

OPTIMIZING PRODUCTION COST MANAGEMENT THROUGH COST ACCOUNTING AND TECHNOLOGY ADOPTION IN SHEEP FARMING ENTERPRISES: A CASE STUDY IN BOGOR, INDONESIA

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Abstract

This study analyzes the implementation of cost accounting and production cost management in small-scale sheep farming enterprises in Gorowong Village, Parung Panjang District, Bogor Regency, Indonesia. Although sheep farming has become an important source of household income, farmers still rely on informal bookkeeping, resulting in inaccurate production cost calculations and limited financial decision-making. A qualitative case study approach was employed using primary data collected through observations, semi-structured interviews, and documentation, supported by secondary data from relevant literature. The data were analyzed using descriptive qualitative analysis through data reduction, data display, and conclusion drawing. The findings show that the farm has not implemented a systematic Cost of Production (COP) calculation. Direct material costs, direct labor costs, and manufacturing overhead costs are not properly recorded, leading to an underestimation of production costs. The Break-Even Point (BEP) analysis indicates that the enterprise must sell approximately 29 sheep annually to reach the break-even point. The study also identifies technology adoption, including CCTV monitoring, silage feed preservation, and individual housing systems, as practical strategies for improving operational efficiency and livestock management. The study highlights the importance of integrating systematic cost accounting with appropriate technology adoption to improve financial accountability, production cost management, and the sustainability of small-scale sheep farming enterprises.

Keywords: Cost Accounting Production, Cost Management, Cost of Production, Break-Even Point, Sheep Farming Technology Adoption.



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INTRODUCTION

Indonesia is the world's largest archipelagic country, comprising 17,508 islands according to the United Nations (2008). As an archipelago, Indonesia possesses exceptional natural resources characterized by unique biodiversity, diverse ecosystems,

and extensive terrestrial and marine landscapes. Although its land area represents only approximately one-third of the country's total territory, Indonesia's natural resources offer substantial economic potential when managed effectively. The country's abundant flora and fauna provide valuable opportunities for sustainable agricultural and livestock development (Imron Hamzah, Beri Moerdani, Saifuddin, 2023).

Geographically, Indonesia is located between 6°04'30" North Latitude and 11°00'36" South Latitude, and between 94°58'21" East Longitude and 141°01'10" East Longitude. The country lies between the Asian and Australian continents and between the Pacific Ocean and the Indonesian seas. This strategic geographical position contributes to significant climatic variation, particularly in annual rainfall distribution (Wirjohamidjojo and Swarinoto, 2010). Rainfall ranges from the highest levels recorded at the BMKG Sisingsing Station in West Sumatra (484.10 mm annually) to the lowest levels at the BMKG Laciana Station in East Nusa Tenggara (900 mm annually) (BPS, 2019). Furthermore, Indonesia is characterized by consistently high humidity, with average monthly humidity levels exceeding 80% (Wirjohamidjojo and Swarinoto, 2010). Based on variations in air masses and meteorological characteristics, Indonesia is broadly divided into eleven synoptic climatic subregions extending from Aceh to Papua. In addition to climatic diversity, Indonesia also exhibits diverse soil characteristics, which Soepraptohardjo (1976) classified into eight major groups: humus, sandy soils, alluvial or sedimentary soils, podzolic soils, volcanic soils, lateritic soils, Mediterranean soils, and organosols.

The diversity of climate, soil types, and environmental conditions has resulted in Indonesia becoming one of the countries with the highest ecosystem diversity in the world. According to LIPI (2015), Indonesia contains approximately 74 distinctive natural ecosystem types, including deep-sea ecosystems, shallow marine ecosystems, coastal ecosystems such as seagrass beds and mangrove forests, dipterocarp forests, kerangas forests, peatlands, karst ecosystems, lakes, lowland montane forests, montane forests, and subalpine ecosystems. Besides natural ecosystems, Indonesia also has numerous artificial ecosystems, including rice fields, wetlands, livestock farms, plantations, ponds, and aquaculture systems. Each ecosystem supports a wide range of plant, animal, and microbial species, making Indonesia one of the world's most biologically diverse countries.

According to National Geographic Indonesia (2019), Indonesia ranks second globally after Brazil in terrestrial biodiversity. When marine biodiversity is combined with terrestrial biodiversity, Indonesia becomes the country with the highest overall biodiversity worldwide. In 2017, approximately 31,750 plant species were identified in Indonesia, including around 25,000 flowering plant species (Retnowati and Ruayah, 2019; LIPI, 2021). LIPI (2021) further reported that approximately 15,000 Indonesian plant species possess medicinal potential, although only about 7,000 species have been utilized as raw materials for pharmaceutical products.

