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ANALYSIS OF FACTORS AFFECTING MILK PRODUCTION IN THE GOAT FARMING INDUSTRY (Case Study of Fathur Farm, Tambang District, Kampar Regency)

Siti Mauriza Putri^{1✉}, Dr. Jahrizal, S.E., M.T.², Ufira Isbah, S.E., M.Sc.³
Universitas Riau, Pekanbaru, Indonesia¹⁾

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✉ Corresponding author:
[sitimaurizaap@gmail.com]

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Penelitian ini menganalisis keterbatasan faktor-faktor produksi terhadap produksi susu pada industri peternakan kambing perah di Kecamatan Tambang, Kabupaten Kampar, dengan studi kasus di Fathur Farm. Penelitian ini menggunakan metode analisis deskriptif berdasarkan data yang diperoleh melalui wawancara mendalam, observasi lapangan, dan catatan peternakan selama periode produksi tahun 2024. Hasil penelitian menunjukkan bahwa produksi susu dipengaruhi oleh keterkaitan antara modal, pakan, dan tenaga kerja. Rata-rata hasil susu harian sebesar 1,2 liter per ekor kambing berada di bawah potensi genetik kambing Saanen yang mencapai 2–4 liter, mencerminkan dampak gabungan dari keterbatasan modal, fluktuasi ketersediaan pakan, dan kekurangan tenaga kerja. Alokasi modal didominasi oleh upah tenaga kerja (71%), diikuti oleh pengadaan pakan (19%) dan biaya pemeliharaan (10%), yang menunjukkan sistem padat karya yang memprioritaskan keberlanjutan operasional namun membatasi peningkatan produktivitas. Manajemen pakan mengombinasikan hijauan produksi sendiri dengan konsentrat yang dibeli, sementara keterbatasan tenaga kerja menyebabkan tingginya intensitas beban kerja. Temuan ini menunjukkan bahwa Fathur Farm beroperasi sebagai sistem produksi mandiri dengan keterbatasan sumber daya. Peningkatan akses pembiayaan, penguatan kemandirian pakan, serta peningkatan kapasitas tenaga kerja merupakan strategi kunci untuk mendorong produktivitas dan keberlanjutan peternakan kambing perah skala kecil.

Abstract

This study analyzes the constraints of production factors on milk production in the goat farming industry of Tambang District, Kampar Regency, with a case study at Fathur Farm. The research employs a descriptive analysis method based on data collected through interviews, field observations, and farm records from the 2024 production period. The results show that milk production is influenced by the interrelationship among capital, feed, and labor. The average daily yield of 1.2 liters per goat is below the Saanen breed's potential of 2-4 liters, reflecting the combined effects of limited capital, fluctuating feed availability, and labor shortage. Capital allocation was dominated by labor wages (71%), followed by feed procurement (19%) and maintenance (10%), indicating a labor-intensive system that prioritizes operational continuity but restricts productivity improvement. Feed management combined self-produced forage with purchased concentrate, while limited labor resulted in high workload intensity. These findings indicate that Fathur Farm operates as a self-sustaining yet resource-constrained system. Enhancing access to financing, improving feed self-sufficiency, and strengthening labor capacity are key strategies to boost productivity and sustainability in small-scale dairy goat farming.

1. INTRODUCTION

The livestock sector plays an essential role in Indonesia's economy by supporting food security, rural employment, and income generation. According to the Central Bureau of Statistics (BPS, 2023), the livestock subsector contributed about 1.56% to Indonesia's Gross Domestic Product (GDP), highlighting its significance for national development. Beyond its economic value, the sector also meets nutritional needs, particularly in rural areas where livestock farming serves as an accessible source of livelihood. Among various livestock commodities, goat farming has gained growing attention due to the nutritional and health benefits of goat milk. It contains higher protein and lower fat than cow milk, making it easier to digest and suitable for health-conscious consumers (Kapadiya *et al.*, 2016).

Goat farming contributes to food security and rural welfare, especially in regions with limited agricultural resources. Goats adapt well to marginal land and minimal feed, reproduce quickly, and require relatively low capital, making them ideal for smallholders (Sumarmono, 2022). This subsector supports both household income and regional trade, particularly in Riau Province, where goat farming continues to grow as part of agricultural diversification and rural economic development (BPS, 2023).

