

## Challenges, Opportunities and Prospects of Dairy Farming in Ethiopia: A Review

*Tadesse Guadu and Mengistie Abebaw*

Department of Veterinary Epidemiology and Public Health, Faculty of Veterinary Medicine,  
University of Gondar, P.O.Box 196, Gondar, Ethiopia

**Abstract:** Ethiopia is one of the Sub-Saharan Africa's developing country with a large potential in livestock, being 1<sup>st</sup> among African countries and 9<sup>th</sup> in the world. Dairying is one of the livestock production systems practiced in almost all over the world including Ethiopia, involving a vast number of small, medium, or large-sized, subsistence or market-oriented farms. Based on climate, land holding and integrated with crop production; dairy production can be; pastoralism, highland smallholder, urban and peri-urban and intensive dairy farming system are recognized in Ethiopia. There are over six distinguishable, indigenous cattle types in Ethiopia mainly Arsi, Barca, Boran, Fogera, Horro and Ogaden are evolved as a source of natural selection. The main objectives of this seminar paper are to review; the challenges, opportunities and prospects of dairy farming in Ethiopia. Challenges and problems for dairying vary from one production system to another and/or from one location to another. These challenges can be technical like, health problems, reproductive problems, institutional like inadequate extension and training services, policy and socio-economic challenges like environmental problems and marketing linkage problems. This challenge lowers the production and reproduction efficiency of dairy cattle in Ethiopia. Dairy farm developments also have different opportunities such as, the presence of high livestock genetic resources and different production systems, availability of access services and land inputs, high income generation and employment opportunities, the presence of service providers, the presence of indigenous knowledge. In line with dairy farm development prospects, getting accesses to services and inputs that could help promote dairy production and productivity is high; as it promotes the motto of government policy in creating employment opportunities at house hold level. The provision of credit facilities and insurance for dairy farms should be encouraged and promoted. Dairying constitutes an important part of the Ethiopian smallholder dairy sector, a careful planning of dairy policy is required for the generation of appropriate and demand driven technologies in order to attain sustainable dairy farm development.

**Key words:** Cattle • Challenges • Dairy production • Ethiopia • Opportunities • Prospects

### INTRODUCTION

Ethiopia is one of the Sub-Saharan Africa's developing country with a large potential in livestock, being 1<sup>st</sup> among African countries and 9<sup>th</sup> in the world. However, meat and milk production are very low, estimated to be 246,000 tones and 960,000 tones, respectively, with per capital consumption of 17.1 kg milk and 5.6 kg meat per year in 1983-1985 [1].

Livestock production constitutes one of the principal means of achieving improved living standard in many regions of the developing world. The cattle population in

Ethiopia is estimated to be 49.3 million heads of cattle. These are well adapted to the tropical environment producing and reproducing under stress of high degree of temperature, high diseases prevalence and low level of nutritional states [2].

Agriculture (mainly crop and livestock production) is the mainstay of the Ethiopian economy, employing approximately 85% of the total population. Livestock production accounts for approximately 30% of the total agricultural GDP and 16% of national foreign currency earnings [3]. Despite the huge number of cattle and their economic importance, the productivity is low due to the

challenges of disease, nutrition, poor management and health problem, lack of infrastructure and lack of veterinary service provision. For the intensive as well as extensive dairy farms, it is characteristic in both tropical and temperate regions that the animals which graze relatively near to the milking area or the dairy-lot are given feed purchased from the surrounding area [4].

Dairying is one of the livestock productions practiced almost all over the world including Ethiopia, involving a vast number of small, medium, or large-sized, subsistence or market-oriented farms. The difference between large and smallholder farms is mainly determined by herd size [5]. Large scale farms keep large herds of cross breed and involve high inputs in terms of land, labor, housing and feed and health management. Hence, from dairy development prospect, a careful planning is required for the generation of appropriate and demand driven technologies in order to attain sustainable dairy development. There are a number of challenges which faced in the dairy farm development. These include limited genetic resources, inadequate veterinary service provision, poor management, inadequate animal feed resources, reproductive challenges and market related challenges [6]. Dairy farm also creates different opportunity which includes; livestock genetic resources and production system, access services and land inputs, agricultural extension services and technologies, income generation and employment opportunities [7].

