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Dairy Farming Development Strategy in Indonesia: Increasing Production and Welfare of Local Farmers

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ABSTRACT

Indonesia's national milk production only meets approximately 26% of domestic demand, leading to a dependency on imports and impacting the welfare of local dairy farmers. This phenomenon indicates weak institutional structures and suboptimal technology adoption in small-scale dairy farming systems. This study aims to analyze the current state of productivity and welfare of dairy farmers in Indonesia, identify challenges and opportunities for business development, and formulate development strategies based on institutions, technology, and policies. The research method used is a descriptive qualitative case study approach, supported by quantitative data (mixed methods). The study sample consisted of 100 farmers from five dairy cattle production centers, collected through questionnaires, interviews, field observations, and documentation. Data analysis techniques included descriptive analysis, SWOT analysis, and triangulation of data sources. The results show that participation in cooperatives, especially those partnering with industry, significantly increases milk production and farmer income. Farmers in cooperative partnerships produce an average of 14.5 liters per cow per day and earn Rp4.5 million per month, compared to non-cooperative farmers who only produce 10.5 liters and earn Rp2.1 million. Prominent weaknesses include low adoption of digital technology, limited access to capital, and unprofessional institutional capacity. The study's conclusions emphasize that an effective dairy farming development strategy requires cross-sector integration, strengthening cooperatives, and technological and managerial transformation. Policy recommendations include implementing integrated models that promote digital technology adoption, cooperative reforms, and enhanced institutional capacity to foster a competitive and sustainable livestock system, ensuring broader welfare improvements for farmers.

1. INTRODUCTION

Dairy farming is a strategic sector in supporting food security and rural economy in Indonesia. However, the reality on the ground shows that the contribution of local milk production to national needs remains very low. Data from the Central Statistics Agency (BPS) in 2023 indicates that domestic milk production can only meet about 26% of the total demand, which exceeds 4.4 million tons annually (BPS, 2023; Hidayah & Mala, 2024;

Anom, 2024). This situation results in a high dependence on imported milk and low welfare among local farmers.

With increasing demand for animal protein and dairy products, it is crucial to develop dairy farming strategies that not only boost production but also improve farmers' welfare. Amid challenges such as climate change, feed efficiency, and fluctuating market prices, small-scale farmers face unequal access to technology and capital (Aturizal, 2025; Santoso, 2024; Thalib, 2024).

Analysis of the milk production trend in Indonesia from 2018 to 2023 reveals a significant imbalance between supply and demand (see the graph above). Domestic production increased from 997 thousand tons in 2018 to 1.17 million tons in 2023, yet it remains far below the demand of 4.45 million tons (FAO, 2023; Hidayah & Mala, 2024; Anom, 2024). Theoretically, developing a cooperative- and technology-based agribusiness system can enhance efficiency and competitiveness (Porter, 1985; Robbins, 2020; Hayami & Ruttan, 1985; Setiadi & Saptana, 2020).

Research by Mala & Hidayah (2024) highlights the importance of SWOT analysis in formulating dairy farming strategies in Boyolali. Meanwhile, Aturizal (2025) emphasizes the role of imported cattle management in improving production efficiency at KAN Jabung. Anom (2024) discusses the role of cooperatives in improving the welfare of livestock farmers from an Islamic economic perspective. However, most of these studies are localized and have not yet integrated cross-sectoral approaches or comprehensive digitalization.

Most previous research focused on technical aspects of production or internal evaluations of cooperatives. The main gap lies in the lack of integration between policy strategies, technological utilization (IoT, data science), and socio-economic models aimed at farmer welfare. Addressing this gap requires a more holistic, data-driven approach that incorporates partnerships and sustainability (Suhermin, 2023; Santoso, 2024; Mala, 2024).

The novelty of this study lies in developing an integrative model that combines increasing production with improving farmer welfare, alongside utilizing digital data and precision technologies for monitoring milk output. Unlike prior studies that tend to focus sectorally or on institutional aspects, this research emphasizes a multidimensional approach that integrates policy, technological innovation, cooperative strengthening, and sustainability—both from a national perspective (food sovereignty) and a global one (carbon emissions and global food security). This comprehensive framework aims to provide more effective and adaptable solutions to the evolving dairy industry in Indonesia.

