

Dairy Farming and its Economic Importance in Ethiopia: A Review

Tadesse Mihret, Fentahun Mitku and Tadesse Guadu

University of Gondar Faculty of Veterinary Medicine P.O. Box: 196, Gondar, Ethiopia

Abstract: Ethiopia has a large livestock population, a relatively favorable climate for improved, high yielding dairy cattle breeds and regions with less animal disease-stress that make the country to have a substantial potential for dairy development. Taking this in to account, this paper is prepared with the objectives of over viewing the Ethiopian dairy sector and its contribution for the economy of the country. Considering the huge potential of the country, investing in development interventions to the dairy sector will contribute to poverty alleviation by increasing the income of smallholder dairy producers and creating employment and transforming the existing largely subsistent type of milk production to commercial level. In 2010, dairying created an estimated 588, 000 full-time on-farm jobs. Smallholder farmers represent about 85% of the population and are responsible for 98% of the milk production. Productivity however is relatively low, quality feeds are difficult to obtain and support services are inadequate. The milk marketing system is not well developed giving the majority of smallholder milk producers, limited access to the market. Review of the dairy sector in Ethiopia indicates that there is a need to focus interventions more coherently. Development interventions should be aimed at addressing technological gaps and marketing problems. The government needs to take actions on this sector and should make developmental interventions in the various components such as breeding, animal health, feeding, milk collection, storage, processing and distribution.

Key words: Ethiopia • Livestock • *dairy*

INTRODUCTION

Ethiopia has the largest livestock population in Africa. The cattle population in the country is estimated to be 53.9 million, out of which female cattle constitutes about 55.4 percent. About 98.95% of the total cattle are local breeds and the remaining are hybrid and exotic breeds. The total estimated goat population was about 22 million with indigenous breeds accounting for 99.98 percent and hybrid and pure exotic breeds for about 0.02 percent. The total camel population was estimated to be 807,581 with the proportion of male and female camels being 33.88 and 66.12 percent, respectively [1].

Considering the important prospective for smallholder income generation and employment opportunities from the high value dairy Products, the development of the dairy sector can contribute immensely to poverty alleviation and improved nutrition in the country [2].

Although the country holds large potential for dairy development, the sector is not developed to the expected level. The annual growth rate in milk production of 1.2 percent falls behind the annual human population growth estimated at 3 percent [3]. Milk consumption habit in the country is low with per capita consumption of 19 kg per year [4]. Dairy processing plants are few in numbers, much of the milk produced by rural small holders is processed on farm using traditional technologies and milk processing is based on sour milk [5].

In adequate feed source in quality as well as in quantity, traditional type of production system and lack of capital by dairy producers, unimproved animal husbandry systems, inefficient and inadequate milk processing materials and methods, low milk production and supply to milk processing centers and poor marketing and market information systems are the major factors that hinder the dairy sector in Ethiopia [6].

Furthermore, there is no standard hygienic condition followed by producers during milk production. The hygienic conditions are different according to the production system. In most of the cases under smallholder condition, the common hygienic measures taken during milk production especially during milking are limited to letting the calf to suckle for few minutes and washing the udder before milking. The quality of the water used for cleaning purpose however, is not secured. Milk production under Ethiopian smallholder condition can generally be characterized as unhygienic [7].

Identification of formal markets that demand standard and high quality products will help to determine market prices based on the quality and thereby enhance commercialization of the smallholder dairy sector. So, the objectives of this paper are:

- To overview the Ethiopian dairy sector and to forward some recommendations.
- To highlight the role of the dairy sector for the economy of the country.

Overview of Ethiopian Dairy Sector

Dairy Production Systems in Ethiopia: Milk production systems in Ethiopia are classified as urban, peri-urban and rural [8]. Urban and Peri-urban milk production is developed in areas where the population density is high and agricultural land is shrinking due to urbanization in and around big cities like Addis Ababa. It possesses animal types ranging from 50% crosses to high grade Friesian in small to medium-sized farms. The peri-urban milk production system includes smallholder and commercial dairy farmers in the proximity of Addis Ababa and other regional towns. This sector owns most of the country's improved dairy stock [8]. The main source of feed is both home produced or purchased hay; and the primary objective is to get additional cash income from milk sale. The animals used in this production system have the capacity of giving 1,120 to 2,005 liters over 209 day lactation [9]. Urban small holders are the suppliers of households in the urban area and according to Redda [8] seventy one percent of the producers sell their milk directly to consumers.

The rural dairy production system includes pastoralists, agro-pastoralists and mixed crop livestock producers. The system is not market oriented and most of the milk produced is retained for home consumption [6]. As reported by CSA[10] of the total annual milk production in rural areas, 85 percent is used for household

consumption, seven percent is sold, only 0.3 percent is used for wages in kind and the remaining eight percent is used for other purposes.

