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Review on the status of dairy production and processing in Ethiopia

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Abstract

The livestock production subsector makes a substantial economic contribution to the country by providing a means of livelihood for farmers, creating employment opportunities, ensuring food security, providing services, maintaining social, cultural, and environmental values, and supplying money. High temperatures, frequent plant associations, limited forage production, little rainfall, high prevalence of serious illnesses and parasites, livestock and human carrying capacity, and other variables are some of the key environmental factors restricting dairy production in Ethiopia. These components can be classified as socioeconomic, institutional, biological, or technological. Up to 60% of the milk produced by farmers is consumed at home due to a variety of factors, including market distance, outdated technology for milk processing, and a lack of institutional marketing. Population expansion and urbanization increase demand for milk and milk products even if there are chances to increase dairy production and processing. The number of lending financial institutions is increasing. The government is now looking at this industry as a potential source of employment for young people and is paying attention to the growing awareness among dairy producers. The intermittent promotion of milk and milk products. The low capacity utilization and low volume supply of milk and milk products of Ethiopian dairy development enterprises can be attributed to a number of factors, including management issues, financial strains, and the society's unstable and low processed milk consumption levels caused by the fasting that prevents orthodox Christians, or about 35-40% of the population, from consuming dairy products for nearly 200 days out of the year. Therefore, in order to access the literature on Ethiopian milk processing, including its status, opportunities, and constraints, it was required to review this work.

Keywords: Dairy, milk, production, processing, and Ethiopia

Introduction

The subsector of livestock production contributes significantly to the national economy by supporting livelihoods, fostering employment possibilities, guaranteeing food security, generating revenue for farmers, and maintaining social, cultural, and environmental values^[1]. The subsector, which mostly consists of smallholder farming systems with multipurpose applications, accounts for around 16.5% of the GDP of the country, 35.6% of the GDP of agriculture, 15% of export revenue, and 30% of employment in the agricultural sector^[2].

Ethiopia boasts the largest diversity of livestock in Africa and holds the top spot in terms of livestock potential. Ethiopia receives cash in the form of foreign money from its livestock in addition to food. Ethiopia has a large potential for livestock, but the amount it has received from the dairy and cattle industries in particular falls short of what may be. The reasons for this include the prevalence of problems, poor genetic potential, limited market access, inadequate health care overall in the livestock industry, inadequate infrastructure, the existence of an unofficial market, adulteration of dairy products, and the seasonality of market demand in the dairy sector in particular^[3].

Due to a number of factors categorized as technical or biological, socio-economic, institutional, and others, dairy production in Ethiopia is limited. Some of the primary environmental constraints include low rainfall, high temperatures, low forage production, common plant associations, livestock and human carrying capacities, and the incidence of significant diseases and parasites, which are primarily defined in Ethiopia's lowland areas^[4]. There are 32 dairy plants in Ethiopia, spread across various regions.

The plants began in Oromia, Addis-Ababa, Amhara, Afar, and South Regional State, with an average mean capacity of 30, 119 liters per day across the nation. The dairy industry confronts numerous obstacles, yet as urbanization and population growth continue, there is a growing need for milk and milk products [5].

The main obstacle preventing the efficient use of dairy and dairy products is that, on average, each dairy plant rejects 147.86 liters of milk per day due to defects in the machinery and plastic pouches; in addition, poor quality milk supply (adulteration) and a shortage of quantity and quality packaging material are caused by the nation's inadequate number of factories that produce milk packaging materials, and even those that do so produce below capacity, resulting in subpar packaging materials and delayed deliveries [5].

The smallholder dairy farms barely employ appropriate and state of the art production technology to produce quality milk in demanded by processors and consumers [6]. Products Pasteurized Milk, Cheese, Butter, Yoghurt, Ghee, Cream and Ice Cream Status produced, and Milk Ice, Ice Confection, Flavored Milk, Chocolate Milk, Fermented Skim Milk, Sterilized Milk, Milk Powder, imported Status of diversified dairy products production in Ethiopia Milk processing in the rural area used only traditional milking utensils for collecting or milking, storing and processing were observed. Due to technical and economic constraints, the major dairy products found in the rural area were yogurt-like fermented/sour milk (Ergo), traditional butter (Kibe), traditional ghee (Neter Kib), and cottage cheese (Ayib) [7].

