

# Assessment on determinants of dairy cattle production and productivity in Wolaita sodo town, Wolaita zone, Southern Ethiopia

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Received on: 09/01/2026

Accepted on: 11/05/2026

Published on: 19/05/2026

## ABSTRACT

**Aim:** Main purpose of the study was to investigate the existing major challenges to dairy production from farmers' viewpoints.

**Method and materials:** Multistage sampling method was employed to drawn data needed for the study, so that the study district and kebeles were selected by purposive sampling and simple random sampling techniques was used to select the sample respondents and about 125 respondents were included from four purposively selected kebeles. Data was collected from both secondary and primary sources generated through exhaustive desk review around the issue in hand and structured questionnaire. To generate qualitative data, field observations; informal interview with key informants was conducted.

**Results:** The majority of the dairy producers (36.8%) were included at age group of 41-50 and 23.2%, 21.6% and 18.7% of household heads were categorized under age categories of 51-60 years, above 60 years and 31-40 years respectively. About 17.6% of the respondents responded that feed shortage was the main determinant of cattle productivity in the study area. Animal diseases were found to be the major challenges limiting dairy sector in the town taking the first rank among the major challenges which accounts about (22.4%).

**Conclusion:** It was concluded that coordinated efforts are required to address the constraints through technological innovations across to improve the productivity.

**Keywords:** Determinants, Dairy cattle, Production, Sodo town, Small Scale Farming

**Cite This Article as:** Kalacho ND and Aydiko AA (2026). Assessment on determinants of dairy cattle production and productivity in Wolaita sodo town, Wolaita zone, Southern Ethiopia. *J. Vet. Res. Adv.*, 08(01): 01-08.

## Introduction

The livestock sector is highly dynamic and contributes 40% of the global value of agricultural output and support the livelihoods and food security of almost a billion people (Eyob *et al.*, 2020; Kena *et al.*, 2022). Ethiopia is known for its highest livestock population in Africa. The estimated domestic livestock population is 70.29 million cattle, 42.9 million sheep, 52.46 million goats, 8.14 million camels, 57 million poultry, 2.14 million horses, 0.38 million mules, and 10.79 million donkeys (CSA,2020/2021). The livestock subsector has an enormous role in Ethiopia's national economy and livelihoods, contributing about 16.5% of the national Gross Domestic Product (GDP) and 45% of the agricultural GDP.

It also contributes 10% of export earnings and 30% of agricultural employment and the subsector supports and sustains livelihoods of 31 to 48% of households as an income source (FAO, 2019).

Though different classifications have been used to characterize the dairy production system in the country; based on their locations, climate, land holdings and integration with crop production as criterion classified into three broad categories, namely, urban, peri-urban and rural dairy production (Galmessa *et al.*, 2013; Tsegay and Gebre-egziabher, 2015). The rural system contributes to 98%, while the peri-urban and urban dairy farms produce only 2% of the total milk production of the country (Lemma *et al.*, 2009).

Ethiopia where livestock and its products are important sources of food and income, and dairying has not been fully exploited and promoted in the country (Sintayehu *et al.*, 2008). Ethiopia holds large potential for dairy development due to its large livestock population, the favorable climate for improved, high-yielding

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animal breeds, emerging market opportunity, improved policy environment for involvement of private sectors, and the relatively disease-free environment for livestock. Given the considerable potential for smallholder income and employment generation from high-value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country (Galmessa *et al.*, 2013). This sub-sector contributes to Ethiopians' livelihoods by providing vital sources of food and income. The dairy industry accounts for around 13.7 percent of overall agricultural output and 39.4 percent of total livestock output (Kebede *et al.*, 2024). Smallholder dairy farming comprises the major milk production in the country and cattle are the main source of milk. About 65% of the total milking cows are found in smallholder mixed farming system and produce about 72% of the national milk production per year. Ethiopia's total annual milk production comes from 7.5 million milking cows and is estimated to be 4.96 billion litres, that is, 1.48 L per cow per day (Mebrate *et al.*, 2019).

Despite the existing high potential for dairy development due to huge livestock resources, conducive climatic conditions and urbanizations, the performance of the dairy industry in Ethiopia has not been encouraging when evaluated against even the dairy performance of Eastern African countries (Milkessa and Tamiru, 2021; Yassin *et al.*, 2022). The milk production per cow per day is very low in Ethiopia. The average lactation period per cow during the reference period at country level is estimated to be about 6 months, and average milk yield per cow per day is about 1.371 litres (Getachew *et al.*, 2022).

