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2050



Integrated snapshot

ETHIOPIA

Cattle sector



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2050**

Integrated Snapshot: Ethiopia

Cattle sector

Introduction

Ethiopia's population is anticipated to grow from about 99 million in 2015 to almost 190 million in 2050, with the share of urban population almost doubling to nearly 40% over the same period. GDP per capita is expected to grow from less than USD 700 in 2015 to over USD 5 500 in 2050 (Fig. 1).

A larger, increasingly affluent and urbanized population will demand more and more high-quality foods, including meat, milk and other livestock products. This growing demand will provide incentives for livestock farms and farmers to expand their livestock assets, increase production and productivity, and tap into the growing market for animal source foods.

Changing livestock systems will have far-reaching effects on society: not only will they provide food to the growing population but will also have immense impact on public health, people's livelihoods and the environment. This brief presents a description of current cattle dairy and beef production systems in Ethiopia and evidences of their impact on three societal dimensions, including livelihoods, the environment and public health.

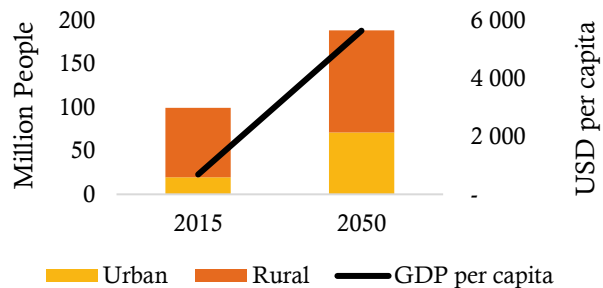


Figure 1. Population and income growth projections for Ethiopia (Source: National Accounts, UN Population Fund)

Cattle production systems in Ethiopia

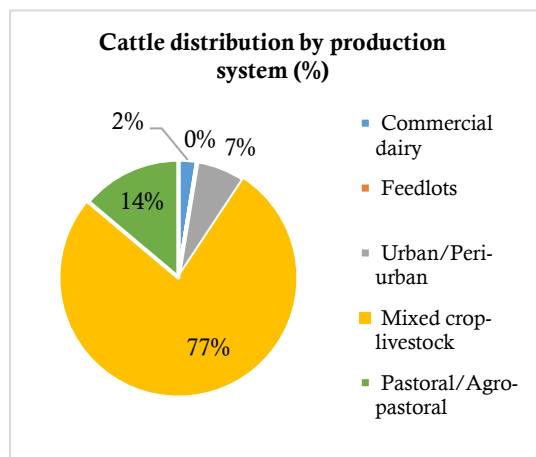


Figure 2. Cattle population distribution by production system (Source: Stakeholder consultation)

Cattle is by far the most important livestock sub-sector in Ethiopia. It contributes about 45 percent to the value added of agriculture (AGDP). Farmers raise cattle, mostly dual-purpose beef and milk animals, in different production systems. Predominant production systems are: the mixed crop-livestock, pastoral/agro-pastoral, urban/peri-urban, commercial dairy and feedlots (Table 1). Figure 2 and 3 present the distribution of animals by production system and by zone, respectively. Over three quarters of all cattle are kept in mixed-crop livestock system and about 14 percent in pastoral and agro-pastoral areas. Cattle are evenly distributed throughout Ethiopia, with higher density in the highlands.

Table 1. Typology of cattle production systems in Ethiopia

Production system	Description
Mixed crop-livestock (dairy and beef)	Subsistence oriented farming concentrated in the mid- and high-altitude agroecological zones where cereals and cash crops are the dominant farm activities. Cattle are primarily kept to supply draft power, however milk is an integral part of production. Old oxen that retire from ploughing are commonly sold to fatteners or conditioned and finished on-farm. This production system comprises 77 percent of the total cattle population. The average herd size is around 4 heads, typically indigenous breeds. Feed types include natural