#### **Therefore, the Main Objectives of this Paper Are:**

- To review the challenges of dairy farm development
- To know the opportunity of dairy farm development and
- To highlight the prospectives of dairy farming in Ethiopia.

**Dairy Production Systems in Ethiopia:** Dairy production system is a biological efficient system that converts large quantities of roughage, the most abundant feed in the tropics, milk the most nutritious food to man. Dairy production is a critical issue in Ethiopia, a livestock-based society where livestock and its products are more important sources of food and income and dairying has not been fully exploited and promoted. The greatest potential for few technologies in dairying is expected in the highlands of Ethiopia and other Sub-Saharan Africa and Asian countries, due to low disease pressure and good agro-climatic conditions for the cultivation of feeds [8].

**Pastoralism:** Livestock owners who exploit natural grass lands mainly in the arid areas, even though information on both absolute numbers and distribution is vary, it estimated that about 30% of the livestock populations are found in the pastoral areas [9]. The herd is dominating with unimproved Zebu animals and milk production is of subsistent type. It is mainly operating in the range lands where the peoples involved follow animal based life styles, which requires of them to move from place to place seasonally, based on feed and water availability. Livestock doesn't provide inputs for crop production but they are the very back bone of their owners providing all of the consumable and saleable outputs and regard as insurance against adversity, milk production is dependent on season due to the rainfall pattern that influenced feed availability [10].

**Urban and Peri-urban Dairy Farming:** Urban and peri-urban dairy farming are emerging as an important component of the milk production system. It is based on cross breed dairy stock, mainly Friesian x Zebu and purchased conserved feeds [11] and it is contributing immensely towards filling in the large demand –supply gap for milk and milk production urban center, where consumption of milk and milk product is remarkably high. The sector contributes immensely to generation, asset accumulation and poverty alleviation. Almost all of the fluid milk supplied to major urban and peri-urban centers in Ethiopia, for example, comes from urban and peri-urban smallholder and commercial dairy producers; land is the major challenges [12].

**Highland Smallholder Dairy Farming:** The highland smallholder milk production is found in the central parts of Ethiopia where dairying is nearly always parts of the subsistence, smallholder mixed crop and livestock farming. It becomes important source of house hold income in Ethiopia. However, the sector is agonized by several problems like poor quality and quantity of feed resource, lack of appropriate feeding system, poor production and reproduction traits, low productive and reproductive performance and economic and technical problems [4]. About 93% of the total milk production in Ethiopia is produced by the smallholder dairy farmers living in the villages and exercising, in most instances, traditional dairying. This sector also produces 90% of the overall agriculture output in the country [13].

**Intensive Dairy Farming:** This is a more specialized dairy farming practiced in state sector and very few individuals on commercial basis. The urban, peri-urban and intensive

dairy farmers produce 2% of the total milk production of the country. Farmers use part or all of their land to grow fodder crops for their dairy cattle. The dairy animals do not provide draft, but their manure is used as fertilizer on crops, milk is the main source of farm income. It is mainly under taken by small farmers using family labor, but commercial farmers using herd labor also practices this system on a large scale [14]. The herd is dominated with improved/cross breed dairy cattle and the production system is market oriented and milk production is for sale (surplus production) [15].

**Dairy Cattle Breeds in Ethiopia:** Over 99% of the cattle populations in Ethiopia are indigenous and about 42% are milk cows [12]. There are over six distinguishable, indigenous cattle types in Ethiopia mainly Arsi, Barca, Boran, Fogera, Horro and Ogaden are evolved as a source of natural selection influenced by factors like climate, altitude, available feed supply, endemic diseases and functional objectives of conditions livestock owners, management techniques and market demands that make them adapted to harsh environmental conditions [16]. Most of them belong to the Zebu type with the inclusion of some intermediate short horn Sanga type [17].

