

Review Article

Review on milk production performance, challenges, and opportunities of dairy cows production in oromia regional state, Ethiopia

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Abstract

This review was conducted to review the information on milk production performance, challenges, and opportunities of dairy cattle production in Oromia. Supported management practices, marketing situations, feed sources, and feeding systems the foremost milk production systems are identified as rural milk production, peri-urban, and concrete milk production. Ethiopia holds large potential for dairy development mainly thanks to an acceptable environment and large cattle number that contains 65.35 million cattle populations. While there is a large milk cow population and favorable climatic conditions, self-sufficiency in milk production is low. The mean values of daily milk yield (DMY) range from 1 to 2.8 liter/day with lactation length (LL) of 6.78 to 9.13 months for indigenous breeds, 6.5 to fifteen liters/day with lactation length of 7.52 to 11.67 months for crossbreed cows respectively. Both DMY and LL were significantly stricken by breed, parity, and year of calving. Challenges for dairying vary from one location to a distinct one. The foremost challenge that affects milk production performance of cattle in Oromia includes feed shortage, high feed cost, land shortage for farming of improved forage, insufficient veterinary services, no operational breeding strategy and policy, and low productivity of the indigenous cattle breeds are the foremost important factor limiting dairy products within the region. Therefore, to enhance these milk production performances of the dairy cow to determine genetic improvement policy, strategy, and breeding program and implement well management practices.

Introduction

Ethiopia is believed to possess the foremost important livestock population in Africa. The overall cattle population for the country is estimated to be about 65.35 million. Out of this total cattle population, the female cattle constitute about 55.90 percent, and also the remaining 44.10 percent are male cattle. The indigenous breeds accounted for 97.76 percent. The remaining are hybrid and exotic breeds that accounted for about 1.91 percent and 0.32 percent, respectively [1].

Ethiopia holds large potential for dairy development mainly due to the appropriate environment [2]. Although there is a large milcher population and favorable climate, self-sufficiency in milk production is low [3]. Accordingly, they contribute a mean of 1.48 liters of milk yield per cow per day, and the annual estimate of total cow milk production in the

country is about 3.89 billion liters with the standard lactation period of seven months [1]. In Ethiopia, an outsized segment of the livestock production sub-sector except for some farms have been managed under an intensive traditional grazing system [4].

Dairy production, among the arena of livestock production, is also a critical issue in Ethiopia where livestock and its products are important sources of food and income, and dairying has not been fully exploited and promoted within the country. Dairy production is traditional in most parts of Ethiopia. Betting on the realm into consideration cattle, goats, camels, and sheep all provide milk for human consumption. However, cattle are the foremost source of milk production capabilities within the country particularly under the smallholder production system [5,6]. Smallholder dairy farms in Ethiopia particularly in regional and zonal cities are alarmingly increasing due to



the high demand for milk and milk products from residents (Gezu et al., 2018). In Ethiopia, considering the potential for smallholder income and employment generation of high-value dairy products, the event of the dairy sector can contribute significantly to poverty alleviation and nutrition [7].

In Ethiopia, the poor genetic potential for productive traits, substandard feeding, poor health care, and management practices, are the foremost contributors to low productivity [6]. Productive and reproductive traits are crucial factors determining the profitability of dairy production [8]. Dairy production in Ethiopia is facing many difficulties like less and fluctuated products price, high and increasing prices of inputs like feed, and lack of land are among the foremost ones which discourage the dairy producers. Though there are constraints that hinder the arena there are plenty of opportunities for its improvement and continuous research is required to tackle problems and sustain dairy development [9]. Additionally, the farming system contains a serious problem with regards to feeding source, feed supply, and also the quantity given per animal below the minimum standard, which entails a reduction in production and reproduction within the farm [10]. So, to enhance the low productivity of local cattle, the selection also as cross-breeding of the indigenous breed with high producing exotic cattle has been considered a practical solution [11]. Crossbreeding work in Ethiopia was initiated to cross indigenous zebu with Holstein-Friesian or Jersey cattle to enhance milk production within the first 1950s [12]. Unfortunately, the activities weren't supported clearly defined breeding policy concerning the number of exotic inheritances and therefore the breed types to be used [12]. Therefore, this paper was aimed to review milk production performance, challenges, and opportunities of dairy cow production in Oromia.

The milk production system of cattle in Oromia

Three milk production systems of cattle were identified in the Oromia region based on the following criteria management practices, marketing situations, feed source, feeding system, herd type and size, land use type, and objective of keeping animals all of these criteria are used in below production systems.