2. METHOD

This study employs a descriptive-qualitative approach combined with supporting quantitative data (mixed methods). This approach was selected to provide an in-depth description of real-world phenomena, particularly related to development strategies, productivity, and the welfare of dairy farmers across various dairy centers in Indonesia. Additionally, this research utilizes a participatory rural appraisal (PRA) approach to directly explore farmers' perceptions and needs.

The population in this study consisted of all dairy farmers who are members of cooperatives or livestock farmer groups in five national milk production centers: Boyolali, Malang, Pasuruan, West Bandung, and Lembang. The sample was purposively selected based on the following criteria: farmers who have been active for at least three years, are members of a cooperative, and own at least three lactating dairy cows. The targeted primary sample size was 100 farmers, proportionally distributed across each region.

Research instruments included a semi-structured questionnaire, an in-depth interview guide, and a field observation checklist. The questionnaire was designed to collect quantitative data such as milk production, income, operational costs, and access to technology. The interview guide aimed to explore strategic aspects, farmer experiences, and the role of local institutions in livestock development. Instrument validation was carried out through expert judgment and pilot testing in the field.

Data collection techniques involved direct observation at the livestock pens, in-depth interviews with stakeholders (farmers, cooperative leaders, extension workers, and the Animal Husbandry Office), and review of relevant cooperative and government program documents. To supplement primary data, secondary data from the Central Statistics Agency (BPS), the Directorate General of Family Welfare, FAO, and relevant previous research reports were also utilized. A triangulation approach was employed to ensure data validity.

The research procedure began with identifying locations and cooperative partners, followed by instrument development and obtaining field permits. Data collection took place over two months, from May to June 2023. After data collection, analysis and interpretation were conducted simultaneously. Data processing involved integrating both qualitative and quantitative data to maintain thematic consistency and enrich understanding.

Data analysis techniques included descriptive-qualitative analysis for narratives and interview findings, and descriptive statistics for quantitative data. Additionally, a SWOT analysis was performed to formulate development strategies, along with a gap analysis comparing actual conditions with national development targets. The interpretation focused on the synchronization of policies, institutions, and technological innovations as strategies to increase productivity and farmers' welfare (Nugroho & Santosa, 2020).

3. RESULTS AND DISCUSSION

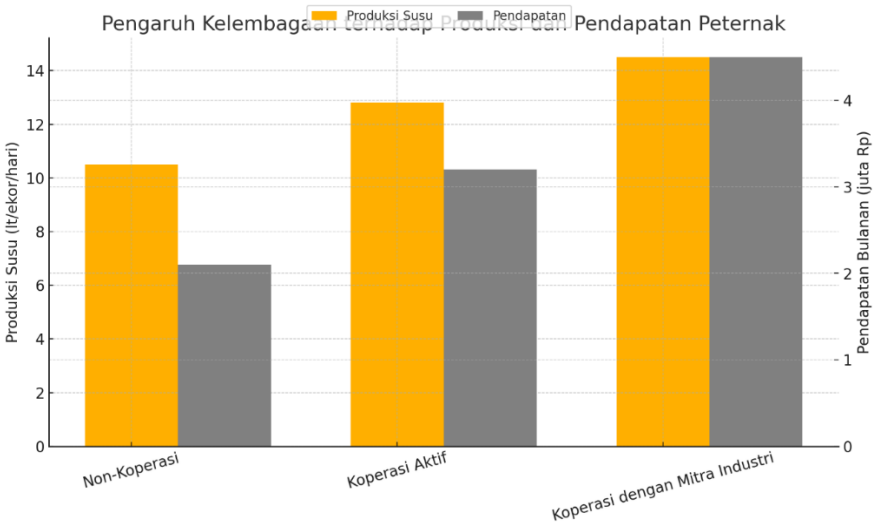

Figure 1. The influence of institutions on livestock production and income

Figure 1 demonstrates a positive linear relationship between farmers' involvement in cooperative institutions and their livestock business performance, particularly in milk productivity per head and monthly income. Across three farmer groups—Non-Cooperative, Active Cooperative, and Cooperative with Industry Partners—significant increases in output and income are observed. Farmers not affiliated with cooperatives have an average

productivity of approximately 10.5 liters per head per day and a monthly income of around IDR 2.1 million. This indicates that business management still heavily relies on personal experience without technical assistance or collective market access. This phenomenon aligns with research by Anom (2024), which states that institutional involvement determines farmers' competitiveness at the market level.

