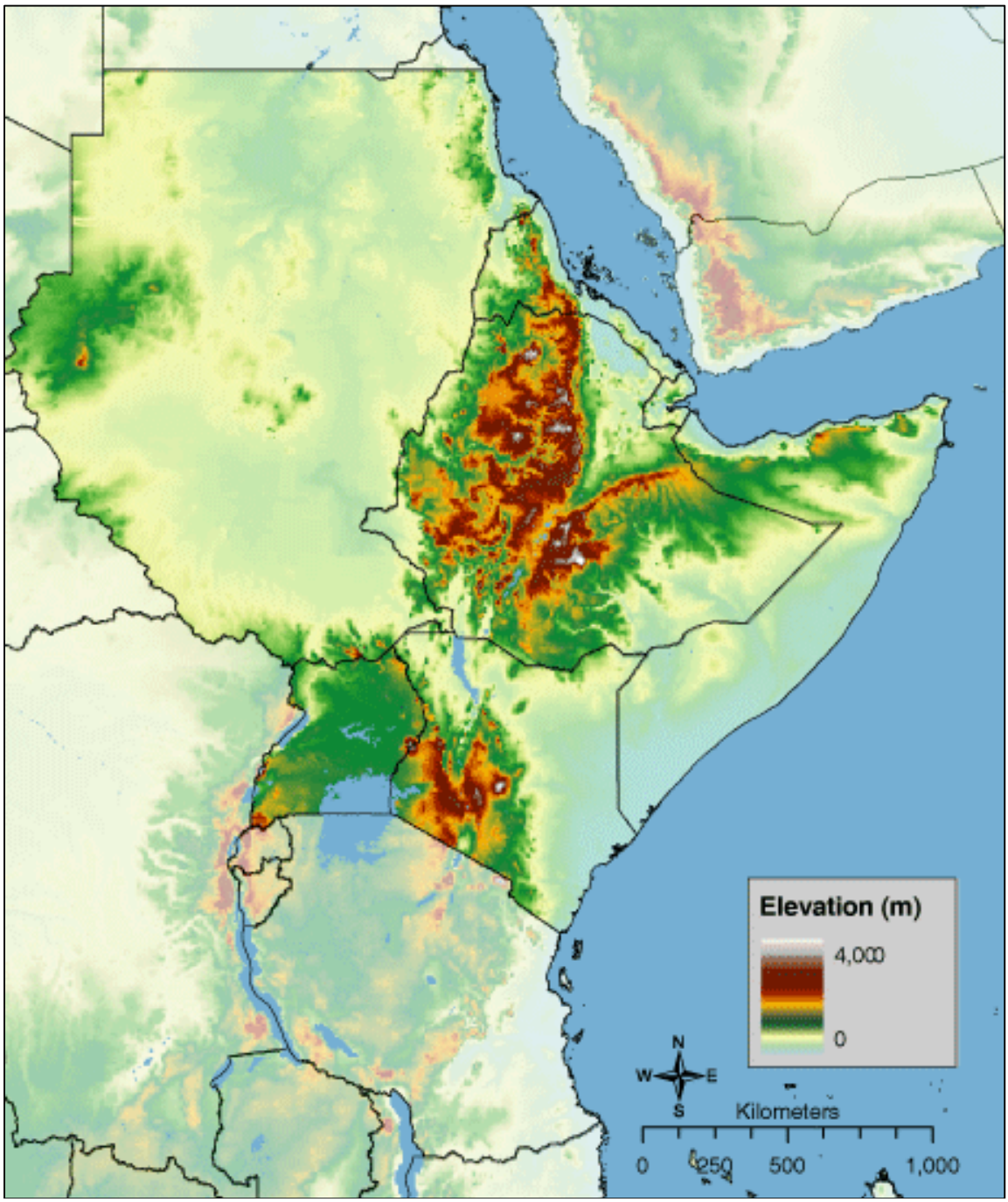
[3] With 60 percent of the land in the IGAD countries being classified as arid (receiving less than 500 mm rainfall annually and having a growing period of less than 90 days), this zone is the largest in the IGAD region. For the single countries the share of the total land area classified as arid ranges from a hundred percent in Djibouti and Somalia, over 73 percent in Kenya, 67 percent in Eritrea and 41 percent in Ethiopia to 1 percent in Uganda (Tables A4 to A10).

Table 1: IGAD - GDP, agricultural GDP and contribution of livestock to agricultural and total GDP.

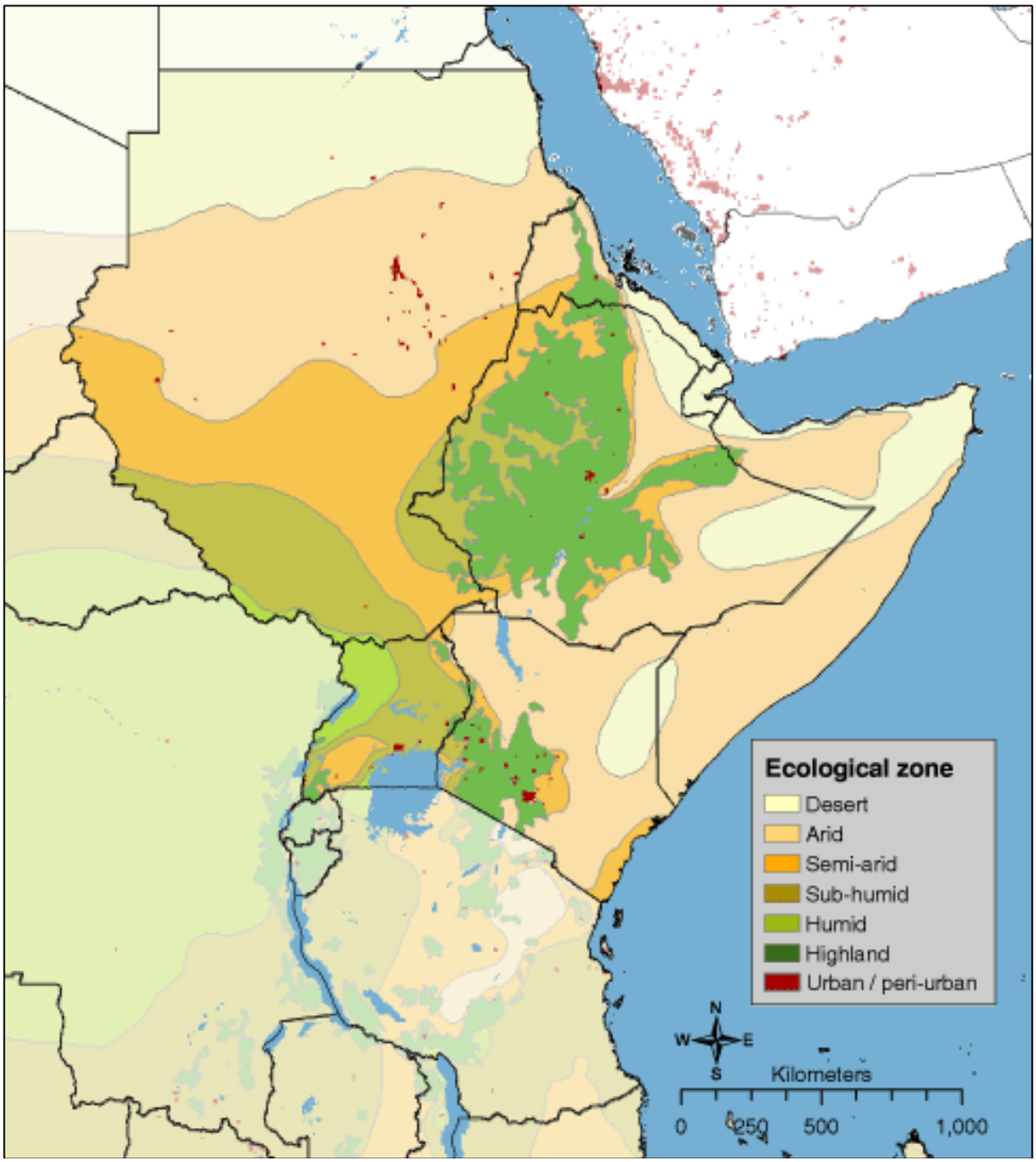
Country	Year	GDP[1] (billion USD)	Share of agricultural GDP in overall GDP[2]	Share of livestock GDP in agricultural GDP[2] (%)	Share of livestock GDP in overall GDP[2] (%)
Djibouti	1980	..	..	86.3	..
	1990	0.5	3.3	89.5	3.0
	2000	0.5	3.7	84.7	3.1
Eritrea	1980	..	..	..	..
	1990	..	..	..	..
	2000	0.6	17.1	56.5[4]	9.7
Ethiopia	1980	..	56.1[5]	36.8	20.6
	1990	5.1	49.3	39.1	19.3
	2000	7.5	52.3	32.5	17.0
Kenya	1980	5.6	32.6	49.4	16.1
	1990	8.4	29.1	53.3	15.5
	2000	9.9	19.9	52.4	10.4
Somalia	1980	..	68.4	88.0	60.2
	1990	..	65.5	82.5	54.0
	2000	..	..	88.2	..
Sudan	1980	4.3	32.9	54.1	17.8
	1990	4.8	32.8[6]	65.5	21.5
	2000	9.9	37.2	61.8	23.0
Uganda	1980	..	72.0	24.2	17.4
	1990	4.1	56.6	20.9	11.8
	2000	7.7	42.5	19.8	8.1

[1] WDI 2002 in constant 1995 US dollars
[2] Calculated based on agriculture and livestock production indices in FAOSTAT 2003
[4] 1999 data
[5] 1981 data
[6] 1987 data

Map 1: Topography of the IGAD region.



Map 2: Agro-ecological zones in the IGAD region.



Population, poverty and undernourishment

Twenty-six percent of the total population of sub-Saharan Africa live in the IGAD countries (FAOSTAT 2004). Population growth is expected to remain high in the region over the next ten years with urban populations growing faster than rural populations. However, despite increasing urbanization, by 2015 over two thirds of the population are still expected to live in rural areas (Figure 1).

Even though the percentage of the overall population that is dependent on agriculture for their livelihoods is decreasing, as people move from agriculture into non-agricultural sectors, the actual number of people living by agriculture is expected to increase in all IGAD countries over the next decade (Annex Table A2).

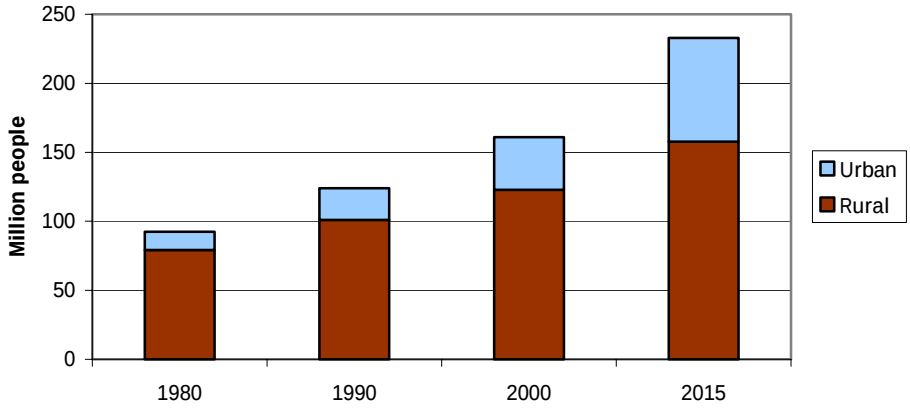
All seven IGAD countries are classified among the least-developed, low income and food deficit countries with widespread poverty and undernutrition. All but Sudan, which is considered to have achieved "medium human development", are ranked in the "low human development" category of the UNDP Human Development Index (HDI) ranking. Somalia was ranked 172 out of 174 countries in 1996 on the HDI ranking but since then has been excluded from the ranking due to lack of data.

High national poverty rates in the IGAD countries confirm the bleak picture of the region. Poverty incidence, based on national poverty lines, varies from 38 percent of the population classified as poor in Uganda to 53 percent in Eritrea. Based on international poverty lines the picture would be worse still as even larger parts of the countries' populations would be classified as living in poverty. In all countries for which data are available, poverty is even more prevalent in rural areas than on the national level. Rural poverty rates range from 42 percent in Uganda to 86.5 percent in Djibouti (Table 2).

Undernourishment is also widespread in the region. The average proportion of undernourished people in the IGAD countries was 36.4 percent (58.5 million people) in 1999-2001. In Somalia the situation is even graver, however, as in the same period the proportion of the population estimated to be undernourished was around 71 percent (Table 3).

The impacts of undernutrition are particularly grave for child development as micronutrient malnutrition in early childhood leads to growth stunting, lower cognitive abilities, poor attention and greater severity and rates of infection. Consequences are slower educational progress, lower physical work capacity as well as reduced life expectancy. Recent studies show that diet quality, particularly the intake of micronutrients through increased animal source food consumption is positively associated with child growth, cognitive development and physical activity (Whaley *et al.,* 2003 and Neumann *et al.,* 2003).

Figure 1: Population growth in the IGAD countries and urbanization trends 1980-2015.



Source: FAOSTAT 2004

Table 2: IGAD – Rural/urban poverty incidence (national poverty lines).

