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Determinants of Profitability in Dairy and Poultry Enterprises: Evidence from Bonga, Mizan Aman, and Tepi Towns, Southwest Ethiopia Region

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Abstract

This study aimed to analyze the determinants of profitability in dairy and Poultry Enterprises: Evidence from Bonga, Mizan Aman, and Tepi Towns, Southwest Ethiopia. It examined production status, productivity, profitability, and SWOT conditions of livestock enterprises. A cross-sectional design was used, with quantitative and qualitative data collected from 120 enterprises 63 dairy and 57 poultry between October and December 2025 using questionnaires, interviews, and observations. Data were coded in SPSS 26 and analyzed using STATA 14 through descriptive statistics, profitability analysis, and OLS regression. The findings show that both enterprises were profitable, with dairy more profitable than poultry, and productivity is significantly influenced by education, dairy /poultry size, veterinary services, production system, and resource access. The study concludes that livestock enterprises have strong potential, and recommends strengthening veterinary and extension services, improving input supply, and enhancing production infrastructure.

Key Words: Dairy production, Determinants, poultry production, Profitability, OLS Regression

1. Introduction

Ethiopia has the largest livestock population (ESS, 2022), including an estimated 59.5 million cattle, 30.7 million sheep, 30.2 million goats, 8.43 million donkeys, 2.158 million horses, 0.409 million mules, and 1.2 million camels. Despite the abundance of livestock resources and the immense potential for increased livestock production, livestock productivity, and commercialization remain poor (Mebrate *et al.*, 2019).

Livestock agriculture, which includes dairy, poultry and beef fattening, plays a crucial role in the economies of many developing countries, including Ethiopia. It contributes to people's livelihoods through various avenues such as food production, income generation, employment opportunities, savings, and insurance. Additionally, it holds significant importance for smallholder farmers as it ensures regular income, self-sufficiency, and food security on a daily basis (Kassa and Yishak, 2022).

According to the Ministry of Agriculture (MoA) and the International Livestock Research Institute (ILRI) in 2022, the dairy, poultry and beef fattening plays a crucial role in livestock production in Ethiopia and significantly contributes to the country's economic development. Furthermore, dairy products have long been recognized as highly nutritious and valuable sources of food for humans, with millions of people in Ethiopia consuming them in various forms on a daily basis (Amentie *et al.*, 2016).

Nationally, the total annual milk production, 54.28 percent was used for household consumption, 10.02 percent was sold, only 0.23 percent was used for wages in kind, and the rest 35.46 percent was used for the production of butter, cheese, and the like (ESS, 2022). The lagging increase in domestic production can be explained by the fact that most producers in Ethiopia in general and South west region still employ traditional rural poultry farming systems although an increasing demand for poultry kept under modern and more hygienic conditions has been observed (FSRP urban need assessment, 2024). Rural poultry farming is by convention a subsistence system comprising stocks of nonstandard chicken breeds or mixed strains, types, and ages (FSRP, 2024). A majority of the farmers operate in these traditional, small-scale structures.

Southwest Peoples Region is the highest potential region in livestock production in general and particularly in production of dairy, poultry, and beef fattening (FSRP report, 2024). The average productivity of cattle is 1.65 L/day/cow, with a total annual milk yield of 667,562 tons and 40-60 eggs annual from endogenous chicken (ESS, 2022). According to the Southwest Peoples Region (Kaffa, Bench Sheko, Sheka, Dawro, Konta, and West Omo), the total number of dairy cows in the region is 2,004,363, from which 933,225 tons of milk is produced annually. However, the productivity of the livestock resources and the benefits obtained from the sector do not match the high livestock population (ESS, 2022).

Unlike other parts of the region, Kaffa, Bench Sheko, and Sheka Zones are well-known for their livestock population, with well-suited agro-ecology and vegetation cover for many years, offering high potential for dairy products Southwest Bureau of Agriculture (SWBOA, 2022). Despite this high potential, milk production per cow per year is low, and the production is very fragmented and uncoordinated in these zones compared to their potential (Kassa and Yishak, 2022). This may be due to a lack of access to land, low awareness of profitability, and poor extension services (FSRP report, 2024).

According to FSRP need assessment report (2024), diseases and seasonal availability of feed resources are the main factors affecting the productivity of dairy, poultry, and fattening in the Southwest. Besides to this, it was indicated that a feed shortage especially 70% for poultry was considered as a significant barrier. The same like poultry, for fattening that affects the productivity and output of that are being fattened in addition to low-graded shelter, and insufficient initial capital. As a town-level, the trends and profitability of dairy, poultry and fattening production are affected by factors such as land size, access to feed, costs, access to inputs (veterinary services), low awareness, access to the market, access to credit, poor livestock management, and poor value addition practices (FSRP urban agriculture report, 2024). Although the study areas have high potential for dairy, poultry and fattening production at the towns level, the production trends and factors affecting profitability across dairy, poultry and fattening production have not been well studied and documented. Identifying the production trends in dairy, poultry and fattening production at the enterprise level will enable policymakers to design and implement effective policies and programs based on urban agriculture. While there have been several studies regarding dairy production in the Southwest Region, none have empirically investigated the trends and

determinants of dairy, poultry and fattening production at the enterprise level in Bonga, Mizan Aman, and Tepi Towns in Southwest Ethiopia. Therefore, this study will be conducted in order to answer the following objectives.

1.1.Objectives of Study

General objective

To analysis the trends and determinants of profitability of dairy and poultry enterprises in urban areas of Southwest Ethiopia.