Rural milk production system: The traditional smallholder system is a component of the farming system, which has pastoralists, agro-pastoral, and mixed crop-livestock producers [5,6,13]. The system isn't commercial based and most of the milk produced during this system is left for home consumption [14]. It's roughly corresponding to the rural milk production system and provides 97% of the overall national milk production. Largely, the system is predicated on low-producing indigenous breeds of zebu cattle. The livestock is kept under traditional management conditions and usually obtain most of their feed from native vegetation, aftermath grazing, and crop residues [13]. The highland smallholder milk production is found within the central a part of Ethiopia, where dairying is a type of always part of the subsistence, smallholder mixed crop, and livestock farming [6].

Peri-urban milk production system: Peri-urban milk production has been performed in areas where the population becomes high and also the agricultural land is scarred due to urbanization around major cities [13]. This technique includes smallholder and commercial dairy farmers near Addis Ababa and other regional towns [14]. This system comprises small-sized to medium dairy farms which are capable of keeping improved and native dairy stock (Gebretnsae et al., 2017). The foremost source of feed is both homes produced or purchased hay; and also, the first objective is to induce more cash income from milk sales. This production system is now expanding within the highlands among mixed crop-livestock farm owners like those found in Selale and Holetta and is the main milk supplier to the urban market [15].

Urban milk production system: This system is developed in major cities and regional towns, which have a high demand for milk, and they are the most important source of milk producers. It consists of dairy farms ranging from smallholder to highly specialized, state or businessmen-owned farms, which are mainly concentrated in major cities of the country. Pure exotic and crossbred cows are utilized during this production system. These dairy farms haven't got any access to grazing lands [16]. The most feed resources are agro-industrial by-products, purchased roughage with the primary objective of milk production for generating more cash income [17].

Cattle Milk production Performance in Oromia

Daily milk yield: The primary and most important norm for cattle rearing is earned milk for family use and sale. Milk yield per day per cow remains to be low for indigenous dairy cows compared to crossbred animals. In step with different studies, there was 1.0 ltr in Arsi as reported by Lemma (2005), 3.3 in Ambo, 2.2 Bedalele, 2 in Jimma, 1.9 in Metu, 2.8 in Nakemte, 2.2 in Dembidolo as reported by [18] for indigenous dairy cows. The low productivity of indigenous cows is associated with genetic and environmental factors [19].

In the study performed by (Urgesa, 2015), the typical daily milk yield per cow was 2.08 liter/day around Borana. The overall mean reported daily milk yield of Horro cattle was 1.65 liters [20]. The typical daily milk yield (DMY) performance of indigenous cows was 1.24 liters within the rural lowland agro-pastoral system of Mieso (Azage et al., 2013).

On the opposite hand, crossbred dairy cows provided a substantial amount of milk compared to indigenous dairy cows in several areas of Oromia. Within the studies performed by different researchers, there are 11.6 and 10.8 in Bishoftu and Akaki, respectively as reported by Dessalegn et al., 2016, 15 and 7.5 in Diredawa and Harar, receptively as reported by FAO (2011), 7.8, 4 and 9.3 in Ambo, Bedele, and Jimma, receptively as reported by Ulfina et al. [18]. For hybrid cows, milk production per day per cow of 8 to 10 liters while their hybrid cow's milk production per day is 11 to 15 liters (Tadesse et al., 2015). The estimated mean daily milk yield of crossbred dairy cows was 9.91+0.13 liters per cow per day [21] in Sebata Awas. It's above the report of Sebata and Kalit of 8.9 kg/day (Yoseph et al., 2003b). However, it's smaller than the finding

from Oromia special zone 13.4 ± 4 kg/day (Fikadu et al., 2020). Additionally, the mean daily milk yield per liter per cow in western Oromia was 2.2 ± 0.6 and 6.5 ± 1.6 for local and dairy breeds [18]. Moreover, the typical daily milk yield of crossbred and native cows in Sululta were 9.56 ± 3.010 and 1.809 ± 0.4574 liter/day respectively. Moreover, the milk yield for crossbred and native cows in the Wolmera areas were 8.60 ± 2.703 and 1.96 ± 0.8193 liters/day, respectively [22].

The overall estimated daily milk yield from the Arsi breed around the Ziway area was about $(1.5 \pm 0.3$ kg/day) [23]. This can be accepted as true with the national average daily milk yield of 1.48 liter was reported [1]. In another area of the region, a lower daily milk yield reported [24] in the Mieso district 1 kg/day and 1.2 kg/day [25] was reported for local cows. Which is extremely low due to poor genetic make-up and lack of feed and poor management conditions (Mulugeta, 2005), and also shorter lactation length. Milk production per day per head is extremely low and this could be further affected by relatively short lactation length and extended post-partum anoestrus resulting in low production efficiencies (Azage, 1997).