Country	Year	Rural %	Urban %	National %
Djibouti	1996	86.5	..	45.1
Eritrea	1993-94	..	..	53
Ethiopia	1999-00	45	37	44.2
Kenya	1992	46.4	29.3	42
Somalia*	1990	53.4	23.5	43.2
Sudan	..	..	..	..
Uganda**	2002-3	42	12	38

Sources: World Bank 2003, *UNDP 2003 (less than 1 US$/day), ** UBOS 2003

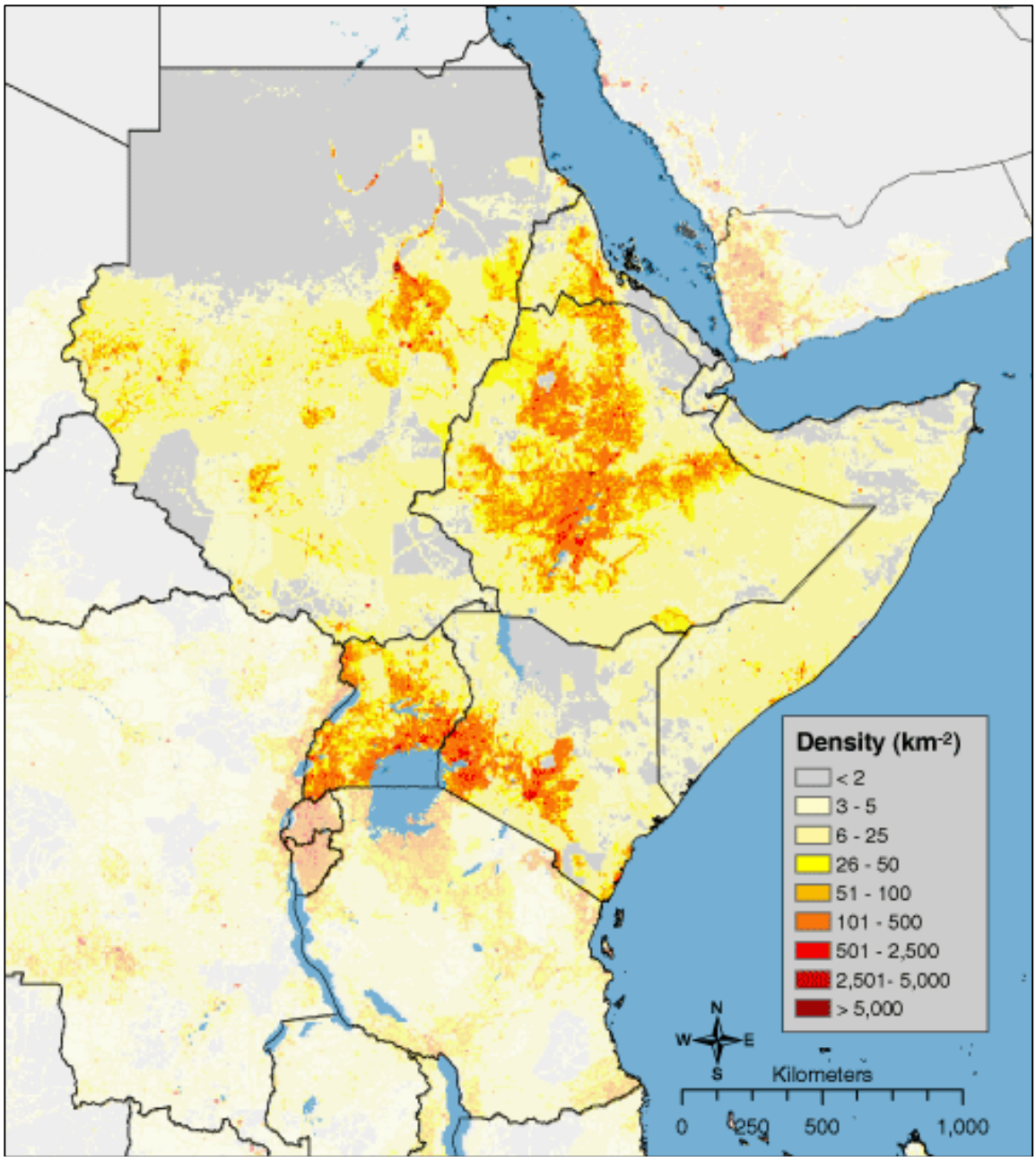
Table 3: IGAD – Prevalence of undernourishment.

	Total population (million)			Number of people undernourished (million)			Proportion of undernourished in total population (%)		
Country	1990–1992	1995–1997	1999–2001	1990–1992	1995–1997	1999–2001	1990–1992	1995–1997	1999–2001
Eritrea [5]	n/a	3.2	3.7	n/a	2.0	2.2	n/a	63.0	61
Ethiopia [5]	n/a	56.9	62.9	n/a	32.2	26.4	n/a	57.0	42
Kenya [5]	24.3	28.0	30.7	10.6	11.1	11.5	44.0	40.0	37
Somalia [5]**	7.2	7.6	8.8	4.9	5.5	6.2	68.0	73.0	71
Sudan [4]	25.4	28.6	31.1	7.9	6.3	7.7	31.0	22.0	25
Uganda [3]	17.8	20.7	23.3	4.1	5.3	4.5	23.0	25.0	19
IGAD total	**74.7**	**145.0**	**160.5**	**27.5**	**62.4**	**58.5**	**36.8**	**43.0**	**36.4**

[undernourishment category: **[3]** 5–19% undernourished, **[4]** 20–34% undernourished, **[5]** ≥35% undernourished]

Source: FAO 2003

Map 3: Human Population density (per square kilometre) in the IGAD region.



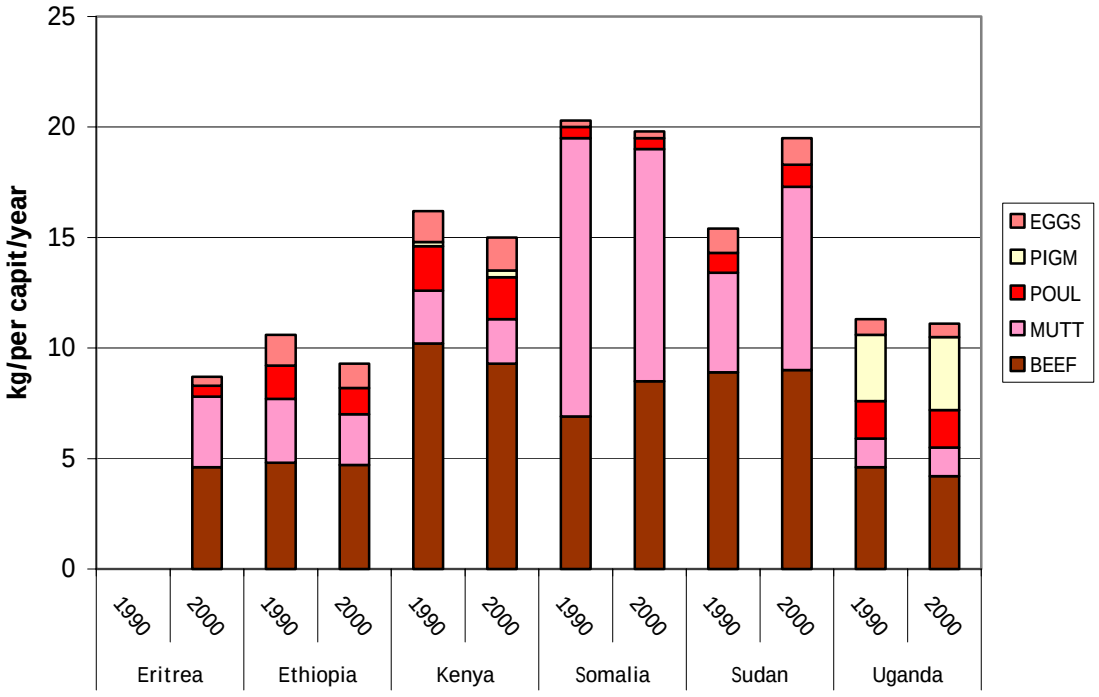
Human diets

Trends in animal derived food consumption are given in figures 2 and 3. Per capita consumption of livestock products fell for all IGAD countries between 1990 and 2000. Only in Sudan (and Somalia in the case of milk) has there been a rise in per capita animal food consumption over the same period.

Consumption of products of animal origin per person per year in the IGAD region only amounts to about 30 kg while in industrialised countries people consume ten times this amount. Milk is by far the most important livestock product in the diets of people in the Horn of Africa while meat and eggs contribute relatively little to total consumption of livestock products. Eritrea, Ethiopia and Uganda have particularly low levels of per capita livestock product consumption.

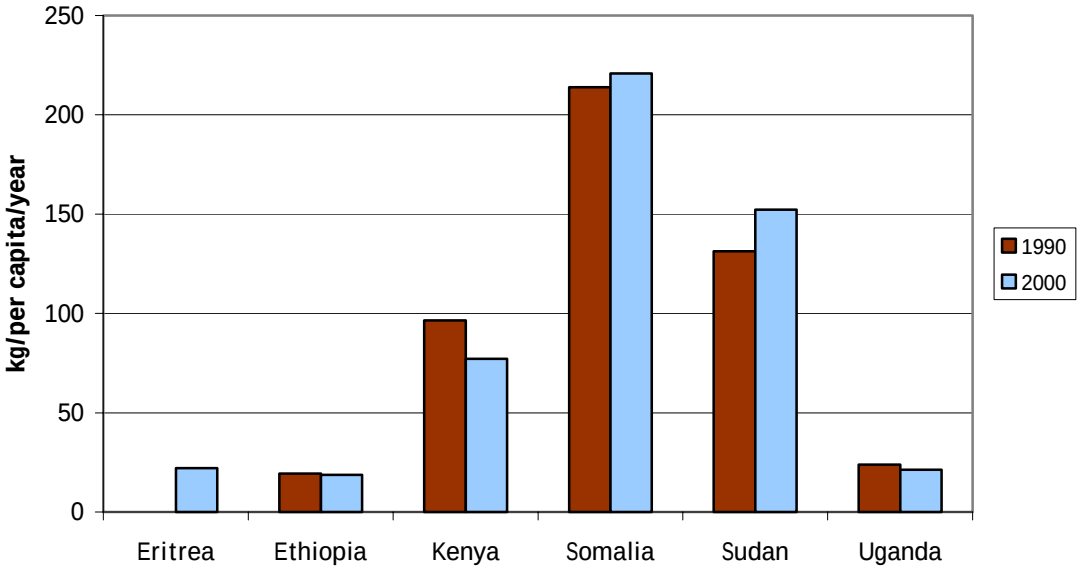
The dominance of milk in people's diet is especially pronounced for Somalia and Sudan. These two countries have the largest shares of population living in arid regions (Annex Tables A8 and A9) where pastoral production systems are practised and milk is an important component of human diets. In agro-ecological zones where cultivation of crops is possible the importance of milk and meat is, however, less pronounced.

Figure 2: IGAD – Trends in per capita consumption of livestock products (except milk) 1990/2000.



Sources: FAO WAT 2015/2003

Figure 3: IGAD – Trends in per capita consumption of milk 1990/2000.



Source: FAO WAT 2015/2003

Trends in production and demand of livestock products

The strong increases in total demand for all livestock products in the IGAD countries are mainly the result of population growth rather than increased per capita consumption: per capita demand has remained constant or even declined (Figures 4 to 9).

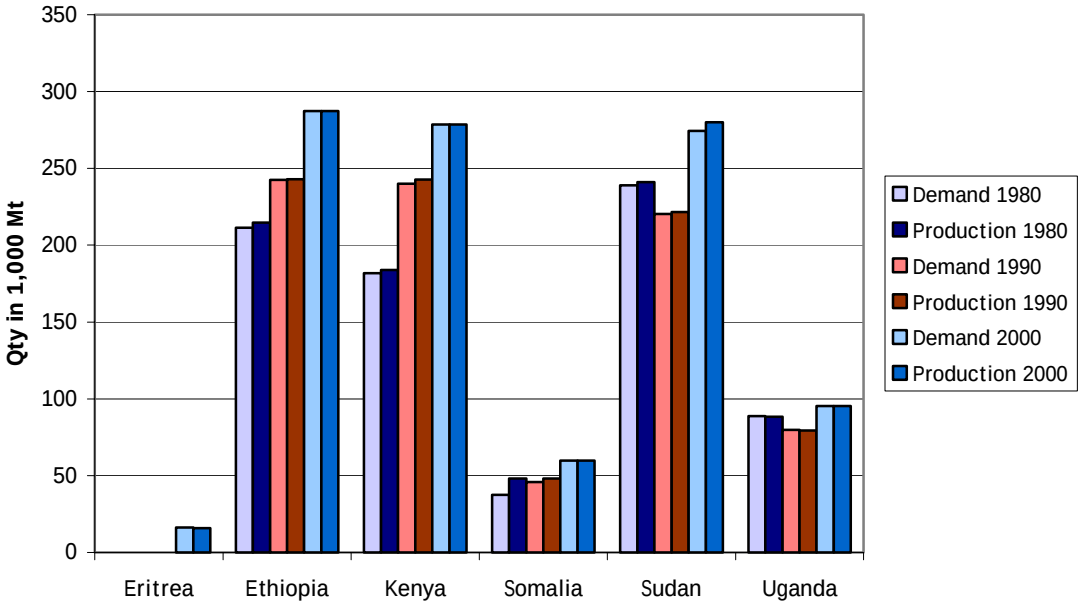
Per capita demand of livestock products in the IGAD countries remains well below the world average. Trends in livestock production in the IGAD countries follow similar patterns to those in demand of livestock products, with strong increases in total production and very little increase in production per capita. This would suggest that the demand for livestock products within the region can be met so far by regional production and does not have to be imported from other parts of the world.