Pastoral milk production system is commonly practiced in the lowland parts of Ethiopia where the livelihood is dependent on their animals. Erratic nature of the rainfall pattern and other associated reasons results in shortage of feed and milk production so that milk per unit area is low and highly seasonal. The primary use of fresh whole milk is for home consumption followed by sale to urban centers and for fermentation to process it into butter [11]. Milk storage and use can be either in the form of milk fermented for a short term for lower than five days (used mainly for family consumption or butter making). The remaining milk will be stored to be fermented for a longer term for up to 30 to 60 days used as *ititu*, a social food commonly reserved for guests [5].

The agro pastoral system has similar but gradual to sedentary ecological characteristics and cattle type to the pastoral area. Its specific identification is livestock dependent but growing of crop and its further expansion in crop farming gradually allocating the pasture land to crop production. The crop residue and aftermath of crop farming is used as a feed source for animals in the area in addition to communal pasture grazing. As compared to the above system, the system have better consideration for milk market and its access for additional inputs such as animal health services and supplementary feed from industrial by products and development of forage to calves and milking cows near to the newly started farm land to some extent[11].

Mixed crop livestock production system is the other system of dairy production in which milk production is an integral part of the production system of small-scale, non-commercial subsistence-farms which represent among the 83.9% of the population and are responsible for 98% of the total milk produced and 75% of commercial, liquid milk production [5, 8]. Indigenous stock are the typical animals maintained within this system; the system is largely a system of extensive husbandry; that is, the stock are for the most part expected to feed for themselves, making the best of natural pasture and crop residues. Local animals raised in this system generally have low performance with average age at first calving of 53 months, average calving intervals of 25 months and average lactation yield of 524 liters [12].

Milk and Milk Product Consumption and Post-harvest Losses: Milk and dairy products are part of the diet for many Ethiopians. [13], estimated 68 percent of the

total milk produced is used for human consumption in the form of fresh milk, butter, cheese and yoghurt while the rest is given to calves and wasted in the process.

National average capita consumption of milk is 19kg/year as compared to 27 kg for other African countries and 100kg to the world per capita consumption. The recommended per capita milk consumption is 200 litres per year [4].

In the rural areas, the consumption of milk will be determined by livestock ownership and season while in urban areas it can be determined by the purchasing power of the household, the level of awareness on its nutritive value and availability [14]. Producers in the rural areas will consume fresh milk and will convert their milk to butter [15]. It is estimated that 40% of the milk produced is converted to butter, while only 9% is converted to cheese. Traditional butter ferments slowly at room temperature and can be kept for a year or longer, offering rural consumers a readily storable and durable dairy product [16].

The wastages may be either of potential losses i.e. wastage of milk due to mishandling, uneconomical use; or efficiency losses which could be attributed to use of low level of technology in preservation and conversion of milk to other dairy products. Milk transportation dominated by hand carrying or packing on donkey/horses or using public transport and long distance traveled, may cause spoilage due to the high ambient temperature and time taken [17]. The value of annual milk and dairy product losses due to mainly mishandling across five African and the Middle East countries (Kenya, Tanzania, Uganda, Ethiopia and Syria) was over US \$90 million FAO [18].

Feeds and Feed Source:Feed is from communal grazing of government land, purchased feed/forage and manufactured commercial feed [16]. Cultivated forages available to producers include napier grass, alfalfa, Rhodes grass, guinea grass, desmodium, lablab, cowpeas and vetch and oat/vetch mixtures. Forage trees are also effective forages; leucanenas, sesbania and tagasaste. Only 60% of the smallholders use feed from own holdings. This problem is exacerbated on the smallholders who have account for nearly 84.8% of the total feed supply from permanent grazing lands, fallow and stubble following crop harvest [19].

Since concentrate supplements are not readily available and are relatively expensive, they are rarely used in animal production [20]. Instead, on-farm grown forage legumes are suggested as good alternatives [21]. However, the various milling by-products obtained from

processing wheat and oil seed meals are of high demand as livestock feed for state farms, city dairy holders and to a lesser extent for small dairy cooperatives [22].

In general livestock feeding depends mainly on grazing and browsing. In the highland grazing, mostly on communal, is in combination with crop residues and agro-industrial by-products which account substantially to the feed availability for oxen and to some for milk producing animals [11].

Breeds and Genetic Improvement:The number of cows in the country is estimated to be 27.1 million out of which about 99.2 % are indigenous breeds and the remaining are cross and exotic breeds that accounted for about 0.61 % and 0.11% respectively. The improved breeds are distributed only in Tigray, Amhara, Oromia and SNNP regions. The number of improved breeds in the country is small which is an indication of the low level usage of modern technological packages like artificial insemination and bull service [15].

The Ethiopian Institute of Biodiversity Conservation (EIBC) reported that 27 cattle breeds are found in the country while Domestic Animal Diversity Information System (DADIS) reported 31 and Domestic Animal Genetic Resource Information System (DAGRIS) reported 32 [6].

