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Article

Characteristics of Dairy Farmers and Dairy Cattle Management Systems in Junrejo Village, Junrejo District, Batu City, East Java Province

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Abstract: In Indonesia, dairy cattle farming is often done in a traditional or conventional maintenance. This study aims to determine the farmer characteristics and maintenance systems of dairy in Junrejo Village, Junrejo District, Batu City, East Java, Indonesia. This study used a survey approach and was observational in nature. Twenty dairy farmers were chosen as respondens because they had dairy cows that were lactation period. The data collected included farmer characteristics, land ownership, and livestock management systems. The data were analyzed using descriptive analysis. The results showed that the average age of farmers was 52.95±10.51 years, most of the farmers were of productive age with 33.54±12.45 years of farming experience. Most of the farmers were of productive age. Most of them (95.00%) were livestock farmer group dairy cattle. Dairy cattle ownership consisted of 2.50±1.79 dairy cows, 0.20±0.70 dairy bull, 1.42±1.22 heifers, 1.20±1.11 female calves, and 0.60±0.60 males calve. In conclusion, this study showed that farmer charateristics were of productive age, had experience in livestock farming, participated in livestock groups, and raised livestock primarily. Livestock maintenance was carried out in communal and individual pens, pen cleaning, and livestock bathing were performed twice a day.

Keywords: Dairy; milk; livestock; farming

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1. Introduction

Milk is one of the animal food products that is essential for human life, alongside meat and eggs. Providing nutritious food for the community is also a key issue for the current Indonesian government. To meet national milk needs, the Indonesian government and private industry must import 90% of the total requirement. Over the past five years, there has been fluctuation in national milk production, particularly following the foot-and-mouth disease outbreak that affected livestock throughout Indonesia. Furthermore, the dairy cattle population has also declined in the past three years following the outbreak, with the decline ranging from 0.91 to 1.76 per year. Livestock development is one aspect that plays a role in agricultural development. Continuous improvement in livestock development must be carried out to improve the welfare of farmers. Dairy farming is one type of livestock business that plays a role in the rural economy. Dairy cattle owners in Indonesia have enormous market potential because demand for dairy products continues to increase along with population growth, national economic development, and the free nutritional meal program, which is championed by President Prabowo's administration, namely achieving food security.

Milk production centers are dominated by provinces on Java Island, which meet national milk needs. East Java, Indonesia's largest milk producer, accounts for 56% of milk production and 60.16% of the dairy cattle population in Indonesia. According to data from

the East Java Provincial Statistics Agency (BPS) in 2025, milk productivity in East Java is found in various regencies/cities across East Java. However, only a few regencies/cities have high productivity. Batu City is the highest milk producer in East Java. However, there is no information regarding the dairy cattle production system and productivity in East Java, particularly in Malang Regency.

Dairy cattle farming in Indonesia is generally carried out traditionally. Farmers keep fewer than 10 dairy cattle. This livestock management is generally carried out without proper management [1]. Batu City, with its unique geographical characteristics, plays a central role in the East Java dairy landscape. Situated among the highlands and boasting a cool climate, the city provides an ideal environment for dairy cattle farming. The agricultural environment here not only contributes to the health and productivity of the cattle but also makes dairy farming a sustainable backbone of the local economy.

Dairy cattle production and management in Batu City face numerous complex challenges despite its significant potential. Management practices such as housing systems, feeding, health and reproductive management, and the use of clean milking technology significantly impact the quantity and quality of milk produced during the production stage. Further challenges arise in the final stage, such as fluctuating milk prices, dependence on large processing industries, and long distribution chains, which can impact farmers' income and business continuity. Furthermore, global pressures on sustainability and animal welfare are driving changes in dairy cattle management practices.

Therefore, understanding the dynamics of dairy cattle production and management in Batu City is crucial. A comprehensive analysis not only helps identify critical points in the dairy value chain but also shapes strategies to improve productivity, milk quality, and farmer welfare. This will strengthen regional food security and contribute to the economy of Batu City and East Java as a whole. Therefore, this research aims to clarify these fundamentals to provide a clear picture of conditions on the ground

2. Materials and Methods

This research was conducted in July 2025 in Junrejo Village, Batu City, Malang Regency, East Java. Batu City was chosen as the location for the study because it has the highest dairy cattle population in East Java. The city offers the perfect setting for dairy cattle production because of its mild climate and highland location. In addition to improving the cattle's production and well-being, the local agricultural climate makes dairy farming a viable mainstay of the community's economy. This research was an observational study using a survey method. Data collection was used qualitative and quantitative, and method of sampling was used snowball sampling. Twenty farmers were selected as respondents, considering they owned lactating dairy cows. The research data included primary and secondary data. The calculation of dairy cattle units based on [2] is below. The variables analyzed were farmer characteristics, land ownership, and dairy cattle husbandry practices. The research instruments used were complete stationery, camera, laptop, Microsoft Excel software, and a questionnaire. The collected data was analyzed using descriptive analysis with Microsoft Excel software.