Literature Review

Milk production

The milk production in Ethiopia mainly depended on the milk of cows and the milking months of local breed exist in countries are almost seven months of lactation and cows actually milking potential average milk yield per cow per day is about 1.48 liters day and average. Total cow milk production potential of the country is about 3.89 billion liters [8].

Agro-pastoralists, mixed crop-livestock producers, and pastoralists make up the rural dairy production system, which is a component of Ethiopia's subsistence agricultural system that accounts for up to 98% of the country's total milk output [9-10]. The majority of the milk produced in this system is solely for domestic consumption, and it is not market-oriented [11]. The household's and its neighbors' need for milk, the herd size and production season's capacity for producing milk, and the availability of a local market all influence the amount of milk surplus. After households have satisfied their needs, the surplus is primarily handled using conventional technologies, and processed milk products including butter, ghee, ayib, and sour milk are typically marketed through the black market [12].

The distribution of various animal species that provide milk varies by area. The Oromia Region has the largest number of milking cows and cattle overall, with estimates of 22.5 million (44.17 percent) and 4.4 million (45.6%) of the total population of the country, respectively. The Harari Region had the lowest numbers, with 45 400 cattle overall (0.09 percent) and 11 000 milking cows (0.11 percent). Together, the three areas of Oromia, Amhara, and SNNPR comprise 89.94 percent of the nation's total cattle population and 89.55 percent of its total milking cow population [13]. This

industry is primarily based on the low-producing native zebu breeds, which yield 400–680 kg of milk per cow during a lactation cycle. The majority of the milk produced is kept for domestic consumption because the system is not focused on the market. This system's milk production is characterized by a low yield and a seasonal supply [14].

Upon segmenting the production system into urban and peri-urban dairy systems, the study was able to observe 57 farms producing 0.6 million liters of milk and 199 farms producing 0.8 million liters of milk, respectively. Compared to peri-urban production, the urban production system generated more milk. Farmers may produce 43 liters per home per day in an urban production system and 14.1 liters per household per day in a peri-urban production system due to the presence of a larger number of crossbred (local zebu type x Holstein Friesian) cows [15-16].

Opportunities of milk production

Ethiopia is one of the nations with the lowest production costs in the world for milk production. According to personal communication, labor costs are also lower than in all developed and many developing nations. Additionally, the dairy industry is developing in a way that will create favorable conditions for future improvements in milk processing, productivity, and dairy production, including marketing accessibility, veterinary care, artificial insemination services (AI), and [17]. The dairy producers were justified in continuing their dairy producing operation because of these [18].

The nations have sizable populations of animals and climates that are ideal for raising livestock. The industry has a lot of milk potential, but the resource is not being used to its full potential at the moment. The nation's government provides excellent working conditions and places a high priority on the production and processing of milk. The government has offered professional training, technical assistance, and consulting services in the areas of milk processing, quality assurance, product input, and diversification. The sector is home to several non-governmental organizations. The demand for milk and milk products rises as a result of population growth and urbanization. The financial institution that provides loans expanding. The railway that is currently being built from Addis Ababa to Djibouti presents a significant opportunity to expand the market for milk and milk products. Additionally, the growth of different industry growing is another opportunity [5].

Constraints of milk production

The Main Barriers to Milk Production The lack of grazing land, infectious and parasitic diseases, a lack of land for the cultivation of improved fodder, poor veterinary care, the low milk production potential of local zebu cattle, a lack of artificial insemination (AI) services, and a labor shortage are the main factors affecting the milk production potential of dairy cattle in the majority of Ethiopia [19]. The majority of farmers, according to [20], stated that the primary issue affecting milk production in Ethiopia was a lack of grazing area, with sickness and parasites coming in second. Inadequate veterinary care to address disease outbreaks was another major obstacle to the nation's milk output.