Barca breed is originated in west part of Eritrea, but abundant in Tigray and Gondar. This selected breed will produce about 647 liters of milk per lactation and considered to be good milk cattle. Arsi type is dominate the highlands of central region of Arsi and Bale, it produce up to 500 kg of milk lactation with 5.4%-5.8% of butter fat. Boran breed is a famous Ethiopian breed which is originated from Borena awraja, Southern part of the country, which produces about 440 kg of milk per lactation with 6.0% of butter fat. Fogera type is found in the North western part of the country around Fogera which produce about 281 kg of milk per lactation with 5.8% of butter fat. Horro type is also originated from the western part of the country particularly in Wollega, which produce up to 543 liters of milk per lactation and Ogaden is originated in the eastern parts of the country around Ogden [14].

**Challenges of Dairy Farm Development in Ethiopia:** Challenges and problems for dairying vary from one production system to another and/or from one location to another. The structure and performance of livestock and its products marketing both for domestic consumption and for export is generally perceived poor in Ethiopia. These challenges faced dairy industry in various level

including technical challenges, institutional, policy and socio-economic challenges reduce the reproductive and production potential of dairy farming [18].

#### **Technical Challenges**

**Genetic Limitation:** About 99% of the cattle populations in Ethiopia are indigenous that are adapted to feed and water shortages, diseases challenges and harsh climates. The productivity of indigenous cattle believed to be poor even if no practical recording scheme has been used to judge their merit [15]. The main problem of milk production in the country is that of the poor genetic potential of the indigenous cattle, which gives to low milk output. Crossbreeding has been practiced with encouraging results. However, a strictly controlled breeding program has not been practiced. Milk production is as low as 0.5 to 2 liters per day over a lactation period of 160 to 200 days [19].

Improving the feeding water availability and health care of indigenous cattle did not increase the quantity of milk per day to allow the animals to be used for commercial market-oriented milk production [18]. If improvement of the local Ethiopian breeds for milk production is targeted, then it is important to have a designed selection program in place for a few selected promising breeds [20].

**Inadequate Animal Feed Resources:** The primary constraints to increased milk production under all production systems are inadequate feed resources, poor pasture development and the ever increasing feed prices. Farmers tend to be keep cattle at stocking rates that for exceeds the carrying capacity of their grazing lands. This has resulted in degraded pastures and eroded soils. Stock numbers are not normally reduced in the dry season leading to grazing lands becoming progressively over grazed. In the dominating crop/livestock production system, producers supplement the feeding of their cows with crop residues and farm by products from their farms [21].

**Animal Health Problems:** The prevalence of various animal diseases, tick borne diseases, internal and external parasite and infectious diseases affect dairy development programs in various scale, depends on ecological zones and management levels. A number of parasite, bacterial, fungal and viral diseases and nutritional deficiency which are prevalent in the country affect the productivity and reproductive efficiency of dairy cattle and make individuals insecure to be involved in and invest on dairy

production specially cows used with exotic blood [17]. Among these diseases, venereal diseases have a direct effect while nutritional deficiencies and other infectious diseases play an indirect role in hampering the reproductive efficiency of dairy cows. The animal health services provided are inadequate, the costs of drugs is very high, while the diagnostic services are not readily available to the dairy farmer. This is partly attributed to the insufficient budget allocated to veterinary services. As it has been reported; an overall diseases occurrence 46.8% and 33.6% in urban and per-urban in the central highlands, respectively [22, 23].