	pasture, crop residues and weeds and crop thinning. Milk yield per cow is below 2 litres per day, and carcass weight is roughly 110 kilograms per slaughtered animal on average.
Pastoral/Agro-pastoral (dairy and beef)	Rangeland based livestock production system that relies on natural or semi-natural vegetation. The main product is milk and the main function of livestock is subsistence, although social and cultural functions are also important. Excess young males are sold to highlanders, where they are used as draught oxen, or to feedlot operators. This production system comprises 14 percent of the total cattle population. The average herd size is around 10-20 heads but herds over 200 heads are common too, largely comprising indigenous breeds. Feeding is on communal pastures; crop residues are used to a limited extent in agro-pastoral areas. Milk yield per cow is around 1.5 litres per day. Households usually do not slaughter animals for home consumption but sell them to traders, who take them to feedlots, exporters or highland farmers.
Urban/Peri-urban (dairy and beef)	Urban/Peri-urban dairy is an expanding production system mostly found in the highlands. It is largely concentrated in the Addis Ababa milk shed area as well as around the regional capital cities where there is an adequate market for fresh milk. Smallholder farmers and landless households around urban areas also fatten a few animals at a time. Oxen are mainly fattened when they can no longer provide farm services (e.g. ploughing) and have to be replaced with younger ones. This production system comprises 7 percent of the total cattle population. The average herd size is around 5-10 heads. Indigenous Zebu, high-grade and cross-bred animals are kept. Feed is based on crop residues, some industrial by-products and supplements. Milk yield per cow is around 10-15 litres per day, and the average carcass weight is around 110 kilograms.
Dairy commercial	Specialized commercial dairy farms involving higher levels of investment are concentrated in the central highland plateau. These are either small-, medium or large-scale farms. Being licensed farms with operational business plans, they are market oriented and specifically target urban consumers. The animals do not provide draft power though their manure is used as fertilizer. This production system comprises only 2 percent of the total cattle population. The average herd size varies between less than 30 (small-scale) and above 100 (large-scale) heads, mainly consisting of exotic and high grade animals. Feed is based on hay, concentrated dairy mix and industrial by-products. Milk yield per cow is around 15-20 litres per day.
Commercial feedlots	There are more than 300 feedlots operating in Ethiopia, predominantly in East Shoa (Oromia). Animals are entirely confined in a yard with watering and feeding facilities for a finishing duration of 3-6 months. This production system comprises a minor share (<1 percent) of the cattle population. The average number of animals kept per batch varies between 100 and 1500 heads, mainly consisting of Borana breed. Feed is based on agro-industrial by-products. Carcass weight is around 110 kilograms, with a dressing percentage of 45-48 percent.