In Kampar Regency, Tambang District is one of the areas with strong potential for dairy goat farming. Based on BPS data (2024), the district had 714 goats, consisting of 136 males and 578 females, indicating the region's ability to sustain milk production. Fathur Farm, located in Kualu Village, represents a small-scale dairy goat farming that contributes to local milk supply and income generation. The farm manages 20 lactating Saanen goats, producing an average of 720 liters of milk per month, sold directly to consumers at IDR 50,000 per liter. This generates an estimated annual income of around IDR 180 million, demonstrating the economic potential of small-scale dairy goat farming.

Despite this potential, the average milk yield per goat, approximately 1.2 liters per day, remains below the Saanen breed's optimal productivity of 2-4 liters per day (Sudrajat *et al.*, 2025). This gap reflects constraints in capital, feed, and labor. Limited financial resources restrict investment in modern facilities and feed quality, while seasonal feed fluctuations increase dependence on purchased concentrate. In addition, the small number of workers results in high workload intensity, reducing operational efficiency. These challenges collectively limit productivity and threaten the long-term sustainability of smallholder dairy goat enterprises.

Previous studies have identified feed as the dominant factor influencing milk production (Afrida *et al.*, 2017; Kumalasari *et al.*, 2025; Suranindyah *et al.*, 2020). However, research that simultaneously analyzes the combined influence of capital, feed, and labor in small-scale dairy goat farming remains limited. Understanding these interactions is crucial, as milk output depends not only on the availability of each input but also on their balance and utilization. Thus, this study aims to analyze the constraints of production factors, namely capital, feed, and labor, on milk production at Fathur Farm in Tambang District, Kampar Regency. It seeks to describe how each factor affects milk output, explain how their interactions shape productivity, and identify strategies

to improve resource use and production sustainability. The findings are expected to provide practical insights for small-scale dairy goat farmers in optimizing input allocation and serve as a reference for stakeholders and policymakers in developing targeted support programs to strengthen the goat farming industry in Indonesia.

2. METHODS

This research was conducted at Fathur Farm, a small-scale dairy goat farming located in Tambang District, Kampar Regency, Riau Province. The site was selected because it consistently operates as a smallholder goat milk producer and provides accessible, reliable data for analyzing production factors. The study took place in January 2025, following the issuance of the research permit, and involved in-depth interviews, field observations, and documentation review.

A descriptive analysis method was applied to describe the roles of capital, feed, and labor in affecting goat milk production. This method was chosen to present operational realities, identifying patterns, and providing a clear overview of how production factors are applied in practice (Sugiyono, 2017). The analysis aimed to describe how each factor supports or constrains production performance at Fathur Farm.

Primary data were collected through in-depth interviews with the barn supervisor, who served as the key informant responsible for daily operations. These interviews were supported by direct observations of production activities and documentation of available farm records. Secondary data were obtained from relevant literature, statistical reports, and previous studies to provide theoretical and comparative context.

Capital was analyzed based on its sources and allocation, feed included both forage and concentrate inputs, while labor covered the number of workers, their tasks, and wage levels. Data were processed through stages of collection, reduction, and interpretation to produce an accurate and systematic description of how production factors interact to determine milk output at Fathur Farm.

3. RESULTS AND DISCUSSION

Results

Capital Utilization

Capital plays a crucial role in sustaining milk production at Fathur Farm. In 2024, total capital use reached IDR 124,800,000, allocated primarily to labor wages (71%), feed procurement (19%), and facility maintenance (10%), as presented in Table 1. The dominance of labor costs indicates that the enterprise operates as a labor-intensive system typical of smallholder goat farming, where most financial resources are used for operational expenses rather than fixed-capital investment.

Table 1. Capital Allocation at Fathur Farm in 2024

Allocation Category	Amount (IDR/year)	Percentage
Labor wages	88,800,000	71%
Feed procurement	24,000,000	19%
Maintenance and utilities	12,000,000	10%
Total	124,800,000	100%

Source: Processed Data, 2025.