**Reproductive Problems:** Reproductive efficiency is a critical component of successful dairy operation and act as an important component of a profitable dairy farm, whereas reproductive inefficiency is one of the most costly problems facing the dairy industry today. Reproductive problems occur frequently in lactating dairy cows and dramatically affect reproductive efficiency in dairy herd. Some of the most common problems include: twinning, dystocia, abortion, stillbirth, retained placenta, pyometra and repeat breeder [24]. These are diverse disorders that are similar in that they all can result in impaired reproductive function. Deciding whether to breed, treat, or cull dairy cows exhibiting one or more of these reproductive problems is a challenges for both veterinarians and dairy producers. In addition, there is a considerable controversy among dairy scientists and bovine practitioners regarding the economic impacts of these problems in dairy operation and the most effective management or therapeutic intervention for treating them [25].

Dairy farming should focus on prevention and control of risk factors associated with each problem rather than on prescriptive therapeutic interventions [24]. Low fertility reduces the profit by decreasing the average milk production and the number of calves per cow per year. Poor reproductive performance is a major cause of involuntary culling and therefore reduces the opportunity for voluntary culling and has a negative effect on the productivity of a dairy herd. Reproductive performance is influenced by the interactive effect of environment, management, health and genetic factors [25].

#### **Institutional Challenges**

**Inadequate Extension and Training Services:** Effective and adequate extension services, advice on animal nutrition and feeding management, reproduction, hygiene, extension works to transfer new technologies, training in

milk handling and marketing, farm management and dairy production efficiency are not always available to the dairy farmer. There is no extension to supply information about technologies to improve production and marketing to estimate certain development. A shift towards a developed dairy industry requires more support from advisory services and more effective links with research services [19].

#### **Lack of Research and Information Exchange System:**

Considering the importance of central institutions to guide and coordinate agricultural researches and unorganized information system to publicize results of research works, new technologies and policy, weak leakages between research, extension and technology users are one of the critical factors that hinder dairy development in the country. This weakness stems partially from the absence of sound linkage policies in the agricultural knowledge generation and transfer systems [7].

#### **Lack of Education and Consultation:**

There are shortages of qualified personnel, poor education and management expertise of farmers, miss understanding of production systems and lack of knowledge gained through researches to farmers, ignorance the experience and knowledge of local farmers and absence of forums for consultation and discussion with the farmers [26].

#### **Policy and Socio-Economic Challenges:**

**Unavailability of land:** The problem of inadequate feed is as a result of the limited land available for pasture establishment, especially in the productive highland zones that have a potential for dairy development. In Amhara region, for instance, nearly all the land suitable for cultivation is already in use, while in Oromia land is scarce in many areas [27].

The scarcity of the land is becoming a critical problem in many parts of Ethiopia, in certain localities are estimated 50% of the population have a problem of land scarcity. If land degradation is not halted and reversed in some areas of the country, it would become extremely difficult to expand dairy production. In the traditional sector, land becomes a challenge to milk production as a result of overstocking, in urban and per-urban dairying, lack of grazing land is often a limited factors. The intensification of the dairy industry by using fewer numbers of improved dairy cows with increased productivity per cow should be a strategy to be followed [28].

**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 make such an important food item easily available and affordable to a large segments of the population. As earlier mentioned, there are no functional quality controls and payment systems in the country [6].

Improving market access to dairy product creates an opportunity for enhanced dairy production. However, marketing and access to market have been reported to be the major problems [29]. Distance to market, shortage of milk and seasonal fluctuation in milk supply has been reported to be the major determinant across all the production systems. Besides, lack of access to market (21.2%), cultural taboo to sell milk (20.8%), spoilage of milk (1.9%) and high transport cost have been identified to be the major reasons for weak market access [13].

**Limited Availability of Credit to the Dairy Farmer:** Many farmers are aware of the existence of the improved technologies that can offer them higher returns as compared with their conventional practices. However, most of the poor farmers do not have financial means required to make the initial investment and acquire the associated technological inputs, financial supports or credit facilities to smallholder farmers who intend to enter in to commercial dairy farming are very much limited. The importance of establishing credit facilities is crucial step to the country's dairy sector as indicated in the livestock development master plan [30].