Dairy cattle breed improvement program, in Ethiopia, was launched during the occupation of Ethiopia by Italy with importation of exotic dairy cattle. Later on, the First Livestock Development Project (1958-63) created the Dairy Development Agency (DDA) that was concerned mainly with the development of commercial dairy farms in Addis Ababa [23]. Crossbreeding has been started by the Institute of Agricultural Research, through the establishment of an on-station Dairy Cattle Crossbreeding Program, using Friesian, Jersey and Simmental sires that were crossed with the local Horro, Boran and Barka dams with the aim of testing the productivity of crossbred dairy cows with different levels of exotic blood [24].

During the last four decades genetic improvement has been recognized in the design and implementation of development programmes and projects in the country. FILDP had distributed grade dairy cattle imported from Kenya and established Abernosa cross breed cattle production centre, DRDP had imported 400 cross Friesian Boran cross bred heifers from Kenya and 92 Pure Jersey from Zimbabwe and Expanded and rehabilitated the cattle breeding ranches of Abernosa, Gobe andasa, Metekel, Didtuyura and Sodo. The production and distribution of crossbred heifers, provision and dairy stocks, provision

and strengthening of AI services and/or bull services were major components of the development projects implemented [11].

The other effort made by the government for genetic improvement is the establishment of the National Artificial Insemination Centre (NAIC) in 1981 in Kaliti with the main objective to achieve an efficient and reliable artificial insemination service and had the mandate to serve nationwide. The liquid nitrogen plant with a well equipped semen processing laboratory was installed in 1984 sourcing frozen semen from 25 Holstein and 10 Brahman bulls donated by the Cuban Government and 44 800 and 2 000 doses of Friesian and Jersey imported semen, respectively [13].

NAIC distributes semen to nine sub-centers: two in Oromia (Nekemt and Asella), two in SNNP (Wolaita and Wolkite), two in Amhara (Bahir Dar and Dessie), two in Tigray (both in Mekelle) and one in Harari (Harar). These places are selected for their strategic locations and all the semen is sent on request to the Regional Agricultural Bureaus, which are responsible for distributing liquid nitrogen and semen to sub-centers in their respective regions [6].

However, these efforts have been met with little success because of the various technical, organizational and socioeconomic constraints. There has been no concrete and binding breeding policy with regard to the choice of the exotic breed types to be crossed with the indigenous animals and the corresponding exotic blood level of the crosses. In addition, most of the breeding programs had no clearly defined breeding objectives and in almost all of the production systems performance recording has been difficult [25].

Dairy Marketing Systems in Ethiopia: Informal and formal dairy marketing systems are practiced in the country. The term 'informal' is often used to describe marketing systems in which governments do not intervene substantially in marketing. The term 'formal' is thus used to describe official marketing systems [26]. Dependable system has not been developed to market milk and milk products in Ethiopia [12,27], indicated that most milk and dairy marketing (88%) occurs through the informal sector and Belachew [28], had reported the same.

The informal marketing system involves direct delivery of fresh milk by producers to consumers in the immediate neighborhood and sales to itinerant traders or individuals in nearby towns. The informal market is scarce especially for the smallholder farmers during the fasting season of the Ethiopian Orthodox Christians when people do not eat animal products [2].

In the formal system, milk is collected at the cooperative or private milk collection centers and transported to processing plants. In this system, milk quality tests (principally acidity using alcohol and clot-on-boiling test and density) are performed on delivery, thereby assuring the quality of milk. This has encouraged the producers to improve the hygiene conditions, storage and transportation of the milk in order to avoid rejection of the product on delivery to the collection centre. The system appears to be expanding during the last decade with the private sector leading the dairy processing industry in Addis Ababa and other major regional towns. However, the share of milk sold in the formal market in Ethiopia (two percent) is much less than that sold in neighboring countries: 15 percent in Kenya and five percent in Uganda [29]. This system was dominated by Dairy Development Enterprise (DDE), which functions as milk producer, collector and processor. The enterprise at present operates 25 collection centers located around Addis Ababa, 13 of them near Selale, 5 near Holetta and 7 around DebreBrehane. However, following the liberalization of the dairy policy, with which the government intervention in the marketing and pricing of livestock products is minimized, private institutions also have started taking part in milk collection and processing business [2].

Dairy Health and Veterinary Services: Dairy health: there is widespread prevalence of livestock diseases and parasites in all agro-ecological zones of the country that causes direct economic losses through mortality and morbidity. The impact of these diseases also contributes to the poor reproductive performance of the animals. Mortality of 8-10%, 14-16% and 11-13% has been reported for the indigenous cattle, sheep and goats respectively [30]. The major diseases diagnosed are Contagious Bovine Pleuro-Pneumonia, Foot and Mouth Disease, Lumpy Skin Disease, Anthrax, Blackleg, Haemorrhagic septicemia, mastitis, Tick-borne diseases including Anaplasmosis, Babesiosis and Heart water, infertility due to Brucellosis, Trichomoniasis and Anoestrus, Calf Pneumonia, Helminth parasites, tick infestations and metabolic disorders. Prevalence and risk factors of major clinical reproductive health problems like repeat breeding, retention of placenta, abortion, dystocia, anoestrus and prolapses were among the many that causes loss of calf and inefficient reproduction [31].