Feed shortage

Regardless of the dairy production method and agro-

ecology, the primary obstacle is a lack of feed, both in terms of quantity and quality. Feed restrictions can be seen from a variety of angles, including quantity, quality, and seasonal feed availability to meet dairy cows' nutritional needs. In order to increase dairy production, roughage and concentrate feeds are either too costly or not readily available in appropriate quantity and quality [21].

The most significant obstacle to improving dairying, according to [22], is the financing lack of feed, which likely limits the milk production capacity of cows with good milk producing ability more than any other single element.

Poor service and inputs

Dairy inputs, AI, market data, animal health, extension, and credit are among the inputs and services that are accessible. The country's deficiency in facilities and skilled AI technicians is linked to the stated inefficiency of the AI service. At the national level, the topic of AI service providing appears to be quite important. Ethiopia's dairy business has not been able to increase its reproductive performance with AI services [23].

Poor health protection and control

According to [24], funding disorders in dairy animals have an impact on the quality, quantity, and reproduction of their milk as well as their mortality and morbidity. The majority of farmers (about 66-86%) in the rural lowland dairy production system of Mieso and Metema identified illness and parasites as the main issues. Major diseases affecting livestock productivity and production in the nation include bloated anthrax, black leg, trypanosomosis, internal and external parasites, and mastitis [21].

According to [19], the main issues with financing the death of animals from diseases were made worse by a lack of veterinary specialists, the accessibility of veterinary care, and inadequate transport facilities. The fact that veterinary services are performing so poorly suggests that regional governments are not giving the cattle industry enough attention. Similar assumption was reported by [21].

Milk product marketing and Seasonality

Season, fasting and non-fasting days, and accessibility to metropolitan areas were among the factors influencing the cost of milk and milk products; to a lesser degree, the quality and sources of dairy products also affected their cost [16]. According to their beliefs, Ethiopian Orthodox Christians fast for 200 days a year - the longest fast being observed 55 days before Easter - abstaining from all animal products, including dairy items. To increase the shelf life of dairy products, producers prepare milk often during the fasting time. The dry season's supply fluctuations are caused by a lack of feed, an increase in demand relative to supply, and the lack of an official milk selling structure [25-26].

Milk Processing

32 milk processing factories were founded in various regions of Ethiopia, according to reports of the number of dairy processing enterprises in the country at various points in time [27]. The nation has 35 operational dairy processing industries prior to it [28]. Similar to this, Ethiopia was home to around 22 medium- and large-scale dairy processing businesses, nine of which were based in Addis Ababa and the remaining ones in other significant regional centers [29]. This suggests that, as other experts have noted, the dairy

industry grows and shrinks over time for various reasons.

The commercial sector is currently in charge of milk processing, although it faces challenges from unfair competition from the unorganized sector and imported dairy products. The quality assurance system is inadequate, and import rivalry is mostly driven by differences in quality rather than price. Shortly after the milking, the purpose of the collection stations is to gather the milk that will thereafter be transferred to the processing facilities. In practice, two hours after milking, the milk should reach the processing facilities. To survive in the increasingly liberalized regional and worldwide markets, processing, quality assurance, and efficiency improvements are essential [30].

Inadequate availability of raw milk for milk processing facilities: This has hampered the production of pasteurized milk and other dairy products and caused the facilities to run at only 40% capacity. Insufficient knowledge of hygienic procedures for processing milk and milk products [31]. Due to cultural attitudes toward milk consumption (a traditional belief that milk is for children, cats, and the sick, as well as local products like butter and ayib that compete with milk sales), there is a strong preference for, and a lack of private sector inputs, this leads to higher milk waste and public health hazards. A lack of infrastructure for the collection and distribution of milk in the dairy market, intentional adulteration of milk, poor handling, transportation, and distribution systems, inadequate fresh milk outlet and spoilage losses during milking for milk value chain actors, and artificial insemination technicians, community animal health workers, business development service providers, animal feed suppliers, etc.