Table 1. Conversion of dairy cattle category to animal unit (AU)

Categories	**AU**
Dairy cow	1.00
Female 3-8 months	0.32
Female 8-12 months	0.39
Female 12-24 months	0.60
Female 24-36 months	0.80
Male 3–8 months	0.32

Categories	AU
Male 8–12 months	0.45
Male 12–24 months	0.80

3. Results and Discussion

The farmer profile provides a general overview of the farmer's circumstances and background. The farmer profile included sex, age, education, primary occupation, livestock farming experience, type of livestock business, livestock farming objectives, ownership, extension participation, number of members involved in livestock farming, and the sustainability of the livestock business (Table 2). Data on farmer characteristics showed that the majority of farmers are male (90%) and female (5%) (Table 2). This was made feasible by the fact that the respondents' line of employment involved a lot of physical labor (farmers).

The majority of farmers were of productive age: 75% are between 45 and 65 years old, 15% are between 15 and 45 years old, and 10% are over 65 years old. Farmers age were categorized based on their productivity. Ages 20 to 55 are considered productive, those under 20 are considered school-age or not yet productive, while those over 55 have passed the optimal point of productivity [3]. Most dairy farmers in Indonesia are over 45 years old, meaning they are nearly past their productive age. Regeneration of dairy farmers is necessary to ensure the smooth running of dairy farming businesses. Observational data showed that the characteristics of livestock farmers vary. Most livestock farmers were male heads of household, mostly between 45 and 65 years old, and their primary profession were livestock farmer. This indicated that livestock farming in Junrejo Village, Batu City, Malang Regency, East Java, is the primary livelihood for livestock farmers, providing for their families. Therefore, livestock farmers strive to increase livestock production, as this will impact family income. [4] stated that the age range of 15 to 64 is considered productive. The age of livestock farmers influences the way they conduct livestock farming activities. A farmer's activity and creativity depend on their productive age [5]. The characteristics of livestock farmers were a factor influencing marketing strategies in livestock farming, as all control of the livestock business rests with the farmers themselves. The characteristics of a farmer as a manager greatly influence the success rate of a livestock business. Considerations used to assess the ability to manage dairy cattle include the farmer's age, work experience, level of cattle ownership, and main occupation.

Dairy cattle groups provide benefits in the form of increased positive group dynamics, facilitating access to information and technology, and enabling more efficient collective purchasing and marketing, thus enhancing the development of dairy cattle farming businesses. The livestock group participated in was the Sejati Farmers Group. In this study, 95% of farmers participated in livestock groups, while 5% did not. Education is a common determinant of the adoption of new agricultural technologies. Education and technology adoption have a positive correlation [6]. The education level of farmers in Junrejo Village was mostly elementary school (55%), resulting in a lack of innovation in adapting technology, and livestock husbandry systems were still traditional. The education level of farmers was crucial in marketing practices because education influences a person's mindset, critical thinking skills, and the ability to develop and improve their quality of life through creativity.

Table 2. Farmer characteristics

Variables	**Results (%)**
Gender	
a. Men	90.0
b. Women	10.0
Age (Year)	
a. <15	0
b. 15-45	15.00
c. 45 – 65	75.00
d. >65	10.00
Livestock group	
a. Yes	95.00
b. No	5.00
Education	
a. Not going to school	10.00
b. Elementary School	55.00
c. Junior High School	20.00
d. High School	5.00
e. Higher Education	10.00
Main job	
a. Livestock farmer	60.00
b. Crop farmer	30.00
c. Farm worker	5.00
d. Other	5.00
Livestock farming experience (year)	
a. <10	10.00
b. 10-20	0.00
c. 20 – 30	30.00
d. 30-40	40.00
e. 40 – 50	20.00
Livestock Business	
a. Source of income	60.00
b. Saving/Side job	40.00
Number of members involved in livestock farming	
a. 1 person	35.00
b. 2 persons	50.00
c. 3 persons	10.00
d. 4 persons	5.00
Business sustainability	
a. Yes	80.00
b. No	20.00