Dairy production in Ethiopia is facing many difficulties such as shortage of feed at the end of dry, land shortage for establish improved forage, high price of dairy cattle, lack of accurate breeding strategy and regulation, insufficient health related service provision, poor linkage among research, technology users and extension service providers, insufficient training service, milk and milk product marketplace connected problems, genetic limitation or poor fertility rate of some dairy cattle, absence of research, shortage of information conversation organization, lack of education and consultation, socio-economic problems and inadequate access of credit to the dairy cattle keeper (Lidetu, 2019; Yassin *et al.*, 2022; Jebessa *et al.*, 2024).

Even though dairy farms are a source of income

and job creation opportunities to the dwellers and dairy farms households, However dairy cattle producing farmers are suffering from different challenges like getting minimum advantages from dairy production opportunities (Getachew *et al.*, 2022). The sector also facing several challenges like the variation in cost, return and usage of important inputs between traditional (local) and modern (cross) urban dairy farms.

As dairy sector in other parts of Ethiopia in Wolaita zone also the same common problems manifested in dairy sector. There are a number of constraints and limiting factors in Wolaita zone that affect the success and profitability of dairy production systems. Therefore, this present study was aimed to investigate the existing major challenges to dairy production from farmers' viewpoints. The information from the study provides information for the development and implementation of appropriate interventions that can contribute to the sustainable dairy production.

### Materials and Methods

A cross-sectional study was conducted from July 2024 to October 2024 in the Sodo town administration of Wolaita zone to assess the determinants of dairy cattle production and productivity in the study area. The data used were quantitative and qualitative in their characteristics, and both primary and secondary data sources were used based on standardized question to collect data.

*Method of data collection:* This study employed both qualitative and quantitative methods of data collection. Data was collected from both secondary and primary sources generated through exhaustive desk review around the issue in hand and case study and structured questionnaire. Primary data was collected using semi structured questionnaire from sample households. Secondary data was collected using reviewing and careful examination of documents, research reports, published and unpublished writings, different journals and websites. It is also be collected from agricultural and livestock sector and governmental bodies concerned for the sectors. A formal and informal survey was conducted to gather information.

*Sampling size and Sampling Technique:* For the current study, multistage sampling method was employed to drawn data needed for the study. Both purposive (non-probability sampling) and simple random sampling techniques (probability sampling) was used to select the kebele

administration and sample respondents. Simple random sampling technique was used to select sample Kebele administration. By applying multi-stage sampling technique, in the first stage, Sodo town was selected purposively among 12 woredas and 6 administrative towns of Wolaita zone based on the availability of extensive agricultural production system practice in the area and access to transport for current study. Among the all kebeles found in Sodo town 4 kebeles were selected purposefully because of the relative access to transport, availability of livestock resources and dairy farms. The chosen kebeles included in the study were Kokate, Otona, Konto and Fana womb. Lastly from 325 households involved in dairy cattle production from these kebeles, about 125 respondents were selected from the four kebeles by using simple random sampling technique. (I.e. by using lottery method).

The sample size for this study was determined using Yamane, (1967) formula which is a simplified formula for proportion by assuming 50 % of population proportion, with a confidence level of 95%, and tolerable precision of 7%. Hence the sample size for this study can be drawn as:

$$n = \frac{N}{1+N(\epsilon)^2}$$

Where: n = sample size

N = total number of households having dairy cattle from four kebeles accordingly

$\epsilon$  = margin of error (7%).

Hence the above formula shows that the actual sample size for this study is 125. This number will be proportionally distributed to four kebeles included in the study.

*Method of data management and analysis:* The data quantitative and qualitative data collected during the study period was organized and entered into Microsoft excel 2010. The data collected was analyzed by using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics, such as mean, tabulation, percentage and frequency was used to present summary statistics of quantitative data pertaining to demographic, socio-economic, and recorded characteristics of sample households.

## Results and Discussion

### *Demographic Characteristics of the Respondents*

The information on socio-economic demographic characteristics of the respondents in the study areas

was recorded based on the questionnaire survey obtained from 125 households heads and summarized (Table 1). Accordingly, male respondents were dominant (75.2%) at both smallholder farmers and dairy farms of rural, urban and peri urban areas than female household heads (24.8%). It was in agreement with similar report from different parts of Ethiopia such as (Samuel, 2020; Getachew *et al.*, 2022). The increase in number of male dairy producers in study district might be due to socio-cultural attitude of societies of the study area and the difference in gender over share of power on properties and communications.

In the study district, the majority of the dairy producers (36.8%) were included at age group of 41-50 and 23.2%, 21.6% and 18.7% of household heads were categorized under age categories of 51-60 years, above 60 years and 31-40 years respectively. This indicate that the majority of livestock herders in town were adults; which could be due to the fact that dairy required a higher investment and it can take longer time to accumulate wealth before being engaged in dairy business.