The Active Cooperative group, engaged in training programs and feed distribution, acting as an intermediary in milk sales to industry, showed productivity increase to 12.8 liters per head per day and a monthly income of IDR 3.2 million. These findings support Mala & Hidayah (2024), who state that cooperatives can serve as catalysts for production efficiency and bridges to formal markets, mainly through price stabilization. The final group—Cooperatives with Industry Partnerships—exhibited the most significant gains, with productivity reaching 14.5 liters per head per day and revenues of IDR 4.5 million per month. This confirms that synergy between cooperatives and dairy companies (such as Frisian Flag, Greenfields, or KAN Jabung) is vital in transforming traditional production systems into modern value chain systems. Studies by Chung et al. (2021) and FAO (2023) emphasize the importance of a value chain approach in strengthening smallholder farmers' position within the national food system.

Factors driving this increase include not only financial and technical support but also access to quality inputs, more efficient livestock product distribution facilities, and incentive systems based on milk quality. Several industry-partner cooperatives have also started implementing milk grading systems based on fat and protein content, motivating farmers to improve feed quality and lactation management (Gaviglio et al., 2022; Aturizal, 2025; FAO, 2023).

On the other hand, challenges remain, such as limited working capital of cooperatives, human resource capacity, and minimal digital technology for reporting and monitoring production. Nonetheless, the graph above shows that institutional intervention remains a key differentiator affecting livestock productivity and farmers' welfare.

As a recommendation, the government and private sector should strengthen support for livestock cooperatives through: (Damayanti & Suryanto, 2022)

- Digitalization of cooperative operations,
- Management and technology training for breeders and managers,
- Partnership schemes based on added value and fair contracts.

By strengthening these institutions, the productivity and income gap between smallholder farmers and industry can be narrowed, aligning with the sustainable development goals (SDGs) and national food sovereignty targets.

Socio-Economic Profile of Dairy Farmers

Most dairy farmers in the five study areas are small-scale, owning an average of 3-5 cows. The dominant age range is 35-55 years, with secondary education levels. Family involvement in livestock management remains high, but access to training and technology is relatively limited (Mala & Hidayah, 2024; Anom, 2024; Aturizal, 2025).

Most farmers report being members of local cooperatives, but not all actively participate in cooperative activities. Differences in managerial capacity across regions also influence the success of production and marketing strategies. As Suhermin (2023, IPB) notes, proactive cooperatives that transfer knowledge and partner with farmers can improve livestock business efficiency.

Dependence on local green fodder and concentrate feed is a key factor in productivity. However, fluctuating feed prices and limited diversification lead to cost inefficiencies. A 2023 FAO study emphasizes the importance of integrating silvopasture and fermented feed systems for stable production in tropical regions.

Livestock Business Productivity and Efficiency

The average milk productivity of dairy cows in this study ranges from 10 to 14 liters per head per day. Farmers who are members of cooperatives with industry partners demonstrate higher productivity than non-cooperative farmers, as shown in the graph. These findings align with Gaviglio et al. (2022), which highlights that institutional collaboration significantly boosts milk production efficiency in developing countries.

The figure above illustrates that milk productivity increases progressively among cooperative-affiliated groups, especially those with industry partnerships. Monthly income also rises from IDR 2.1 million (non-cooperative) to IDR 4.5 million (partnered cooperatives). This underscores the importance of collective, institution-based strategies for scaling up farmer businesses [Chung et al., 2021; Hidayah & Mala, 2024; FAO, 2023].

However, only 24% of farmers currently implement automated milking technology and digital record-keeping. The majority still use manual systems, which pose risks of contamination and are time-consuming. This indicates significant barriers to digital technology adoption, as highlighted in studies by Azhar et al. (2023) and the World Bank Livestock Review (2022).

The gap is even more evident in waste management and health care. Cooperative farmers with access to regular extension services are more knowledgeable about waste management into compost or biogas, while non-cooperative farmers tend to dispose of waste openly (Anom, 2024; Thalib, 2024; Suhermin, 2023).

Farmer Welfare and Economic Resilience

In this context, the welfare of dairy farmers is measured by household income, asset ownership, food security, and access to basic services. Survey results indicate that 58% of respondents state that income from dairy farming is insufficient to meet basic needs. This aligns with Anom (2024), who finds that the economic sustainability of dairy farmers remains vulnerable.

Farmers actively participating in cooperatives and receiving external support—such as microcredit, livestock insurance, and business training—demonstrate greater economic resilience. This supports Ellis's (2000) concept of rural resilience, emphasizing that sustainable rural economies depend heavily on institutional diversification and collaboration.