Indonesia's remarkable floral diversity is accompanied by equally rich faunal diversity. The country is home to approximately 515 mammal species, 1,500 bird species, 600 reptile species, and 270 amphibian species (LIPI, 2021). Indonesia also possesses one of the world's richest fish biodiversities, including numerous endemic marine and freshwater species (Lasabuda, 2013; IUCN, 2011; KLHK, 2014). LIPI (2021) reported that Indonesia hosts approximately 97 coral reef fish species and around 1,400 freshwater fish species.

Despite this extraordinary biodiversity, Indonesia also faces a rapid decline in flora and fauna diversity. Sutarno and Setyawan (2015) identified Indonesia as one of the five countries with the highest number of threatened species, while the Jurnal Geografi Nasional Indonesia (2019) ranked Indonesia sixth among countries experiencing the highest rates of species extinction. Consequently, biodiversity conservation through both in-situ and ex-situ approaches has become increasingly important to prevent further ecosystem degradation and biodiversity loss.

Indonesia's biodiversity represents not only an ecological asset but also a significant economic resource that can contribute to national food security and rural economic development. One of the most strategic sectors for utilizing these biological resources is the livestock sector. Livestock farming contributes substantially to food production by supplying meat, milk, and eggs while simultaneously generating employment and income opportunities in rural communities.

The livestock sector is an important subsector within Indonesia's agricultural economy. Based on data from the Central Bureau of Statistics (BPS), livestock contributes approximately 15–20% of Indonesia's agricultural Gross Domestic Product (GDP), while the agricultural sector contributes approximately 12–14% of the national GDP. This contribution highlights the strategic role of livestock production in supporting national economic growth and food security.

Livestock production in Indonesia is generally categorized into large livestock (cattle, buffaloes, and horses), small livestock (sheep, goats, and pigs), poultry (chickens and ducks), and other livestock (rabbits and quails). Among these categories, sheep farming has become increasingly important as a source of animal protein and household income, particularly for smallholder farmers in rural areas.

Several provinces dominate Indonesia's livestock population. East Java recorded the largest cattle population, increasing from 4,705,067 head in 2019 to 4,823,970 head in 2020 and 4,938,874 head in 2021. Central Java ranked second, with a cattle population increasing from 1,786,932 head in 2019 to 1,835,717 head in 2020 and 1,863,327 head in 2021. South Sulawesi also demonstrated significant growth, with cattle populations increasing from 1,369,890 head in 2019 to 1,405,246 head in 2020 and 1,461,457 head in 2021. Similarly, West Nusa Tenggara (NTB) recorded growth from 1,234,640 head in 2019 to 1,285,746 head in 2020 and 1,336,324 head in 2021, while East Nusa Tenggara (NTT) increased from 1,087,761 head in 2019 to 1,176,317 head in 2020 and 1,248,930

head in 2021 (Nur Jamal Shayed, Muhammad Idris, 2021). These statistics indicate the considerable potential of livestock production across Indonesian provinces.

Although Indonesia possesses abundant biological resources, these resources have not been managed optimally to maximize their economic value. Inadequate management practices, ecosystem degradation, and inefficient utilization of natural resources continue to limit the contribution of biodiversity to community welfare. Unsustainable land conversion for agriculture, plantations, and industrial development has accelerated habitat loss, threatening biodiversity and disrupting ecological functions essential for sustainable agricultural production.

Strengthening community-based management of natural resources has therefore become increasingly important, particularly in rural villages where agriculture and livestock farming constitute primary livelihood sources. Local participation in managing biological resources can simultaneously improve environmental sustainability and enhance household economic resilience.

This issue became particularly evident during the COVID-19 pandemic, which significantly affected the livelihoods of residents in Gorowong Village, Parung Panjang District, Bogor Regency, West Java. Beginning in 2019, many residents experienced unemployment due to layoffs from small and medium-sized enterprises. Even after the pandemic subsided, many former workers encountered difficulties re-entering the labor market. Some migrated to urban areas, including Jakarta, seeking employment as laborers, while others remained in the village and relied on irregular jobs such as agricultural labor, construction work, and market trading, which generated limited income.

Following the COVID-19 pandemic, particularly in early 2024, many residents of Gorowong Village began raising sheep as an alternative livelihood strategy to improve household income. Sheep farming rapidly expanded within the community, especially among male household members. Farmers initially started with only one pair of sheep, but many have gradually expanded their herds to dozens of animals. Sheep are primarily fed locally available grasses collected from previously abandoned and unproductive land, thereby transforming unused land into productive forage resources. Income generated from livestock sales has become an important source of household income for local communities.