The extent of productive diseases in dairy cattle like mastitis is high and farmers' awareness of the problem and control practiced is low. The prevalence of mastitis in

dairy farms is reported to be high (42.1% for sub clinical, 3.8% for clinical and 2.1% for blocked teat cases) [32].

Veterinary services: the animal health service organized under the Federal and Regional Governments had contributed to the national economy through reducing the negative impacts produced by epizootic and zoonotic diseases. In this regard the regional governments have responsibilities of ensuring the accessibility of animal health services to all citizens in affordable manner while at the Federal level on disease surveillance, research and regulating the services [33].

On quality control and disease investigation the establishment of the National Animal Health Diagnostic and Investigation Centre as well as the nine Regional veterinary laboratories played a major role. There are also organized Veterinary Medicine faculties and one National Veterinary Laboratory in the country. This faculty produces yearly skilled human resources to meet the demand of the producers while the National veterinary Institute produces over 19 different bacterial and viral vaccines against various infectious animal diseases. The faculty is also another source of part-time animal health professionals that serve the dairy producers and accounts for 18% of clinical service and 4.7% of drug provision during treatment [14].

However, the delivery system of animal health services to dairy farmers is inadequate. The organizational structure of the veterinary system is unclear. Inadequate budget have resulted in a lack of materials for diagnostic testing; there is a high turnover of personnel and the skill level, particularly microbiology skills are weak. There is also no clearly defined role between regional and local veterinarians and the regional laboratories and this is a major constraint in resolving issues in milk quality / udder health [15]

Quality of Milk and Milk Products in Ethiopia: Milk is a highly nutritious food, ideal for microbial growth. Fresh milk easily deteriorates to become unsuitable for processing and human consumption. Milk is also an important vehicle for transmission of pathogenic microorganisms to human beings unless it is produced and handled under good hygienic conditions. Thus, hygienic production of milk has to get due attention in order to provide more and better quality milk for the general public [34].

Quality milk means, milk which is free from pathogenic bacteria and harmful toxic substances, free from sediment and extraneous substances, of good flavor, with normal composition, adequate in keeping quality and low in bacterial counts [35].

Different microbiological tests are used to indicate the hygienic condition during the manufacturing of a given product. A commonly used procedure to measure the sanitary quality of milk is to estimate its bacterial content. The number of bacteria in aseptically drawn milk varies from animal to animal and even from different breasts of the same animal [6]. On average, aseptically drawn milk from healthy udders contains between 500 and 1000 bacteria ml⁻¹. High initial counts (more than 10⁵ bacteria ml⁻¹) are evidence of poor production hygiene [36]. Somatic cell count (SCC) is another indirect indicator of the microbial quality of milk. The number of somatic cells increases in response to pus-producing bacteria like *Staphylococcus aureus*, a cause of mastitis [37].

Constraints of Dairy Farming in Ethiopia: Constraints faced dairy industry in various level including policy and socio-economic, institutional and technical constraints that reduce the reproductive and production potential of dairy farming [40].

Policy and Socioeconomic Issues

Land Ownership and Land Rights: Land ownership is on the hands of the state. The issue of land ownership with respect to dairy production is particularly important in the urban and peri-urban areas. The land policy doesn't make individuals, who already have land, free and secure to invest more on the land and there is also scarcity and difficulty in acquiring new land [41].

Farmers' Participation: Farmers have in general limited opportunity and authority to participate in decision making processes for what is economically, socially and culturally good for them. Most obviously, government intervention is based on a top-down development approach which has lead to the imposition of ideas [25].

Milk Market Linkage Challenges: There are no promotional activities being carried out by various government offices to portray milk as a highly nutritious and essential food for the health of nation. There are also no price regulatory mechanisms in place that can much such an important food item easily available and affordable to a large segments of the population. As mentioned earlier, there is no functional quality control and payment system in the country [42].

Credit Facilities and Incentives: Credit is a very important tool in dairy development by providing farmers with a capacity to invest in order to increase productivity of the dairy operations. Available credits from the Agricultural

and Industrial Development Bank in Ethiopia are targeted to the crop sector mainly for purchases of oxen, fertilizers and improved seed. According to the 1990-94 Rural Credit Performance Reports of AIDB, the livestock sectors share was only 3% of the total credit services given to the rural community [43].

Environmental Issues: Environmental issues associated with the pastoral and highland small-holder dairy production systems are overgrazing and land degradation that are the results of continuous utilization of crop lands and communal grazing lands without rehabilitation and conservation works. Hygienic and sanitary hazard and pollution of soil, water and air due to a large volume of waste and close human-animal interaction are environmental risks associated with the urban, peri-urban and the intensive commercial dairy production systems [44].