However, unregistered cross-border trade within the region leads to a bias when assessing national livestock production. As the estimation of meat production is based on the number of animals that are actually slaughtered in a country, production in countries that are net exporters of live animals, such as Ethiopia and Somalia, gets systematically underrated, while for Kenya, a net livestock importer, production is overrated.

Rising per capita incomes will profoundly affect the demand for animal products as there remains ample scope in the region for people to improve their diets through increased consumption of livestock products. A study on milk consumption patterns in Kenya has shown that milk consumption in urban areas is highly skewed by income groups with the high income groups consuming the greater part of the milk marketed in urban areas (Karanja, 2003).

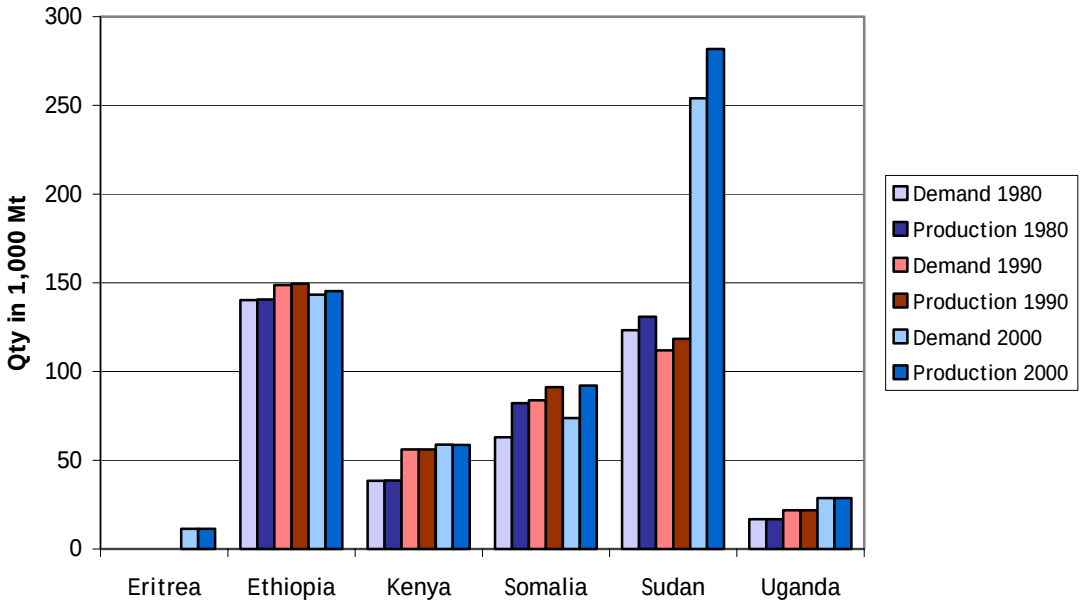
Observed high income elasticities of demand for livestock products in sub-Saharan Africa imply that increases in per capita income will lead to strong growth in livestock product demand. On the other hand, declining per capita incomes result in sharp falls in the demand for livestock products (Winrock, 1992).

Figure 4: Trends in beef demand and production in the IGAD countries, 1980-2000.



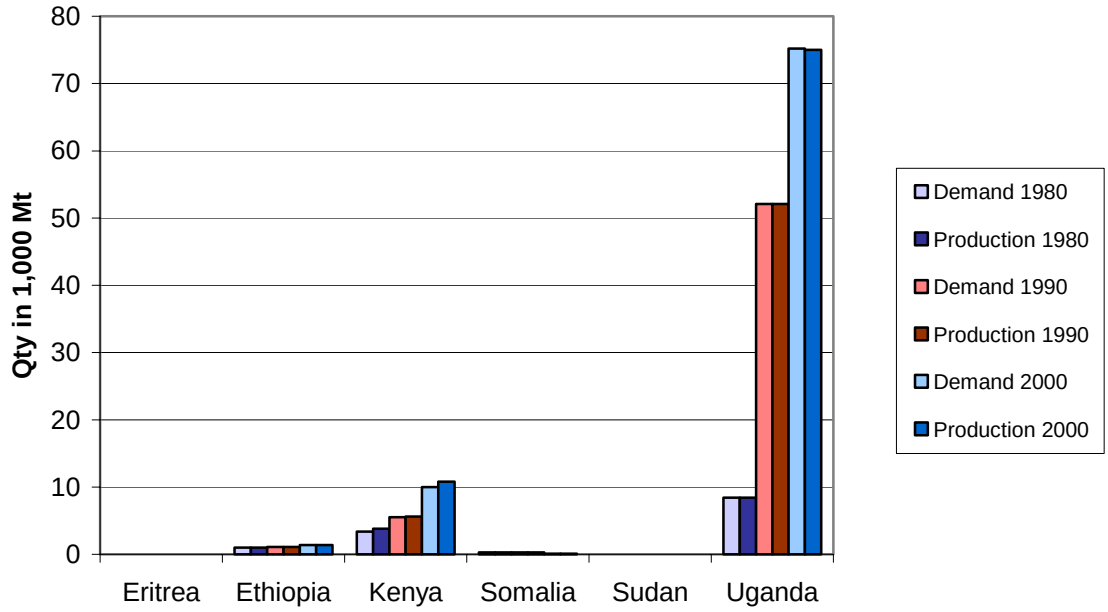
Source: FAO 2002

Figure 5: Trends in mutton & goat meat demand and production in the IGAD countries, 1980-2000.



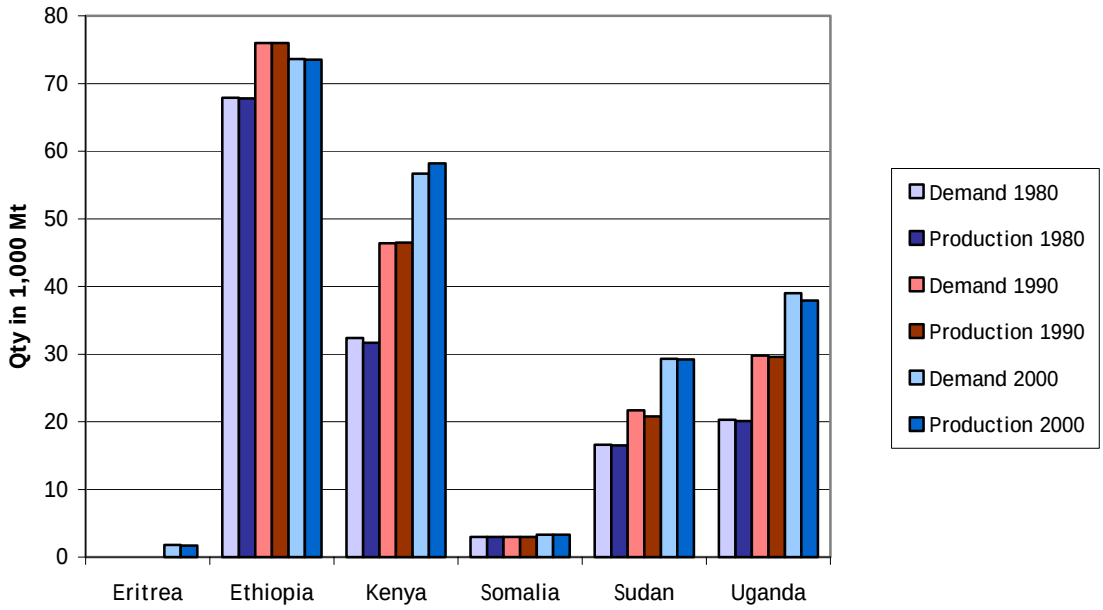
Source: FAO 2002

Figure 6: Trends in pig meat demand and production in the IGAD countries, 1980-2000.



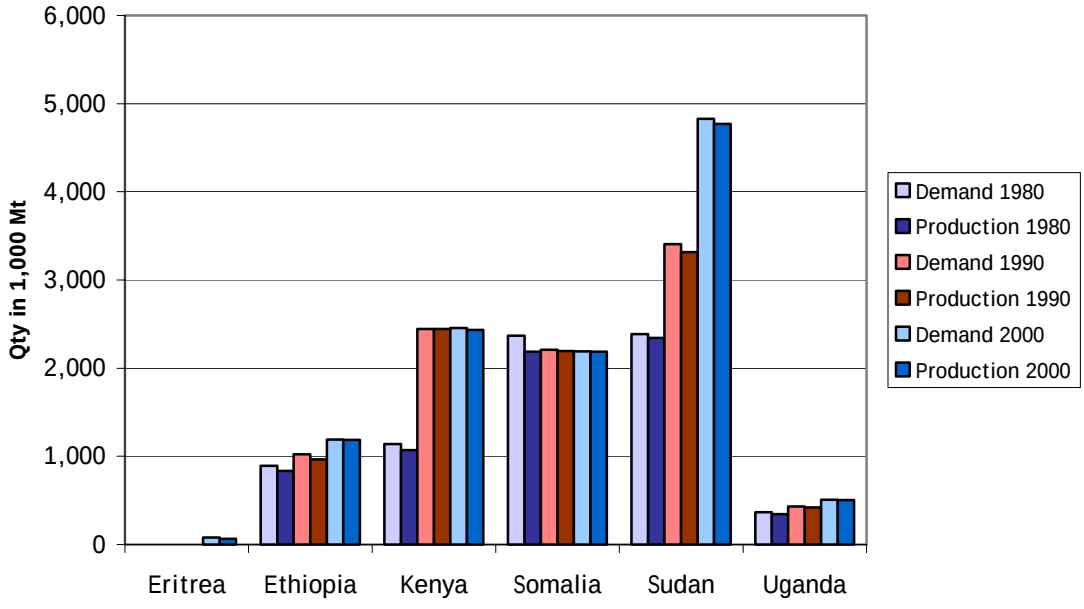
Source: FAO 2002

Figure 7: Trends in poultry meat demand and production in the IGAD countries, 1980-2000.



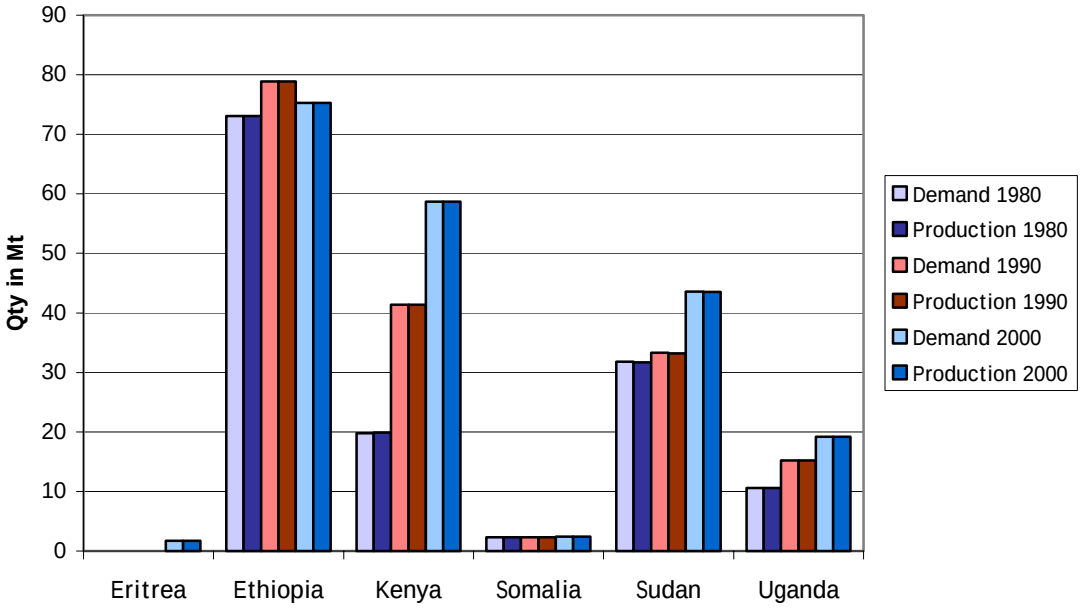
Source: FAO 2002

Figure 8: Trends in milk demand and production in the IGAD countries, 1980-2000.



Source: FAO 2002

Figure 9: Trends in egg demand and production in the IGAD countries, 1980-2000.



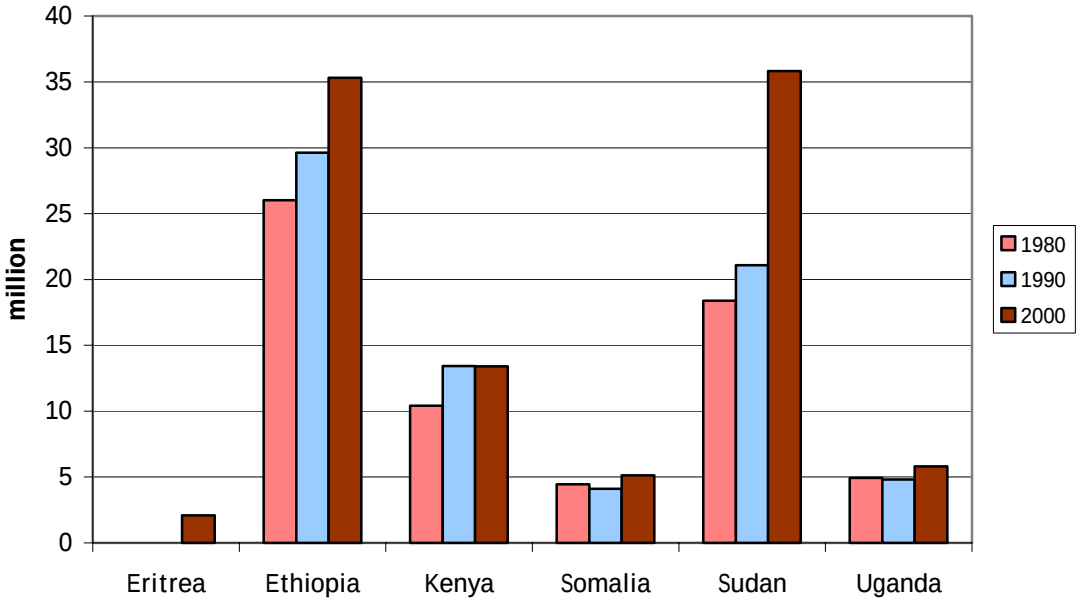
Source: FAO 2002

Livestock populations & productivity

In the IGAD region 98 million cattle and 173 million sheep and goats are kept. This amounts to nearly half of the populations of these species in sub-Saharan Africa. The number of poultry held in the region amounts to 151 million birds which is slightly over 20 percent of sub-Saharan Africa's total poultry population. While cattle, sheep, goats and poultry are widely held in all IGAD countries, pigs are only found in Uganda and, to a lesser extent, in Kenya where a rapid growth in the number of pigs has occurred between 1990 and 2000 (Figures 10 to 13). In the rest of the IGAD region pig raising is not common due to the prevalence of a Muslim population.