Despite the rapid growth of sheep farming enterprises, farmers encountered significant challenges in managing their financial records after approximately one year of operation. Financial transactions were recorded manually in notebooks, with income and expenditure documented inconsistently. This practice increased the likelihood of missing or forgotten transactions and limited farmers' ability to evaluate business performance accurately. In small-scale livestock enterprises, reliable accounting information is essential not only for monitoring financial performance but also for supporting managerial decision-making and ensuring business sustainability.

Cost accounting plays a critical role in livestock production by identifying, measuring, and controlling production costs associated with farming activities, including housing, feed, animal health care, labor, and farm facility maintenance. A systematic cost accounting system enables livestock farmers to calculate the Cost of Production (COP) accurately, establish appropriate selling prices, evaluate profitability, and improve operational efficiency. However, preliminary observations in Gorowong Village indicate that sheep farmers have not yet implemented a systematic cost accounting system. Important production cost components, including direct material costs, direct labor costs, manufacturing overhead, and animal health expenditures, are often omitted or underestimated, resulting in inaccurate production cost calculations and limited financial decision-making capacity.

This study addresses this practical gap by analyzing the implementation of cost accounting in small-scale sheep farming enterprises in Gorowong Village, Parung Panjang District, Bogor Regency. Specifically, the study examines the identification and calculation of production cost components, evaluates current cost management practices, and explores the role of technology adoption—including CCTV monitoring, silage feed preservation, and individual housing systems—in improving operational efficiency and business sustainability. The findings are expected to contribute both theoretically to the literature on agricultural cost accounting and practically by providing recommendations for strengthening financial management and sustainable livestock production among rural sheep farming enterprises in Indonesia.

LITERATURE REVIEW

Cost Accounting in Livestock Enterprises

Cost accounting is a systematic process of identifying, measuring, recording, analyzing, and reporting costs incurred during the production of goods and services. It provides financial information regarding the resources consumed in business operations and supports managerial decision-making related to planning, controlling, and evaluating operational performance. In accounting, costs represent the monetary value of resources sacrificed to obtain economic benefits. Once these resources have been consumed in production activities, they become expenses that affect business profitability.

Within the broader field of management accounting, cost accounting serves as an essential information system that enables business owners and managers to understand the cost structure of their operations. Accurate cost information supports decisions regarding pricing, production planning, resource allocation, operational efficiency, and long-term business sustainability. For small and medium-sized enterprises, including agricultural and livestock businesses, cost accounting is particularly important because it provides a foundation for evaluating production efficiency and financial viability.

In the context of sheep farming, cost accounting encompasses all expenditures associated with livestock production, including direct materials, direct labor, and manufacturing overhead. Direct material costs include inputs directly attributable to

raising sheep, such as feed, breeding stock, and other production inputs. Although some smallholder farmers utilize naturally available grass without direct cash expenditures, these inputs still represent economic resources that should be recognized in production cost calculations to reflect the actual cost of production. Direct labor costs include wages or the economic value of labor devoted to feeding, cleaning, monitoring animal health, and maintaining livestock facilities. Manufacturing overhead includes indirect production costs such as housing construction and maintenance, equipment depreciation, utilities, sanitation, and veterinary supplies required to support farming operations.

A comprehensive cost accounting system enables livestock farmers to determine the actual Cost of Production (COP) for each production cycle. The Cost of Production represents the total cost incurred in producing livestock products and serves as a fundamental basis for determining selling prices, measuring profitability, and evaluating production efficiency. Without systematic production cost calculations, farmers may underestimate production expenses, leading to inaccurate pricing decisions and reduced business profitability. Therefore, proper cost accounting contributes directly to improving financial performance and strengthening the sustainability of livestock enterprises.

Production Cost Management in Sheep Farming

Production cost management refers to the planning, monitoring, and controlling of production expenditures to achieve operational efficiency while maintaining product quality. Effective production cost management requires businesses to identify cost drivers, classify production costs accurately, and evaluate opportunities to reduce unnecessary expenditures without compromising productivity.

For sheep farming enterprises, production cost management involves optimizing expenditures related to feed, labor, housing, animal health, breeding, and farm maintenance. Since feed and labor generally represent the largest cost components in livestock production, efficient management of these resources significantly influences production costs and profitability. Additionally, investments in preventive animal healthcare, including medicines and vitamins, should be viewed as productive expenditures because they contribute to livestock health, reduce mortality risk, and improve productivity.

For small-scale sheep farmers, implementing production cost management is expected to improve operational efficiency, enhance financial control, and support informed managerial decisions regarding production expansion and resource utilization.

Break-Even Point Analysis

Break-Even Point (BEP) analysis is an important managerial accounting tool used to determine the minimum level of production or sales required for a business to cover all fixed and variable costs. At the break-even point, total revenue equals total production costs, meaning that the business neither earns a profit nor incurs a loss.