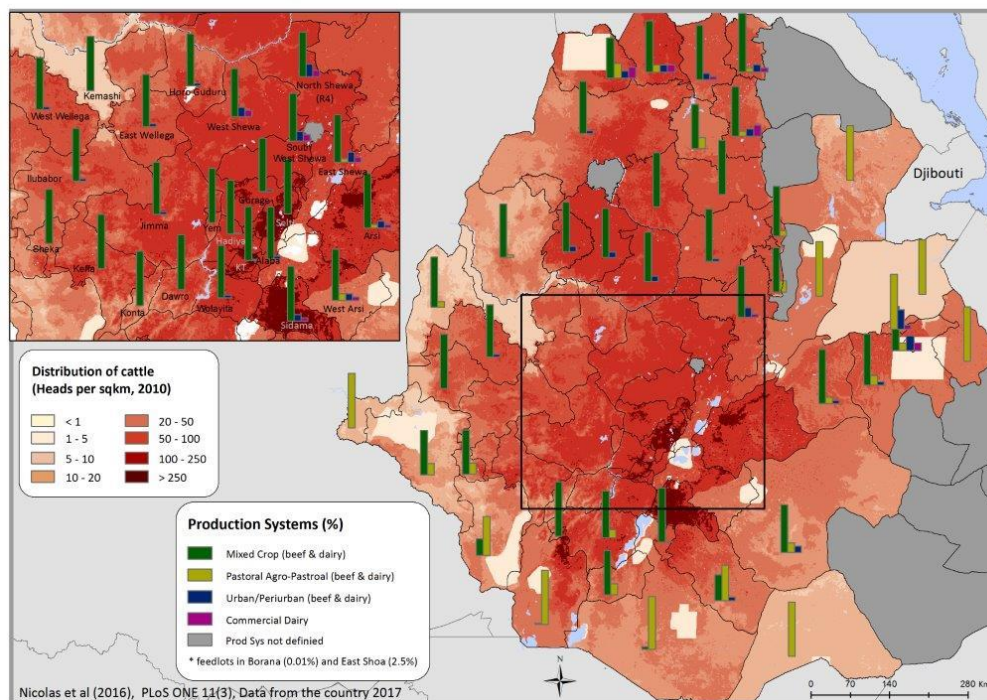


Figure 3. Map of cattle production systems in Ethiopia, (Source: GLW and stakeholder consultation)

Livelihoods

More than 12 million households, including 70 percent of the population in Ethiopia keep cattle as source of income, food, draft power, insurance and savings, social capital and other goods and services. In addition, a multitude of people are employed along the livestock value chain, such as abattoir workers, traders, veterinarians, breeders, wholesalers and retailers.

Table 2. Number of households (HHs), average total income and income from cattle, dung and draft power use in Ethiopia (Source: CSA, FAO RuLIS)

Production system	Number of cattle keeping households	Average annual household income (Birr)	Share of income from cattle related activities (%)	Use of cattle dung (% HHs)	Use of cattle for draft power (% HHs)
Mixed crop-livestock	10 583 073	14 512	31	87	69
Pastoral/Agro-pastoral	948 544	23 497	48	41	50
Urban/Peri-urban	612 644	26 968	43	77	42
Dairy commercial	425 733	32 080	48	95	80
TOTAL	12 569 994	16 392	33	84	66

Source: Ethiopia Socio-Economic Survey 2015/16¹

Table 2 presents statistics on livestock-keeping households, including their number and the benefits they derive from their animals, including income, dung and draft power. The vast majority of households depending on cattle are in mixed-crop livestock systems, with cattle contributing over 30 percent to total household income. In the pastoral/agro-pastoral system, nearly 50 percent of household income comes from cattle production. Total income and livestock-generated income, however, are higher in the intensive systems, in which investments in input and market access are non-marginal. A large share of households (41 to 95 percent) use cattle dung and draft power, thereby further supporting livelihoods.

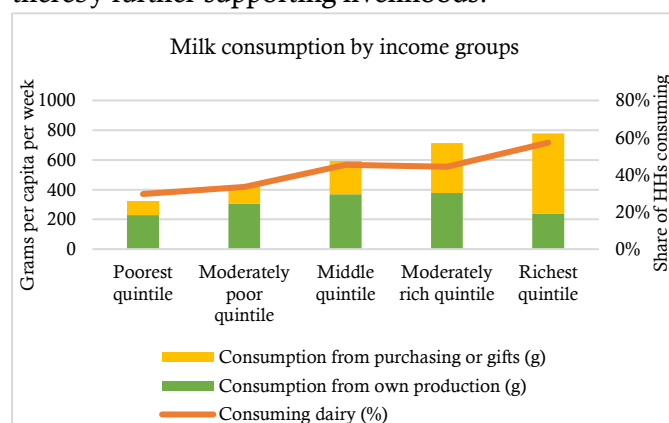


Figure 4. Milk consumption per week per capita by income group (Source: Ethiopia Socioeconomic Survey 2015/16)

Cattle also provide meat and milk to the population. Figure 4 shows that on average 42 percent of the Ethiopian population consume dairy products on a regular basis, with huge difference among the wealth categories (only about 30 percent among the poorest to about 57 percent among the better-off). On average, per-capita milk consumption is 576 grams per week, with consumption increasing with income level and the share of milk consumed from own-production decreasing as income rises.