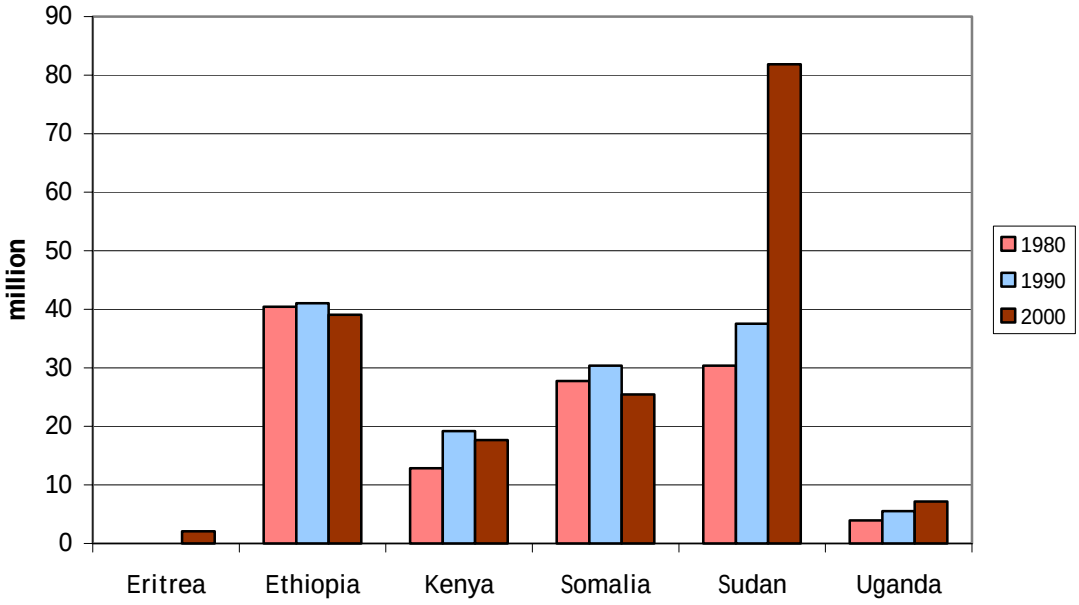
Statistics on livestock populations in the IGAD region are not very reliable due to the seasonal movement of livestock, the displacement of communities due to conflicts, frequent raiding of livestock and a cultural taboo against counting animals. This applies especially to Sudan and Somalia.

Figure 10: Number of cattle in the IGAD countries 1980-2000.



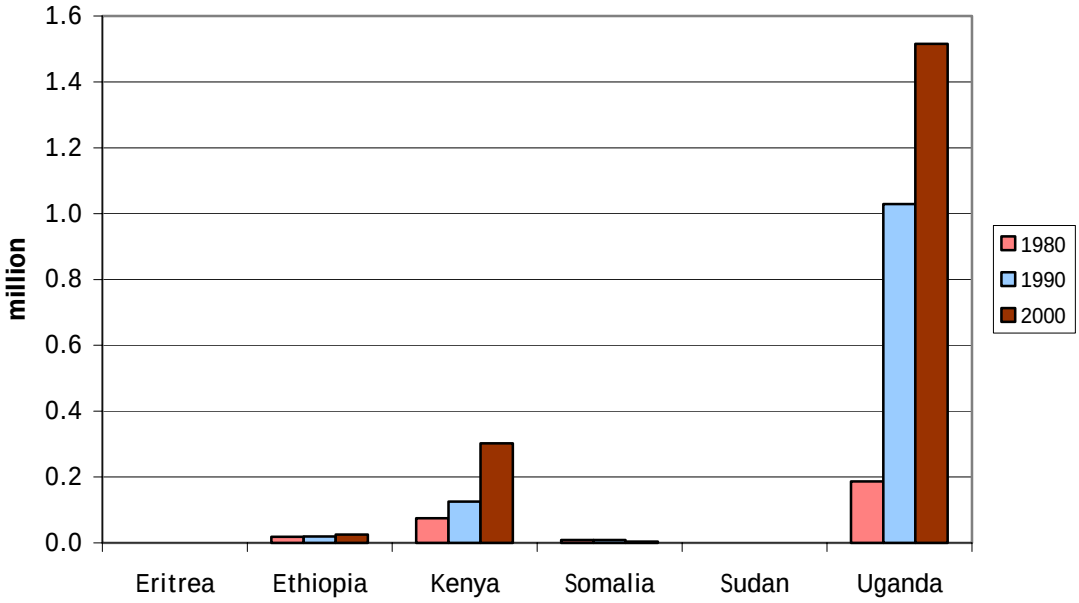
Source: FAO 2002

Figure 11: Number of sheep & goats in the IGAD countries 1980-2000.



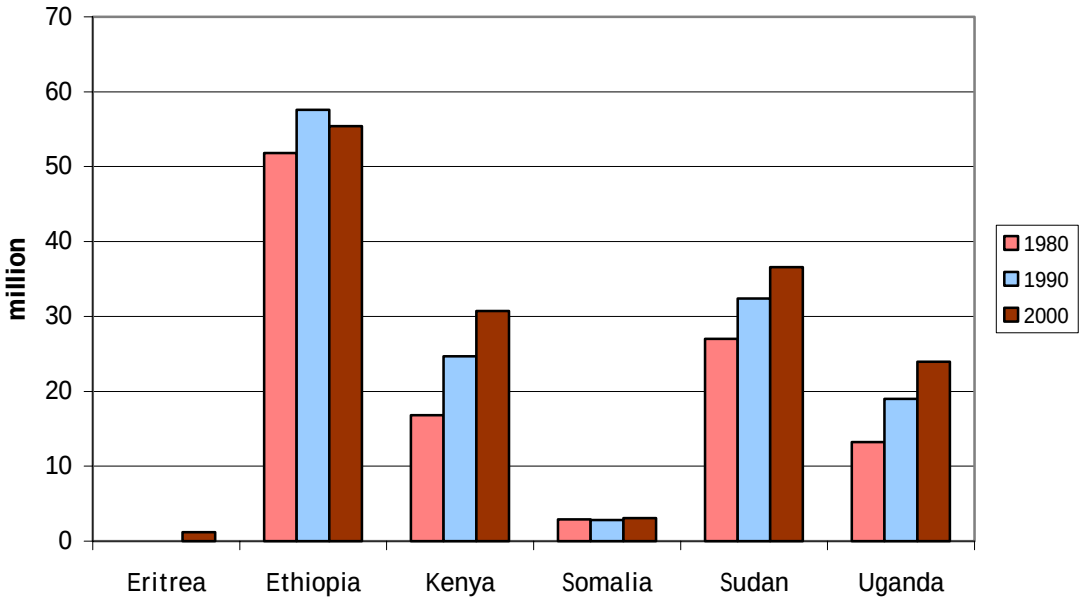
Source: FAO 2002

Figure 12: Number of pigs in the IGAD countries 1980-2000.



Source: FAO 2002

Figure 13: Number of poultry in the IGAD countries 1980-2000.



Source: FAO 2002

With the exception of milk, livestock productivity in the IGAD region is low, even by developing country standards, and there has been no consistent trend of productivity increases over the past 20 years (Table 4). The relatively high productivity in milk production compared to developing countries in general can to a large part be attributed to widely practised small-scale dairy farming in Kenya, and to a lesser extent in Uganda.[4]

Table 4: Comparison of average livestock productivity 2000 (kg/animal/year), three year averages.

Product	IGAD region	Developing countries	Developed countries
Beef	10.4	25.0	90.9
Milk	395.8	196.8	1050.5
Sheep & goat meat	3.5	5.9	8.2
Pig meat	47.1	83.2	131.3
Poultry meat	1.4	3.1	6.9
Eggs	2.6	3.2	3.9

Source: FAO 2002

Production systems

Pastoral/agro-pastoral livestock production

Pasture-based livestock production is the dominant land use in the arid zone[5] and in the lower rainfall areas of the semi-arid[6] zone. Pastoral livestock production involves seasonal or annual mobility of livestock in search of pasture over a large area of rangeland. Pastoral production systems are generally characterised by a contribution of livestock or livestock-related activities to household gross revenue of over 50 percent, or by a contribution of livestock to overall household food energy of 20 percent or more (Otte and Chilonda, 2002).

Fifty-three percent of the IGAD region's cattle (51 million), 71 percent of the region's sheep (58 million) and 68 percent of the region's goats (50 million) are held in pastoral and agro-pastoral production systems. Pastoral and agro-pastoral production systems are of most importance in Djibouti and Somalia where 100 percent of all ruminants are kept in these systems, and slightly less important in the other countries. In Kenya 44 to 70 percent of ruminants (depending on the species) are kept in pastoral and agro-pastoral production systems, 63 to 65 percent in Eritrea, 16 to 82 percent in Sudan and 17 to 33 percent in Ethiopia and 23 to 100 in Uganda (Table 5).

Pastoral production systems can be found at all scales of operation, producing milk, meat, blood, hides and skins and serving as means of transport. Furthermore,

[4] However, it has to be noted that significant differences in productivity exist between smallholder open- and zero-grazing, with open grazing farms' yields being 28.8 percent lower than average yields in zero-grazing (Karanja, 2003).
[5] The arid agro-ecological zone receives less than 500 millimetres of rainfall annually and has a plant growing season of less then 90 days.
[6] The semi-arid agro-ecological zone receives 500 to 1,000 millimetres of rainfall annually and has a plant growing season of 90 to 180 days.

livestock serve as a store of wealth, to meet social obligations and to insure against disaster. Livestock products contribute to subsistence directly, via milk and meat for home consumption, and indirectly via sales to generate cash or to barter for cereals and other crops (Otte and Chilonda, 2002).

Pastoral and agro-pastoral production systems in the IGAD region account for 53 percent of total beef production, 70 and 68 percent of sheep and goat meat production respectively, and 33 percent of cattle milk production (Table 5).

Common to all traditional pastoralist systems is the use of communal land for grazing. They vary in herd size and composition and in the relative importance of different species. The dominant species kept in pastoral and agro-pastoral systems in the IGAD region may be cattle, sheep, goats or camels. The degree of mobility of herds and households also varies depending on environmental factors and normally increases with increasing aridity of the area. Long range migratory movements of pastoralists in Eastern Africa are commonly not restricted by national borders (Schwartz, 1993).

Pure pastoral economies rely heavily on barter trade as they produce no food grains and households rely on the exchange of milk or animals for covering their cereal requirements and generally lack access to infrastructure and markets.

With traditional grazing practices, the value of off-take per square kilometre in the pastoral system is at least equal to the productivity of comparable rangelands in North America and Australia. However, the East African rangelands are stocked near capacity and there is only limited potential for increasing off-take (Winrock, 1992).

Though human population and livestock density are generally very low, human overpopulation and the spread of cropping are among the most serious problems facing pastoral livestock production, particularly in areas critical to dry season grazing. Uncontrolled grazing around water points and near villages and the cutting of trees for fuel are leading to serious range degradation (Winrock, 1992).

The main differences in livestock production between the arid and the lower rainfall areas of the semi-arid zone are a higher degree of settlement and greater interactions with crop farming leading to a larger scale intrusion of cropping into the rangelands in the semi-arid zone. In these agro-pastoral systems livestock are kept for subsistence (milk and milk products), transportation (camels, donkeys), land preparation (oxen, camels), sale or exchange, savings, bridewealth and insurance against crop failure. The population generally lives in permanent villages, although part of their herds may continue to migrate seasonally in the care of herd boys (Dixon, 2001).

The main crops planted in agro-pastoral systems are millet, sorghum, maize, and cowpea. Irrigation is rare except for a few locations in Somalia and Sudan where cotton, sugarcane and rice are grown (Winrock, 1992 and Dixon, 2001).

The more humid part of the semi-arid zone also provides much dry season subsistence for pastoral herds. Livestock have a strong potential in the semi-arid zone due to the absence of trypanosomosis (Winrock, 1992).

Table 5: IGAD – Animal numbers and production in pastoral/agro-pastoral production systems (2000).