Specific objectives:

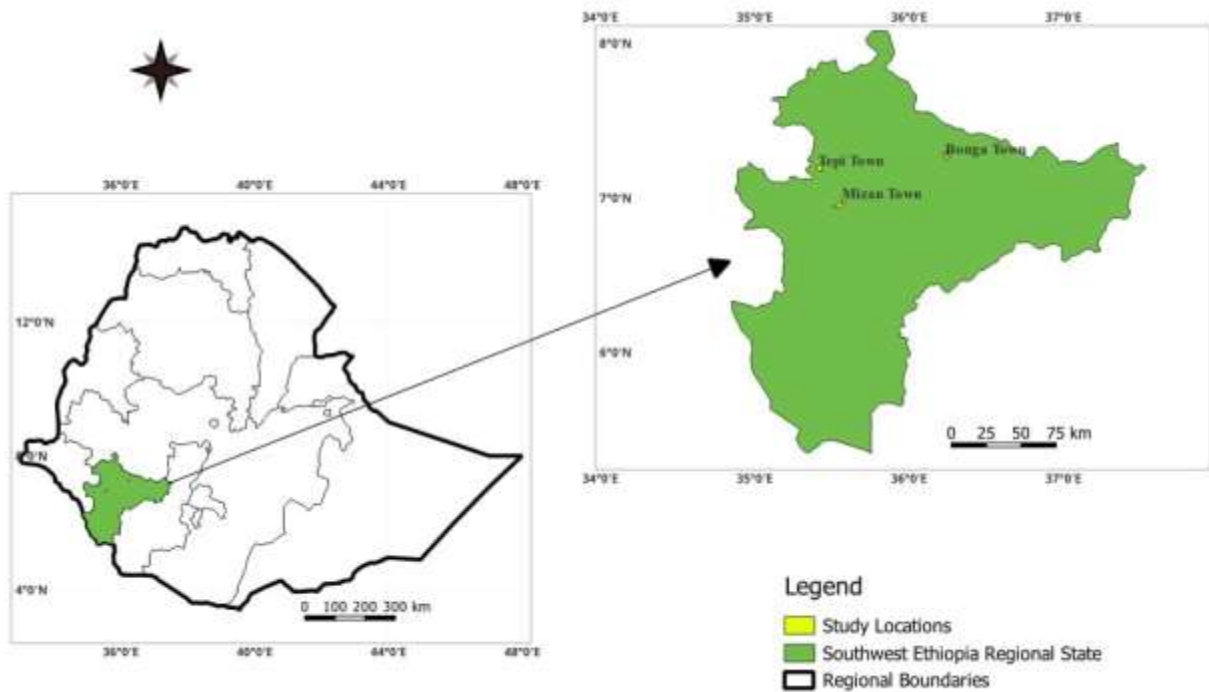
- ✓ To examine the status of dairy and poultry production and productivity.
- ✓ To identify the determinants of dairy and poultry enterprise production.
- ✓ To examine the profitability of dairy and poultry enterprises.
- ✓ To identify a Strengths, weaknesses, opportunities and Threats (SWOT analysis) of dairy and poultry enterprises.

2. Research Methodology

2.1 Study Area

This study was conducted in three towns of Southwest Ethiopia: Mizan-Aman, Tepi, and Bonga, using a community-based cross-sectional study design to identify the determinants of dairy, poultry and enterprise production. Mizan-Aman, the capital of Bench Shako Zone, is located approximately 560 km southwest of Addis Ababa, at about 7°00'N latitude and 35°35'E longitude, with an elevation of around 1,451 meters above sea level. The town consists of five kebeles and had a total population of about 50,113, of which 24,555 were male and 25,558 were female, along with relatively well-developed health infrastructure (Asrat *et al*, .2017). Tepi is located about 621 km southwest of Addis Ababa at approximately 7°12'N latitude and 35°27'E longitude, with a mean elevation of 1,097 meters above sea level. The town is well known for its coffee and spice production, and according to the Central Statistical Agency population projection, it had a total population of about 60,160 in 2017 (CSA, 2017). Similarly, Bonga, the administrative center of Kaffa Zone, is located approximately 460 km southwest of Addis Ababa at about 7°16'N latitude

and 36°14'E longitude, with an elevation of around 1,714 meters above sea level. The area is characterized by high rainfall, dense natural forests, and favorable agro-ecological conditions for agriculture, particularly coffee production, as it is recognized as part of the origin of Arabica coffee (CSA, 2017).



Map of study Area

2.2 Research Design

The cross-section data design was implemented. The research employed both quantitative and qualitative methods used to collect primary and secondary data from October to December 2025

2.3 .Sampling technique and Sample size

A two-stage purposive sampling technique was used. First, the Bonga, Mizan Aman and Tepi towns were selected purposively based on FSRP support as urban agriculture. Second stage enterprises was selected based on, participation in dairy, poultry and fattening after consultations with urban agriculture experts.

Lastly, respondents was purposively selected and then interviewed after observing their dairy, poultry capacity. A structured questionnaire was prepared and utilized for data collection from the

purposively selected enterprises' manager. A total of 120 livestock enterprises were surveyed in the study area. Of these, 63 were dairy enterprises, while 57 were poultry enterprises. This distribution indicates that dairy enterprises slightly outnumber poultry enterprises, although both types of enterprises are almost equally represented in the sample.