¹ The Ethiopia Socio-Economic Survey does not allow to generate accurate statistics for feedlots and dairy commercial households (ASL 2050, 2017)

Cattle and Livelihoods: Emerging challenges as Ethiopia grows and develops

- Most households will become net buyers of animal source foods, particularly of semi-processed and processed livestock products.
- The most efficient farmers are expected to expand their livestock operations, increasingly sell livestock products to the market, and improve their livelihoods.
- Keeping livestock will become unprofitable and irrational for a large share of farmers— as cheap proteins become available on the market. They will exit the livestock sector and look for alternative sources of employment.
- The livestock sector will intensify and become more concentrated and livestock value chains will involve many more stakeholders.
- Jobs will be created along the livestock value chains, providing some, but not necessarily many opportunities for employment

Cattle systems and the environment

Cattle production systems impact on the natural environment: they depend on land and water availability, and at the same time emit polluting materials.

The cattle sector in Ethiopia is a major user of land and water, though a big part of these would hardly be used for other purposes. Figure 5 presents the water footprints per production system. The green water footprint represents rainwater and accounts for most of the consumption. Grazing in this case refers to the rangeland-based pastoral/agro-pastoral systems while industrial means intensive systems. Blue and grey water measure withdrawal from ground and surface water, and water pollution respectively. Intensive systems are more efficient in terms of water use, though they are the only ones that also pollute (grey water). Though the rangeland-based grazing has the highest green water footprint, the opportunity cost of the used water is much lower as it hardly can be used for other purposes.

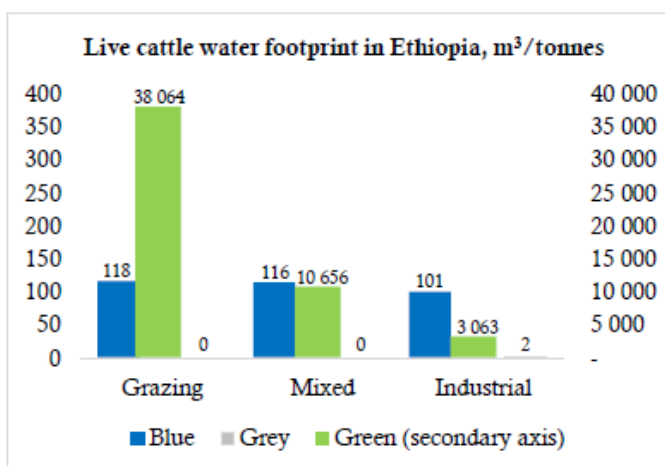


Figure 5. Live cattle water footprint (green, blue and grey), m³ per tonnes
(Source: Mekonnen and Hoekstra, 2010)

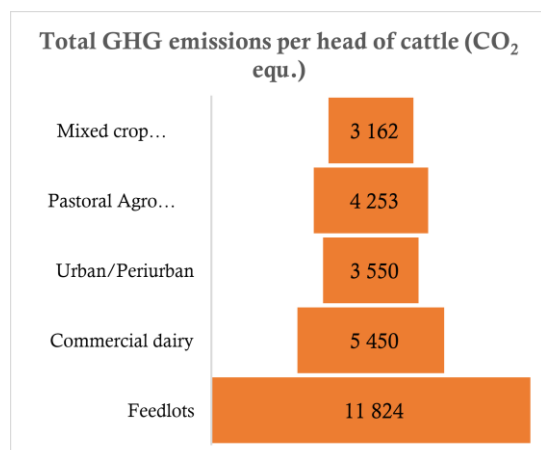


Figure 6. Total GHG emissions per head in CO₂ equivalent
(Source: GLEAM)

Cattle also contribute to greenhouse gas emissions. Emissions in extensive systems (mixed crop-livestock and pastoral/agro-pastoral) are lower on a per animal basis (Fig. 6) but higher per unit of outputs produced. Conversely, the per head emission level is higher in the intensive systems but lower per unit of product.