	Pastoral/agro-pastoral production													
	Cattle						Sheep				Goats			
Country	Numbers	%	Meat in Mt	%	Milk in Mt	%	Numbers	%	Meat in Mt	%	Numbers	%	Meat in Mt	%
Djibouti	297	100	3,565	100	12,298	100	464	100	839	100	511	100	1,180	100
Eritrea	1,415	63	16,647	74	57,802	74	1,435	65	3,260	61	906	52	2,306	47
Ethiopia	6,551	20	76,285	27	265,775	21	1,797	17	4,208	15	2,788	33	7,482	29
Kenya	5,165	44	54,739	33	190,010	7	4,252	55	9,059	50	6,801	70	17,588	66
Somalia	5,141	100	61,688	100	212,828	100	13,773	100	24,831	100	12,269	100	28,199	100
Sudan	30,570	82	356,677	81	1,241,878	88	36,539	80	90,618	82	25,596	73	80,219	75
Uganda	1,415	23	15,328	20	53,777	13	163	17	519	21	873	16	2,906	16
Total	**50,553**	**53**	**584,927**	**56**	**2,034,367**	**33**	**58,423**	**71**	**133,334**	**70**	**49,744**	**68**	**139,880**	**66**

Source: Estimates based on FAO (2004) and Otte and Chilonda (2002)

Table 6: IGAD – Animal numbers and production in mixed crop-livestock production systems (2000).

	Mixed crop-livestock production													
	Cattle						Sheep				Goats			
Country	Numbers	%	Meat in Mt	%	Milk in Mt	%	Numbers	%	Meat in Mt	%	Numbers	%	Meat in Mt	%
Djibouti	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eritrea	831	37	5,898	26	20,603	26	767	35	2,070	39	853	48	2,644	53
Ethiopia	25,958	78	194,922	69	646,794	50	9,069	83	24,209	85	5,764	67	17,903	71
Kenya	2,389	20	28,989	18	60,907	2	3,517	45	9,195	50	2,941	30	9,019	34
Somalia	0	0	0	0	0	0	0	0	14	0	0	0	55	0
Sudan	6,530	18	82,260	19	172,192	12	9,396	20	19,238	18	9,377	27	27,297	25
Uganda	4,176	69	52,985	69	108,414	26	770	83	1,993	79	4,583	84	15,031	84
Total	**39,883**	**42**	**365,055**	**35**	**1,008,910**	**16**	**23,520**	**29**	**56,719**	**30**	**23,518**	**32**	**71,950**	**34**

Source: Estimates based on FAO (2004) and Otte and Chilonda (2002)

Settled mixed crop-livestock production

Mixed systems are found in the highlands[7], sub-humid[8] and humid[9] zones within the IGAD countries. Mixed systems in the IGAD region are predominantly subsistence oriented and crop dominated with the type of crops planted depending on agro-climatic conditions while the numbers and species of livestock kept depend on human population pressure and prevalence of trypanosomosis. For instance, cattle numbers are lower in densely populated areas as well as more humid regions infested with tsetse flies. Livestock species typically kept in mixed farming systems comprise cattle, sheep, goats, poultry and, in Kenya and Uganda, pigs.

42 percent of the IGAD region's cattle (40 million), 29 percent of the region's sheep (24 million) and 32 percent of the region's goats (24 million) are held in mixed settled production systems. By country, 71 to 83 percent of the ruminants (depending on the species) are kept in mixed systems in Ethiopia, 69 to 84 percent in Uganda, 35 to 53 percent in Eritrea, 20 to 45 percent in Kenya and 18 to 25 percent in Sudan while in Djibouti and Somalia mixed livestock-crop production is hardly practised (Table 6).

Mixed production systems in the IGAD region account for 35 percent of total beef production, 29 and 30 percent, respectively, of sheep and goat meat production and 16 percent of cattle milk production (Table 6).

A favourable climate, relatively moderate disease and pest problems, and high production potential make the highlands attractive to people and a favourable environment for livestock. The highland areas are most important for mixed farming in Eritrea, Ethiopia, Kenya and to a lesser extent Uganda.

The highlands have the greatest density of people and livestock in sub-Saharan Africa (Annex Tables A4 to A10). Forage production is intensive, and a wide range of vegetation, including cultivated forages, is used for livestock feed. In the highland areas, many crops are grown that are unsuited to production for the lowland areas. These are wheat, barley, teff in Ethiopia, coffee and tea (Otte and Chilonda, 2002). The most common farming systems are smallholder crop-livestock farms. Cattle are kept for ploughing especially in Ethiopia and Kenya, but also for milk, manure, savings, bridewealth and emergency sale. Small grains such as wheat, teff and barley are the main staples, complemented by peas, lentils, broad beans, rape, Irish potatoes, pulses and oilseeds (Winrock, 1992).

In the sub-humid zone rainfall is less variable than in the drier zones, making crop production less risky and pastures more productive. With 50 percent of the land area classified as sub-humid, mixed farming under sub-humid agro-ecological conditions is mainly practised in Uganda, and to a much smaller extent in the rest of the region. A wide variety of crops is grown in the sub-humid zone. The main staple is maize and the main cash sources are migrant remittances, cattle, small ruminants, tobacco, coffee and cotton plus the sale of food crops such as maize and pulses. Cattle are mostly kept for ploughing, breeding, milk, farm manure, bridewealth, savings and emergency sale. The proliferation of small farms in the sub-humid zone reflects the potential of the land resource endowment in

[7] The highland agro-ecological zone is defined as the area in which the mean daily temperature is less than 20 degrees.
[8] The sub-humid agro-ecological zone receives 1,000 to 1,500 millimetres of rainfall annually and has a plant growing season of 180 to 270 days.
[9] The humid agro-ecological zone receives over 1,500 millimetres of rainfall annually and has a plant growing season of 270 to 365 days.

combination with the climatic conditions to generate relatively high returns on agricultural activities to support a household, even on small plots or tracts of land. However, livestock production is somewhat limited by the prevalence of trypanosomosis. In spite of scattered settlement patterns, community institutions and market linkages are relatively better developed than in pastoral farming systems (Winrock, 2002 and Dixon 2001).

The humid zone is of relatively little importance for mixed farming in the IGAD region as only in Uganda and Sudan part of the land area can be classified as humid and animal numbers in these areas are relatively small. The zone consists mainly of rain forests and derived savannahs with a native vegetation that has very low nutritive value for livestock. The major factor that limits livestock production in these areas is trypanosomosis. Crop-livestock interactions are relatively low. Pigs are more commonly raised in this zone than in any other (Winrock, 1992).

Most poultry production in the IGAD region is undertaken extensively in mixed crop-livestock farming systems at family level. Almost every village household keeps domestic poultry (on average between 5 and 20 birds). Poultry survive by scavenging, generally without feed supplements though household waste is fed to the birds and the diet might be supplemented with grains (IAEA, 2002).

Small-scale dairy production

A special feature of the Kenyan highlands - and to a lesser extent also other East African highland areas - is the high concentration of smallholder dairying in mixed crop-livestock systems. The major characteristic of smallholder dairy systems is the production of milk for sale. Milk production is integrated with the growing of subsistence crops, such as maize, beans, and potatoes and of cash crops including coffee, tea and pyrethrum. Besides engaging in crop farming and keeping other livestock (e.g. poultry), smallholder dairy farmers in Kenya typically keep two or three dairy cows with their offspring (Otte and Chilonda, 2002).

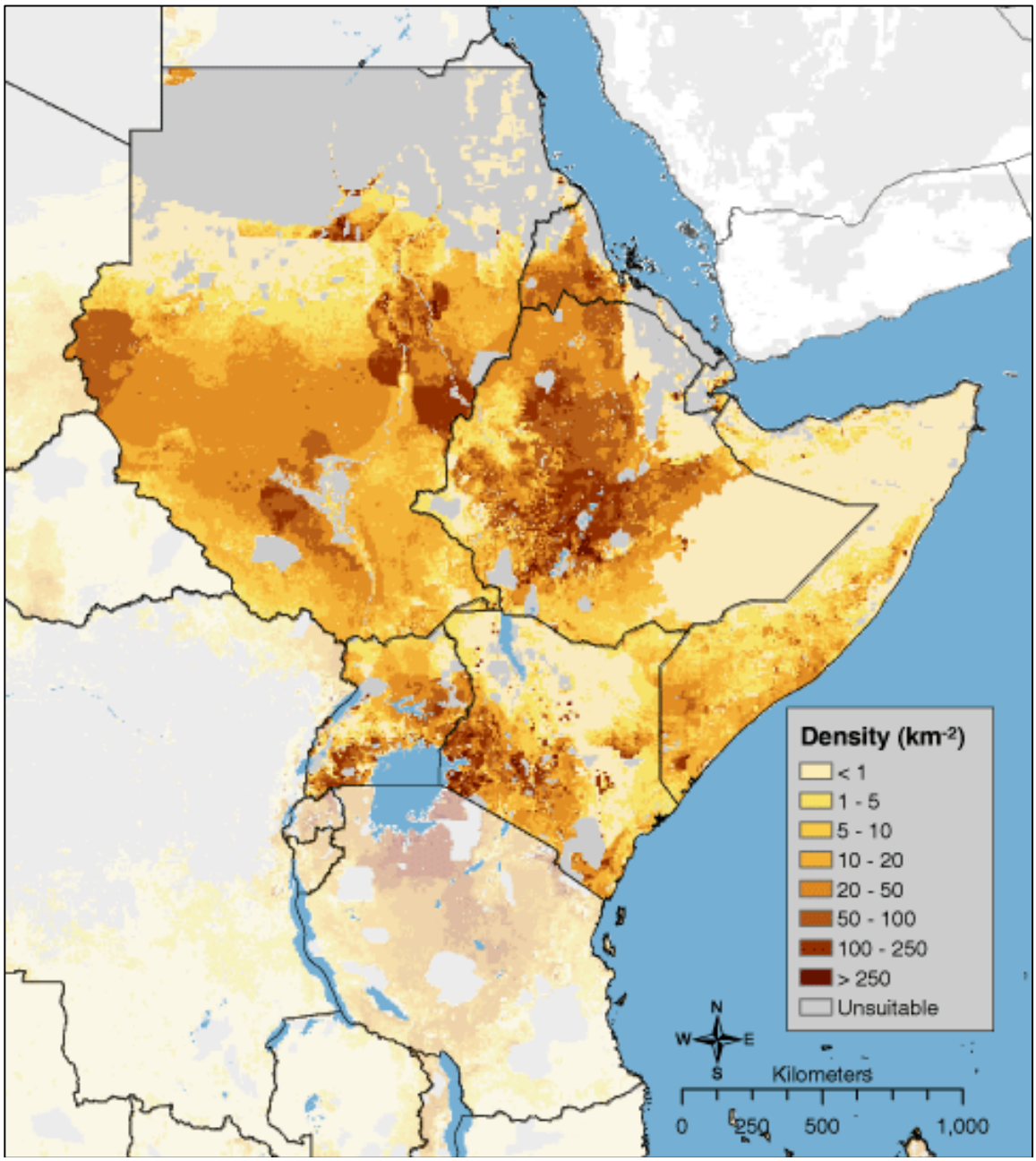
Approximately 5 percent of cattle in the IGAD region or 5 million animals are kept by small-scale dairy farmers. These produce 10 percent of the beef in the region, and 51 percent of cattle milk (Table 7).

Table 7: IGAD – Animal numbers and production in small-scale dairy production systems (2000)

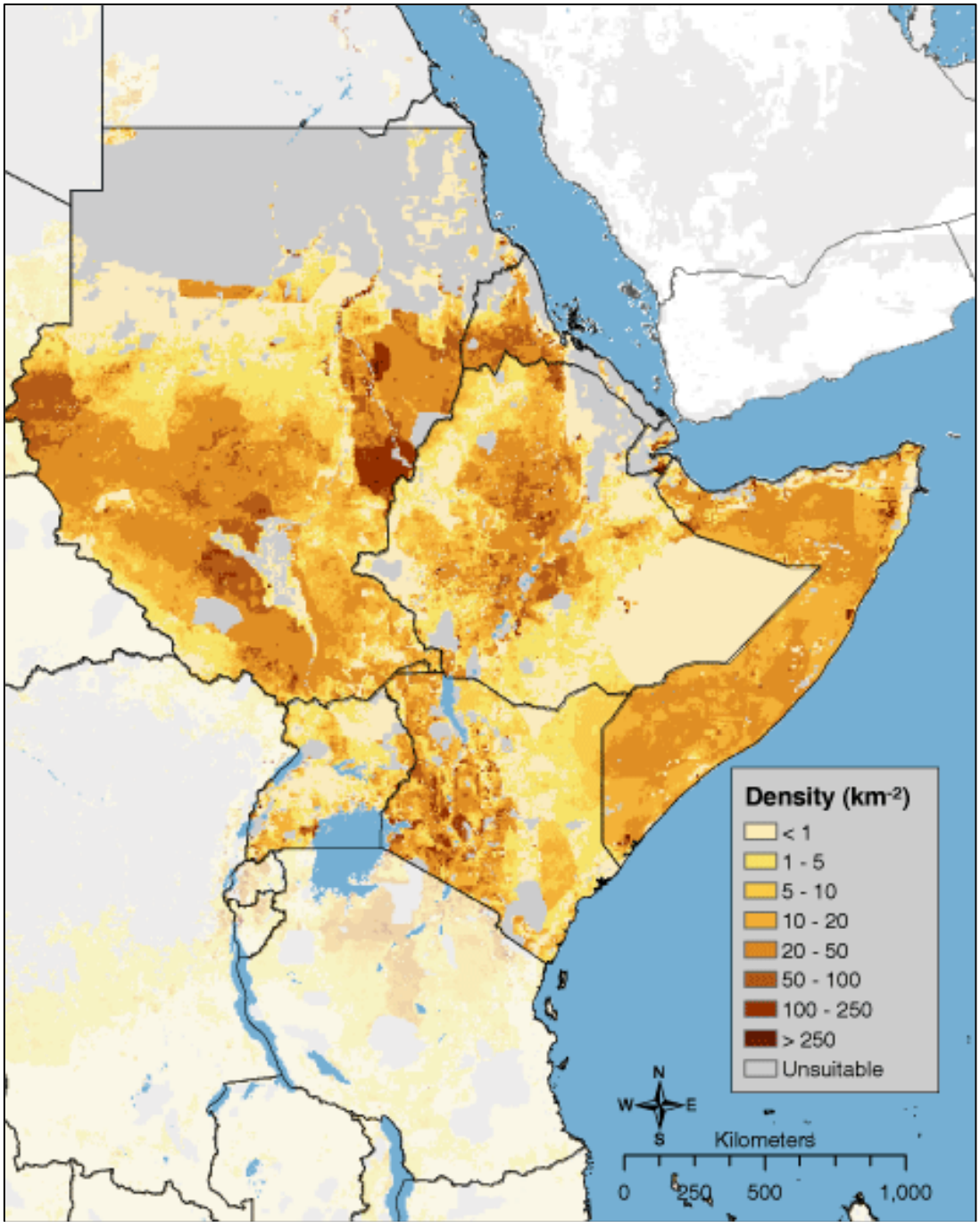
Small-scale dairy production						
			Cattle			
Country	Numbers	%	Meat in Mt	%	Milk in Mt	%
Djibouti	0	0	0	0	0	0
Eritrea	0	0	0	0	0	0
Ethiopia	617	2	11,907	4	370,179	29
Kenya	4,163	36	80,337	49	2,497,524	91
Somalia	0	0	0	0	0	0
Sudan	0	0	0	0	0	0
Uganda	433	7	8,358	11	259,830	62
Total	**5,213**	**5**	**100,602**	**10**	**3,127,533**	**51**

