

Full Length Research

Review on Beef Productivity of Local Cattle: In Ethiopia

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Accepted 15 June 2020

Beef cattle are one of a few agricultural commodities in Ethiopia from which the country earn foreign currency through both live and processed forms of the commodity export and also most of rural poor are engaged in rearing it to fulfill their daily needs and economic gaps. The main objective of this paper is to review beef productivity of local cattle. Livestock production system in Ethiopia categorized as agro pastoral (in low land) and mixed crop (in high land). Traditionally fattening of animal under take in both rural and urban small holder farmer, cattle fattening is an important source of income. Local breed average carcass weight ranges from 95.3 to 200 kg for Sanga and Boran bull respectively. Ethiopian per capital meat consumption is extremely low in African standards (5.3 kg/person in year). Beef marketing in Ethiopia is limited for cattle due to lack of abattoir facilities and challenges faces in feed quality and scarcity, knowledge and experts and output side organizational market links are weak over all infrastructure and policy are faced. However, opportunities include growing population, urbanization; economic growth and government recognize the important of livestock in poverty alleviation.

Key words: beef productivity, local cattle, Ethiopia, meat consumption

Cite this article as: Melkam A., Mohammed A (2020). Review on Beef Productivity of Local Cattle: In Ethiopia. Acad. Res. J. Agri. Sci. Res. 8(6): 655-661

INTRODUCTION

Livestock still play great role to rural incomes, nutrition and food security, and resilience in smallholder mixed crop/livestock and pastoral systems in developing world. For instance, in most African countries 60%- 80% of rural households keep livestock as mobile and liquid assets, income generators, and for household food security and nutrition (Alexandratos and Bruinsma, 2012).

Importance of cattle breeds is arising in most African countries by increasing local and international demand associated with increasing population pressure, land scarcity, diminishing production resources, poverty and hunger (Bett et al., 2009).

Ethiopia has a total 59.5 million heads of cattle among which 44.5% are male cattle (CSA, 2017), which represents the largest cattle population in Africa (Negassa et al., 2011) and 6th in the world. Cattle fulfill

several functions in the Ethiopian economy among which direct food as beef, traction power, cash income, hides, fuel and organic fertilizer. According to Teshager et.al. (2013), beef production in Ethiopia in agro-pastoral and pastoral production systems, and/or in both rural and urban areas is emerging as an important source of income as well.

Cattle production in Ethiopia contributes about 80% of livestock part in GDP of the country (Tefera, 2011). The Ethiopian indigenous cattle breed so far identified are 25 namely: Arsi, Begait, Ogaden, Borena, Goffa, Arado, Nuer, Gurage, Jidu, Karayu/ Afar, Harar, Horro, Smada, Fogera, Mursi, Raya-Azebo, Adwa, Jem-Jem, Sheko, Ambo, Jijiga, Bale, Hammer, Medense and Abergelle (IBC, 2004). The annual contribution of ruminants to meat production in Ethiopia is estimated at over 3.2 million tones, representing over 72% of the total meat production. Cattle meat accounts for over 70% of the total

red meat production and over 50% of the total meat output in Sub-Saharan Africa. In 2016/17, about 0.5 million cattle population had been slaughtered in Ethiopia among which 0.27 million were males (CSA, 2017).

Cattle in Ethiopia produced about 0.331 million tons of meat annually (CSA, 2008). Average carcass weight of cattle was 108 kg/head (Negassa et al., 2011), while Ethiopians consume about 8 kg of meat per capita annually which is far less than what is consumed in developing countries (Betru and Kawashima, 2009). There is no specialized production system specifically for beef production in Ethiopia. Beef is a by-product in the pastoral and mixed crop-livestock production system as cattle are primarily kept for milk and traction purposes, respectively. Cattle are usually sold when they are culled from dairy purpose, too old for draft purpose and usually in a poor body condition. Pastoral, agro-pastoral and mixed crop-livestock production systems accounted for more than 99% of cattle production system practiced in the country (Negassa et al., 2011).

Very little research has been done concerning meat production in Ethiopia (Avery, 2004), and in particular, on carcass quality of beef cattle (Negassa and Jabbar, 2008). Even though Ethiopia has developed a beef carcass classification system in 2012 (ES, 2012), the system was not used to characterize the carcass quality to date. Characterizing carcass traits of cattle is important to develop an appropriate improvement strategy of the sector. Moreover, the tendency to pay beef producers based on carcasses quality and weight is increasing. Carcass quality is mainly determined by age, sex, conformation and fat cover (Lazzaroni and Biagini, 2009). Different proportion of categories of cattle, conformation grade and fat grade were reported for different abattoirs in different countries (Lazzaroni and Biagini, 2009). The aim of this review paper is therefore to summarize the beef productivity of local cattle in Ethiopia.