The educational background of the respondents in study district was seen as, about (36.8%) of the respondents have completed college level and above followed by(28.8%) who had secondary education certificate and about (20%) had primary level education status; and only 14% of respondents were illiterate; Which indicate that dairy cattle owners in the study areas were mainly literate; suggesting that with good extension and training program they can improve their dairy production and marketing, as education is entry point for enabling of community and tool for sustainably improves dairy production through knowledge, attitude and skill (Samuel, 2020; Tsegaye *et al.*, 2022).

According to the present investigation, the majority (54.4%) of family size was failed between 1 and 5 in number, followed (45.6%) of households were having greater than 5 family size. It was known that family size influences the availability of labour in households for dairy cattle management.

The marital status of dairy producers indicated that about (72.8%) of farmers were married and (27.2%) were un-married (Table 1). This implied that marital status could contribute to difference in production between the married and unmarried respondents in that, a household with a married

Table 1. Demographic Characteristics of the Respondents

Categories		Kebeles				Over all Percentage
		Fana	Kokate	Otona	Konto	
Sex	Male	14	32	26	19	94 (75.2%)
	Female	4	11	5	11	31 (24.8%)
Age	30-40	4	8	6	15	23 (18.7%)
	41-50	12	17	10	7	46 (36.8%)
	51-60	-	7	11	4	29 (23.2%)
	Above 60	2	11	4	4	27 (21.6%)
Education level	Illiterate	-	8	5	5	18 (14.4%)
	Primary	4	12	5	4	25 (20%)
	Secondary	4	7	13	12	36 (28.8%)
	College and above	10	18	8	9	46 (36.8%)
Family size (in number)	<5	7	22	15	14	57 (45.6%)
	>5	11	23	18	16	68 (54.4%)
Marital status	Married	9	36	25	21	91 (72.8%)
	Unmarried	9	7	7	11	34 (27.2%)

Table 2. Characterization of farm husbandry practices in the study area

Variables	Categories	No. of households observed	Percentage
Herd size	Small	78	62.4%
	Medium	45	36%
	Large	2	1.6%
Production system	Extensive	35	28%
	Intensive	54	43.2%
	Semi intensive	36	28.8%
Cattle breeds kept	Exotic	22	17.6%
	Cross	78	62.4%
	Local	25	20%
Purpose of the farm	Home consumption	42	33.6%
	Source of income	83	66.4%
Land use	Land use for crop-livestock	74	59.2%
	Land used for livestock only	17	13.6%
Housing	No land	34	27.2%
	Concrete	34	27.2%
	Mud	71	56.8%
	Mixed	20	16%

Table 3. Major challenges of dairy sector in the study area

Constraints	Number of respondents	Percentage (%)
Availability and costs of feeds	22	17.6%
Animal genetics	7	5.6%
Market access and marketing system	17	13.6%
Animal diseases	28	22.4%
Inefficient AI services	11	8.8%
Land shortage and space	12	9.6%
Shortage of budget	17	13.6%
Inadequate extension and veterinary services	11	8.8%
Total	125	100%

couple tends to have more labour capital for dairy farming, which is mostly a labour-intensive activity when practiced in small scale in Ethiopia.

#### *Characterization of farm husbandry practices in the study area*

In the study area, based on own observation and interview results of respondents, among dairy cattle management systems identified; majority of households (43.2%) were categorized under intensive production system followed by (28.8%)

semi-intensive farming system and (28%) were categorized under extensive farming. The intensive farms were mainly found in centers of the town which were characterized by dominance of purebred cows and crossbred cows, which are restricted in closed housing and managed by zero grazing, fed from purchased hay and concentrates.

According to current investigation, it was found that majority (62.4%) of dairy cattle produced in the

town were crossbred cows (Jersey and Holstein freisan with local zebu) and about 17.6% of dairy cows were pure exotic cows, and the rest 20% were indigenous cattle. Of the surveyed households, the majority of respondents had cross bred dairy cattle genotypes, which could be attributed to lack of supply, their high prices when available and poor adaptation to the local production environment (Misgana *et al.*, 2015).

Housing of dairy cattle is important for protection of the animals from adverse climatic conditions and to confine or control the animals. Most of respondents in study area (56.8%) used separate sheds made from mud and about 27.2% of dairy houses use concrete floor for dairy cattle production. Cattle houses in areas were constructed from locally available materials; mainly woods. The floor of livestock houses was made of earthen material. It was observed that in most of houses, cattle housed with the family for the fear of thieves, to protect animals from extreme environmental hazards and for ease of husbandry practices such as feeding, watering, milking and waste management. This investigation was in agreement with report of Tesfaye and Wondossen (2019), Asrat *et al.* (2015).