2.4. Methods of data collection

Both primary and secondary data was utilized in this study. The primary data were collected through structured questionnaires and observations focusing on dairy cow, and poultry management. Additionally, secondary data were gathered from sources such as the Ethiopia Statistics Service (ESS), unpublished reports from the Bureau of Urban Agriculture, journal articles, theses, and FAO.

The primary data was encompass the entirety of the dairy, and poultry, including its production trends, obtained directly from enterprises. This was involve identifying production trends, determining factors affecting production and productivity within each town, and conducting a SWOT analysis. Furthermore, the primary data was encompass information on marketing challenges specifically threats, marketing functions, facilities and services, as well as other socioeconomic variables relevant to the research.

Discussions were also held with key informants, including dairy, and poultry producers, and relevant experts from urban agriculture (both governmental and non-governmental institutions) who have been involved in Bonga Town, Mizan Aman Town, and Tepi Town.

2.5. Methods of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric analysis was employed for analyzing the data collected from sampled households of the study areas.

2.5.1. Descriptive statistics

This method of data analysis was involve the use of percentages, means, and standard deviations to analyze the socio-economic and institutional characteristics of the households in the study area. Percentages was primarily used to gain insights into the trends of dairy production and productivity.

2.5.2. Profitability Analysis

Profit was measured using:

$$\Pi = TR - TC \dots \dots \dots \text{Eq. (1)}$$

$$TR = PQ \dots \dots \dots \text{Eq. (2)}$$

Where:

Π = Total profit (N)

TR = Total revenue (N)

TC = Total cost (N)

P = Unit price of output (N)

Q = Total quantity of output (N)

2.5.3. Econometric analysis

Before conducting the OLS regression analysis, it is important to assess potential issues that could violate the model. These issues include multicollinearity, heteroscedasticity, and specification errors tested. In this study, a multiple linear regression model (OLS) was utilized to examine the factors influencing dairy, poultry, and fattening production.

2.5.4. Analytical techniques

The OLS regression model will be used to identify the determinants of profit from dairy, poultry, and fattening production.

Determinants of profit from dairy, poultry, and fattening production

The general form of the model is expressed as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \varepsilon_i \dots \dots \dots \text{(Equation 1)}$$

In this equation, Y_i represents the quantity of dairy, poultry, and fattened by the i -th producer in the 2025/2025 period. The β coefficients ($\beta_0, \beta_1, \beta_2, \beta_k$) are the parameters to be estimated by

the model, and $x_1, x_2 \dots x_k$ represent the independent variables. The error term ϵ_i accounts for unobserved factors that might affect the quantity of production.

The specific form of the model is given by:

$$Y = \beta_0 + \beta_1 \text{AGE} + \beta_2 \text{SEX} + \beta_3 \text{Dairy cow size / Poultry size} + \beta_4 \text{Edu} + \beta_5 \text{water supply} + \beta_6 \text{veterinary service} + \beta_7 \text{Market info} + \beta_8 \text{Training} + \beta_9 \text{Extension Contact} + \beta_{10} \text{ grazing land/poultry shed} + \beta_{11} \text{ production System} \dots \dots \dots (\text{Equation 3})$$

Where:

Y = Milk per day/egg per day

β_1 = age of enterprise manager

β_2 = Sex of enterprise manager

β_3 = Number of dairy cow/Number of poultry

β_4 = Education of enterprise manager

β_5 = water supply

β_6 = veterinary service

β_7 = market information

β_8 = Training

β_9 = Extension Contact

β_{10} = Grazing land/ poultry shed

β_{11} = production system

2.7 Strengths, weaknesses, opportunities and Threats (SWOT) Analysis

A qualitative SWOT analysis was conducted based on interviews and field observations to identify strengths and weaknesses and opportunities and threats of dairy and poultry enterprises.

3. Results and Discussions

3.1.Descriptive Statistics

3.1.1. Descriptive Statistics of Dummy Variables for Dairy and Poultry Enterprises

The Table 1 presents key the socioeconomic and institutional characteristics of both dairy and Poultry enterprises in study area.

The results of sex of menagerie reveals that the majority both dairy 92% and poultry 93% enterprises are managed by males. This indicates that in study area the livestock production activity predominantly controlled by male. Regarding veterinary services, 52% of dairy enterprise and 70% of poultry enterprises present in study area. This shows that poultry enterprisers are relatively served by veterinary services compared with dairy enterprises, which may contribute to differences in productivity and animal health management.

For training access, 71% of dairy enterprises indicated receiving training, while 30% of poultry enterprises had access to training. This reveal that there substantial gaps capacity building support as well as follow up, with dairy enterprises benefitting more from training services than poultry enterprises.

In terms of extension contact, 42% of dairy enterprises and 61% of poultry enterprises had contact with extension services. This endorse that poultry producers are more frequently gotten by extension workers, which may enhance their access to technical information and improved management practices.

Concerning access to credit, only 24% of dairy and 16% of poultry enterprises got credit access. This indicates generally low financial support across both sectors, with poultry enterprises being more constrained in accessing credit services. Limited credit access may hinder investment in inputs, infrastructure, and productivity improvement.

Lastly, for water supply, 60% of dairy enterprises conveyed access to reliable water sources. This is an important factor for dairy production, as water availability directly affects animal health, milk production, and overall farm efficiency.