Quality Control and Public Health Issues: There are no official rules and regulations to control the quality of milk produced and distributed to consumers. At the DDE milk quality control and pasteurization is practiced routinely for milk entering the processing plant, which is a very small proportion of the total amount of milk produced in the country (13%). The highest proportion of milk (71%) is distributed to consumers informally as raw milk without passing through any type of quality and safety tests [45].

Institutional Constraints

Lack of Education, Extension and Consultation: There is shortage of qualified personnel, poor education and management expertise of farmers, misunderstanding of production systems and lack of extension works to transfer new technologies and knowledge gained through researches to farmers, ignorance of the experience and knowledge of local farmers and absence of forums for consultations and discussions with farmers [46].

Lack of Research and Information Exchange System: There is no effective research and technology transformation system in the country which results in weak linkage between agricultural knowledge and new technology [47].

Technical Constraints

Animal Health: Poor animal health and management are major constraints of dairy development in Ethiopia which cause poor performance across all dairy production

systems. Many of these problems result from the interaction among constraints themselves e.g. poorly fed animals develop low disease resistance, fertility problem, partly because the animal health care system relies heavily on veterinary measures. Many of the disease constraints which affect supply are also a consequence of the non-technical constraints e.g. insufficient money to purchase drugs or vaccines [14].

Feed and Nutrition: Inadequate supply of quality feed is the major factors limiting dairy productivity in Ethiopia. Improved feeding is crucial to provide satisfactory environment for animal growth and feed supplements stimulate higher milk productivity. Feed, usually based on fodder and grass, are either not available in sufficient quantities due to fluctuating weather conditions or when available are of poor nutritional quality [6].

Animal Genetic Resources: About 99% of the cattle population in Ethiopia is indigenous that are adapted to feed and water shortages, disease challenges and harsh climates. The productivity of indigenous livestock is, however, believed to be poor even if no practical recording scheme has been used to judge their merit [48].

Economic Importance of Dairy Farming for Ethiopia Role of Dairy Farming for the National Economy:

All livestock currently support and sustain livelihoods for 80% of all rural poor. Of the total population, 35–40% of all livestock are located in the pastoral areas. Female cattle constitute about 55.48% of the national herd [30]. Of the total female cattle population, dairy and milking cows total 16,941,361, 14.24% dairy cows and 20.12% milking cows. Eighty-three percent of all milk produced in Ethiopia comes from cattle with the remainder coming from goats and camels. It is estimated that 2.76 billion liters of cow milk produced by sedentary populations annually while camel milk is estimated at 16.2 million liters annually [19].

The Ministry of Finance and Economic Development (MOFED) estimated the gross value of ruminant livestock production in 2008/09 at Birr 32.64 billion. The estimate includes the values of livestock off-take (Birr 9.653 billion), milk and milk products (Birr 19.471 billion) and other products, e.g. wool, dung and change in stock inventory. Milk and milk products contributes 63 percent to gross value of ruminant livestock production. The GOE has been underestimating the contribution of livestock and especially milk to the agriculture gross domestic product (AGDP) for the country [15].

Role for Food Security and Household Nutrition:

Livestock, milk and milk products play an important role in the food security status in both highland and pastoral communities. In pastoralist regions, livestock are owned by a large percentage of the population. Women play a large role in decision-making regarding the processing and marketing of milk [15].

In highland areas, income earned from daily milk production is used to purchase agriculture inputs or hire labor and land, effectively increasing a household's food production potential. Although the daily income earned is marginal, especially from low milk producing local breed animals, milk sales and livestock ownership is necessary for food security. For example, farmers without access or unwilling to join a cooperative will often contract to sell their milk to a neighbour, kiosk, or a local café. The buyer pays monthly while receiving milk daily. This monthly cash transaction enables farmers to save small amounts of daily income for re-investment into household livelihoods or the purchase of other livestock [39].

In addition to the positive impact that dairy and livestock can have on household income, assets and food security, the nutritional significance of dairy products has also been well documented. Dairy provides importance sources of vitamins and minerals, particularly zinc, potassium, calcium, riboflavin and B12 [49]. These micronutrients, particularly important for infants and young children, are largely insufficient, absent, or poorly bio-available in plant-based diets, making dairy an important and essential source of nutrition. Milk is also highly energy dense, which is important for young children or chronically ill with lack of appetite. Importantly, milk comprises all eight essential amino acids, thus constituting high quality protein [50]. Research has demonstrated the positive nutritional impacts of dairy, including an association between increased consumption of milk and improved child growth), as well as an association between consumption of fermented milk products and the prevention of diarrhea. Thus, the consumption of even small quantities of milk can markedly improve the nutritional quality and diversity of the diet [51].