Furthermore, capital was sourced equally from owner's equity and milk sales revenue, as presented in Table 2. Owner's equity covered initial investment and periodic cash injections, while milk sales provided operational liquidity. This self-financing structure ensures the farm's continuity but restricts the ability to reinvest in productivity-enhancing assets.

Table 2. Capital Sources at Fathur Farm in 2024

Source of Capital	Description
Owner's equity	Initial investment and occasional funds for operational stability.
Milk sales revenue	Direct consumer sales at IDR 50,000 per liter, serving as the primary source of monthly operational funds.

Source: Processed Data, 2025.

Because most of the capital is absorbed by wages and daily operational costs, limited funds remain for productivity improvements such as feed technology, veterinary upgrades, or barn mechanization. These findings align with Choirunisa *et al.* (2021), who observed that small-scale goat farming often rely heavily on internal

funding, leaving little room for capital deepening. Consequently, the current structure supports operational continuity but constrains long-term growth potential.

Feed Utilization

Feed is the second most important production input, directly affecting milk yield and herd health. In 2024, total feed consumption amounted to 18,000 kg, consisting of 6,000 kg of forage produced on-farm and 12,000 kg of purchased concentrate, as presented in Table 3.

Table 3. Feed Utilization at Fathur Farm in 2024

Type of Feed	Quantity (kg/year)	Source	Cost (IDR/year)	Percentage
Forage (Indigofera, Calliandra, corn)	6,000	Self-cultivated	6,000,000	25%
Concentrate	12,000	Purchased	18,000,000	75%
Total	18,000	-	24,000,000	100%

Source: Processed Data, 2025.

The dominance of concentrate reflects both financial and technical limitations. Although land is available for forage expansion, limited capital prevents the adoption of improved cultivation practices. Consequently, the farm depends heavily on purchased feed, exposing it to price fluctuations and supply risks. This finding supports a study by Widyaharsanto (2016), who emphasized that feed costs and availability remain critical constraints in smallholder dairy systems.

Goats are fed twice daily, combining forage in the morning and concentrate after each milking session. In addition, supplementation with mineral salts and clean water helps maintain milk quality. The feeding strategy supports stable output but provides little opportunity for yield improvement. Moreover, improved forage cultivation and balanced feed ratios could enhance productivity without proportionate cost increases, as suggested by (Liu *et al.*, 2019).

Taken as a whole, feed management at Fathur Farm illustrates a balanced yet resource-limited system. Feed accounted for 19% of total expenditure but had a strong impact on milk output, confirming its role as a key determinant of productivity. Strengthening on-farm forage production and optimizing concentrate use would be essential steps toward higher efficiency and sustainability.

Labor Utilization

Labor represents the dominant production factor, absorbing 71% of total costs and serving as the operational backbone of Fathur Farm. In 2024, the farm employed four full-time workers, consists of hree farm workers and one barn supervisor, as presented in Table 4.

Table 4. Labor Utilization at Fathur Farm in 2024

Labor Category	Quantity	Monthly Wage (IDR)	Annual Wage (IDR)	Working Hours	Description
Barn Supervisor	1	2,000,000	24,000,000	8 hrs/day	Oversees operations, herd health, and productivity.
Farm Workers	3	1,800,000	64,800,000	8 hrs/day	Feeding, milking, forage collection, barn cleaning, milk handling.
Total	4	-	88,800,000	-	-

Source: Processed Data, 2025.

Each worker handles multiple tasks daily, from forage collection to post-milking processing, leading to high workload intensity. Despite the modest wages, the workforce ensures operational consistency through efficient coordination and time management. However, limited human resources restrict the potential for expansion and innovation. Similar findings by Afrida *et al.* (2017) and Khusna *et al.* (2023) show that labor shortages and low wages remain key barriers to productivity improvement in smallholder dairy enterprises.

Thus, for a small-scale dairy goat farming like Fathur Farm, labor efficiency is essential for productivity gains. Training, task specialization, and simple labor-saving tools, such as improved milking and feed-handling equipment, could enhance operational efficiency within current financial constraints.