Table 2. Descriptive Statistics of Dummy Variables for Dairy and Poultry Enterprises

Variable	Dairy Frequency(N=63)	Dairy (%)	Poultry Frequency(N=57)	Poultry (%)
Sex of enterprise Manager (Male=1)	58	92	53	93
Veterinary service (Yes = 1)	33	52	40	70
Training access (Yes= 1)	45	71	17	30
Extension contact(Yes= 1)	27	42	35	61
Access to credit (Yes= 1)	15	24	9	16
Water supply (Dairy) (Yes = 1)	38	60	-	-

Source: Own survey result, 2025

3.1.2. Descriptive Statistics of Continuous Variables for Dairy and Poultry Enterprises

The table 2. Presents the mean, standard deviation, and range of crucial continuous variables for dairy and poultry enterprises.

The age of enterprise managers, dairy managers have a higher average age approximately 42 years compared to poultry managers approximately 37 years. This show that dairy production is mainly managed by relatively older and more experienced farmers, while poultry production tends to attract younger individuals.

Regarding education level, poultry managers have a higher average schooling 10.5 years than dairy managers 8.3 years. This implies that poultry enterprises are more likely to be managed by relatively more educated individuals, which may influence their adoption of improved technologies. The variation in education is similar across both groups, with standard deviations of 2.5 dairy and for 2.4 poultry.

In terms of production output, dairy enterprises produce an average of 27.5 liters of milk per day, with a wide variation ranging from minimum 3 to maximum 150 liters and a standard deviation of

38.88. This indicates strong heterogeneity in dairy productivity among households. Poultry enterprises, on the other hand, produce an average of 225.6 eggs per day, with a very high variation (SD = 273.8) and a range from 35 to 850 eggs, showing large differences in flock productivity across producers.

Furthermore, regarding resource endowment, the mean grazing land size for dairy enterprises is 1.2 hectares, with a minimum of 0 and a maximum of 4.5 hectares, indicating substantial variation in land access among households. This suggests that some farmers operate dairy production without grazing land, while others have relatively larger land holdings that support livestock feeding. In contrast, poultry enterprises require very limited land resources, as reflected by the mean poultry shed size of 0.01 hectares, with a minimum of 0 and a maximum of 0.25 hectares. This shows that poultry production is less land-intensive and can be practiced even by land-constrained households. Overall, the findings highlight that dairy production is more land-dependent and relatively managed by older farmers, whereas poultry production is less land-demanding, attracts more educated and younger farmers, and shows higher variability in output performance.

Table 2. Descriptive Statistics of Continuous Variables for Dairy and Poultry Enterprises

Variable	Dairy Mean	Poultry Mean	Std.Dev (Dairy)	Std.Dev (Poultry)	Min (Dairy)	Max (Dairy)	Min (poultry)	Max (Poultry)
Age of manager	41.79	36.86	8.86	10.25	28	73	21	69
Education of manager	8.3	10.5	2.5	2.4	4	10+3	6	12+3
Milk per litters/day	27.50	-	38.88	-	3	150	-	-
Egg per day	-	225.6	-	273'8	-	-	35	850
Grazing Land	1.2	-	0.987	-	0	4.5	-	-
Poultry shed	-	0.01	-	.041	-	-	0	0.25
Enterprise size								
Dairy cows	13.20		12.29		3	45	-	-
Poultry flock	-	1020.6	-	1020.60	-	-	45	4350

Source: Own survey result, 2025

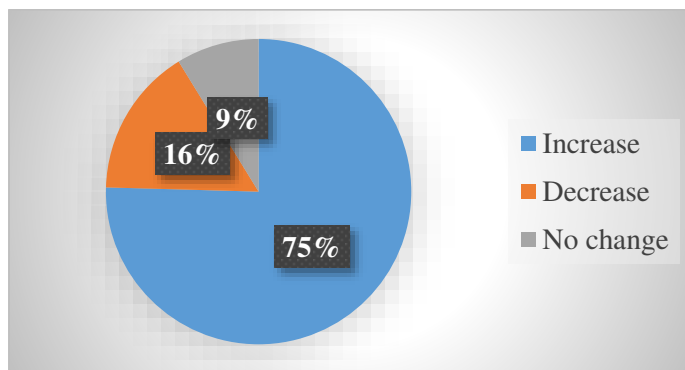
3.2.Profit Trends

3.2.1. Distribution of Profit Trends of poultry Enterprises over the Last Five years

The pie chart 1 results illustration that most poultry enterprises 75% experienced an increase in profit, indicating overall positive performance. A smaller share 16% faced a decrease in profit, while only 9% reported no change in profit.

In generally, the result reveal that poultry enterprises in the study area are generally showing improving profitability.

Pie chart 1. Percentage Distribution of Profit Trends of poultry Enterprises over the Last Five years



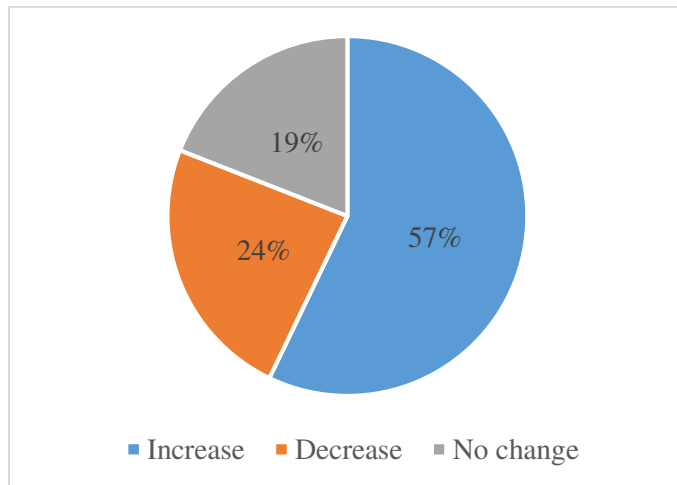
Source: Own survey result, 2025

3.2.2. Distribution of Profit Trends of dairy Enterprises over the Last Five Years

The pie chart shows that 57% of dairy enterprises experienced an increase in profit, indicating a generally positive trend in the sector. However, 24% of enterprises faced a decrease in profit, suggesting that a considerable number of farmers still encounter challenges. Meanwhile, 19% of dairy enterprises reported no change in profit, reflecting stable but non-improving performance.