In livestock farming, BEP analysis assists farmers in determining the minimum number of sheep that must be sold or the minimum selling price required to recover production costs. This analysis provides valuable information for production planning,

pricing strategies, and investment decisions. Moreover, BEP analysis enables farmers to evaluate the financial feasibility of expanding livestock populations or adopting new production technologies.

For smallholder sheep farming enterprises, integrating BEP analysis with systematic cost accounting provides a practical framework for assessing business viability and minimizing financial risk.

Technology Adoption for Operational Efficiency

Technology adoption has become an increasingly important strategy for improving productivity and operational efficiency in agricultural and livestock enterprises. In small-scale sheep farming, technological innovations can improve monitoring, feeding management, livestock health, and overall farm management practices.

Several technologies are particularly relevant to sheep farming operations. Closed-Circuit Television (CCTV) systems enable continuous monitoring of livestock conditions and improve farm security. Silage technology allows farmers to preserve forage during periods of abundant grass availability, ensuring a stable feed supply during dry seasons and reducing feed shortages. Individual housing systems facilitate better health monitoring, disease prevention, and feeding management while improving animal welfare and productivity.

The adoption of these technologies complements cost accounting practices by providing better operational data, reducing production losses, improving resource utilization, and supporting more efficient cost management. Consequently, technology adoption is expected to enhance both operational effectiveness and the long-term sustainability of sheep farming enterprises.

Research Gap and Theoretical Contribution

Although cost accounting has been widely discussed in manufacturing and commercial sectors, its application in small-scale livestock enterprises remains relatively limited, particularly among rural sheep farming businesses in Indonesia. Existing farming practices often rely on simple cash records that do not distinguish between direct materials, direct labor, and manufacturing overhead. As a result, farmers experience difficulties in calculating accurate production costs and evaluating business profitability.

This study addresses that gap by examining the implementation of cost accounting in sheep farming enterprises in Gorowong Village, Parung Panjang District, Bogor Regency. The research extends previous discussions by integrating production cost calculation, Break-Even Point (BEP) analysis, and technology adoption within a single analytical framework. This integrated perspective is expected to provide practical guidance for sheep farmers in improving financial management, determining accurate production costs, optimizing pricing decisions, and enhancing operational sustainability through appropriate technological innovation.

Theoretically, this study contributes to the literature on cost accounting in agricultural and livestock enterprises by demonstrating how systematic production cost management and managerial accounting tools can be adapted to smallholder farming

contexts. Practically, the findings provide a framework that can assist sheep farmers in Gorowong Village and similar rural communities in developing more efficient, accountable, and sustainable livestock businesses.

RESEARCH METHOD

Research Design

This study employed a qualitative case study design to examine the implementation of cost accounting and production cost management in a small-scale sheep farming enterprise located in Gorowong Village, Parung Panjang District, Bogor Regency, Indonesia. The case study approach was selected because it enables an in-depth investigation of accounting practices within their real-life operational context, allowing the researcher to understand the complexity of cost management in livestock farming from the perspectives of the business operators.

A qualitative approach was considered appropriate because the research focused on understanding existing accounting practices, identifying production cost components, and exploring operational challenges encountered by sheep farmers. According to Sugiyono (2020:9), qualitative research is a method used to investigate phenomena under natural conditions, where the researcher acts as the primary research instrument. Data collection is conducted through triangulation techniques, data analysis is inductive in nature, and the findings emphasize the interpretation of meaning rather than statistical generalization.

Furthermore, Bogdan and Biklen, as cited in Sugiyono (2020:7), explained that descriptive qualitative research produces data in the form of words, narratives, and visual documentation rather than numerical measurements. After the data are collected and analyzed, they are described systematically to provide a comprehensive understanding of the research phenomenon.

Research Site

The research was conducted in Gorowong Village, Parung Panjang District, Bogor Regency, West Java, Indonesia. The study site was selected because sheep farming has become an important community-based economic activity following the COVID-19 pandemic, while the implementation of formal cost accounting practices among local farmers remains limited.

Data Types and Sources

This study utilized both primary data and secondary data to obtain comprehensive information regarding cost accounting practices and production cost management in sheep farming enterprises.

Primary data were obtained directly from the research subjects through field observations and interviews with sheep farmers. These data represent original and up-to-date information collected specifically for the purposes of this study. Observations were conducted to examine daily farming activities, livestock management practices, production processes, and cost recording procedures. Semi-structured interviews were carried out to explore farmers' understanding of production costs, accounting practices,

labor utilization, feed management, animal health expenditures, and business decision-making.

Secondary data were obtained from existing sources that support the research analysis. These sources included academic journals, books, statistical publications, government reports, and other relevant literature related to cost accounting, livestock management, and agricultural business practices. Secondary data were used to strengthen the theoretical framework and provide contextual information for interpreting the research findings.