Lactation length

Lactation length is the time through which a cow continues giving milk in one milking time. Lactation yields milk production throughout the lactation period and is incredibly much affected by lactation length. Milk yield is also measured in terms of lactation yield, 305 days lactation, or annual yield. 305 days of lactation can be a reference lactation yield and is indicative of

the milk production capacity of animals. Indigenous dairy cows had (9.13 months) shorter lactation length than crossbreeds (11.13 months) [26] in the North Shoa zone. This one is comparable reported by Keberu B [27], the standard lactation length of crossbred dairy cows was (330.7 days/11.02 months) in the Agarfa Multi-purpose training center. The upper result was reported by Enyew et al. [28] for crossbred cows (11.67 months) within the Asela research station. Belay Duguma [29], in his study, revealed that Lactation Length for Holstein-Friesian x Zebu crossbred animals were 9.13 ± 1.99 months in Jimma town. On the opposite hand, the shorter finding reported by Fikadu et al. (2020), was the lactation length of crossbred cows (7.52 ± 0.8 months) in the Oromia special zone.

The mean of lactation length reported by Ulfina et al. [18] for various Oromia regions higher lactation length were reported from Gimbi 10.1 and lower from Baddalle 7.5 overall mean of 8.8 months. Similarly, [30] reported that the standard lactation length for local cows was 8.96 months within the Dandi district. The overall estimated mean lactation length of cows within the Highland system was 296 days/9.8 month reported by Zewdie W. [23]. This agrees with 9.8 months reported by Adebabay et al. [31]. But, under the report [23] that was 321 days/ 10.7 months around Ziway was slightly longer. Another report indicated that the mean lactation length of indigenous dairy cows was 7.29 months [24] which is analogous to the report of CSA [1], the average lactation length 7 of months. The lower lactation length was reported by Asefa et al. [32] which is 6.78 months (Figure 1).

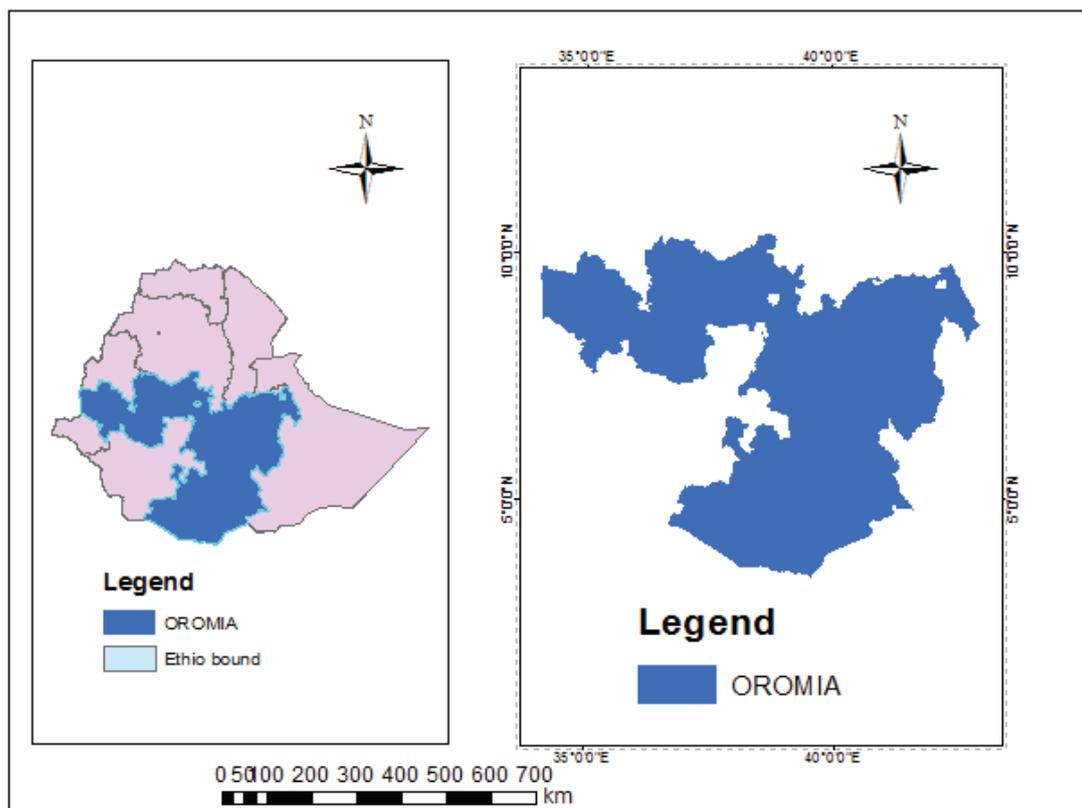


Figure 1: Map of the review area.