**Limited Access and High Cost of Dairy Heifers/cows:** The improved cross breed, grade and pure exotic dairy cattle are usually in short supply and when available the high cost is a major problem. The feed government cross breed heifers multiplication centers that used to distribute in calf cross breed heifers to producers at reasonable prices have been sold after the introduction of the privatization policy. Prices of cross breed cows and heifers are now unaffordable by the poor smallholder farmers that would have liked to engage in the dairy business [31].

**Environmental Issues:** Environmental issues associated with the pastoral and highland smallholder 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. Hygiene and sanitary hazard and pollution of soil, water and air due to a large volume of waste and close human-animal interaction are an environmental risks associated with the urban, per-urban and the intensive commercial dairy production system [32].

Waste from dairy farm is also a serious problem, particularly in urban production system. If not properly managed, manure is a source of bad odor and flies, sources of conflict with neighbors and sources of zoonotic diseases. Dairy producers from urban dairy system complained that manure disposal incurs cost. Although urban dairy farming is recognized by public authorities in some urban center, it was not encouraged in others and so there is a lot of pressures and restriction on dairy producers [28].

#### **Absence of Operational Breeding Strategy and Policy:**

The absence of effective breeding program is the major challenges to the dairy development. The AI services has been inefficient for different reasons in rural areas where smallholder farmers predominant. As reported by Shiferaw *et al.*, 2003, some of these reasons include: inappropriate infrastructure, managerial and financial challenges, inefficient heat detection and improper timing of insemination, embryonic death and very small numbers of AI technician [19, 31].

Ethiopia doesn't have a functional breeding policy. Most of the cattle breeding activities have been executed under strategy set by various individual organizations. The current conducive policy for investment opportunities is not supported by an operational breeding policy that determines the types of genetic material to be brought in to the country in order to achieve the targeted genetic improvement in different farming system and agro-ecologies [33].

#### **Opportunities for Dairy Farm Development in Ethiopia** **Livestock Genetic Resources and Production System:**

Ethiopia is endowed with large and diverse dairy animal genetic resources, which are widely distributed across the various agro-ecologies and climatic conditions prevalent in the country. The country with different breeds of cattle, indigenous animals have evolved over time through natural selection and adaptation to the existing diverse ecological conditions of their habitat [34]. Consequently, dairy production system in Ethiopia forms a continuum with postural form of production system dominating the

lowland agro-ecological set up (livestock production is dominant to sustain the livelihood of society) to market-oriented urban and per-urban dairy production system that exists in mid to upper highlands [35]. There are indications that milk yield among the indigenous animals is variable improving that there are opportunities for improvement [36].

**Accesses Services and Land Inputs:** Dairy development depends on reliable inputs and services such as Artificial Insemination, health service and improved forage seeds supply [37]. Currently, the numbers of AI service centers has been increasing and cover most urban and per-urban areas and some parts of rural highlands [21]. This is an opportunity to improve the genetic potential of indigenous dairy animals in the areas where there is critical shortage of milk and milk products [38]. Cognizant of the fact that diseases and parasitic infestations are economically important to reduce production, several public veterinary clinics have been established across the different dairy production systems in the country, although its efficiency of operation is low [39].

**Demand for and Consumption of Milk:** Although, the contribution of cow milk is dominant, milk from camels and goats are also consumed in Ethiopia, especially in pastoral and agro-pastoral systems of production. In Ethiopia there is long standing and strong culture of consumption of dairy products. In addition to raw milk, milk products, such as butter, cottage cheese, fermented milk (yogurt) and whey are also commonly consumed [4].

**Income Generation and Employment Opportunities:** Dairy farming supports livelihoods of society under low input production systems, generates income and creates employment opportunity under market-oriented production system. Dairy farmers in urban, per-urban and rural dairy production system demonstrated strong interest to expand dairying as one of the means of income generating activity [33].