Data Collection Techniques

Data were collected using three complementary techniques to ensure the credibility and validity of the findings through methodological triangulation.

1. Observation was conducted through direct visits to sheep farming locations to observe production activities, livestock housing conditions, feeding practices, equipment utilization, animal health management, and the existing system of financial record-keeping.
2. Semi-structured interviews were conducted with sheep farmers to obtain detailed information regarding production cost components, cost recording practices, pricing decisions, operational challenges, and the adoption of technology in farming activities.
3. Documentation involved collecting and reviewing business records, notebooks containing income and expenditure transactions, photographs of farming facilities, and other documents relevant to production cost calculations and farm management practices.

The combination of these techniques enabled the researcher to cross-validate information obtained from different sources and improve the trustworthiness of the qualitative findings.

Data Analysis Technique

The collected data were analyzed using a descriptive qualitative analysis approach. The analysis followed an inductive process in which findings were derived from field evidence rather than predetermined hypotheses. The analytical procedures consisted of three stages.

First, data reduction was conducted by selecting, organizing, and simplifying field data that were relevant to the research objectives, particularly information related to production costs, cost accounting practices, and operational management in sheep farming. Second, data display involved presenting the reduced data in a systematic narrative form to facilitate interpretation and identify relationships among production cost components, accounting practices, and operational activities. Finally, conclusion drawing and verification were conducted by interpreting the findings obtained through observations, interviews, and documentation. The conclusions were continuously verified throughout the analysis process to ensure consistency across multiple data sources.

This analytical approach enabled the study to provide an in-depth understanding of how cost accounting is currently implemented in sheep farming enterprises, identify deficiencies in production cost calculations, and formulate recommendations for improving production cost management through appropriate accounting practices and technology adoption.

RESULTS AND DISCUSSION

The findings demonstrate that sheep farming in Gorowong Village is managed through a community-based production system in which farmers collectively participate in livestock maintenance, feeding, and farm operations. Although husbandry practices are relatively well implemented from an animal welfare perspective, the financial management system remains informal and has not adopted systematic cost accounting practices. The discussion is organized into five major themes: livestock management practices, production cost analysis, Break-Even Point (BEP) analysis, operational challenges, and technology adoption for sustainable sheep farming.

Livestock Management Practices in Gorowong Village

Animal Health Management and Daily Husbandry Practices

Daily husbandry activities constitute the foundation of sheep production in Gorowong Village. Farmers perform routine activities including feeding, watering, cleaning animal housing, monitoring livestock health, and maintaining animal hygiene. These practices reflect farmers' practical knowledge in maintaining sheep productivity despite limited formal livestock management systems.

According to Ardi Fahara, the farm caretaker, one of the most important daily activities is exposing sheep to morning sunlight before returning them to the housing area. He explained:

“Sunlight plays a very important role for sheep because it provides natural vitamin D. In addition, sunlight helps maintain body temperature, improves digestion, and supports sheep growth. We also bathe the sheep once every week to prevent skin diseases, improve their health, and maintain wool quality.”

Field observations support this statement. Morning sunlight exposure contributes to maintaining animal health through natural thermoregulation and vitamin D synthesis, while regular bathing reduces the risk of skin infections and external parasites. These preventive husbandry practices indicate that farmers prioritize animal welfare, although these activities are not yet recognized as part of production cost calculations within their accounting records.

The findings suggest that animal health management should be incorporated into cost accounting because preventive care requires labor time, water resources, cleaning materials, and health supplements. Excluding these components results in an underestimation of the actual cost of production.

Feed Management and Nutritional Practices

Feed management represents the most critical operational activity in sheep farming because feed availability directly influences livestock growth and productivity. Farmers provide feed twice daily, in the morning and evening, while forage collection is conducted during the daytime.

Ardi Fahara explained:

“Feeding has a significant impact on sheep growth. We provide the best available feed for our sheep twice a day. During the day we collect grass around the farm, and when forage is limited, we collect leftover vegetables from the local market. However, we always inspect the vegetables carefully to ensure they are clean and suitable for sheep.”

Figure 1. Sheep Feeding Practices and Health Monitoring Conducted by Farmers



Field observations revealed that farmers carefully select market vegetables to avoid spoiled or contaminated feed that could negatively affect livestock health. This practice demonstrates awareness of feed quality despite relying primarily on freely available forage resources.

The findings indicate that feed quality management contributes significantly to livestock productivity. However, because feed is collected directly from surrounding grasslands rather than purchased, farmers do not record feed as a production cost. From a cost accounting perspective, forage collection still involves labor, transportation, and opportunity costs that should be recognized in production cost calculations.