Overall, the dairy sector shows a promising upward trend, as more than half of the enterprises 57% are experiencing increased profits. However, the presence of enterprises with declining 24% and unchanged 19% profits indicates that growth is not evenly distributed. This suggests that, while the sector has strong potential, targeted support is still needed to address existing challenges and ensure more balanced and sustainable profitability among all dairy producers

Pie Chart 2. Percentage Distribution of Profit Trends of dairy Enterprises over the Last Five Years



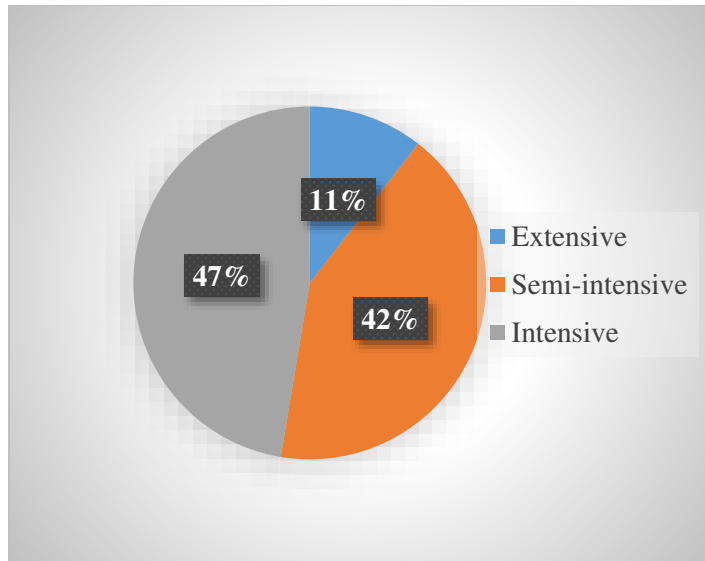
Source: Own survey result, 2025

3.3. Poultry Production System in Bonga, Mizan and Tepi Towns

The pie chart 3 report illustrated that most enterprises in the study area use Intensive 47% and Semi-intensive 42% poultry production systems, showing a preference for methods that maximize productivity and efficiently use resources. Only a small proportion 11% rely on extensive systems, indicating that low-input, low-output approaches are less common.

Overall, poultry production in the area is mainly intensive and semi-intensive, showing a shift toward more productive and resource-efficient systems. The low use of extensive systems 11% indicates that traditional methods are less common. This suggests a move toward improved productivity, but continued support is needed to sustain and strengthen these modern production systems.

Pie chart 3. Poultry Production System in Bonga, Mizan and Tepi Towns

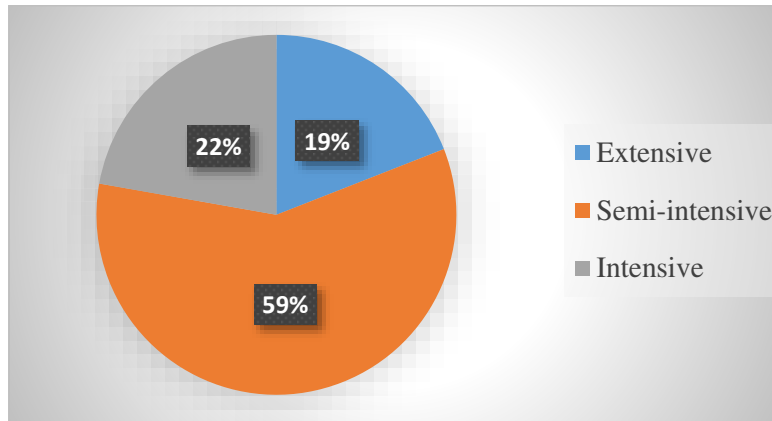


Source: Own survey result, 2025

3.4. Dairy Production System in Bonga, Mizan and Tepi Towns

The pie chart 4 indicates that the semi-intensive production system is the most widely practiced among dairy enterprises, accounting for 59% of respondents. This suggests that the majority of farmers combine grazing with supplementary feeding to improve productivity and efficiently utilize available resources. The intensive production system represents 22% of the enterprises, where farmers rely entirely on stall-feeding and apply more controlled and improved management practices. In contrast, the remaining 19% of respondents follow an extensive system, allowing dairy cows to graze freely in the field with minimal supplementation. Overall, the results highlight the dominance of semi-intensive practices in the study area, reflecting a balance between traditional and improved production methods.

Pie chart 4. Dairy Production System in Bonga, Mizan and Tepi Towns



Source: Own survey result, 2025

3.5.Econometric Results

Before interpreting the results of the OLS model, it is essential to verify the model's validity through several diagnostic tests for both for poultry and dairy production.

A. Dairy Production Model

The diagnostic tests were conducted to check the validity of the classical linear regression assumptions. Multicollinearity was examined using the Variance Inflation Factor (VIF). According to Gujarati (2004), a VIF value below 10 indicates the absence of serious multicollinearity. The results show that all explanatory variables have VIF values below 10 with a mean VIF of 1.76, indicating that multicollinearity is not a problem in the model (see appendix).