Role for Employment: According to [52], 12 to 14 percent of the world population (an estimated 750 to 900 million people) lives on dairy farms or within dairy farming households. Employment and income from dairy will vary between and within production systems because of differences such as feed sources, management systems,

herd sizes, form of milk disposal patterns and access to or use of technology. In Ethiopia, traditional smallholder mixed farming systems generate several times more employment but low income per unit of milk produced compared with urban and peri-urban dairy systems because of low productivity of animals in the former. In both systems, over two-third of the labour requirement is provided by children as they usually do the herding. Mostly women are involved in traditional milk processing and marketing [6].

[53], (2009) estimated that labour use in various dairy processing and marketing activities in different production systems and scales of operation in Ethiopia totalled an equivalent of 174, 000 full-time jobs in 2004. [27], reported that that the urban/peri-urban system creates annually 4.4 million person days of work or 16, 400 full-time jobs, while the small-scale mixed farming systems create 166 million person days of work, equivalent to 553, 500 full-time jobs. The production of one million litres of milk per year on small-scale dairy farms creates approximately 200 on-farm jobs. In 2010, dairying created an estimated 588, 000 full-time on-farm jobs in the country [52].

CONCLUSION AND RECOMMENDATIONS

The dairy sector in Ethiopia is not developed to the expected level, though the country has the largest livestock population in Africa. Dairy production systems are traditional and the cattle breeds used in the system have poor genetic potential that yield low amount of milk per lactation. In addition, the dairy marketing system of the country is mainly informal, milk consumption habit is low even in African standard, dairy production inputs such as, feeds, veterinary services and AI services are poor. Moreover, the quality of milk and milk products is below the international standard. The sector is challenged by different factors that can be categorized as technical, institutional, policy and socio-economic. But the sector still plays a great role for the national economy (GDP), for employment, for income generation and house hold nutrition even if its contribution is low as compared with the potential of the country.

Based on the above conclusion, the following recommendations are forwarded;

- Productivity of local animals should be improved through selection and use of appropriate management.

- The public has to be informed about milk consumption and its nutritional values.
- Strengthen milk marketing system at national level.
- Develop and enact animal feed resource strategy and encourage feed Processers in the livestock development potential areas.
- Artificial insemination service has to be expanded to improve the genetic potential of local breeds and veterinary service has to be addressed.
- Quality of milk and milk products should be improved.

REFERENCES

1. CSA. 2010a. Agricultural Sample Survey. Livestock, Poultry and Beehives population (private peasant holdings). Federal Democratic Republic of Ethiopia Central Statistical Authority (CSA), Addis Ababa, Ethiopia.
2. Ahmed, M.A.M., S. Ehui and Y. Assefa, 2004. Dairy development in Ethiopia. EPTD Discussion paper No. 123. International Food Policy Research Institute. Washington, U.S.A.
3. GRM International, B.V., 2007. Livestock Development Master Plan Study. Phase I Report –Data Collection and Analysis. Volume 1 – Dairy.
4. FAO. 2003. Livestock Sector Brief, 20035.
5. Getachew, F., 2003. Milk and Dairy Products, Post-harvest Losses and Food Safety in Sub-Saharan Africa and the Near East. A Review of the Small Dairy Sector – Ethiopia. FAO Prevention of Food Losses Programme. FAO, Rome: Italy.
6. Yilma, Z., G.B. Emannuelle and S. Ameha, 2011. A Review of the Ethiopian Dairy Sector. Ed. Rudolf Fombad, Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa (FAO/SFE), Addis Ababa, Ethiopia.
7. Zelalem, Y., 2003. Sanitary conditions and microbial qualities of dairy products in urban and peri-urban dairy shed of the central Ethiopia. LAMBERT Academic publishing, pp: 85.
8. Redda T., 2001. Small-scale milk marketing and processing in Ethiopia. In: Proceedings of a South–South workshop on Smallholder Dairy Production and Marketing- Constraints and Opportunities. March 12–16, 2001. Anand, India.
9. Azage, T., Z. Sileshi, M. Tadesse and M. Alemayehu, 2002. Scoping Study on Urban and Peri-Urban livestock keeping practices in Addis Abba. Part I. Literature review on Dairy Production Management and Marketing – ILRI and EARO, 2002.
10. CSA. 2010b. Agricultural sample survey. Report on crop and livestock product utilization. The Federal Democratic republic of Ethiopia, Central Statistical Agency (CSA). Private Peasant Holdings. Statistical Bulletin 468, Addis Ababa, Ethiopia
11. Felleke, G., M. Woldearegay and G. Haile, 2010. Inventory of Dairy Policy – Ethiopia, Target Business Consultants Plc, Netherlands Development Organization (SNV), Addis Ababa, Ethiopia.
12. Zegeye Yigezu, 2003. Imperative and challenges of dairy production, processing and marketing in Ethiopia. In: Jobre Y and Gebru G (eds). Challenges and opportunities of livestock marketing in Ethiopia. Proceedings of the 10th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, 22–24 August 2002. ESAP, Addis Ababa: Ethiopia.
13. Felleke, G. and G. Geda, 2001. The Ethiopian dairy development policy, a draft policy document: Ministry of agriculture (MoA), Addis Ababa, Ethiopia.
14. SNV., 2008. Dairy Investment Opportunities in Ethiopia. By TAM Consult, Netherlands Development Organization (SNV), Addis Ababa, Ethiopia.
15. Land O'Lakes, 2010. The next stage in dairy development for Ethiopia. Dairy Value Chains, End Markets and Food Security Cooperative Agreement 663-A-00-05-00431-00, November, 2010. Addis Ababa, Ethiopia.
16. GOE. 2007. The Livestock Master Plan Study Report. Addis Ababa, Ethiopia.
17. Getachew Felleke, 2005. Assessment of Means to Minimize Losses and Improve Quality and Supply of Milk and Dairy Products in Ethiopia, Vol. II, Milk and Dairy Products, Post-Harvest Losses and Food Safety in Sub-Saharan Africa and the Near East, FAO Action Programme for the Prevention of Food Losses, FAO/MOA Ethiopia.
18. ENA., 2004. Milk, Dairy Products Loss Of Five African, Middle East Countries Stands At 90 Mln. USD, Ethiopian News Agency (ENA), Addis Ababa, 10/22/2004.
19. CSA, 2008. Agricultural Sample Survey 2007/08. Volume II. Report on livestock and livestock characteristics (private peasant holdings). CSA, Addis Ababa, Ethiopia.