Utilization of Pakchong Grass as the Primary Feed Source

Field observations identified Pakchong grass (*Pennisetum purpureum*) as the primary forage cultivated by farmers. According to the Department of Agriculture (2022), Pakchong grass is a hybrid between *Pennisetum purpureum* (elephant grass) and *Pennisetum glaucum* developed in Pak Chong, Thailand. The grass contains relatively

high crude protein content and demonstrates strong drought tolerance, making it suitable for livestock production under various environmental conditions (Dinas Pertanian, 2022).

Figure 2. Pakchong Grass (*Pennisetum purpureum*) Used as the Primary Feed for Sheep



Ardi Fahara explained:

“Pakchong grass is the sheep's favorite feed. Sheep consume it more enthusiastically because it is soft and easy to digest. Compared with other grasses, Pakchong improves sheep performance, making them healthier and more active.”

Direct observations confirmed that sheep consumed Pakchong grass more readily than other forage species. Farmers intentionally cultivate this grass near the farm to ensure a consistent supply of high-quality forage throughout the year. This strategy reduces dependence on external feed purchases and contributes to lower production costs.

The findings demonstrate that locally cultivated forage represents an economic advantage for small-scale sheep farming. Nevertheless, systematic cost accounting should recognize forage cultivation and harvesting activities as economic resources rather than treating them as cost-free inputs.

Water Resources for Livestock Operations

Water availability is another important operational resource supporting sheep farming activities. The sheep farm is located adjacent to a flowing river that supplies water for drinking, bathing sheep, and cleaning livestock facilities.

Figure 3. River Located Near the Sheep Farm in Gorowong Village as a Water Source for Sheep



According to Ardi Fahara:

“The river beside the farm provides abundant water for sheep. We use it for drinking water and bathing the sheep. Water shortages occur only during prolonged dry seasons.”

Field observations confirmed that the river provides an accessible and continuous water source for livestock operations. Besides supporting sheep farming, the river is also utilized by surrounding communities for irrigation and household agricultural activities.

Although water is naturally available, its utilization remains an operational resource supporting production activities. Therefore, water-related operational expenditures, including drinking water supplied for farm workers and electricity supporting water management activities, should be incorporated into production cost calculations.

Cost of Production Analysis in Sheep Farming

Direct Material Cost Analysis

The analysis revealed that sheep farmers in Gorowong Village do not record direct material costs because they assume forage collected from surrounding land is free of charge. Consequently, feed costs are omitted entirely from financial records.

Operationally, farmers collect forage twice daily from nearby grasslands, while during dry seasons they supplement feed with selected leftover vegetables obtained from local markets. Although this practice minimizes cash expenditures, it does not eliminate the economic value of resources consumed during production.

From a cost accounting perspective, this practice is inconsistent with production cost principles because resources used in production should be recognized regardless of whether they involve cash payments. Electricity supporting farm operations and drinking

water provided for workers constitute operational inputs that contribute directly to livestock production activities.

Based on field analysis, the direct material costs that should be recognized annually are presented below.

Table 1. Recommended Direct Material Costs in Sheep Farming

Direct Material Component	Annual Cost (IDR)
Electricity	1,200,000
Drinking Water for Farm Workers	120,000
Total Direct Material Cost	1,320,000

The analysis indicates that the minimum annual direct material cost should be IDR 1,320,000 for the production period between August and the following August. Although this amount remains relatively small compared with total production revenue, recognizing these costs improves the accuracy of production cost calculations.

Direct Labor Cost Analysis

Labor represents one of the most important production cost components in sheep farming because daily operations depend heavily on human involvement. Activities such as feeding, cleaning housing, monitoring animal health, and maintaining facilities require continuous labor throughout the production cycle.

However, field findings indicate that direct labor costs are not paid through monthly wages. Instead, farmers apply a profit-sharing system in which labor compensation is distributed only after sheep are sold.

Revenue sharing is implemented twice annually, particularly during major Islamic holidays when demand for sheep increases. Sheep are also sold for weddings, circumcision ceremonies, and other community events requiring mutton.

The existing labor compensation mechanism is summarized below.

Table 2. Labor Compensation

Labor Compensation Component	Value
Selling Price per Kilogram	IDR 70,000
Average Weight per Sheep	25 kg
Number of Sheep Sold	24 sheep
Total Revenue from Sheep Sales	IDR 40,000,000
Number of Community Participants	28 people
Compensation per Participant	IDR 1,440,000

This compensation system does not reflect proper direct labor accounting because labor costs depend entirely on sales performance rather than actual labor contributions during production.

Field observations indicate that approximately two to three workers perform daily husbandry activities. From a cost accounting perspective, these workers should receive regular monthly wages based on the local minimum wage or an agreed compensation

standard. Recognizing labor costs monthly would improve financial accountability, facilitate production cost calculations, and ensure labor sustainability.