**Service Providers:** Currently, the number of public universities has reached 31 compared to 9 universities 10 years ago and most of them have programs to train students in the area of animal science and animal health at under graduate level. Agricultural and technical, vocational education training (ATVET) colleges are producing quite a large number of development agents to work grass root levels to meet the demands of farmers [40].

**Research Institution Opportunities:** In Ethiopia, research on dairying started over 5 decades ago. Since the dairy research system has passed through a lot of transformations. The existence of various institutions involved in dairy research and development across the different parts of the country is an opportunity to come up with a solution for challenges that constrain dairy production and for low uptake of dairy technologies in the country [8].

**Indigenous Knowledge:** The existence of diverse production system and agro-ecologies coupled with diverse flora of species rendered the country to have indigenous knowledge, especially in the areas of livestock production and dairy processing. For instance, strong indigenous knowledge exists in the preservation of milk in the agro-pastoral dairy system and milk products in the rural highland dairy system using various sources of herbs [36].

**Prospects of Dairy Farming in Ethiopia:** The future prospects of dairying seems to be bright because the challenges so far indicated and the government is attempting them to address through policies and strategies. Thus, dairy farmers are on the way to getting accesses to services and inputs that could help promote dairy production and productivity. This mainly include feed and feeding, breeding services, credit extension, training veterinary services and appropriate marketing system that address customers demand. Since dairying is labor intensive, it promotes the motto of government policy in creating employment opportunities at household level. This improves employment, income and nutrition values of the family of the producers and the other demanders/consumers. The dairy industry would address and serve as one of the major instrument of the governments' policy in achieving food security. This in turn promotes dairy production due to the attention of given by the government [10].

The development of infrastructure like, transportation would help change the traditional thinking of fresh milk not for sale other than exclusively intended for human consumption among the rural population. On the other side when the rural farmers expose themselves to the market, their income will increase and be in position to buy non-market food types in exchange and thereby improve their living standard. Since the country is an agrarian economy, dairying is much expected to be one of the major targets of the prospective agro-processing industries in the country [41].

As human population increases in the coming 25 years, there will be an increase in demand for milk and milk products in the future in urban areas and, hence, large commercial and market oriented smallholder peri-urban dairy production systems have tremendous potential for development. Strengthen the linkage on the information network system on marketing, production and dairy processing technology including, packaging and prepare action plan and financial statement by law invite general assembly and approve by leadership election [15].

### **CONCLUSION AND RECOMMENDATIONS**

Dairy farming constitutes an important part of the Ethiopian smallholder dairy sector, which plays a crucial role for economic development of the country as a source of feed and income and making it one of the biggest potential producers of milk and milk products. Dairy farm plugged with a number of challenges these include: Health problem, lack of infrastructure, environmental issues and lack of access to credit, reproductive challenges and lack of trained man power are some of the major reason for poor performance of dairy cattle production and cause a huge loss of production and productivity of dairy cattle in the country. Dairy farming also create different opportunities for dairy development such as indigenous knowledge, access services and land inputs, demand for and consumption of milk and create conducive policy and increase diversity, improve quantity, quality and distribution of dairy products in Ethiopia. The future prospects of dairying seem to be bright and much expected to be one of the major targets of the prospective agro-processing industries in the country.

Based on the above conclusion the following recommendations are forwarded:

- Responsible government authority and veterinarian should cooperate for prevention and control of animal disease.
- Government and funding organizations should encourage towards the improvement of indigenous dairy cattle and cross breeding with exotic breeds.
- The Government should ensure proper marketing of milk a long with proper feeding, breeding and improve health practices of dairy cattle.
- Detailed studies should be done on major challenges of dairy cattle production in the future.

- Careful planning of dairy policies and generation of appropriate dairy technologies should be encouraged in order to attain sustainable dairy development in the country.
- Feed utilization systems and adequate veterinary services should be improved.

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