The heteroskedasticity test using the Breusch–Pagan/Cook–Weisberg test (Breusch & Pagan, 1979; Cook & Weisberg, 1983) shows a statistically significant result ($\chi^2 = 45.06$, $p = 0.000$), indicating the presence of heteroskedasticity. To address this issue, robust standard errors were used in the regression estimation (Wooldridge, 2010).

Furthermore, the Ramsey RESET test for model specification (Ramsey, 1969) shows a marginally significant result ($p = 0.060$), suggesting weak evidence of possible omitted variables or functional form misspecification at the 10% level.

B. Poultry Production Model

For the poultry production model, multicollinearity was also tested using VIF. Following Gujarati (2004), all VIF values are below 10 with a mean VIF of 1.97, confirming that multicollinearity is not a concern.

The Breusch–Pagan/Cook–Weisberg test (Breusch & Pagan, 1979; Cook & Weisberg, 1983) shows an insignificant result ($\chi^2 = 0.74$, $p = 0.3896$), indicating no heteroskedasticity problem. This implies that the assumption of constant variance is satisfied in the poultry model.

Similarly, the Ramsey RESET test (Ramsey, 1969) yields an insignificant result ($p = 0.6253$), indicating that the model is correctly specified with no evidence of omitted variables or incorrect functional form.

Overall, the diagnostic tests indicate that both models are free from multicollinearity problems. However, the dairy model exhibits heteroskedasticity, which was corrected using robust standard errors (Wooldridge, 2010). The poultry model, on the other hand, satisfies all classical regression assumptions, confirming its robustness and reliability.

3.5.1 The Determinants of Poultry Enterprise Production

The results presented in Table 3 indicate that the sex of the poultry enterprise manager had a positive and statistically significant effect on egg production at the 1% significance level. That implies that the male poultry manager increase the output of poultry production while female poultry enterprises manager may be decrease the output poultry. This lined with Emaziye *et al.* (2023) who found that the female gender decreases the output of poultry farmers while male poultry farmers were more productive. The result suggest a gender gap in poultry productivity where male- managed enterprises achieved higher output than female managed one. This does not mean female managed enterprises are less capable, but rather than have more workload and constraints such as limited access to resources, training, credit, and extension services. Age of manager show that positively and statically significant effect on the egg production at 5%. This implies that older enterprises manager had more managing experience to produce more poultry than the younger ones (Table 3).

The level of schooling had a positive and statically effect on the egg production at the 10% significant level. This implies that with higher education the enterprisers key all the production techniques which could improve productivity. This agrees with the finding of Johnson *et al.* (2020) who found that education provides opportunities to have better information, acquires new skill and thus stimulates the mind of the farmers to accept new farming techniques. Regarding production systems, both semi-intensive and intensive systems positively and statistically at 10% significantly increase poultry output compared to the extensive system, highlighting the importance of improved production technologies. It is suggested that farmers should be encouraged and supported to adopt semi-intensive and intensive poultry production systems instead of the extensive system, through improved access to inputs, training, and infrastructure, in order to enhance poultry productivity. The veterinary service access also has a positive and significant effect on egg production at 5%, emphasizing the crucial role of animal health support. This study concurs with the findings of Mubeen *et al.* (2024), who investigated the role of veterinary care in enhancing the health and productivity of livestock in small-scale farming systems.

In addition, poultry housing (shed) has the positive and significant influence on egg production, showing that proper infrastructure is a key driver of productivity. This suggested that farmers should improve poultry housing (shed) by investing in proper and well-designed infrastructure, as this can significantly enhance egg production and overall productivity.

Table 3. The econometric results for poultry production

Variables	Coef.	Robust Std. Err.	T	P>t
Sex	263.599	57.409	4.59	0.000***
Age	6.552	2.619	2.50	0.016 **
Education	26.014	15.456	1.68	0.099*
Poultry size	.0199	.0274	0.72	0.473
production system	Extensive system used as base category			
Semi-intensive	200.671	84.075	2.39	0.021*
Intensive	219.760	114.869	1.91	0.062*
Veterinary service	179.162	49.910	3.59	0.001**
Training	96.770	58.822	1.65	0.107
Extension contact	3.052	33.127	0.09	0.927
Access credit	-133.997	131.403	-1.02	0.313
Poultry shed	2420.341	394.389	6.14	0.000***
R-squared = 0.423				
Prob > F= 0.0000				

Note:*, ** and *** mean significant at 10%, 5% and 1%, respectively.

Source: Own survey result, 2025

3.5.2. The Determinants of Dairy Enterprise Production

The interpretation of OLS results in Table 4 is as follows:

Table 4 presents the results of a multiple regression analysis utilizing OLS on the key variables that determined the production of dairy production among enterprises in Bonga, Mizan Aman, and Tepi towns. The model was calculated utilizing STAT v.17, and it fitted well and was statistically significant at $P < 0.05$. The model's adjusted R-squared = 0.8219, signifying that the independent variables explain 82.2% of the variance in production per dairy cow among enterprises. Holding other factors constant, the variable sex of the manager had a positive and statistical effect on the milk production per day at 1%. This implies that male-managed dairy enterprises produce higher milk output per day compared to female-managed ones. This suggests the existence of a gender gap in dairy productivity, which may be due to differences in access to resources, labor availability, training opportunities, and extension services rather than inherent ability. Age had a negative and statistically significant effect on milk production at 10%. This indicates that maybe older farmers tend to produce slightly less milk, possibly due to lower adoption of improved practices. This agreed with finding of Nigussie, and Adem (2023) who studied that older enterprise managers might have a broader knowledge base and range of abilities as a consequence of their experience.