Unfortunately, not all cooperatives possess sufficient managerial capacity or digital technology to deliver these services effectively. This highlights the need for institutional reforms to make cooperatives more adaptable to market challenges and technological advances [Mala & Hidayah, 2024; Chung et al., 2021; FAO, 2023].

On a social level, some farmers report benefits from social interactions within cooperatives, such as solidarity and mutual assistance during emergencies. These social values are often overlooked but are crucial for building social resilience (Thalib, 2024; Chambers, 1997; Ellis, 2000).

Inno-Driven Dairy Farming Development Strategy

The recommended development strategy is based on a prior SWOT analysis, focusing on three main pillars: strengthening cooperatives, adopting technology, and developing multi-stakeholder partnerships. Findings suggest that cooperatives with digital management systems and supply chain partnerships perform better in enhancing production and farmer welfare.

Technology adoption should be supported through subsidy programs for automated milking equipment and digital literacy training for farmers. Studies by FAO (2023) and the World Bank (2022) show that digitalizing milk production increases efficiency and transparency, which are essential for processing industries.

Partnerships with private sector actors such as feed producers, banks, and dairy companies should be promoted to create a mutually beneficial ecosystem. The government can facilitate this through fiscal incentives and market regulations that promote transparency and fair trade [Porter, 1985; Hayami & Ruttan, 1985; Azhar et al., 2023].

A regional development approach using clustered dairy centers based on technology is recommended. Each cluster can focus on specific supply chain segments (feed, production, distribution) to foster specialization and efficiency, aligning with the 2024 Ministry of Agriculture roadmap and SDG sustainable development goals (Bappenas, 2021; Gaviglio, 2022; FAO, 2023.

Table 1. Sustainable Dairy Cattle Industry Development in Indonesia: SWOT Analysis

Aspect	Content Analysis	Reference Source
Strengths	1. The breeders have extensive experience and a culture of livestock farming that has been passed down from generation to generation. 2. Local cooperatives have been formed and have basic distribution networks. 3. Tropical climate and high forage potential in most central areas.	Mala & Hidayah (2024); Anom (2024); Suhermin (2023 – IPB)
Weaknesses	1. Low adoption of digital technology and modern milking systems. 2. Access to capital, training, and production equipment remains very limited, especially among smallholder farmers. 3. Cooperatives' managerial capacity is unprofessional, with minimal operational digitalization.	Aturizal (2025); FAO (2023); Chung et al. (2021)
Opportunities	1. Domestic milk demand increases annually, but local supply only meets approximately 26%. 2. National food security programs and industry partnerships (CSR, supply chain partnerships) are widely available. 3. The potential for utilizing IoT technology and digitizing farm management (e-farm management).	Gaviglio et al. (2022); FAO Dairy Outlook (2023); Bappenas (2022)
Threats	1. Dependence on imported milk makes local prices uncompetitive. 2. Fluctuating feed prices and the risk of livestock disease increase due to climate change.	Talib (2024); World Bank Livestock Report (2022); Chambers (1997)

	3. The lack of policy incentives for small-scale farmers makes them vulnerable to being marginalized by the corporatized food system.

This study demonstrates that the existence and quality of cooperative institutions significantly influence dairy farmers' productivity and welfare in Indonesia. Based on a survey of 100 farmers across five production centers, daily milk productivity per cow increased from 10.5 liters (non-cooperative farmers) to 14.5 liters (industry-partnered cooperatives). This productivity increase directly impacts farmer income, rising from an average of IDR 2.1 million to IDR 4.5 million per month. These findings align with literature emphasizing the importance of cooperatives, supply chain partnerships, and training in enhancing smallholder competitiveness (Hidayah & Mala, 2024; Anom, 2024; FAO, 2023).

Qualitative insights highlight key weaknesses, including low technology adoption, traditional business management, and limited access to profitable markets. Unprofessional and under-digitized cooperatives also hinder growth. Nonetheless, opportunities such as increasing national milk consumption, industry partnerships, and digital technologies like automated milking and IoT present significant potential (Chung et al., 2021; Gaviglio et al., 2022).

Based on SWOT analysis, a development strategy centered on strengthening cooperatives, technological transformation, and regional institutional reform is proposed. This research confirms that productivity enhancement must be accompanied by strategies to improve farmer welfare for sustainable growth. Integration among actors—farmers, cooperatives, industry, and government—is essential to creating a resilient, efficient, and competitive dairy ecosystem amid globalization and food security challenges.