Source: Estimates based on FAO (2004) and Otte and Chilonda (2002)

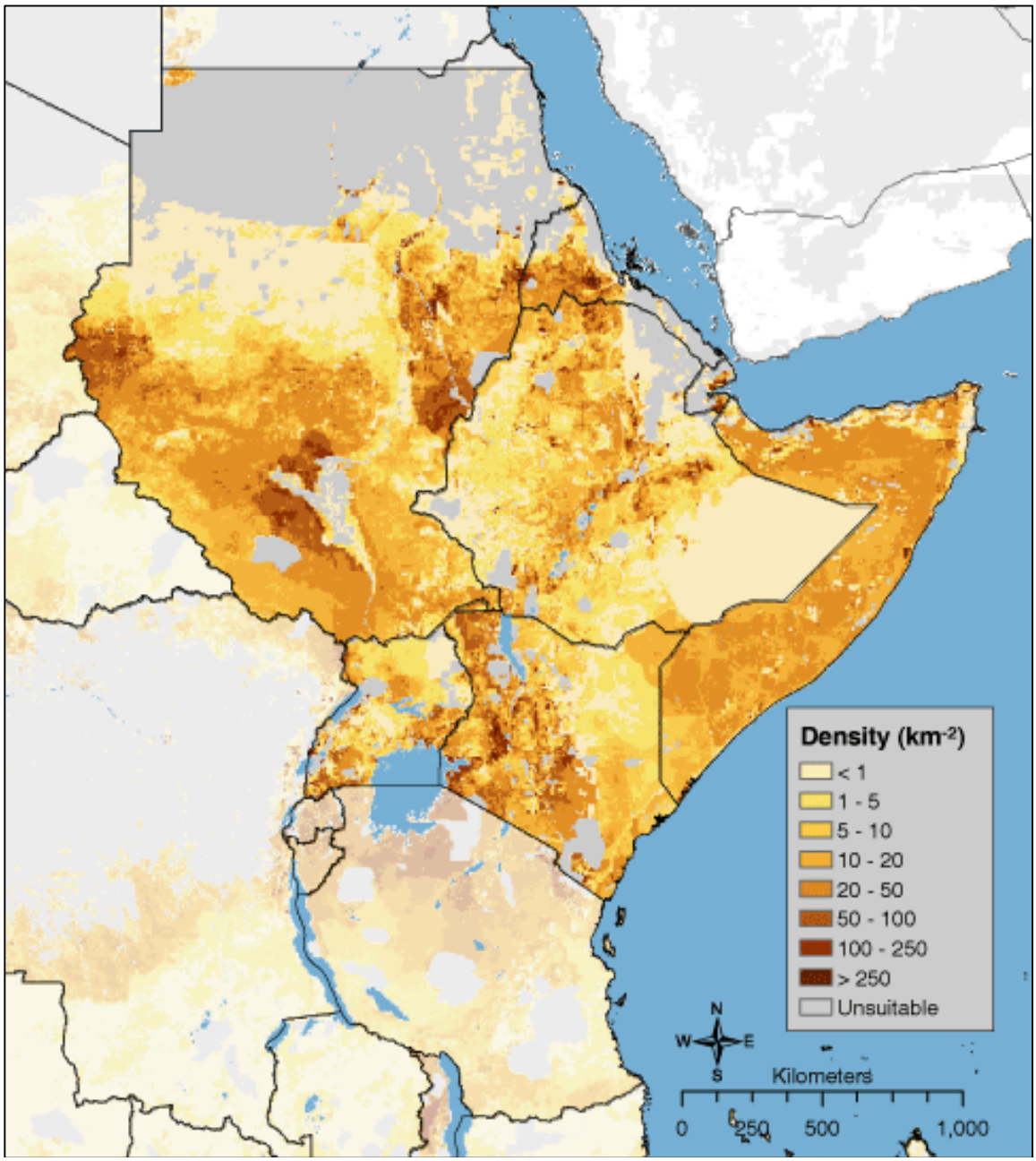
Map 4: Density of cattle in the IGAD region, adjusted for land unsuitable for bovines, and disaggregated based on remotely sensed data.



Map 5: Density of sheep in the IGAD region, adjusted for land unsuitable for bovines, and disaggregated based on remotely sensed data.



Map 6: Density of goats in the IGAD region, adjusted for land unsuitable for bovines, and disaggregated based on remotely sensed data.



Marketing and trade

Livestock in most areas of the IGAD region are managed traditionally with low input and productivity levels. Livestock and livestock products are primarily used for home consumption. The decision to sell animals by farmers and pastoralists is usually based on urgent cash requirements. Profit only becomes a motive for livestock sales higher up the marketing chain (Aklilu, 2002).

Official domestic livestock marketing systems are based on a series of primary, secondary and terminal markets. Various actors are involved in the process of selling animals. Producers sell livestock to small-scale traders at market centres located in rural areas, the animals then pass through larger markets and bigger traders in regional towns, and finally reach terminal markets. Livestock marketing is burdened by government taxes and fees levied at every step of the marketing chain, high transport costs and under-equipped markets. Factors such as those contribute to the emergence of unofficial markets and widespread home slaughtering (Halderman, 2004).

Market places mostly lack watering facilities, feeding areas, shelters for attendants, weighing scales for animals and veterinary inspection. Producers and traders, therefore have little incentive to bring their animals to 'official' market places, and a considerable proportion of sales are carried out outside market centres. Sheep and goat slaughtering is often undertaken in the backyards where there are no slaughtering and curing facilities, leading to deterioration of meat, hides and skins quality as well as substantial wastage.

In Kenya some of the infrastructure, such as holding grounds have recently been rehabilitated and handed over to management boards of user-associations.

Even though livestock prices drop during droughts and peak during holidays the price of meat has remained more or less constant in the major cities of Ethiopia, Kenya, and Sudan over the last years. However, the producer's share of the retail price shows a declining trend over time, particularly for cattle. This is due to urban meat markets being controlled by butchery owners, the most powerful group in the livestock marketing chain, and by middlemen, who act as brokers between livestock traders and butchery owners. These two groups control the prices of livestock in the major domestic markets and indirectly also the volume of national red meat consumption in the region. Domestic market saturation, at the prevailing price of meat, and limited access to export markets (especially in the cases of Kenya and Ethiopia and less so for Sudan), effectively limits livestock producers' ability to increase livestock sales. Livestock sellers are also in a disadvantaged position because they normally sell their animals under pressure for cash needs and lack price information (Aklilu, 2002).

Transport constitutes a major cost factor in livestock trading whether animals are trekked or transported on trucks. Trekking is the most common mode of transport particularly for livestock from pastoral areas. However, transportation on hoof is slow and leads to considerable weight losses, deterioration of health condition, injuries or even death of animals (Aklilu, 2002).

Another method of livestock transport is loading the animals on trucks, which in most cases is used to move small stock and finished cattle to big consumption sites and export centres. Trucking often occurs more as a security measure against herd raiding than for speedier transport. As general cargo trucks are not necessarily

fitted for the transportation of livestock, livestock trucking over long distances also leads to considerable weight losses and thus diminished value of animals.

Livestock are the most repeatedly (and perhaps the most highly) taxed agricultural commodity in the IGAD region. In Sudan, livestock traders pay taxes and transit fees in about 20 places en route to the terminal markets. In Ethiopia, livestock are taxed a number of times as transit commodities within the country, with the amount paid per head varying from place to place. In both Sudan and Ethiopia, transit fees and taxes are collected in a bid to enrich the coffers of regional governments, despite regulations that livestock should only be taxed at the point of origin. In Kenya, traders pay taxes at source and en-route to the terminal markets. Furthermore, traders in Kenya complain about the many roadblocks especially in the north and northeast. Between Moyale and Nairobi alone, there are about 18 roadblocks in place. In none of the three countries are the livestock taxes and transit fees collected by the respective councils used to improve the physical structure or the efficiency of livestock markets (Aklilu, 2002).

In Kenya, though local chickens produce the major part of total eggs and poultry meat, only 10 and 40 percent of the eggs and poultry meat, respectively, is marketed. About 71 percent of poultry meat and eggs are sold in open-air markets and retail shops. Marketing of poultry products is restricted by small size of output per household, irregular outputs, lack of market information and high marketing margins (Njue *et al.*, 2002).

Almost all marketed milk in Kenya comes from the dairy herd and a high proportion thereof originates from smallholder dairy systems comprising about 600,000 farmers. From the smallholder dairy herd production about 64 percent are offered as marketed surplus. This marketed surplus is sold either through direct sales to consumers or to cooperatives, self-help groups and traders, who market milk in local and urban markets, or to private processors (Omore *et al.*, 1999).

In Kenya, hides and skins are generally obtained from either pastoral areas or slaughterhouses in major towns. Middlemen collect hides and skins and sell them in bulk either to local traders or to tanneries. Generally, poor animal nutrition, branding, external parasites, thorns, improper flaying and storage and putrefaction depress prices of hides and skins. Neither are transport problems uncommon (Aklilu, 2002).

Export

Cross-border livestock trade, especially cattle trade from Ethiopia and Somalia into Kenya, plays an important role within the region. Cross-border trade occurs, less as a result of better prices in neighbouring countries but rather if the local supply of animals is not met by domestic demand or if the closer proximity to a cross-border market makes it easier to sell animals there than on the nearest domestic market.

Apart from Sudan, none of the IGAD countries manages to seize the opportunity to export animals to the relatively close Gulf countries, the world's largest market for live animals, which have a high demand for regionally produced animals. This is in part due to the IGAD countries not attaining certified quality and health standards required for live animal exports to the Gulf region.

The official export systems are burdened by an even greater set of regulations, documentation and fees than are the domestic marketing systems. These include

market fees, sales taxes and export fees including veterinary certificates and other charges collected by a variety of governmental and other organisations. It requires considerable skill and perseverance to meet the many requirements of the various layers of bureaucracy that is reportedly not user-friendly (Halderman, 2004).

In contrast to the above, unofficial systems have successfully been moving live animals within and out of the region for many years. The value of the unofficial cross-border trade in live animals exceeds by far the value of official exports of live animals and meat. Whilst official marketing and export systems have been working so poorly, the unofficial trade has thriven in recent years. The unofficial cross-border systems have long operated in the pastoral areas of the region that are the primary source of the animals exported on the hoof, via Somalia and Djibouti to Saudi Arabia, Yemen and the Gulf States. These long established private sector trading systems have functioned well in spite of adversity, and of their illegal status (Halderman, 2004).

Both systems, the official as well as the unofficial have been hit hard by the import bans on live animals and meat imposed by Saudi Arabia, Yemen and several Gulf countries following the outbreak of Rift Valley Fever in 1997[10]. The import bans have not been applied consistently to all IGAD countries and have most seriously affected pastoralists and traders in Afar and Somali regions who depend heavily on the export of live animals through the unofficial cross-border trade (Halderman, 2004).

Live sheep are the major livestock exports from Sudan, while some cattle are exported mainly to Yemen, Jordan and the Gulf states. Live goats are exported in small numbers to the Gulf States and camels trekked across the desert to Egypt and Libya. Quarantine measures for export animals are very tight and the minimum is 21 days after vaccination in a disease free zone which is recognized by the World Organisation for Animal Health (OIE); nevertheless there are some rejections from Saudi Arabia amounting to 5 to 9 percent of all shipments for unknown reasons. For meat export there are now five modern slaughterhouses designed mainly for export. Meat is mostly exported in from of chilled whole sheep carcasses, which account for 90 percent of total meat exports (PPLPI, 2004).