Beef cattle production system in Ethiopia

Based on integration of livestock with crop production, level of input and intensity of production, agro-ecology and market orientation, livestock production systems in Ethiopia is categorized as pastoral, agro-pastoral, mixed crop-livestock farming, urban and peri-urban farming and specialized intensive farming systems (Yitay, 2007). However, the livestock production systems are predominantly categorized as agro-pastoral system in the lowlands, and the mixed crop-livestock system in the highlands. Traditionally, fattening of animals in both systems concentrates on male animals and on females which are either infertile or have finished their reproductive cycle. In the lowland agro-pastoral system, grazing is the most common source of feed, with limited use of crop residues, whereas in the highland system, crop residues are the most important source of animal

feed. During the wet season, when crop residues are scarce in the highlands, male animals are taken to the lowland areas for grazing (Elias et al., 2007).

Approximately 10 million lowland pastoralists in Ethiopia cover nomadic communities as well as sedentary agro-pastoralists. Each agro-pastoralist owns between 10-15 cattle. Average distance to market in the lowland system is about 90 kilometers (IBID). The key interaction between the lowland and highland systems is the exchange of male calves, which are primarily used for draught purposes for six to eight years after which they are sold into the meat supply chain; almost entirely destined for domestic markets (Solomon et al., 2010). The highland Crop-Livestock system, with a total rural population of over 55 million, accounts for 60-70% of the cattle or about 34 million heads of cattle in herds averaging of two to five (LMD Research, 2013). Average distance to market in the highland system is about 30 kilometers (IBID). Cattle are used primarily for draught power, with oxen making up 40-50 percent of the herd, while dairy/milking cows constitute approximately 25% of the herd.

Beef Cattle Fattening and beef productivity in Ethiopia

In both rural and urban areas, smallholder cattle fattening is emerging as an important source of income. In rural Ethiopia, cattle fattening is based on locally available feed resources (Takele et.al, 2009). According to (MOA, 1997b) cattle fattening practices in Ethiopia is categorized in to three major fattening systems are traditional system, by product-based system and Hararghe fattening system. In traditional system, farmers usually sell oxen after the plowing season when they are in poor condition and too old for the draught purposes. By-product fattening system is mainly based on agro-industrial by-product such as molasses, cereal milling by-product and oilseed meals. Intensive feeding of available feed supply to young oxen used for draught power could best describe the Hararghe fattening practice.

According to Sintayehu et.al (2013) only a small fraction of Ethiopian beef is raised in feedlots-smallholders throughout the country fatten the vast majority of cattle in backyard systems. The widely held perception is that feedlot fattened cattle generally produce softer meat, with white fat and a good proportion of red meat. This meat is preferred for steaks or Ethiopian tibbs (beef cut in strips and fried). Backyard fattened meat is reported to be tougher, with yellow fat, more fat (but less marbling) and less red meat. This is preferred for consumption as raw meat for the local stew called we'et. The backyard fattening is cheaper than feedlot operation, but cannot supply large and consistent volumes to a commercial abattoir or traders.

Table 1. Literature of average carcass and body weight of some local breeds

Abattoirs	Breed	Mean carcass weight (kg)	Live weight (kg)	References
Adama	--	161.26		Yyesihak y. and Endward C., 2014
	Boran	98.2-135.2		Mekasha <i>et al</i> , 2011
	Ogaden	182-163		Taye and Sunkwa 2010
	Sanga	95.3		Lemma <i>et al</i> , 2007
	Boran bull	179.2		Mohamed B. and Hailu D., 216
		200	268	DAGRIS, 2006
Hawassa		142.46		Yyesihak y. and Endward C., 2014
Kombolcha		95.63		Yyesihak y. and Endward C., 2014
Mekelle		136.15		Yyesihak y. and Endward C., 2014
		137.74	323.59	Hassen <i>et al</i> , 2017
Abergelle	Begait	139.94	324.04	Terefe <i>et al</i> , 2011
	Abergelle	137.29	320.36	
	Arado	135.73	319.35	
	Raya	138.47	327.32	

Meat Consumption in Ethiopia

The per capita consumption of livestock products, especially meat, is extremely low in Ethiopia, even by African standards. The national average of annual meat consumption stands at just 5.3 kg per person, of which 3.1 kg is beef, 1.4 kg mutton & goat meat, and 0.7 kg chicken. This very low meat consumption is mainly driven by low rural consumption. In urban areas, the average annual meat consumption stands at 11.5 kg per person, while the corresponding number for rural areas is 4.0 kg per person. Consumption of eggs also follows the same trend: urban areas have a higher consumption than rural areas.