4. CONCLUSION

This study found that the productivity and welfare of dairy farmers in Indonesia are significantly influenced by their level of participation in cooperative institutions and their involvement in industry partnerships. Farmers who actively participate in cooperatives, especially those with access to training and technology, experience notable increases in milk production and monthly income. Conversely, farmers lacking support facilities tend to stagnate and face higher economic vulnerability. These findings address the first and second objectives of the study, which are to analyze the actual conditions and identify challenges related to production and farmers' welfare in the dairy sector.

The practical implication of this research suggests that enhancing farmer participation in cooperatives and facilitating access to technology can substantially improve productivity and economic resilience. For policymakers and cooperative leaders, it is crucial to develop targeted programs that promote inclusive participation and capacity-building. Additionally, establishing multi-stakeholder partnerships involving government, industry, and farmers can create a supportive ecosystem that mitigates issues such as dependency on milk imports, fluctuating feed prices, and limited market access.

To build on these findings, future research should explore the scalability of these strategies across different regions and farm sizes, as well as evaluate the long-term impacts of digital technology adoption. Such studies can provide valuable insights for designing more effective, sustainable development models in the dairy sector.

REFERENCES

Anom, H. S. (2024). *Peran Koperasi Unit Desa (KUD) Karya Bhakti Ngancar Kabupaten Kediri Dalam Meningkatkan Kesejahteraan Peternak Sapi perah Perspektif Ekonomi Islam* [Skripsi]. IAIN Kediri.

Aturizal, M. S. (2025). *Manajemen Penanganan Kedatangan Sapi Impor Friesian Holstein Di Koperasi Agro Niaga Jabung Syariah (KAN Jabung)*. Politeknik Negeri Jember.

Chambers, R. (1997). *Whose reality counts? Putting the first last*. Intermediate Technology Publications.

Chung, Y., Oh, J., & Lee, M. (2021). Smart dairy farming: A review of data-driven dairy management using Internet of Things (IoT). *Animals*, *11*(6), 1534.

FAO. (2023). *Dairy market review: Emerging market trends and dairy sustainability*. Food and Agriculture Organization.

Gaviglio, A., Demartini, E., & Gambelli, D. (2022). Dairy production systems and sustainability in developing countries: A review. *Sustainability*, *14*(7), 4013.

Hayami, Y., & Ruttan, V. W. (1985). *Agricultural development: An international perspective*. Johns Hopkins University Press.

Hidayah, C. W., & Mala, I. K. (2024). Strategi bisnis peternakan susu sapi perah di daerah Kabupaten Boyolali dengan menggunakan paradigma analisis SWOT. *Jurnal Kajian Ilmiah Multidisipliner*, *5*(1), 112–123.

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free Press.

Robbins, S. P., & Coulter, M. (2020). *Management* (14th ed.). Pearson Education.

Thalib, R. A. W. (2024). Kesiapan rantai pasok dalam menurunkan rasio impor bahan baku sebagai acuan data dan informasi pengembangan industri susu nasional. *Mutiara: Multidiciplinary Scientific Journal*, *4*(2), 54–62.

World Bank. (2022). *Livestock and the future of food systems: Rethinking investments and sustainability*.

Setiadi, D. J., & Saptana. (2020). Strategi pengembangan usaha peternakan sapi perah rakyat dalam menghadapi pasar bebas. *Jurnal Analisis Kebijakan Pertanian*, *18*(2), 123–138. https://doi.org/10.21082/akp.v18n2.2020.123-138

Prasetyo, E., & Handayani, S. (2021). Kesejahteraan peternak sapi perah dan peran koperasi dalam pembangunan ekonomi lokal. *Jurnal Ekonomi dan Pembangunan Daerah*, *12*(1), 55–66.

Nugroho, B. A., & Santosa, A. (2020). Penerapan teknologi digital dalam peternakan sapi perah: Studi kasus peternak milenial di Lembang. *Jurnal Teknologi Peternakan dan Agribisnis*, *8*(1), 47–59.

Damayanti, R., & Suryanto, H. (2022). Efektivitas pelatihan peternakan dalam meningkatkan kapasitas produksi susu pada peternak koperasi. *Jurnal Penyuluhan Peternakan*, *17*(2), 84–96.