Milk Production Results

Milk production reflects the combined influence of capital, feed, and labor utilization. In 2024, Fathur Farm managed 20 lactating Saanen goats, producing an average of 720 liters per month or 3,600 liters per year, as presented in Table 5.

Table 5. Goat Milk Production at Fathur Farm in 2024

Indicator	Quantity	Unit	Description
Lactating goats	20	Head	Predominantly Saanen breed
Average milk production	720	L/month	1.2 L/day per goat
Annual milk production	3,600	L/year	Five-month lactation period
Selling price	50,000	IDR/L	Direct consumer sales
Total annual revenue	180,000,000	IDR	Fathur Farm's annual revenue

Source: Processed Data, 2025.

The daily average yield of 1.2 liters per goat is below the Saanen breed's genetic potential of 2-4 liters (Sudrajat *et al.*, 2025). This shortfall reflects limited feed quality, seasonal forage fluctuations, and financial constraints that prevent investment in productivity-enhancing technologies. Nonetheless, stable output and consistent marketing demonstrate effective management within existing limitations.

Taken as a whole, milk production at Fathur Farm illustrates the interdependence of production factors. Capital ensures liquidity but limits reinvestment, feed availability directly shapes milk yield, and labor maintains operational continuity under resource constraints. The results highlight the need for integrated strategies that combine better feed self-sufficiency, labor training, and incremental capital investment to enhance productivity and long-term sustainability in small-scale dairy goat farming.

Discussion

The Role of Capital in Goat Milk Production

Capital determines a farm's ability to acquire inputs, pay labor, and maintain operations. At Fathur Farm, total capital in 2024 reached IDR 124,800,000, sourced equally from the owner's equity and milk sales revenue. The majority (71%) was allocated to labor wages, followed by feed procurement (19%) and facility maintenance (10%). This allocation pattern typifies smallholder systems where financial resources are primarily directed toward daily operational needs rather than long-term investment.

The dependence on milk sales for liquidity indicates that financial stability is highly sensitive to production volume and price consistency. Limited reinvestment capacity constrains opportunities to modernize facilities or adopt technology. In line with Production Theory, capital in this context functions as a sustaining rather than productivity-enhancing input. Similar to findings by Choirunisa *et al.* (2021) and Istiqomah *et al.* (2025), the absence of institutional financing limits investment in mechanized tools, improved housing, and feed storage. Consequently, while the existing capital structure supports operational continuity, it restricts potential output growth and technological upgrading.

Feed Management and Its Contribution to Output

Feed serves as the most direct determinant of milk yield and herd health. In 2024, Fathur Farm utilized approximately 18,000 kg of feed, comprising 6,000 kg of self-produced forage, such as Indigofera, Calliandra, and corn, with 12,000 kg of purchased concentrate. Feed costs totaled IDR 24,000,000, or 19% of total expenditure, with concentrate purchases dominating 75% of total feed costs.

While this feeding combination maintained stable production of 3,600 liters per year, it also reflects limited feed self-sufficiency. Land availability allows for expansion of forage cultivation, yet constrained capital prevents such improvement. Seasonal fluctuations in forage supply, particularly during the dry season, heighten dependency on external concentrate and expose the farm to price volatility. These findings support previous studies by Suranindyah *et al.* (2020) and Kumalasari *et al.* (2025), emphasizing that feed cost and availability are the major constraints in smallholder dairy goat systems.

From an Input-Output Theory perspective, the effectiveness of feed depends on its composition balance, in which forage provides fiber and stability for rumen function, while concentrate supplies the protein and energy necessary for milk synthesis (Liu *et al.*, 2019). At Fathur Farm, feed accounted for less than one-fifth of total expenditure but had a disproportionately large impact on milk productivity. Thus, enhancing forage self-production and feed preservation would therefore be critical to reducing costs and improving sustainability.

Labor Utilization and Its Effect on Productivity

Labor remains the most dominant factor, absorbing 71% of total capital. In 2024, Fathur Farm employed one barn supervisor and three workers, each working approximately eight hours per day. The small workforce performs all production tasks, starting from feeding, milking, cleaning, forage collection, and packaging, reflecting a highly labor-intensive system.