Dairy products form the largest consumption group among the livestock products. In 2004/05, the national average of annual consumption per person was 16.7 kg. There is a substantive difference between urban and rural areas, however. Unlike meat consumption, the annual per capita consumption of dairy products in rural areas is more than twice that of urban areas. At 18.4 kg, the rural annual consumption of dairy products overwhelms the meat consumption, which is only 4.0 kg. The picture is different in urban areas: per capita annual dairy product consumption is 8.5 kg and is less than the average meat consumption of 11.5 kg.

The reason for this marked difference between rural and urban areas could be food availability and individuals' ability to buy food. These factors differ in urban and rural areas (Regmi and Dyck, 2001). The Ethiopian rural economy is mainly based on subsistence agriculture, so the composition of food in rural areas is likely to be influenced by residents' market access (for selling their own produce and buying other foods). On average, 76 percent of rural households get their food from their own production, whereas the number for urban households is just 7 percent. Moreover, the poor marketing infrastructure for perishable products, such as the lack of cold chains which, to an extent, could be associated with the low level of urbanization in Ethiopia limits the extent to which rural households can sell their produce. It is also likely that rural households are discouraged from meat consumption as much by the nature of the product it is produced in bulk and is largely indivisible as by the lack of retail markets for such products in rural areas. Bopape and Myers (2007) have reported consistent results for South Africa. They found that high-income groups have higher expenditure shares for meat, fish, and dairy products, whereas low-income groups have a higher expenditure share for grains. There is also evidence from cross-country studies that food demands change with income growth, with people showing a greater preference for fruit, meat, dairy products, and other 'high value' food (Drewnowski and Popkin 1997; Cranfield *et al.*, 1998; Guo *et al.* 2000).

Table 2. Quantity of meat consumption (kg/capita/year) across living standards

Living standards	Beef	Mutton & goat Meat	Chicken	Other meat (camel, pork, Crocodile...)	Fish & fish products	Dairy products	Eggs	Honey	Total meat *
National	3.1	1.4	0.7	0.1	0.1	16.7	0.2	0.1	4.6
Urban	6.8	3.1	1.6	0.1	0.0	8.5	0.5	0.1	9.9
Rural	2.4	1.1	0.5	0.1	0.1	18.4	0.1	0.1	3.5

Source: Authors calculation using HICES, 2004/05

Note: * Total meat = Beef + Mutton & goat meat

Beef marketing in Ethiopia

All of the existing abattoirs have facilities for sheep and goats, but facilities for cattle are limited in all of the abattoirs and none of the export abattoirs are currently exporting beef. These abattoirs get their animals supplied by traders or through their agents. When the demand is high and the supplies are limited from their usual sources, some of them buy animals from big traders at their factory gate. Upon arrival animals undergo physical examination and are rested for two to three days in a holding area where they receive feed and water. Before slaughtering, they are held in lairage for 12 to 24 hours with access to water but not feed. During their stay in the lairage, animals undergo ante mortem or pre-slaughter examination. Animals that pass the examination are slaughtered using the Halal procedure. Afterward the carcass is chilled at -2 to 2 degrees Celsius for 24 hours. In most cases slaughtering is done when abattoirs receive orders from their customers. The only processing that local abattoirs do is put the carcass in stock net for shipping. Depending on demand and availability of freight, carcasses are loaded onto trucks fitted with coolers and transported to the airport. All of the export abattoirs have their own trucks which they use for transporting. Upon arrival at the airport, the chilled carcasses are transferred to cold stores and held there until loaded onto the airplane shortly before the flight time.

The export abattoirs all have networks in destination markets through which they sell their product. Mojo Modern even has a retail outlet in each of Riyadh and Dubai from which they sell meat directly to consumers as well as being an outlet for their wholesale business in Saudi Arabia and the UAE, respectively. Abattoirs in Ethiopia sell both meat and meat by-products. Contrary to the approach taken by abattoirs elsewhere, the abattoirs in Ethiopia try to sell as much of the by-product as they can because it is by selling the by-product of the animals – hides, skins, blood, intestines, organs, etc – that they make enough money to break even. Consistently selling the meat into the market is the road to profitability for the abattoirs in Ethiopia.