Challenges of dairy cow Production

A major constraint altogether production systems is the dearth of animal feeding. Land shortage for establishing improved forage, genetic limitation, limited access and high cost of concentrated feed, Availability and high cost of dairy heifers/cows, no operational breeding strategy and policy, low coverage of veterinary service provision, lack of coaching and capacity development opportunities, weak linkages between research, extension providers and technology users, inadequate extension and training service, milk market-related constraints, reproductive problems, lack of research and knowledge exchange system, socio-economic challenges and inadequate access to credit and financing to the dairy farmer [33].

According to a study by Musa et al, [34] around West Hararghe, there are different challenges faced in dairy production. These include shortage of feed, shortage of water, inadequate access to veterinary drugs and services, lack of improved dairy animals, and inadequate extension. High feed cost, land shortage, space limitations feed quality, and availability also as inadequate extension and veterinary services were the most dairy production system constraints in both Arsi urban and peri-urban areas. High feed cost was the primary constraint in the urban dairy production system of Holetta, Bishoftu, Sululta, Assela, and per-urban Sululta, Bishoftu, Holetta, and Assela Kiros A, (2019).

Inadequate supply of quality feed and low productivity of the indigenous cattle breeds are the most factor limiting dairy products within the region Ulfina et al, [18]. In line with a study by (Urgesa, 2015) in Borana, the low production can be due to a spread of factors including lack of proper supplementary feeding of the cows, the poor nutritive value of pastures and forages offered to the animals, and lack of dairy husbandry training to boost productivity.

Opportunities for Dairy Production

There is an existing culture of milk and dairy products production and consumption. Population increment and also increasing urbanization favor the consumption of more animal products. Also, the emerging middle-class segment of consumers in urban centers is receptive to new products, including dairy products [33]. Urban and peri-urban stated that the top demand for milk consumption is because of the most opportunity for dairy production [9].

According to Azage et al. (2006) urban and peri-urban dairy production systems could contribute to overall development through income generation and employment opportunities. Indicated some Studies within the highland of Ethiopia that dairying generated 34% of the whole household income of farmers within the Holleta area Mohamed et al. [14]. The dairy sub-sector has economic relevance and potential for employment creation. The sustained growth and also the positive economic outlook of Ethiopia are favorable to investments within the dairy sub-sector [33].

Other opportunities are increasing ever-sustaining demand by the community for milk and milk products and provoking prices for these products. Particular attention should be paid to increasing the role of women in dairy development since the study shows that they play a major role in dairy production and marketing [34]. Environmental conditions are favorable for the dairy sub-sector. There is a substantial cattle population and a relatively high level of improved breeds; The establishment of the Integrated Agro-Industrial Park will provide market opportunities for dairy producers [33,35-41].

Conclusion and recommendation

Conclusion

Dairy cattle production could be a vital enterprise and have a high potential for economically viable, improved family nutrition and income and employment generation. The target of this paper was to review Milk Production Performance, Challenges, and Opportunities of dairy cattle Production in Oromia. In general, this paper showed that indigenous breeds had lower daily milk yield and lactation length than crossbreeds. Milk yield was highest for crossbreeds. The extreme variability in milk yield observed, between and within breeds during this paper will be attributed to genetic, change in climatic and management factors.

Generally, from this review lack of animal feeding in terms of quality and quantity, high feed cost, land shortage, genetic limitation, limited access and high cost of concentrated feed, no operational breeding strategy and policy, low coverage of veterinary service provision, lack of coaching and capacity development opportunities, weak linkages between research, teaching providers and technology users, inadequate extension and training service, poor management of animals, lack of market-oriented production were the primary as constraints of dairy cattle production. With the prevailing bottleneck problems, there are many opportunities for dairy development in Oromia. Therefore, coordinated efforts are necessary to handle the identified constraints across the assorted dairy production systems.

The way forward:

- Farmers have a lack of awareness of the use of improved forages and hence consolidated extension is required.
- It needs government and private investors' participation in the establishment of feed processing centers so on provide a feed with a daily quality and a decent price.
- Farmers should train different aspects of improving cattle productivity by considering productive traits for improvement of sustainable milk cow production and productivity
- Improving the technical efficiency of milk production which enable the farmer to provide maximum output under a given set of inputs and technology must lean due consideration.



- Promoting farmer's organization and provision of coaching contribute to the event of the world

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