This limited labor supply leads to multitasking and high workload intensity, which may reduce efficiency and affect animal welfare. Consistent with Production Theory, labor acts as the mobilizing input that transforms

feed and capital into output. Thus, when labor capacity is constrained, total productivity tends to stagnate. Empirical studies by Afrida *et al.* (2017) and Khusna *et al.* (2023) similarly found that small-scale goat farming often experience reduced milk yield due to limited labor availability and technical skills.

At Fathur Farm, while the existing workforce maintains stable production, additional training or task specialization could improve labor productivity without increasing employment costs. Incremental investment in simple labor-saving tools, such as improved milking equipment or forage-handling devices, may also ease workload pressure and enhance efficiency.

Interrelationship among Capital, Feed, and Labor

The interaction among production factors at Fathur Farm shows that capital, feed, and labor are complementary but imbalanced. Capital sustains daily operations through financial support for wages, feed, and maintenance. Feed determines biological productivity by influencing milk yield and animal health. Labor integrates both inputs into an operational process, directly affecting efficiency and consistency in daily production activities.

Descriptive evidence indicates that while capital and feed are essential, labor exerts the strongest influence on milk output. The limited workforce, responsible for multiple tasks, determines how effectively feed is utilized and how smoothly operations run. When labor is insufficient, feed quality and capital allocation cannot be fully optimized. This finding aligns with Afrida *et al.* (2017), who found that labor availability and technical competence are the main determinants of productivity in small-scale dairy goat farming systems.

The observed conditions also reflect the Law of Diminishing Returns, where increasing one input, such as feed, without proportional improvements in labor or capital yields only marginal gains. Conversely, balanced enhancement across all factors, such as improving feed quality alongside adequate labor support, has the potential to generate more substantial and sustainable increases in milk production.

Implications for Small-Scale Dairy Goat Farming

The findings indicate that Fathur Farm operates as a self-sustaining yet resource-constrained production system in which capital, feed, and labor interact to determine milk output. Capital supports operational continuity but remains insufficient for reinvestment and technological improvement. Feed determines milk productivity, yet dependence on purchased concentrate and limited forage land reduce self-sufficiency and increase vulnerability to seasonal fluctuations. Labor, as the dominant factor, integrates both capital and feed into production but is constrained by high workload intensity and limited capacity.

Sustainable productivity improvement therefore requires a balanced strategy that enhances financial access, strengthens feed management, and develops workforce skills. In the short term, optimizing capital allocation toward feed quality and animal health can stabilize output without major investment. Over time, gradual reinvestment in productive assets, such as improved housing or small-scale milking tools, can reduce manual workload and enhance milk quality. Collaborative partnerships among feed suppliers, cooperatives, and veterinary service providers could improve feed stability and technical support, while targeted government programs on training and microcredit access would further strengthen smallholder resilience. Moreover, these implications emphasize that the advancement of small-scale dairy goat farming relies not only on increasing input quantities but also on improving efficiency, resource balance, and institutional support to achieve long-term sustainability in rural livestock development.

4. CONCLUSION

This study analyzed the interactions among capital, feed, and labor in determining goat milk production at Fathur Farm, a small-scale dairy goat farming in Tambang District, Kampar Regency. Using descriptive analysis based on interviews, field observations, and farm records, the findings reveal that milk production is sustained through a labor-intensive system supported by limited financial capital and partially self-sufficient feed management.

Financial capital, sourced from owner equity and milk sales, primarily covers operational costs rather than productivity-enhancing investments, reflecting financial constraints typical of smallholder farms. Feed management combines on-farm forage with purchased concentrate, ensuring production continuity but exposing the farm to market price fluctuations and seasonal shortages. Labor emerges as the most influential factor, integrating both capital and feed into daily operations, yet limited workforce capacity and manual processes restrict productivity growth.

The findings indicate that Fathur Farm's production system is self-sustaining but constrained by imbalances among production factors. Enhancing access to financing, strengthening feed self-sufficiency, and improving labor capacity are essential strategies for achieving higher productivity and long-term sustainability

in small-scale dairy goat farming systems in Indonesia.

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