The majority of livestock farmers (60%) primarily work as livestock farmers, and they have 30-40 years of livestock farming experience (40%). Livestock farming experience influences a farmer's ability to manage their business. Farmers with more experience tend to be more cautious in their actions, especially after experiencing negative experiences in the past. Livestock farming is conducted for the purpose of breeding, raising, and fattening (75%). Livestock farming experience refers to the time a farmer has spent running the business. The more experience, the wiser the farmer were in making

decisions. Livestock farming experience is a crucial factor for farmers in determining all policies to be implemented in their business. Livestock farming experience is gained through various activities carried out within the livestock business. This livestock business serves as a primary source of income for farmers (60%) and as savings or a side income (40%). Fresh milk is sold to cooperatives or milk processing industries, providing daily or monthly income for the farmer's family (Table 1). Farmers strive to properly care for their dairy cattle to increase production and family income. Milk production is influenced by factors such as feed, livestock health, environmental conditions, and livestock handling [7]. The number of dependents in a family reflects the number of family members a dairy farmer has. Family members can have a positive impact on livestock farming because they can be used as labor. Population in this context is not just a number, but also includes people, objects, and other natural objects.

Observations on land ownership yielded several data points, including land ownership status, and dairy cattle ownership. Based on land ownership data, farmers own private land in the form of dry fields with an area of 2,700±5,229.79 m^2, yards of 283±845.92 m^2, and rice fields of 428 ± 1,192.04 m^2. Meanwhile, the land for profit sharing consists of dry fields with an area of 2,861±7,494.71 m^2 (Table 3). Land area refers to the amount of land owned by a dairy farmer. The amount of land available can influence how farmers operate their businesses. Land area also helps farmers grow forage and build pens for their livestock. [8] stated that land is a crucial factor in developing a dairy farm. This is because land can be used to build pens and grow grass, which provides a source of forage. The availability of land for growing grass was crucial. The total ownership of dairy cattle by farmers in Junrejo is 4.14 AU, with ownership of the cows being dominated by more than one cows (85%) (Table 3). [9] emphasized that more than 90% of dairy farms are smallholder farms, characterized by a relatively small scale, ranging from 1-5 cattle. Population is not simply a matter of numbers or needs, but also encompasses various objects and natural resources that help increase income. Population includes not only people but also objects and other items owned by the farmer.

Table 3. Land and livestock ownership

Variables	Average±SD	Percentage (%)
Land ownership		
Personal		
Tegal (m^2)	2,700±5,229.79	
Yard (m^2)	283±845.92	
Ricefield (m^2)	428±1,192.04	
Sharing profit		
Tegal (m^2)	2,861±7,494.71	
Ownership of dairy cattle (AU)	4.14±1.91	
Ownership of cows lactation (heads)		
1		15
2		45
3		15
4		10
>4		15

Livestock husbandry data can be seen in Table 4. The location of pens is mostly behind the house (95%), while the remaining 5% are located in front of the house. Livestock raised intensively (100%), with communal pens in 40% and individual pens in 60% of the time. Drinking water comes from wells 100% of the time, and there are forage

and concentrate sheds. Livestock were bathed twice daily (35%), pens are cleaned twice daily (55%), and manure were removed twice daily (55%).

Table 4. Livestock maintenance

Variables	**Results (%)**
Pen Location	
Behind the house	95.00
Front of the house	5.00
Maintenance Method	
Intensive	100
Facilities Available	
Communal pen	40
Individual pen	60
Drinking Water Source	
Well water	100
Feed storage	
Forage storage	40
Concentrate storage	40
Pen Materials	
Cement floor	45
Other	55
Pen and livestock sanitation	
Cattle bathing twice a day	35
Pen cleaning twice a day	55
Manure cleaning twice a day	55

Feeding is provided before milking to keep the cows calm during the milking process. Dairy cows were bathed by pouring clean water over their bodies and other areas. The population size is not limited to the thighs, anus, udders, and teats. Dairy cows are bathed before each milking session to prevent feces from contaminating the milk during the milking process [10]. Equipment that must be provided before milking includes buckets, stools, milk cans, and gauze. Milking equipment must be clean and sterile to prevent contaminating the milk. Aactivities include cleaning pens of feces, bathing cattle, and feeding areas using clean water. Sanitation activities are carried out on pens, feed, and the surrounding environment to prevent livestock from disease [11].