Poor export performance in Ethiopia and Kenya has led to the deterioration of holding grounds, stock routes, watering points, quarantine stations and market yards, that were built at considerable expense in the past. The current state of this infrastructure is such that substantial funds would be required to rehabilitate them for export services. This is also true for Sudan, particularly between the primary and the terminal markets, though the Kadero and Port Sudan quarantine stations are in good condition (Aklilu, 2002).

A comparison of livestock product exports shows that the most important livestock products exported by the IGAD countries are hides and skins. In Ethiopia the export of hides and skins is the second most important source of foreign exchange earnings after coffee. Most of the hides and skins are exported raw or semi-processed thus export values are relatively low while finished leather goods are mainly produced for the domestic market as they do not, or are perceived not to, meet international quality standards (Aklilu, 2002).

[10] The ban was lifted after 15 months but re-imposed in 2000 because of human deaths and animal disease as a result of RVF occurring in southwestern parts of Saudi Arabia and in northwestern Yemen.

Table 8: Live animal trade volume in the IGAD countries 1980-2000, three year averages.

Country	(Birds in 1,000)	1980 Exports	1980 Imports	1980 Net trade	1990 Exports	1990 Imports	1990 Net trade	2000 Exports	2000 Imports	2000 Net trade
Djibouti	Cattle	11,888	3	11,885	64,949	57	64,892	16,667	0	16,667
	Sheep	8,164	0	8,164	77	0	77	0	0	0
	Goats	n/a	0	n/a	n/a	0	n/a	n/a	0	n/a
	Chickens	n/a	0	n/a	n/a	0	n/a	n/a	0	n/a
Eritrea	Cattle	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,000	n/a
	Sheep	n/a	n/a	n/a	n/a	n/a	n/a	11,067	4,000	7,067
	Goats	n/a	n/a	n/a	n/a	n/a	n/a	0	n/a	n/a
	Chickens	n/a	n/a	n/a	n/a	n/a	n/a	n/a	183	n/a
Ethiopia	Cattle	9,440	68	9,371	5,390	0	5,390	720	0	720
	Sheep	21,732	83	21,649	43,231	0	43,231	17,617		17,617
	Goats	1,512	2	1,510	17,028	0	17,028	65		65
	Chickens	1	12	-11	0	56	-56	n/a	12	n/a
Kenya	Cattle	4,073	267	3,806	9,623	2	9,622	19	30	-11
	Sheep	4,989	843	4,146	1,759	214	1,545	0	0	0
	Goats	552	275	277	1,290	3	1,287	317	12	305
	Chickens	121	808	-687	168	166	2	1,824	56	1,768
Somalia	Cattle	93,462	0	93,462	20,000	0	20,000	n/a	n/a	n/a
	Sheep	702,774	n/a	n/a	288,333	n/a	n/a	n/a	n/a	n/a
	Goats	784,426	n/a	n/a	288,333	n/a	n/a	n/a	n/a	n/a
	Chickens	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sudan	Cattle	14,542	2,059	12,483	10,441	733	9,708	3,358	13	3,345
	Sheep	427,104	0	427,104	408,036	0	408,036	630,106	1,452	628,654
	Goats	2,576	0	2,576	334	0	334	7,693	279	7,414
	Chickens	n/a	149	n/a	n/a	933	n/a	n/a	178	n/a
Uganda	Cattle	0	2,000	-2,000	0	650	-650	0	67	-67
	Sheep	0	0	0	0	0	0	0	0	0
	Goats	0	0	0	0	0	0	600	0	600
	Chickens	0	150	-150	0	120	-120	53	548	-495

Source: FAOSTAT 2004

Table 9: Livestock product trade in the IGAD countries 1980-2000, three year averages.

Country		1980			1990			2000		
	Qty in Mt	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
Djibouti	Bovine Meat	0	264	-264	0	118	-117	0	177	-177
	Ovine Meat	n/a	13	n/a	n/a	35	n/a	n/a	7	n/a
	Poultry Meat	0	261	-261	1	256	-255	0	400	-400
	Milk Dry	0	1,765	-1,765	0	1,568	-1,567	70	4,691	-4,622
	Hides and Skins	258	5	253	582	0	582	0	187	-187
Eritrea	Bovine Meat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	87	n/a
	Ovine Meat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Poultry Meat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Milk Dry	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,625	n/a
	Hides and Skins	n/a	n/a	n/a	n/a	n/a	n/a	28	n/a	n/a
Ethiopia	Bovine Meat	1,854	5	1,848	223	223	0	6	18	-11
	Ovine Meat	301	0	301	0	0	0	822	1	821
	Poultry Meat	0	13	-13	2	0	2	2	3	0
	Milk Dry	0	5,785	-5,785	0	6,139	-6,139	0	1,056	-1,056
	Hides and Skins	14,670	1	14,669	6,910	0	6,910	3,506		3,506
Kenya	Bovine Meat	1,659	20	1,639	1,646	2	1,644	102	65	37
	Ovine Meat	34	0	34	43	38	5	18	144	-125
	Poultry Meat	74	0	74	15	0	15	11	5	6
	Milk Dry	1,962	7,742	-5,780	452	326	126	283	2,005	-1,722
	Hides and Skins	11,506	34	11,471	3,840	215	3,625	8,931	229	8,702
Somalia	Bovine Meat	599	79	520	0	0	0	n/a	n/a	n/a
	Ovine Meat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Poultry Meat	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Milk Dry	0	17,375	-17,375	0	1,133	-1,133	n/a	n/a	n/a
	Hides and Skins	3,098	0	3,098	1,270	0	1,270	n/a	n/a	n/a
Sudan	Bovine Meat	30	34	-4	0	13	-13	1,495	197	1,298
	Ovine Meat	12	0	12	0	0	0	6,292	32	6,259
	Poultry Meat	0	0	0	0	0	0	0	31	-31
	Milk Dry	0	4,116	-4,116	0	9,000	-9,000	69	8,352	-8,283
	Hides and Skins	4,583	0	4,583	4,317	0	4,317	3,941	21	3,919
Uganda	Bovine Meat	0	117	-117	0	330	-330	11	12	0
	Ovine Meat	0	0	0	0	0	0	1	2	-1
	Poultry Meat	0	0	0	0	0	0	0	14	-14
	Milk Dry	0	2,830	-2,830	0	1,533	-1,533	11	270	-259
	Hides and Skins	0	0	0	3,947	0	3,947	12,714	59	12,655

Source: FAOSTAT 2004

Animal health

Disease and parasites reduce the productivity of livestock in all agro-ecological zones in the Horn of Africa. The epidemic diseases such as Rift Valley fever, contagious bovine pleuro-pneumonia, rinderpest and Newcastle disease, fowl pox and infectious coryza constitute a region-wide risk and can cause high mortalities and severe economic loss. Movement of livestock across international borders is a characteristic feature in the region and facilitates the spread of epidemic diseases. Control of epidemic diseases is thwarted by the absence of effective vaccines, for instance against Rift Valley fever and contagious bovine pleuro-pneumonia or in the case of poultry by the fact that disease control is not cost effective. The only successful attempt in eradicating a disease region-wide is the example of rinderpest, which has been eliminated from the Horn of Africa with only a residual focus on Somalia.

The most important animal health constraints lo livestock productivity in the Horn of Africa are endemic diseases, mainly vector transmitted, that have a wide geographic distribution and whose severity is strongly influenced by the environment, such as trypanosomosis and parasites, namely ectoparasites, helminths, trypanosomosis, liver fluke and coccidiosis (in poultry). No effective and easily administered vaccines (or chemotherapeutic agents) exist for these diseases. Control of their tick or insect vectors with pesticides is expensive, difficult to achieve, and may be not sustainable due to the development of resistant strains.

Trypanosomosis is arguably the single most important animal disease in the Horn of Africa, as evidenced by the small numbers of ruminants in the tse-tse infested sub-humid and humid zones.

The major factor that holds back sustainable control of livestock diseases in the Horn of Africa is the inability of countries to maintain functional veterinary services. Disease surveillance is limited by a lack of diagnostic capacity while disease control programs are constrained by inadequate vaccine production and supply facilities (Winrock, 1992).

The strong impacts disease outbreaks can have on economies of developing countries can be illustrated by the 1997/1998 outbreaks of RVF in eastern Africa which severely affected the pastoralist economy of the Somali region although the region itself only experienced minimal incidence of the disease. When Saudi Arabia banned imports of all livestock originating from the Horn of Africa, livestock exports through the Somali ports of Berbera and Bossasso which had formerly generated more than 90 percent of all foreign exchange receipts of Somaliland, dropped by more than 75 percent. The region's economy came close to a standstill with foreign exchange for the purchase of vital imports such as grains, sugar, medicines, fuel etc. dwindling. In urban centres, a large proportion of the shops closed and prices of commodities such as grain and sugar skyrocketed while the purchasing power of the population dramatically declined (Otte *et al.*, 2004).

Table 10: Major diseases/pathogens in Eastern Africa, ranked according to their impact on the poor.

Disease/pathogen	Region overall	Pastoral	Mixed	Peri-urban(small scale dairy)
Ruminants				
Ectoparasites	A	A	A	A
Gastro-intestinal helminths	A	A	A	A
Respiratory complexes	A	A	B	B
Rift Valley fever	A	A	C	C
East Coast fever	A	-	D	A
Trypanosomosis	B	A	B	B
Contagious bovine pleuro-pneumonia	B	A	C	D
Liver fluke	B	D	A	B
Poultry				
Infectious coryza	A	B	C	C
Newcastle disease	A	B	A	C
Fowl pox	B	B	D	C
Coccidiosis	B	E	B	C

Adapted from Perry et. al 2002
A: top 10 ranked diseases, B: 11-20, C: 21-30, D: 31-40, E: 41-50

Concluding remarks

Agriculture and livestock remain the dominating components of the economies and societies of the IGAD countries. Especially in rural areas, the wide majority of the people tend to be involved in livestock production in one way or the other. Livestock production is almost exclusively in the hands of smallholders and characterised by low in- and output and hence, low levels of production per animal. Furthermore, livestock production is heavily influenced by climatic conditions on which feed availability and the prevalence of diseases, such as trypanosomosis, depend to a large extent.

Fuelled by population growth, local demand for livestock products will continue to grow in the IGAD region, though increases in per capita consumption will crucially depend on rising per capita incomes. In the absence of viable alternative opportunities, this growth in demand for livestock products is one of the few opportunities for improving the incomes and livelihoods of the region's poor. Whether livestock production in the IGAD region will be able to meet increases in demand will depend on livestock keepers' ability to increase productivity and improved linkages of smallholders to the expanding markets.

Factors that constrain small-holders productivity are of climatic and environmental as well as institutional nature. Large areas of the IGAD region are classified as arid or semi-arid, with low capacity to supply nutrition for humans and animals. In the more favourable sub-humid or humid climatic zones, trypanosomosis is a major constraint to ruminant production, limiting livestock productivity and posing a danger to human health.

Apart from these climatic factors, livestock productivity is also constrained by weak governance and institutions leading to poor animal health provision, insufficient marketing infrastructure as well as corruption and uncontrolled taxation.

Some policy options to improve the performance of the livestock sector that Halderman (2004) suggests in the case of Ethiopia but that could be extended to the whole group of IGAD countries as their livestock sectors face similar constraints are given below.

- Lacking security of land tenure, is a particularly grave problem in pastoralist areas as pastoralists have lost (and continue to lose) critically important dry season grazing areas and water sources to communities of settled agriculturalists (who have moved from the densely populated, often environmentally degraded highland areas), irrigation projects, commercial agriculture and game reserves.

- For some parts of the highlands non-farm development, accompanied by agricultural development, appears to be a productive and sustainable development pathway. In many areas, however, there is limited potential for the development of non-farm activities and cash crops. In highland areas with low agricultural potential and poor market access, an appropriate development approach would be based on improved livestock production through better management of grazing lands and integrated natural resource management.

- The development of effective and efficient livestock marketing systems is essential to improving and sustaining the livelihoods of poor livestock producers in the region, and to promoting environmentally sound natural resource management systems. In addition to the conventional activities of such marketing systems, they will also be necessary for de-stocking activities linked to drought management and disaster preparedness.

- Improving animal health services is necessary for the countries in the region in order to develop more effective livestock marketing and export systems, as demonstrated by the import bans imposed by Saudi Arabia and the Gulf states. Improving access to animal health services is essential to improving the health and productivity of the region's livestock. The poor have limited access to animal health services because (a) they cannot afford the services, (b) live in remote areas where the services were not available, and (c) the governments' ability to provide services is restricted by inadequate funds, infrastructure and skilled manpower, and the large territories that need to be covered. Community-based approaches appear essential if the poor are to have access to animal health care services - especially those living in remote areas.

References

Aklilu, Y., P. Irungu and A. Reda (2002). 'An Audit of the Livestock Marketing Status in Kenya, Ethiopia and Sudan', Community-Based Animal Health and Participatory Epidemiology Unit, Pan African Programme for the Control of Epizootics (PACE), Organization of African Unity/Interafrican Bureau for Animal Resources (AU-IBAR), Nairobi.

Dixon, J., A. Gulliver and D. Gibbon (2001). 'Farming Systems and Poverty', Food and Agricultural Organisation of the United Nations (FAO) and World Bank, Rome and Washington D.C.

FAO (2002). 'World agriculture towards 2015/30', Food and Agriculture Organisation of the United Nations (FAO), Rome.

FAO (2003). 'The State of Food Insecurity in the World 2003', Food and Agriculture Organisation of the United Nations (FAO), Rome.

FAO (2004). 'FAO global livestock distribution atlas, 2004', Food and Agriculture Organisation of the United Nations (FAO), Rome. In preparation.