The education had a positive and statistically significant effect at 10% on milk production. This implies that enterprise managers with higher levels of education tend to produce more milk per day. This may indicate that education improves enterprises' managers' ability to adopt improved dairy management practices, use inputs efficiently, and make better production decisions, thereby enhancing milk productivity. This results in concurrency with the finding of Jobirov *et al.* (2022), who found that education improves the ability to apply knowledge and the usage of ideas essential for cattle production. This finding also contradicts the findings of Nkadameng *et al.* (2021), who found a negative relationship between a farmer's education and profit earned. The study did explain, however, that more educated farmers may have other income-generating sources other than the beef cattle farming project.

Regarding dairy cows, size has a positive and static effect on milk per day. This indicates that increasing the number of cows significantly boosts production. This agrees with the finding of

Adigun *et al.* (2023), who found that the positive relationship observed conforms to the a priori expectation that the more animals, the more the profit. The finding studied by Nigussie and Adem (2022) contracted who found that the greater the number of dairy cattle in an individual's herd, the less likely the dairy firm was to engage in value-added milk. This might be because larger dairy enterprises are compelled to give their cows a greater quantity of concentrated feed. Veterinary service has positive and statistically significant effects on 10% of milk production per day. This suggests that enterprises with access to health care services are more likely to invest in dairy farms. This investment allows them to maintain healthier and more productive cows, ultimately leading to greater profitability for the business. This finding is supported by studies by Tewelde (2015), who found that those who have access to health care services for dairy animals are more likely to have 13.34 times higher attraction to the urban dairy farm investment. Water supply also has a positive and significant effect at 10% on milk production per day. This implies that dairy cows who get adequate water access properly enhance milk production per day.

In conclusion, Extension contact positively and statically significant at 10% milk production per day. This indicates that enterprises frequently contact with extension contact achieve higher milk productivity.

Table 4. The econometric results for poultry production

Variables	Coef.	Robust Std. Err.	T	P>t
Sex	31.20572	6.515005	4.79	0.000***
Age	-.6136884	.3535072	-1.74	0.089*
Education	1.842316	.7505798	2.45	0.018*
Dairy cows size	2.453507	.377767	6.49	0.000***
Veterinary service	11.9276	5.107542	2.34	0.024*
Training	1.499953	4.667982	0.32	0.749
water supply	6.691721	3.210369	2.08	0.042*
Extension contact	6.26641	2.772513	2.26	0.028*
Market information	-.3522682	4.845761	-0.07	0.942
Access credit	1.428432	4.625409	0.31	0.759
Grazing land	-2.997385	2.56285	-1.17	0.248
R-squared = 0.8219				
Prob > F = 0.0000				

Note:* and *** mean significant at 10%, and 1%, respectively.

Source: Own survey result, 2025

3.6.Profitability Analysis

3.6.1. Monthly Cost–Benefit Analysis of poultry Production Enterprises

Table 5 illustrates that the total revenue and total cost of poultry production were 303,765 ETB and 235,962.80 ETB, respectively. These figures show that poultry production was a profitable business. The business benefit cost ratio was 1.29, which indicates 29% profitability. This agreed with Emaziye *et al.* (2023), who reported 30% profitability in poultry production in South-South Niger. But however uninformed an increase in the cost of feed and other inputs may be, it may lead to a reduction in the profit margin of poultry operations.

Table 5. Cost–Benefit Analysis of poultry Production Enterprises per Month.

Items	Amount (ETB)
A. Total Revenue	303,765.8
Egg sales	123505.5
Chick sales	180260.3
B. Variable Cost	
Feed Cost	95490.35
Day-old chicks	124500
Veterinary Service	3952.632
Labor	9885.965
Transport	1184.561
Utilities Cost	414.7368
C. Fixed Cost	
Rent	534.5614
D. Total cost (TC=B+C)	235,962.8
E. Profit(TR-TC)	67,803
F. Benefit-Cost Ratio	1.29

Source: Own survey result, 2025

3.6.2. Monthly Cost–Benefit Analysis of Dairy Production Enterprises

The result in Table 6 reveals that the total revenue and total cost of dairy production were 122,968.30 ETB and 71,883.91 ETB, respectively. These figures show that dairy production was a profitable enterprise. The cost–benefit ratio for the dairy enterprise was 1.71, indicating that the enterprise is profitable. This means that for every 1 birr invested in dairy production, the farmer obtains 1.71 birr in return. In other words, the dairy enterprise generates a net profit of about 0.71 birr per birr invested (71% return), clearly showing that dairy production in the study area is economically viable and provides a strong financial incentive for enterprises to continue and expand their dairy activities. This agreed with Emaziye, P.O. (2021), who reported 30% profitability in goat farming in the Niger Delta.