Extensive and intensive livestock production systems also affect biodiversity differently, both positively and negatively. For example, extensive systems are part of biodiversity but overgrazing can cause severe land degradation and hence reduce natural habitats. In the intensive systems, only few (in some cases single) animal breeds are kept and depend on intensively managed feed crops, which are often blamed for ecosystem degradation. However, intensive land use may protect non-agricultural biodiversity by reducing pressure to expand crop and pasture areas.

Cattle and the environment: future challenges as Ethiopia grows and develops

- The livestock sector will intensify and become more concentrated.
- Demand for cattle production inputs, such as feed and water, will increase.
- Livestock will increasingly compete with other sectors for the use of land and water.
- Greenhouse gas emissions per unit of beef and milk will reduce.
- Soil and water pollution from livestock will be more concentrated, making waste management a growing challenge.

Animal and human health: the impact of zoonoses

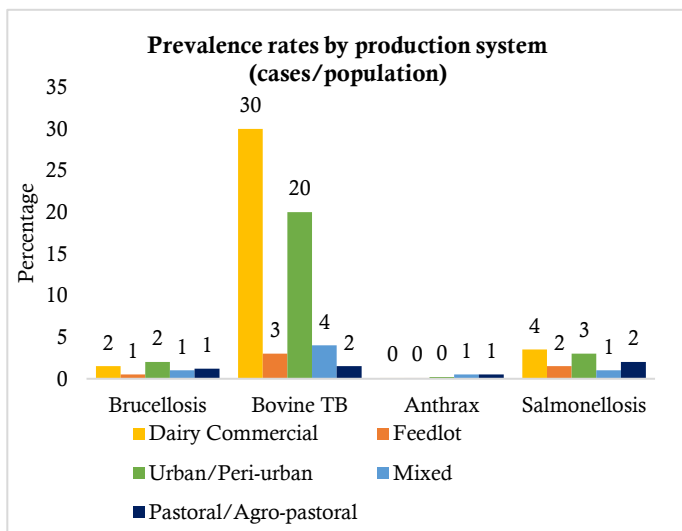


Figure 7. Prevalence rates by cattle production systems for selected zoonoses (Source: ASL 2050 Expert Elicitation)

Cattle production systems can also have negative impacts on public health, particularly through zoonotic diseases that jump the animal-human species barrier. Figure 7 presents prevalence rates in the different cattle production systems, estimated through an expert elicitation survey, for four main zoonotic diseases: brucellosis, bovine tuberculosis, anthrax and salmonellosis. There is large variation across diseases and no strong pattern across production systems. The only exception is bovine tuberculosis, whose prevalence rate is particularly high in commercial dairy and urban/peri-urban systems (30 and 20 percent, respectively).

Figure 8 shows the case fatality rates, i.e. the number of deaths over total cases (fatality rate in anthrax is 100 percent and not reported). Case fatality is higher in extensive than in other cattle production systems, suggesting improved animal management along the intensification gradient. This is expected because of the higher value of animals in intensive system: on a per head basis diseases generate higher economic losses, as measured by reduced production, foregone production, and animal deaths in intensive than extensive systems (Table 3). At the same time, as

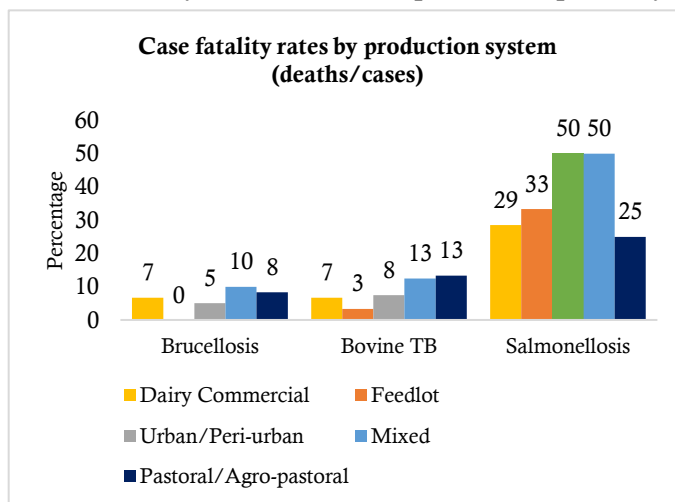


Figure 8. Case fatality rates by cattle production systems for selected zoonoses (Source: ASL 2050 Expert Elicitation)

disease management is less effective in extensive systems, livestock keepers in these systems are more likely to be affected by zoonotic diseases. The cost of morbidity and mortality in humans, as proxied by the willingness to pay for one year of healthy life, is in fact higher in extensive than intensive systems (Table 4).