In study district majority of households (farms) have small sized livestock herds (62.4%) followed by medium sized herds (36%) and only 1.6% of farms have large herds. This might be related to the capital owned by the households (Table 2).

#### *Major Constraints of dairy cattle production identified in Wolaita Sodo town*

Challenges and problems for dairy development vary from place to place (Miressa *et al.*, 2021). According to the respondents in study area there were various challenges facing dairying industry (Table 3).

Inadequate livestock extension service is the major constraint in dairy value chain in the study area. Livestock extension services requiring fodder production and feeding schemes, husbandry (particularly calf rearing), dairy hygiene, demonstration of dairy technologies, market information utilization, among others are needed. Animal health and breeding services can best be handled by specialized professional services. During the current investigation inadequate extension services was one of the potential constraints to dairy cattle production and productivity which raised by 8.8% of the respondents. Indicated that the contact between extension serve agents and dairy producers was

weak and infrequent. Poor extensions along with high cost of veterinary services collectively make the animal health poor. The current investigation agreed with reports of Wondimu and Ephrem (2019) and Berhanu (2012).

One of the major constraints that the dairy sector in Wolaita Sodo town was lack of access to land for establishment of a dairy farm and for forage production. Dairy farms under this system are under tremendous pressure to expand dairying mainly due to rapid urbanization and population growth. It was observed that about (13.6%) of the respondents indicated that it was very difficult to get land for establishment of dairy farms in the town. Most urban producers keep their cattle within their residential compound. This was in agreement with the report from Diredawa (Seifu and Doluschitz, 2014; Yassin *et al.*, 2022).

Shortage of feeds and feed cost was the main constraint of cattle production in the study area. The result of this study indicates that about 17.6% of the respondents responded that feed shortage was the main determinant of cattle productivity in the study area. The current observation was in agreement with Asrat *et al.* (2015), Misgana *et al.* (2015); Tsegaye *et al.* (2022). The quantity and quality of feed supply is challenging for the dairy sector. Also, the price and supply of feed and fodder in the area had been a hindrance to the livestock sector, especially peri-urban, urban areas. This might be associated with the shortage of land for forage production and most of the feed for animals was obtained from nearby markets. Poor nutritive values of feeds lower the production capacity and fertility potential of animals. If fed well, 20-25% more milk could be produced from the same livestock (Getachew *et al.*, 2022; Abraha, 2015).

The breed composition was also the major challenge observed in the study area, so that most of the farmers owned low blood level cross bred cows and local zebu cows; so that the productivity was much low as compared to pure exotic cows. This record agreed with reports of Milkessa and Tamiru (2021). As compared to breeds originated from temperate areas, cattle breeds originate from the Tropics generally have a limited genetic potential for milk production. The large cattle population of Ethiopia had relatively limited numbers of exotic dairy cattle and their crosses (Abraha, 2015).

Animal diseases negatively influence

production and reproduction in dairy cows (which found to be one of the challenging issues for dairy development in the country (Milkessa and Tamiru, 2021). In current study, Animal diseases were found to be the major challenges limiting dairy sector in the town taking the first rank among the major challenges which accounts about (22.4%). The respondents complained that diseases were impacting dairy production in many ways such as reduced body weight, growth rate, low milk production, and reproductive performance, mortality and high treatment cost. The reason behind this might be due to limited animal health service delivery, shortage of veterinary drugs, lack of veterinary laboratory services and lack of timely vaccination. The current observation was in agreement with Tsegaye *et al.* (2022), Eyob *et al.* (2020).

### Conclusion

Production constraints determine the state of dairy cattle production in the study areas. Some of the constraints mentioned by the farmers in the current study area are, Shortage of feed resources, poor breeding genotype, animal diseases, undeveloped market access and marketing technologies and shortage of land and capital are the major challenges limited dairy production. Therefore, coordinated efforts are required to address the constraints through technological innovations across to improve the productivity.

Based on the above conclusion, the following recommendations were forwarded:

- Feed availability is low both in quality and quantity hence strong extension service on use of concentrate feed, grazing land management system, and development and utilization of improved forage is very important.
- Diseases are among the major constraints; therefore, dairy owners should be trained with good management practices and the government should expand enough veterinary services and better health care.
- Marketing linkage between the producer and consumer of milk products should be created and developed.
- Improved and breed and breeding technologies should be in place to improve milking potential of cows.
- Awareness should be created among dairy farm owners concerning basic animal nutrition and health management for the increment of dairy products.

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