The findings therefore demonstrate that labor compensation should transition from an informal profit-sharing model toward a structured wage-based accounting system.

Manufacturing Overhead Cost Analysis

Manufacturing overhead includes indirect production costs that support operational activities but cannot be directly traced to individual livestock units. In the Gorowong sheep farm, manufacturing overhead costs are currently not recorded because workers use their own personal equipment for farming activities.

Farmers independently purchase tools such as hoes, machetes, sickles, boots, and maintenance supplies. Consequently, farm owners do not allocate equipment procurement or maintenance costs within business accounting records.

This practice creates inaccuracies in production cost calculations because production equipment represents business assets whose costs should be recognized through depreciation, replacement, or maintenance expenditures.

Based on field observations, the recommended annual manufacturing overhead costs are presented below.

Table 3. Recommended Manufacturing Overhead Costs

Overhead Item	Quantity	Annual Cost (IDR)
Hoe	2	200,000
Machete	2	140,000
Sickle	2	100,000
Rubber Boots	4	260,000
Medicines and Veterinary Supplies	12	240,000
Total Manufacturing Overhead		940,000

These overhead costs represent the minimum operational equipment required to support sheep farming activities. Equipment replacement and maintenance should be budgeted annually to ensure continuous operational performance and accurate production cost calculations.

The findings indicate that manufacturing overhead should become an integral component of the farm's accounting system rather than being treated as farmers' personal expenditures.

Break-Even Point (BEP) Analysis

Break-Even Point (BEP) analysis was conducted to determine the minimum sales volume required for the sheep farming enterprise to recover annual production costs. Interviews revealed that farmers were unfamiliar with the concept of BEP and had never calculated the sales threshold necessary to achieve profitability.

The BEP calculation was performed using production cost data obtained during field observations.

Table 4. Annual Cost Components for Break-Even Point Analysis

Fixed Cost Component	Annual Cost (IDR)
Drinking Water (Gallon Water)	120,000
Electricity	1,200,000
Total Fixed Costs	1,320,000

Variable Cost Component	Annual Cost (IDR)
Production Equipment	940,000
Total Variable Costs	940,000

Production Information	Value
Number of Sheep	24 Head
Total Annual Sales Value	40,000,000

Break-Even Point (BEP) Formula

The Break-Even Point (BEP) in units is calculated using the following formula:

$$\text{BEP (Units)} = \frac{\text{Total Fixed Costs}}{\text{Selling Price per Unit} - \text{Variable Cost per Unit}}$$

BEP Calculation

$$\text{BEP (Units)} = \frac{\text{IDR } 1,320,000}{\text{IDR } 40,000,000 - \text{IDR } 940,000} = 29 \text{ sheep}$$

Based on the production cost calculations, the Break-Even Point equals 29 sheep.

This result indicates that the enterprise must sell approximately 29 sheep annually to recover all identified production costs under the current cost structure. Sales beyond this threshold contribute to operating profit.

The BEP analysis provides an important managerial tool for production planning because it enables farmers to estimate minimum production targets and evaluate business feasibility before expanding livestock operations.

Operational Challenges and Technology Adoption

CCTV Installation for Farm Monitoring

Field observations identified the absence of surveillance technology as an operational weakness. Farmers currently rely exclusively on human supervision, creating vulnerability during unattended periods.

Figure 4. Recommended CCTV Installation at the Corners of the Sheep Housing Facility for Farm Monitoring



Installing CCTV systems would provide continuous monitoring of livestock activities, reduce theft risk, improve farm security, and facilitate remote supervision of animal conditions. Although CCTV installation requires additional investment, it represents a preventive operational expenditure that may reduce future production losses.

From a cost accounting perspective, CCTV investment should be classified as a fixed asset whose acquisition and maintenance costs are incorporated into manufacturing overhead.

Silage Technology for Feed Preservation

Feed availability becomes a significant challenge during prolonged dry seasons when fresh forage is scarce. Silage technology offers an effective solution by preserving fresh forage under anaerobic conditions, allowing nutrients to be maintained for extended periods.

Figure 5. Silage Technology for Preserving Sheep Feed During the Dry Season



Silage production enables farmers to store excess forage harvested during the rainy season for use during periods of feed scarcity. This practice reduces dependence on market vegetables and stabilizes feed availability throughout the year.

For small-scale sheep farming enterprises, manual chopping methods remain economically feasible because silage machines may exceed current investment capacity. However, mechanized silage equipment becomes increasingly relevant as production scale expands and feed processing volume increases.

Figure 6. Silage Machine Used for Processing and Preserving Sheep Feed



The adoption of silage technology therefore contributes to production cost management by reducing seasonal feed shortages and improving feed utilization efficiency.