Livestock health is a crucial factor influencing livestock production, including dairy milk production. According to [12], livestock health is closely related to efforts to prevent and treat infections caused by various disease-causing agents. Dairy cattle health management in Junrejo Village, Batu City includes disease prevention through barn sanitation, livestock sanitation, and the administration of medications and vaccines. According to [13], preventive measures that can be taken to create good conditions for livestock to prevent disease include sterilizing livestock, barns, and equipment.

House sanitation is a preventative activity that includes cleaning livestock housing buildings or pens and their surroundings, aimed at maintaining the health of both livestock and their owners [14]. Dairy cattle pens sanitation is carried out before and after milking. This aligns with [15] opinion that dairy cattle pens are cleaned twice daily before and after milking.

Pen sanitation is performed before milking, including cleaning the feed and drink troughs, removing cow manure, bathing the cows, and cleaning the pen area. Feed troughs are cleaned by removing any remaining feed using a shovel. Cow manure (feces)

is removed with a shovel, followed by flushing the pen floor and gutters with water from a hose. Sanitation activities are carried out on the pen, feed, and surrounding area to prevent disease in the cattle.

Livestock waste is waste resulting from livestock farming activities, such as livestock raising, slaughterhouses, livestock product processing, and others [16]. Dairy cow waste in Junrejo Village consists of solid waste in the form of cow dung (feces) and liquid waste in the form of cow urine. Dairy cow waste in Junrejo Village has not been optimally processed, as it is only discharged into green fields through holding tanks. Unprocessed dairy cow waste can pollute the environment.

Dairy cow waste in Junrejo Village can be processed into compost and biogas. Dairy cow waste is primarily used as manure and biogas [17]. Dairy cow waste management not only prevents environmental pollution but can also provide a source of additional income for cooperatives by selling liquid fertilizer and compost. This aligns with [18] opinion that waste management requires careful planning, and efforts are often made to generate additional income, such as processing manure into compost. Cow dung is very good for making compost because it does not contain heavy metals and antibiotics. During the composting process, the inclusion of cow dung speeds up humus production and microbial community changes, which are crucial markers of microbial activity that support the breakdown of organic matter into stable compost products. This supports the idea that cow dung encourages microorganisms to break down organic particles [19]. Compost made from livestock dung can raise the soil's organic carbon, microbial biomass, and total nitrogen content, all of which improve the soil's fertility and structure [20].

4. Conclusions

This study concluded that most farmers of productive age have considerable experience in animal husbandry as their main occupation. These findings indicate that dairy cow management and performance deserve appreciation because the cattle were owned by the farmers themselves and they have sufficient land area. With a fairly high level of business sustainability, dairy cow groups need assistance to increase milk production so that farmers' welfare can be improved.

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References

1. N.S. Asminaya, A. Bain, N. Sandiah, L. Muhsafaat, F.Y. Irawan, A. Indi, and A. Sulfitrana, "Evaluation of the implementation of Good Dairy Farming Practices (GDFP) at Ambopi smallholder dairy farm Southeast Sulawesi," *IOP Conf series: Earth and Environmental Science*, vol. 465, p. 1-5, 2020. https://doi.org/10.1088/1755-1315/465/1/012055
2. M. Benoiy, and P. Veysset, "Livestock unit calculation: a method based on energy requirements to refine the study of livestock farming system,"*INRAE Prod. Anim*., vol. 34, p. 139e-160e, 2021
3. R. D. Haloho, S. I. Santoso, S. Marzuki, W. Roessali, and A. Setiadi, "Profit function analysis of dairy cattle farming in Getasan and West Ungaran Districts, Semarang Regency," *J. Indonesian Trop. Anim. Agric*., vol. 38, p. 116-122, 2013. https://doi.org/ 10.14710/jitaa.38.2.116-122
4. A. T. Warman, Panjono, T.S.M. Widi, S. Bintara, B. A. Atmoko, and E. Baliarti, "Factor affecting bull breed choices of smallholders farmers in Lombok Tengah Regency, West Nusa Tenggara Province, Indonesia," *Adv. Anim. Vet. Sci*. vol. 12, p. 2326-2334, 2024. https://doi.org/ 10.17582/journal.aavs/2024/12.12.2326.2334
5. Saediman, *The Effect of Business Scale on the Income of Laying Hen Farmers in Maritengngae District, Sidrap Regency*. Thesis,