20. Solomon, A. and G. Solomon, 1995. Changes in carcass characteristics of Horro rams with increasing age and body weight under different feeding regimes. In: Proceedings of the Third National Conference of the Ethiopian Society of Animal Production. 27-29 April, 1995, Addis Ababa: Ethiopia. Pp: 233-235.
21. Nnadi, I.A. and L. Hague, 1998. Forage legumes in African crop-livestock production systems. *ILCA Bull*, 30, pp: 10-19.
22. Alemayehu, M., 1995. Feed resources in Ethiopia. Animal Feed Resources for Small-scale Livestock Producers. In: Proceedings of the second PANESA Workshop., 11-15 November 1995, Kenya, Nairobi.
23. Fekadu, G., 1990. Pastoral nomadism and rural development. In: Ethiopia: Rural Development Options.
24. Ethiopian Agricultural Research Organization (EARO), 2001. 1. Back ground paper on developing animal breeding policy. A working paper. January, 2001.
25. Tesfaye, A., 1990. Livestock development in the peasant sector of highland of Ethiopia. Some policy issues and implications. In: African Livestock Policy Analysis Network (ALPAN), Network paper No 24, June, 1990, ILCA, Addis Ababa, Ethiopia.
26. Debrah, S., 1990. Dairy marketing by intra-urban, peri-urban and rural dairy producers near Addis Ababa, Ethiopia. In: Brokken RF and SenaitSeyoum (eds), Dairy marketing in sub-Saharan Africa: Proceedings of a symposium held at ILCA, Addis Ababa, Ethiopia, 26–30 November.
27. Staal, S., C. Delgado and C. Nicholsin, 1998. Smallholder dairying under transaction costs in East Africa. *Livestock Policy Analyses Brief, No.6*
28. Belachew, H., 1997. Milk sales outlet options in Addis and the surrounding peri-urban areas. In: Proceedings of the Fifth National Conference of the Ethiopian Society of Animal Production. 15-17 May, 1997, Addis Ababa, Ethiopia. pp: 72-81.
29. Muriukia, H.G. and W. Thorpe, 2001. Regional synthesis: Smallholder Dairy Production animal marketing in Ethiopia. Improving productivity and Marketing in East and South Africa. In: Proceeding of the South-South Workshop on Smallholder Dairy Production and Marketing-Constraints and Opportunities. NDDDB (National Dairy Development and ILRI (International Livestock Research Institute). March, 12 -16, 2001. Anand, India.
30. MoARD. ,2007. Livestock Master Plan Study Phase I Report Volume T – Sociological Aspects, 2007.
31. Regasa, B. Megersa, Z. Woldemichael, F. Abunna, K. Amenu and R. Abebe, Asefa, 2009. Major Clinical Disease Syndromes of cows in smallholder Dairy farms of Hawassa, Southern Ethiopia, in *Ethiopian Veterinary Journal*, V 13, No. 2, 2009.
32. Girum Shiferaw, 2009. Bovine Mastitis in dairy farms of Eastern part of Amhara Region, Ethiopia: industrious problem. In *Ethiopian Veterinary Journal*, V 13, No. 2, 2009.
33. Berhe, G., Z. Sileshi, W. Abebe, D. Zeleke, A. Wondwosen and W.G. Asefa, 2009. Historical Development and Major Contributions of the Ethiopian Veterinary Service to the Livestock sector, In *Ethiopian Veterinary Journal*, V 13, No. 2, 2009.
34. FAO, 2001. The Lactoperoxidase System of Milk Preservation. Regional Lactoperoxidase Workshop in West Africa. Burkina Faso, 2001, pp: 17-19.
35. Khan, M.T.G., M.A. Zinnah, M.P. Siddique, M.H.A. Rashid, M.A. Islam and K.A. Choudhury, 2008. Physical and Microbial Qualities of Raw Milk Collected from Bangladesh Agricultural University. Dairy Farm and the Surrounding Villages, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh, *Bangl. J. Vet. Med.*, 6: 217-221.
36. O'Connor, C.B., 1994. Rural dairy technology. ILRI training manual 1. ILRI (International Livestock Research Institute), Addis Ababa, Ethiopia. pp: 133.
37. Kleinschmit, M. and T. Gompert, 2007. Raw Milk Use and Safety Fact Sheet. Center for Rural Affairs, Northeast Nebraska RC&D, Plainview, Nebraska.
38. Zelalem Yilma and B. Faye, 2006. Handling and microbial load of cow's milk and Ergo fermented milk collected from different shops and producers in central highlands of Ethiopia. *Ethiopian Journal of Animal Production* 6(2): 67-82.
39. Yilma, Z., 2010. Quality Factors that Affect Ethiopian Milk Business: Experiences from selected dairy potential areas. Netherlands Development Organization, Addis Ababa, Ethiopia.
40. Belachew, H. and E. Jemberu, 2003. Challenges and opportunities of livestock marketing in Ethiopia. In: proceedings of the 10th annual conference of the Ethiopia Society of Animal Production (ESAP), held in Addis Ababa, Ethiopia, 21-23 August 2003. ESAP: Addis Ababa, Ethiopia.