Opportunities of milk processing

The government has offered professional training, technical assistance, and consulting services in the areas of milk processing, quality assurance, product input, and diversification. The sector is home to several non-governmental organizations. The demand for milk and milk products rises as a result of population growth and urbanization. The financial institution that provides loans expanding. The railway that is currently being built from Addis Ababa to Djibouti presents a significant opportunity to expand the market for milk and milk products. Additionally, there is a chance for several industries to flourish [5].

Constraints of milk processing

The main issues facing the nation's milk processing industries were the lack of cold truck vehicles to transport milk from milk producers or collection centers and finished goods to markets or consumers; the supply of milk through unofficial channels; the scarcity of milk in both quality and quantity; the lack of packaging materials in both quality and quantity; the irregular flow of electricity and power interruptions; the absence of factories that produced original milk processing machine spare parts; the lack of skilled labor for machine maintenance and repair; and the nation's propensity for milk consumption. These difficulties have a significant impact on the production and sale of milk [5]. In many cooperative societies, milk from different farms and animals is not screened for zoonotic illnesses, adulterants, or pollutants before it is pooled up at the collection center.

If one of the milk cans is overlooked, this frequently leads to the entire batch of pooled milk spoiling. The wholesomeness and purity of the milk are the most crucial aspects of processing. There have been cases of skim milk powder being cheaply substituted with less-than-standard ingredients, which is unhealthy. Furthermore, farmers who are unable to obtain equitable and compensatory prices for their milk frequently give contaminated milk to collection centers, adding additives to raise the milk's fat content and obtain a higher price per lot. Farmers have been known to add starch, vegetable or animal fat, and other substances to change the milk's fat and solid content [32].

If raw milk is not chilled or preserved, it will quickly ferment and deteriorate when stored in hot and humid climates. However, these kinds of storage facilities are hard to come by in rural regions, and when they are, they are too expensive for smallholder farmers who lack the necessary dairy infrastructure. Cooling systems are also impractical [33]. Every dairy factory rejected, on average, 147.86 liters of milk per day due to defects in the machinery and plastic pouches, as well as low-quality milk supply (Adulteration) [33].

Conclusion and Recommendation

Ethiopia is one of the African countries with a big population of cattle resources. Around 98% of the livestock in the country consists of local dairy cows, with the remaining portion being made up of a small number of improved dairy cows. This state determines the present cattle's potential for milk production. Yet, despite the fact that farmers produce milk, up to 60% of it ends up being consumed at home for a variety of reasons, such as a lack of official marketing, market distance, antiquated milk processing technology, and others.

Ethiopia has a well-established traditional milk processing industry that produces Ergo, butter (Kibe), buttermilk (Arerra), ghee (NeterKibe), cottage cheese (Ayib), and Metata ayib from milk. It also has a modern dairy factory that processes milk to make pasteurized milk, yogurt, and several types of cheese; however, this industry is not very developed. Due to financial and technological constraints, the region's main dairy products were cottage cheese (Ayib), traditional butter (Kibe), traditional ghee (Neter Kibe), and yogurt that looks like fermented/sour milk (Ergo). Many factors, including management problems, financial strains, and the society's unstable and low processed milk consumption levels brought on by the fasting that prevents orthodox Christians, or about 35-40% of the population, from consuming dairy products for nearly 200 days out of the year, can be blamed for the low capacity utilization and low volume supply of milk and milk products of Ethiopian dairy development enterprises.

Ethiopia generally has a lot of animals; however, productivity and production are still low. Consequently, it is preferable to put the following suggestions into practice in order to lessen the bottlenecks in the dairy production and processing industry.

Recommendation

- Create a market channel that is competitive to boost the marketing of dairy products.
- Enhance the current system with greater health care and feed augmentation.
- Employ AI services to boost milk output through the

genetic potential of nearby dairy cattle and the utilization of contemporary, technologically advanced production systems in both rural and urban areas.

- Using feed storage systems and irrigation to plant better fodder for dry seasons.
- Milk processing facilities that can compete in the global market should process dairy products.
- It is recommended that the government provide the necessary infrastructure and services to support cooperatives that process dairy products.
- Improving the coordination of cooperative and private dairy processing facilities to produce premium milk and milk products that can rival those sold on the global market.

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