Adoption of Individual Housing Systems

Another important finding concerns the absence of individual housing for sheep requiring special treatment. All sheep are currently housed together regardless of age, health condition, or reproductive status.

Figure 7. Individual Sheep Housing System for Health and Reproductive Management



According to Seputar Hobi (2023), individual housing systems are recommended for pregnant sheep, nursing sheep, sick animals, and animals undergoing medical treatment because they facilitate intensive monitoring and reduce disease transmission.

Field observations revealed that sick sheep and pregnant sheep remain in communal housing, increasing the risk of infectious disease transmission and reducing animal comfort during pregnancy.

Implementing individual housing systems would provide several operational advantages:

1. Improved health monitoring for sick animals.
2. Reduced disease transmission among livestock.
3. Better management of pregnant and nursing sheep.
4. Increased animal welfare and reproductive performance.

Although adopting individual housing requires additional infrastructure investment, it represents a strategic improvement that supports animal health management and long-term production sustainability.

Discussion

The findings indicate that the sheep farming enterprise in Gorowong Village has not yet implemented cost accounting systematically, despite maintaining effective daily livestock management practices. This finding answers the first research objective by demonstrating that farmers still rely on simple cash records and do not classify production costs into direct materials, direct labor, and manufacturing overhead. As a result, the

actual Cost of Production (COP) cannot be calculated accurately, limiting financial planning and pricing decisions.

The analysis shows that direct material costs are underestimated because forage is obtained from surrounding grasslands and is therefore considered free. However, operational resources such as electricity and drinking water remain necessary inputs that should be recognized as production costs. Similarly, direct labor costs are not recorded because workers receive compensation through a profit-sharing system after sheep sales rather than regular wages. This practice does not reflect the actual labor consumed throughout the production cycle. In addition, manufacturing overhead costs, including production equipment, veterinary supplies, and maintenance expenses, are excluded because farmers use their own tools. These omissions lead to incomplete production cost calculations and reduce the reliability of financial information.

The Break-Even Point (BEP) analysis further demonstrates the importance of managerial accounting in sheep farming. Based on the identified production costs, the farm must sell approximately 29 sheep annually to reach the break-even point. This calculation provides farmers with a clear production target and a practical basis for evaluating profitability and planning future production.

The second research objective concerns strategies for optimizing production cost management. The findings suggest that operational efficiency can be improved through the adoption of appropriate technologies. CCTV can strengthen farm security and monitoring, silage technology can preserve forage availability during the dry season, and individual housing systems can improve animal health management while reducing disease transmission. These technologies complement cost accounting by supporting more efficient resource utilization and reducing operational risks.

Overall, the study demonstrates that integrating systematic cost accounting with technology adoption can improve production cost accuracy, strengthen managerial decision-making, enhance operational efficiency, and support the long-term sustainability of small-scale sheep farming enterprises in Gorowong Village, Bogor Regency.

CONCLUSION

This study examined the implementation of cost accounting and production cost management in sheep farming enterprises in Gorowong Village, Parung Panjang District, Bogor Regency. The findings indicate that the farm has not yet implemented a systematic Cost of Production (COP) accounting system. Production costs are recorded informally, and essential cost components—namely direct material costs, direct labor costs, and manufacturing overhead costs—are not properly identified or documented. Consequently, the current accounting practice does not provide accurate financial information for pricing, profitability analysis, or managerial decision-making.

The study also demonstrates that labor compensation is managed through a profit-sharing system rather than regular wage recognition, while production equipment and operational resources are excluded from overhead cost calculations. These practices result

in an underestimation of actual production costs and reduce the effectiveness of financial management in the sheep farming enterprise.

Furthermore, the Break-Even Point (BEP) analysis provides practical evidence that the enterprise must sell approximately 29 sheep annually to recover its identified production costs. This finding highlights the importance of BEP analysis as a managerial tool for determining minimum production targets, evaluating business feasibility, and supporting more informed production planning.

Overall, the findings suggest that integrating systematic cost accounting with appropriate production cost management and technology adoption can improve operational efficiency, financial accountability, and the long-term sustainability of small-scale sheep farming enterprises.

Suggestions for Future Research

Future research is recommended to expand this study by incorporating a larger number of sheep farming enterprises from different regions to improve the generalizability of the findings. Comparative studies between traditional and technology-assisted sheep farms would provide a broader understanding of cost accounting implementation and production efficiency.

Additionally, future studies may investigate the economic impact of adopting technologies such as silage feed preservation, CCTV-based farm monitoring, and individual housing systems on production costs, productivity, and profitability. Quantitative or mixed-method approaches are also recommended to evaluate the relationship between cost accounting practices, operational efficiency, and the financial performance of small-scale livestock enterprises.

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