41. Girma, T. and A. Zegeye, 1996. Land tenure structure and development in Ethiopia. A case study of 10 peasant associations in WaraJarsoWoreda. Paper presented at Sob regional Workshop on Land tenure Issues in Natural Resource Management. 11-15 March, Addis Ababa, Ethiopia.
42. Hurise, B. and J. Eshetu, 2002. Challenges and opportunities of livestock trade in Ethiopia. Paper presented at the 10 annual conference of Ethiopian Society of Animal Production (ESAP), Addis Ababa, Ethiopia, 22-24 August 2002. Addis Ababa, Ethiopia. pp: 33.
43. Bekele, T., 1995. Rural credit in Ethiopia. In: Proceedings of the Fourth Annual Conference on the Ethiopian Economy. 1995, Addis Ababa, Ethiopia. pp: 353.
44. FAO. 1999. Livestock, environment and development (LEAD) initiative. Livestock and Environment Toolbox. <http://www.fao.org/lead/toolbox/homepage.htm>.
45. Yilkal, A., 1998. The epidemiology of bovine Brucellosis in intra- and peri-urban dairy production systems, Ethiopia. MVSc Thesis, Free University of Berlin and Addis Ababa University.
46. Sendros, D. and K. Tesfaye, 1997. Factors to be considered in the formulation of livestock breeding policy. In: Proceedings of the Fifth National Conference of ESAP. 15-17 May, 1997, Addis Ababa, Ethiopia. pp: 13-27.
47. Goshu, M., 1995. Agricultural research and extension in Ethiopia. In: proceedings of the 4th Annual Conference on the Ethiopian Economy, 1995. Addis Ababa, Ethiopia, pp: 373-390.
48. Tsehay, R., 1997. Milk processing and marketing options for rural small scale producers. In: Proceedings of the Fifth National Conference of the Ethiopian Society of Animal Production. 15-17 May, 1997, Addis Ababa, Ethiopia. pp: 28-39.
49. Sadler, K., C. Kerven, M. Calo, M. Manske and A. Catley, 2009. Milk Matters. A literature review of pastoralist nutrition and programming responses. Feinstein International Center, Tufts University and Save the Children, 2009.
50. Randolph, T.F., E. Schelling, D. Grace, C.F. Nicholson, J.L. Leroy, D.C. Cole, M.W. Demment, A. Omore, J. Zinsstag and M. Ruel, 2007. Invited Review: Role of livestock in human nutrition and health for poverty reduction in developing countries. *Journal of Animal Science*, 85: 2788-2800.
51. Hoppe, C., T. Udam, L. Lauritzen, C. Molgaard, A. Juul and K. Michaelsen, 2004. Animal protein intake, serum insulin-like growth factor I and growth in healthy 2.5 years old Danish children. *American Journal of Clinical Nutrition*, 80(2): 447-452.
52. FAO., 2010. Status and prospects for smallholder milk production. A global perspective, by T. Hemme and J. Otte. Rome.
53. Haile, G., 2009. The impact of global economic and financial crisis on the Ethiopian dairy industry. Impact of the global economic crisis on least developed countries' (LDCs) productive capacities and trade prospects: Threats and opportunities, Least Developed Countries Ministerial Conference, UNIDO, UN-OHRLLS, 3-4 December 2009. Vienna International Center: Austria.