Table 3. Value of production and animal losses in cattle, USD PPP per case (Source: ASL 2050 Expert Elicitation Survey)

Production and animal losses, USD PPP per case in cattle	Dairy Commercial	Feedlot	Urban/ Peri-urban	Mixed crop-livestock	Pastoral/ Agro-pastoral
Brucellosis	3 228	1 899	1 516	385	265
Bovine TB	2 835	875	1 974	397	537
Anthrax	5 697	3 798	3 750	630	630
Salmonellosis	2 061	2 078	2 122	525	364

Table 4. Value of social cost due to transmission of disease in livestock keepers, USD PPP per case in cattle (Source: ASL 2050 Expert Elicitation Survey)

Social cost in livestock keepers, USD PPP per case in cattle	Dairy Commercial	Feedlot ²	Urban/ Peri-urban	Mixed crop-livestock	Pastoral/ Agro-pastoral
Brucellosis	195	-	77	265	269
Bovine TB	5	-	4	33	107
Anthrax	1 659	-	1 000	1 561	1 119
Salmonellosis	83	-	76	262	216

Animal and human health: Emerging challenges as Ethiopia grows and develops

- *The livestock sector will intensify and become more concentrated.*
- *Livestock systems will continue being affected by zoonotic diseases*
- *Any outbreak of zoonotic diseases is likely to have large negative impact on public health, livestock production, and productivity.*
- *Zoonotic diseases prevention and control plans will hugely cost the public.*
- *There will be risk of misuse of antibiotics, leading to antimicrobial resistance.*

Conclusions

The Ethiopian cattle sector widely affects society. It contributes to livelihoods, provides food and nutrition, is a major consumer of natural resources, and causes public health threats through emerging and re-emerging zoonotic diseases.

The cattle sector is anticipated to undergo rapid growth and transformation in the coming decades, because of the implementation of the Livestock Sector Master Plan and, more fundamentally, because of the anticipated population and economic growth, which will provide major incentives for increased production and productivity in the livestock sector.

Available evidence suggests that the impending changes in livestock production systems provide both opportunities and challenges to society. For example, intensification can result in higher

² The number of livestock keepers in feedlots could not be determined, but can be assumed negligible (the overall cattle population in this system is around 30 000 animals, out of the total 56 million).

incomes for farmers, increased availability of animal source foods, lower emission per unit of produce and more efficient response to emerging diseases. However, these changes come coupled with many challenges: the benefit of productivity and income increase will reach relatively only fewer farmers, consequently many will be forced to exit the livestock sector and will look for other employment opportunities – increasing the rural-urban migration and associated social crisis. Emissions per animal will be lower but will be more concentrated; waste management will become increasingly a challenge; and inappropriate use of antibiotics could lead to emergence of antimicrobial resistant pathogens. Novel human-animal-ecosystem dynamics will likely create new public health threats. Some, such as emerging zoonotic diseases, may have pandemic potential, add to existing food safety hazards and proliferation of antimicrobial resistant pathogens. However, the longer-term future of Ethiopian livestock, and of the cattle sector in particular, is still in the making and can be shaped by informed decisions taken today. To this end, the Ministry of Agriculture and Livestock, Ministry of Health and the Ministry of Environment, Forest and Climate Change not only are currently implementing policies to address current pressures and constraints, but have also joined forces with the Africa Sustainable Livestock 2050 Project to articulate alternative long-term (2050) livestock scenarios for Ethiopia and formulate policies that support transformational pathways, which are sustainable from an environmental and livelihoods perspective and safeguard the health of humans and animals.



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