Table 6. Cost-Benefit Analysis of Dairy Production Enterprises per Month

Items	Amount (ETB)
A. Total Revenue	122968.3
Milk and milk productive sale	122968.3
B. Variable Cost	
Feed Cost	48893.65
Veterinary Service	2606.349
Labor	8660.317
Transport	9850.7143
Utilities Cost	763.4921
C. Fixed Cost	
Rent	1110.10
D. Total cost (TC=B+C)	71,883.91
E. Profit(TR-TC)	51,084.39
F. Benefit-Cost Ratio (BCR=TR/TC)	1.71

Source: Own survey result, 2025

3.7. SWOT Analysis

Table 7. SWOT Analysis of Poultry and Dairy Enterprises by three Towns

Strength	Weakness	Opportunities	Threats
➤ Trained/skilled Workers	➤ Shortage of shed for poultry	➤ High Demand for eggs/chicken	➤ Late supply of Ethio-chicke company
➤ Access To capital	➤ Water scarcity	➤ Government and support and follow up	➤ Diseases (especially day-old chicks)
➤ Experience poultry Management	➤ Limited credit	➤ Availability of production area	➤ Shortage/high price of feed
➤ Existing sheds(poultry)	➤ Low Marketing linkage	➤ Access to training/extension services	➤ Lack of competent suppliers
➤ Some of them record keeping about profit and loss	➤ Some of them no record keeping about profit and loss	➤ High demand for milk and milk product	➤ Water scarcity during dry season
➤ Experience in dairy management	➤ Limited capital	➤ Initiatives like Lemat-Trufat	-
➤ Existing dairy cattle	➤ Unequal member participation	➤ Access to grazing land/production areas	-
-	➤ Land provided for production dairy used for crops(Bonga)	-	-

Source: Own survey result, 2025

4. Conclusion and Recommendation

4.5. Conclusion

This study was conducted in Bonga, Mizan-Aman, and Tepi towns to identify the determinants of dairy and poultry enterprise production using cross-sectional data collected between October and December 2025. Both quantitative and qualitative approaches were applied, combining structured

questionnaires, observations, key informant interviews, and secondary data sources. A total of 120 livestock enterprises were surveyed, comprising 63 dairy and 57 poultry enterprises selected through a two-stage purposive sampling technique.

The descriptive results indicate that dairy and poultry enterprises differ in their management characteristics. Dairy production is mainly practiced by relatively older manager and requires larger grazing land, while poultry production is commonly managed by younger and more educated manager and requires very limited land. Both enterprises show considerable variation in output, reflecting differences in management practices, resource use, and access to services. The profitability analysis further shows that both enterprises are economically viable, with dairy production having a higher benefit-cost ratio 1.71 compared to poultry production 1.29, indicating relatively higher profitability in dairy enterprises.

The econometric analysis using an OLS regression model reveals that different factors significantly influence production performance. In poultry enterprises, sex, education, poultry size, veterinary services, and poultry housing significantly affect output. In dairy enterprises, sex, education, dairy cow's size, water supply, veterinary services, extension contact, and production system are key determinants of milk production per day. These results confirm that livestock productivity is strongly influenced by human capital, institutional support, production technologies, and access to essential resources such as land, water, and housing.

In addition, the SWOT analysis highlights both internal and external factors affecting enterprise performance, including strengths in resource availability and market potential, weaknesses in input access and management practices, and threats such as disease, feed shortages, and input supply constraints.

Overall, the study concludes that dairy and poultry enterprises in the study areas are profitable and have strong potential for expansion. However, improving human capital, strengthening veterinary and extension services, ensuring reliable input supply systems, and enhancing production infrastructure are essential to further increase productivity and ensure sustainable livestock development in the study areas.

5.2. Recommendation

Based on the findings of this study, the following recommendations are forwarded to improve the productivity and profitability of dairy and poultry enterprises in Bonga, Mizan-Aman, and Tepi.

Strengthening continuous training and capacity-building programs is essential, as education, veterinary services, production systems, and infrastructure are key determinants of enterprise performance. This will improve enterpriser's managerial skills and enhance the adoption of improved livestock technologies.

Improving access to animal health services is also critical. Expanding veterinary clinics, ensuring regular extension support, and increasing the availability of quality veterinary drugs will help reduce disease-related losses and improve productivity in both dairy and poultry enterprises.

Upgrading production systems should be given priority by supporting enterprises to shift from extensive systems to semi-intensive and intensive production through improved access to inputs, technical support, and better management practices.

Infrastructure development, particularly poultry housing and reliable water supply for dairy production, should be strengthened as these factors have strong effects on productivity and overall enterprise performance.

Efficient utilization of grazing land and promotion of improved fodder production should be encouraged for dairy enterprises, while poultry production should be further promoted as a suitable enterprise for land-constrained households due to its low land requirement.

Livestock fattening enterprises should also be introduced and expanded through awareness creation, demonstration activities, and financial support in order to diversify income sources and improve household livelihoods.

In addition, several key operational constraints require immediate attention. These include late supply of Ethio-chicken chicks, frequent disease outbreaks especially in day-old chicks, high feed prices, lack of competent input suppliers, and water scarcity during the dry season. Addressing these challenges requires stronger coordination among suppliers and stakeholders, improved veterinary and extension services, promotion of local feed production, regulation and capacity-building of input suppliers, and investment in water harvesting and storage technologies.

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Author Contributions

Author Contributions

Tesfaye Gafaro performed data analysis, interpreted the results, and prepared the full manuscript write-up. Amanuel Afeto was responsible for data collection and contributed to data preparation. Tarku Teka contributed to data collection and assisted in organizing the dataset for analysis. Yishak Shitaye developed the research proposal. All authors reviewed and approved the final manuscript.

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Data Availability

The data used and analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethical Approval and Consent to Participate

The study was conducted in accordance with ethical research standards. Informed consent was obtained from all participants before data collection, and respondents were assured that the information provided would be kept confidential and used only for research purposes.

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