Halderman, M. (2004). 'The political economy of pro-poor livestock policy-making in Ethiopia', Pro-Poor Livestock Policy Initiative (PPLPI), Food and Agriculture Organisation of the United Nations (FAO), Rome. forthcoming

IAEA (2002). 'Characteristics and Parameters of Family Poultry Production in Africa', Animal Production & Health Section, International Atomic Energy Agency (IAEA), Vienna.

Karanja, A.M. (2003). 'The dairy industry in Kenya: the post-liberalization agenda', Tegemeo Agricultural Monitoring and Policy Analysis Project (TAMPA), Working Paper No. 1, Egerton University/Tegemeo Institute of Agricultural Policy and Development (TEGEMEO), Nairobi, Kenya and Michigan State University, East Lansing, USA.

Neumann, C.G., N.O. Bwiwo, S.P. Murphy, M. Sigman, S. Whaley, L.H. Allen, D. Guthrie, R.E. Weiss and M.W. Demment (2003). 'Animal source foods improve dietary quality, micronutrient status growth and cognitive function in Kenyan school children: background, study design and baseline findings', in: American Society for Nutritional Sciences.

Njue, S.W., J.L. Kasiiti, M.J. Macharia, S.G. Gacheru, H.C.W. Mbugua (2002). 'Health and management improvements of family poultry production in Africa – survey results from Kenya' in: IAEA (2002), 'Characteristics and Parameters of Family Poultry Production in Africa', Animal Production & Health Section, International Atomic Energy Agency (IAEA), Vienna.

Omore A., H.Muriuki, M. Kenyanjui, M. Owango and S. Staal (1999). 'The Kenyan Dairy Sub-sector: A Rapid Appraisal', Smallholder Dairy (Research & Development) Project Report, Kenyan Ministry of Agriculture (MOA)/Kenyan Agricultural Research Institute (KARI)/ International Livestock Research Institute (ILRI), Nairobi.

Otte, M.J. and P. Chilonda (2002). 'Cattle and small ruminant production systems in sub-Saharan Africa – A systematic review', Food and Agriculture Organisation of the United Nations (FAO), Rome.

Otte, M.J., R. Nugent R. and A. McLeod (2004). 'Transboundary animal diseases: assessment of socio-economic impacts and institutional responses', Livestock Policy Discussion Paper No. 9, Livestock Information and Policy Branch, Food and Agriculture Organisation of the United Nations (FAO), Rome.

Perry, B.D., T.F. Randolph, J.J. McDermott, K.R. Sones and P.K. Thornton (2002). 'Investing in Animal Health Research to alleviate Poverty', International Livestock Research Institute (ILRI), Nairobi.

PPLPI (2004a). 'Sudan country report, Pro-Poor Livestock Policy Initiative (PPLPI), Food and Agriculture Organisation of the United Nations (FAO), Rome. (unpublished)

Schwartz, H. J. (1993). 'Pastoral production systems in the dry lowlands of Eastern Africa', in: 'Pastoral production in central Somalia', Gesellschaft für Technische Zusammenarbeit (GTZ), Eschborn.

UBOS (2003). 'Uganda National Household Survey 2002/2003: Report on the socioeconomic survey', Uganda Bureau of Statistics, Kampala.

Whaley, S.E., M. Sigman, C. Neumann, N. Bwibo, D. Guthrie, R.E. Weiss, S. Alber and S.P. Murphy (2003). 'The impact of dietary intervention and the cognitive development of Kenyan school children', in: American Society for Nutritional Sciences.

Winrock International (1992). 'Animal agriculture in sub-Saharan Africa', Winrock International Institute for Agricultural Development, Morrilton Arkansas.

World Bank (2002). World Development Indicators 2002, CD-Rom, World Bank, Washington D.C.

Annex

Table A1: Per capita GDP (in constant 1995 US $) in the IGAD countries.

Country	1980	1990	2000
Djibouti	..	1158	783
Eritrea	..	..	155
Ethiopia	..	100	116
Kenya	337	358	328
Somalia	..	..	..
Sudan	221	192	319
Uganda	..	251	348

Source: World Bank, WDI 2002

Table A2: Population (in millions and shares) in the IGAD countries, and urbanization trends.

Country	Rural (2000)[1]	Urban (2000)[1]	Total	Rural (2015)[1]	Urban (2015)[1]	Total	2000-2015 p.a. growth of rural population[2]	2000-2015 p.a. growth of urban population[2]
Djibouti	0.1 (16.0%)	0.5 (84.0%)	0.6	0.09 (13.1%)	0.6 (86.9%)	0.7	-1.4	2.1
Eritrea	3.0 (81.3%)	0.7 (18.7%)	3.7	4.2 (73.8%)	1.5 (26.2%)	5.7	5.2	11.7
Ethiopia	53.2 (84.5%)	9.8 (15.5%)	62.9	70.0 (78.0%)	19.7 (22.0%)	89.8	4.1	10.6
Kenya	20.4 (66.6%)	10.2 (33.4%)	30.7	21.1 (52.8%)	18.9 (47.2%)	40.0	0.5	9.2
Somalia	6.4 (72.5%)	2.4 (27.5%)	8.8	9.9 (64.1%)	5.5 (35.9%)	15.4	6.6	12.4
Sudan	19.9 (63.9%)	11.2 (36.1%)	31.1	21.8 (51.3%)	20.7 (48.7%)	42.4	1.4	9.1
Uganda	20.0 (85.8%)	3.3 (14.2%)	23.3	30.7 (79.3%)	8.0 (20.7%)	38.7	6.4	13.3
IGAD total	122.9 (76.3%)	38.2 (23.7%)	161.0	157.9 (67.8%)	74.9 (32.2%)	232.8		

Source: [1] FAOSTAT 2003
[2] average logarithmic growth rates

Table A3: Population (historical figures and projections) active in agriculture in the IGAD countries (in 1,000).

Country	Year	Agricultural[11]	Non agricultural
Ethiopia	1980	33,381 (88.9%)	4,161(11.1%)
	1990	43,437 (85.8%)	7,175 (14.2%)
	2000	51,835 (82.4%)	11,073 (17.6%)
	2010	62,140 (77.8%)	17,713 (22.2%)
Kenya	1980	13,463 (82.3%)	2,905 (17.7%)
	1990	18,755 (79.6%)	4,819 (20.4%)
	2000	23,138 (75.4%)	7,531 (25.6%)
	2010	26,082 (70.6%)	10,859 (29.4%)
Somalia	1980	5,081 (78.3%)	1,405 (21.7%)
	1990	5,395 (75.3%)	1,768 (25.7%)
	2000	6,247 (71.2%)	2,531 (28.8%)
	2010	8,670 (66.4%)	4,395 (33.6%)
Sudan	1980	13,945 (72.2%)	5,370 (27.8%)
	1990	17,243 (69.5%)	7,575 (30.5%)
	2000	18,987 (61.1%)	12,108 (38.9%)
	2010	19,981 (51.7%)	18,687(48.3%)
Uganda	1980	10,766 (86.3%)	1,713 (13.7%)
	1990	14,414 (83.6 %)	2,831 (16.4%)
	2000	18,404 (79.0%)	4,896 (21.0%)
	2010	23,924 (73.4 %)	8,664 (26.6%)

Source: FAOSTAT 2003 (FAO 2003).

Table A4: Land area (in percent) by agro-ecological zone (AEZ) in the IGAD countries.

Agro-ecological zone	Arid	Semi-arid	Sub-humid	Humid	Highlands	Total (km^2)
Djibouti	100.0	0.0	0.0	0.0	0.0	22,851
Eritrea	67.3	12.5	0.0	0.0	20.3	123,181
Ethiopia	41.0	10.4	8.0	0.0	40.7	1,127,486
Kenya	72.7	9.5	2.0	0.0	15.7	57,2241
Somalia	99.9	0.1	0.0	0.0	0.0	63,1104
Sudan	60.2	25.4	13.6	0.8	0.0	2,479,490
Uganda	0.9	16.4	49.5	27.3	5.9	204,996
IGAD total	**60.2**	**16.5**	**10.5**	**1.5**	**11.3**	**5,161,350**

[1]Smallholder dairy estimated to be less than 5% in the highlands of Ethiopia, Eritrea and Uganda
Source: PC

[11] The agricultural population is defined as all persons depending for their livelihood on agriculture, hunting, fishing or forestry. This estimate comprises all persons actively engaged in agriculture and their non-working dependants.

Table A5: Djibouti – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Djibouti	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**22,851**	**0**	**0**	**0**	**0**	**22,851**
Human population	**443,345**	**0**	**0**	**0**	**0**	**443,345**
Population density	19	0	0	0	0	19
Cattle	**295,995**	**0**	**0**	**0**	**0**	**295,995**
Cattle density	13	0	0	0	0	13
Sheep	**464,359**	**0**	**0**	**0**	**0**	**464,359**
Sheep density	20	0	0	0	0	20
Goats	**511,449**	**0**	**0**	**0**	**0**	**511,449**
Goat density	22	0	0	0	0	22

Table A6: Eritrea – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Eritrea	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**82,877**	**15,337**	**0**	**0**	**24,968**	**123,181**
Human population	**1,316,153**	**430,063**	**0**	**0**	**2,541,311**	**4,287,527**
Population density	16	28	0	0	102	35
Cattle	**858,450**	**553,765**	**0**	**0**	**829,832**	**2,242,047**
Cattle density	10	36	0	0	33	18
Sheep	**800,675**	**634,312**	**0**	**0**	**766,882**	**2,201,869**
Sheep density	10	41	0	0	31	18
Goats	**584,024**	**322,383**	**0**	**0**	**852,713**	**1,759,120**
Goat density	7	21	0	0	34	14

Table A7: Ethiopia – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Ethiopia	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**462,084**	**117,206**	**89,721**	**0**	**458,475**	**1,127,486**
Human population	**6,561,812**	**5,934,055**	**2,647,565**	**0**	**50,087,212**	**65,230,644**
Population density	14	51	30	0	109	58
Cattle	**2,666,379**	**3,860,177**	**1,886,826**	**0**	**24,421,761**	**32,835,144**
Cattle density	6	33	21	0	53	29
Sheep	**930,778**	**865,800**	**737,773**	**0**	**8,331,313**	**10,865,664**
Sheep density	2	7	8	0	18	10
Goats	**1,320,305**	**1,468,121**	**462,411**	**0**	**5,301,711**	**8,552,549**
Goat density	3	13	5	0	12	8

Table A8: Kenya – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Kenya						
	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**415,988**	**54,647**	**11,544**	**0**	**90,063**	**572,241**
Human population	**4,374,663**	**6,725,084**	**4,004,599**	**0**	**15,746,514**	**30,850,860**
Population density	11	123	347	0	175	54
Cattle	**3,179,276**	**1,778,709**	**1,134,130**	**0**	**5,386,494**	**11,478,609**
Cattle density	8	33	98	0	60	20
Sheep	**3,274,851**	**977,461**	**484,419**	**0**	**3,032,909**	**7,769,640**
Sheep density	8	18	42	0	34	14
Goats	**4,970,820**	**1,829,765**	**476,989**	**0**	**2,463,714**	**9,741,288**
Goat density	12	33	41	0	27	17

Table A9: Somalia – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Somalia						
	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**630,343**	**761**	**0**	**0**	**0**	**631,104**
Human population	**7,429,849**	**13,252**	**0**	**0**	**0**	**7,443,101**
Population density	12	17	0	0	0	12
Cattle	**5,110,035**	**2,389**	**0**	**0**	**0**	**5,112,424**
Cattle density	8	3	0	0	0	8
Sheep	**13,760,377**	**12,599**	**0**	**0**	**0**	**13,772,977**
Sheep density	22	17	0	0	0	22
Goats	**12,258,755**	**9,895**	**0**	**0**	**0**	**12,268,650**
Goat density	19	13	0	0	0	19

Table A10: Sudan – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Sudan						
	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**1,492,345**	**630,721**	**337,498**	**18,926**	**0**	**2,479,490**
Human population	**22,268,910**	**10,710,023**	**3,635,193**	**265,763**	**0**	**36,879,889**
Population density	15	17	11	14	0	15
Cattle	**13,527,282**	**16,955,849**	**6,343,372**	**112,134**	**0**	**36,938,637**
Cattle density	9	27	19	6	0	15
Sheep	**13,743,486**	**22,795,900**	**9,247,169**	**148,794**	**0**	**45,935,349**
Sheep density	9	36	27	8	0	19
Goats	**6,438,705**	**19,157,173**	**9,066,102**	**311,082**	**0**	**34,973,061**
Goat density	4	30	27	16	0	14

Table A11: Uganda – Land area, human and livestock populations and densities by agro-ecological zone (2000).

Uganda	Arid	Semi-arid	Sub-humid	Humid	Highlands	**Total**
Land area (km^2)	**1,880**	**33,540**	**101,534**	**55,917**	**12,125**	**204,996**
Human population	**12,716**	**3,184,953**	**14,847,818**	**4,533,785**	**2,117,301**	**24,696,573**
Population density	7	95	146	81	175	120
Cattle	**5,681**	**1,268,750**	**2,494,441**	**799,013**	**611,348**	**5,179,233**
Cattle density	3	38	25	14	50	25
Sheep	**1,008**	**161,624**	**365,117**	**216,892**	**188,263**	**932,904**
Sheep density	1	5	4	4	16	5
Goats	**1,305**	**871,533**	**2,135,731**	**1,396,411**	**1,051,136**	**5,456,118**
Goat density	1	26	21	25	87	27