In Ethiopia, some of the by-products are being exported; however, there is an active domestic market for by-products as well. These include rumen gastro intestinal tract (GIT), liver, kidney and lung. Of these products the lung is usually sold as a pet food (dog) and other products are used in some dishes preferred by consumers in the market. Some export abattoirs have recently started exporting by-products like kidneys, brain and intestines. There seems to be a prospect for expanding the export of by-products as new markets for these products are appearing. Two by-product processing plants, which are located in Dukem (Turkish company) and Debre Zeit (Chinese Company), process intestines and other GIT products and export to various countries including Vietnam, China, Turkey and the Gulf states. It is notable that the costs of by-products have increased to 10 ETB per kg, up from just 2 ETB/kg only two years ago.

Table 3: Export of Meat from Ethiopia

Measurement	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Volume(metric tons)	5,850	6,487	7468	10,183	16,877	17,666
Revenue (millions USD)	15.4	20.9	26.6	34	63.2	78.7

Source: LMD Research, 2013

Challenges and Opportunities to Ethiopian Beef Cattle Production

Challenges

There are a number of challenges that need to be overcome in order to enhance the market success of smallholder production. On the input side, technical inputs such as feeds are scarce, relatively expensive and of poor quality, and the knowledge and expertise needed is not readily accessible. On the output side, organizational farm-to-market links are weak as are the overall infrastructure investment, enabling the policy and regulatory environment to support smallholder market access (McDermott *et al.*, 2010). The primary challenge for Ethiopia's cattle chain is a shortage of animal feed, resulting from drought and land use change. Limited supply has resulted in high feed prices, which in turn has led to high domestic prices and reduced competitiveness on international export markets (Carina, 2013). According to Takele *et al.* (2009) feed scarcity and quality deterioration of the feed during dry season are the main challenges facing smallholder cattle feeders. Additionally, high feed costs have reduced incentives for feeding regimes, resulting in "non-uniform" lines of animals being marketed.

Although there is some profitability among traders and retailers, it also noted that producer profitability was hampered by late payments. Feedlots reported profitable fattening operations, but the report pointed out that margins were low. "Low margins are, in theory, compensated for by high throughput, but many Ethiopian feedlots are poor users of available capacity and produce small numbers of animals," it said. Live cattle exports were further hampered by administrative and structural factors, including the lack of an internationally-recognized quarantine station, minimum weight and price regulations at the border, the inability to source a uniform line of high-quality stock, lack of access to working capital, and the necessity of late payments, the report concluded (Carina, 2013).

Opportunities

Growing populations, urbanization and economic growth in developing countries are contributing to growing demand for livestock and livestock products (Hall *et al.*, 2004). The government recognizes the importance of livestock in poverty alleviation and it has increased its emphasis on modernizing and commercializing the livestock sub-sector in recent years (SPS-LMM, 2009). Estimates of the numbers of cattle and other livestock species in Ethiopia vary substantially. Table 3 presents regionally disaggregated Central Statistical Agency (CSA) estimates of the livestock population, which shows a cattle population of around 50 million. Similar sets of numbers have recently been assembled by ILRI specialists, for a total of 47.5 million (Fadiga and Amare, 2010), but other sources put the numbers higher or lower.

Table 4: Livestock Populations and Regional Distribution through year

Year	Tigray	Amhara	Benshangul Gumuz	Dire Dawa	Harari	Oromia	SNNPR
2003/04	1.06	1.05	0.98	4.05	0.92	0.60	0.68
2004/05	1.04	1.08	1.01	4.09	0.96	0.68	0.70
2005/06	1.23	1.23	1.09	4.64	1.00	0.74	0.68
2006/07	1.27	1.28	1.33	4.77	1.03	0.77	0.78
2007/08	1.41	1.27	1.26	4.30	1.13	0.80	0.69
2008/09	1.45	1.18	0.99	3.38	0.92	0.74	0.70
2009/10	1.16	1.06	1.01	4.87	1.02	0.75	0.85
2010/11	1.19	1.04	1.10	5.72	0.97	0.71	0.69
2012/13	1.12	1.01	0.90	5.22	1.09	0.73	0.72

Source: (CSA 2012/13)

CONCLUSIONS AND POLICY IMPLICATIONS

Ethiopia is known to have one of the largest livestock populations in the world. Yet the overall contribution to Ethiopian households' daily consumption is very limited.

Cattle play a significant economic role in rural Ethiopia, including the generation of income for traders, service providers and butchers, and exporters. The perceived

level of economic activity in the livestock sector varies substantially from year to year due to external factors (climate and disease, changing regulation and policy environment, as well as associated with disease).

Potential areas of livestock production should be well identified and scaled up further,

Trainings on beef cattle production, products handling, marketing, transportation, etc should be provided,

Beef cattle products processing and preservation industries should be scaled up in both technical aspects and human resource use and management via trainings accordingly.

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