Faculty of Animal Husbandry, Hasanuddin University, Makassar. Indonesian, 2012
6. M. Erdem, and H. B. Agır, "Enhancing dairy farm welfare: a holistic examination of technology adoption and economic performance in Kahramanmaras Province, Turkey," *Sustainability*., vol. 16, p. 1-22, 2024. **https://doi.org/10.3390/su16072989**
7. C. A. K. Dissanayake, W. Jayathilake, H. V. A. Wickramasuriya, U. Dissanayake, and W. W. C. B. Wasala, "A Review on factors affecting technology adoption in agricultural sector, "*The Journal of Agricultural Sciences*., vol. 7, p. 280–296, 2022. https://doi.org/ 10.4038/jas.v17i2.9743
8. Sundari and Katamso, "Analysis of the income of local and export-import dairy cattle farmers members of the Warga Mulya Cooperative in Sleman Regency, Yogyakarta,"*Caraka Tani Journal*., vol. 25, p. 26-32, 2010. https://doi.org/ 10.20961/carakatani.v25i2.14054
9. A. Sudono., Rosdiana, and B. S. Setiawan, *Intensive Dairy Cattle Farming*. Agromedia Pustaka, Bogor, Indonesian, 2003
10. H. Hristov, B. Stanković, L. Samolovac, and D. O. Andrić, "Hygiene procedures before, during and after cow milking," Arhiv Veterinarske Medicine., vol. 16, p. 5-15, 2023. https://doi.org/ 10.46784/e-avm.v16i1.316
11. A. S. Prasetyo, W. Sumekar., D. A. Kurniasari., and A. Musabikin," Member activities and participation level in dairy cattle farming in the Rejeki Lumintu Gunungpati Livestock Farmers Group, Semarang City," *Jurnal Agrinika: Journal of Agrotechnology and Agribusiness*., vol. 4, p. 186–196, 2020. https://doi.org/10.30737/agrinika.v4i2.1053
12. D. M. Nuraini, Sunarto, N. Widyas, A. Pramono, and S. Prastowo, "Improving the capacity of beef cattle health management in Pelemrejo, Andong, Boyolali," *PRIMA: Journal of Community Empowering and Services*., vol. 4, p. 102–108, 2020. https://doi.org/ 10.20961/prima.v4i2.42574
13. V. Renault, M. F. Humblet, P. N. Pham, and C. Saegerman, "Biosecurity at cattle farms: strengths,weaknesses, opportunities and threats," *Pathogens*., vol. 10, p. 1-21, 2022
14. Y. Retnani., I.G. Permana, N.R. Komalasari, and Taryati, *Techniques for Making Animal Feed Biscuits from Agricultural Waste*. Penebar Swadaya, Indonesian, 2015
15. R. Zuroida, "Cages sanitation and health complaints among dairy cattle farmers in Murukan Village, Jombang Regency,"*Journal of Environmental Health*., vol. 10, p. 434-440, 2018. https://doi.org/ 10.20473/jkl.v10i4.2018.434-440
16. I. M. Mara, "Analisis penyerapan gas karbondioksida (CO2) dengan larutan NaOH terhadap kualitas biogas kotoran sapi," *Dinamika Teknik Mesin*., vol. 2, p. 38-46, 2012
17. G. Soyer, and E. Yilmaz, "Waste management in dairy cattle farms in Aydın Region. Potential of energy application," *Sustainability*., vol. 2020, p. 1-11, 2020. https://doi.org/10.3390/su12041614
18. R. K. Dewi, D. Wahyuningsih, D. E. Sari, S. H. Jatiningrum, and W. Handayani, "Waste management of traditional dairy farming for alternative energy: a feasibility study on biogas processing in Dusun Banyudono, Semarang Regency, Indonesia,"*Journal of Environment and Sutainability*., vol. 5, p. 9-24, 2021. https://doi.org/ 10.22515/sustinere.jes.v5i1.117
19. B. Zhang, J. Zhong, S. Xie, X. Huang, D. Zhou, Y. Lv, Z. Yang, Z.Liu, H. Yin, X. Wang, and D. Meng, "Cow dung accelerates the synthesis of humus by regulating the microbial community and function during composting," *Environ. Technol. Innov*., vol. 40, p. 104659, 2025. https://doi.org/10.1016/j.eti.2025.104659
20. S.Das, S. T. Jeong, S. Das, and P. J. Kim,"Composted cattle manure increases microbial activity and soil fertility more than composted swine manure in a submerged rice paddy," *Front. Microbiol,*. vol. 8, p. 1702, 2017. https://doi.org/10.3389/fmicb.2017.01702