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Milk Yield and Composition of Etawah Crossbred Does at Different Parities

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ABSTRACT

Milk yield and composition of dairy goats are commonly influenced by breed, lactation stage, feed (nutrition and intake), age, milking time, and environmental conditions. The purposes of this study were to evaluate the milk yield and its composition from different parities of Etawah crossbred does. The Etawah crossbred does with age ranging from 13 to 31 months were divided into two groups: first parity group (n = 6) and the second-parity group (n = 8). Milk yield was recorded during both the morning and afternoon milking sessions (total daily milk yield). The fresh milk was used to analyze its composition. The results revealed that parity had a significant effect on total solid, moisture, and fat content ($p<0.01$), but not on daily milk yield, ash, or protein content. The total solids of milk from does in the first parity were lower than those from the second parity, whereas the moisture content was higher. Furthermore, the fat content of milk from the second parity was higher than that from the first parity. However, milk yield tended to increase in the second parity compared to the first. It can be concluded that the different parity has an impact on the milk composition of Etawah crossbred does. Thus, beside parity, feed quality and good milking practices can improved milk yield and its composition.

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ABSTRAK

Produksi dan komposisi susu kambing perah secara umum dipengaruhi oleh berbagai faktor seperti bangsa, periode laktasi, pakan (nutrisi dan konsumsi), umur, waktu pemerahan, dan kondisi lingkungan. Tujuan penelitian ini adalah untuk mengevaluasi produksi dan komposisi susu Kambing Peranakan Etawah dengan paritas yang berbeda. Kambing Peranakan Etawah dengan kisaran umur 13 – 31 bulan yang dibagi menjadi dua kelompok yang terdiri dari paritas pertama (n = 6) dan paritas kedua (n = 8). Proses pemerahan dilakukan sebanyak dua kali dalam sehari, yaitu pada pagi dan sore hari yang kemudian dicatat sebagai total produksi susu harian. Selanjutnya sampel susu segar digunakan untuk analisis terhadap komposisi susu. Hasil penelitian menunjukkan bahwa paritas berpengaruh secara signifikan terhadap total padatan, kadar air, dan kadar lemak ($p<0.01$), tetapi tidak berpengaruh terhadap produksi susu, kadar abu, dan kadar protein. Paritas pertama memiliki total padatan yang lebih rendah, tetapi kadar air yang lebih tinggi dibandingkan dengan paritas kedua. Di samping itu, kadar lemak pada paritas kedua lebih tinggi daripada paritas pertama. Meskipun demikian, produksi susu menunjukkan tren peningkatan pada paritas kedua dibandingkan dengan paritas pertama. Dapat disimpulkan bahwa perbedaan paritas berdampak pada komposisi susu Kambing Peranakan Etawah. Oleh karena itu selain paritas, kualitas pakan dan praktik pemerahan yang baik dapat meningkatkan produksi dan komposisi susu.

INTRODUCTION

Milk is produced mainly by dairy animals such as cattle, buffalo, camels, horses, and small ruminants, including goats and sheep. In recent years, global demand for goat milk has increased due to its perceived medicinal and nutritional properties. As a result, its market price is considerably higher than that of cow milk in several Asian countries, including Indonesia, Malaysia, Thailand, Vietnam, Japan, and China. To meet this rising demand, large industrial and medium-scale dairy goat farms have expanded across these regions; however, their sustainability and productivity remain below expectations (Liang & Paengkoum, 2019).

In Indonesia, one of the goat breeds which is potential to produce milk is Etawah crossbred goat whereas mostly keeping by smallholder farmers in Java that generally implemented intensive management (Ma'rufah *et al*., 2023). Milk yield and their composition depend on breeds, lactation period, feed (nutrition and intake), milking time, and environmental conditions (Goetsch *et al*., 2011; Marufah *et al*., 2025; Nayik *et al*., 2022; Park, 2017; Park *et al*., 2007; Roy *et al*., 2020). In many developing countries, where cow milk is less available, goat milk and its derived products serve as essential dietary sources of protein, phosphate, and calcium. In addition, increasing use of goat milk as an alternative for individuals with intolerance to cow milk (Park, 2017). Goat milk generally contains substantial amounts of key macronutrients, including fat (4%), water (87%), carbohydrates (4.5%), protein (3.5%), and ash (1%) (Nayik *et al*., 2022).

The milk yield and composition of Etawah crossbred goats in Indonesia have been investigated by several researchers. Subagyo *et al*. (2025) reported that the different lactation stage influencing milk yield and composition (total solids, solids non fat, fat, protein, lactose, and minerals) of Etawah crossbred goat keeping in Banyumas Regency, Central Java. Sholeh *et al*. (2021) has been evaluated as the milk quality (color, aroma, taste, acceptance, organoleptic,

specific gravity, pH, and alcohol test) of Etawah crossbred goat at different lactation periods from Metro, Lampung. Moreover, Suranindyah *et al.* (2018) investigated the milk yield and composition of three goat breeds in their second to third lactations in Turi, Sleman, Yogyakarta. The results showed that Saperong goats produced higher milk yields than Sapera and Etawah crossbred goats. However, Etawah crossbred goats exhibited the best milk composition than Sapera and Saperong goats. Sitepu *et al.* (2025) reported that morning milking produces higher milk yield than milking in the afternoon. Furthermore, the previous studies mostly related to feed application on the milk yield and composition (Adriani *et al*., 2024; Albi *et al*., 2024; Jaelani *et al*., 2021; Ramadhan *et al*., 2022; Sari *et al*., 2024). Nevertheless, information regarding the milk yield and composition across different parities of Etawah Crossbred goats in Yogyakarta remains limited. Therefore, the purposes of this study were to evaluate the milk yield and its composition from different parities of Etawah crossbred does.

MATERIALS AND METHODS

Etawah crossbred goats with age ranging from 13 to 31 months used in this study were divided into two groups based on parity: the first-parity group (n = 6) and the second-parity group (n = 8). Milk yield was recorded during both the morning at 07.00 and afternoon at 16.00 milking sessions, collected in measuring cups, and summed to calculate the total daily milk yield.

The fresh milk was used to analyze its composition. The total solids were analyzed by the standard method according to AOAC (2005). Briefly, 2 g of the milk sample was dried in an oven at 105 °C for 3 hours and then cooled in a desiccator. The sample was weighed, and the drying process was repeated until a constant weight was obtained. The total solid was calculated as follows: 100% – % moisture. The moisture, ash, fat, and protein of milk were analyzed by proximate analysis (AOAC, 2005). The data on milk yield and its composition were analyzed using an independent t-test and presented as means ± standard error of the mean (SEM).

RESULTS AND DISCUSSION

The results revealed that parity had a significant effect on total solids, moisture, and fat content ($p<0.01$), but not on daily milk yield (Figure 1), ash, or protein content. The total solids of milk (Figure 2) from does in the first parity were lower than those from the second parity, whereas the moisture content (Table 1) was higher. Furthermore, the fat content of milk from the first parity was lower than that from the second parity (Table 1).

In this study, we investigated the milk yield and composition of Etawah crossbred goats at different parities. Parity is an important factor for dairy goat farmers to consider, as it is closely associated with both milk yield and quality.

The daily milk yield of Etawah crossbred goat in our study did not differ between the first (613.89 mL/day) and second parity (728.06 mL/day); however, the second parity tends to

increase compared to first parity (Figure 1). This result is in line with previously reported by Pramono *et al*. (2023), which indicate that the different lactation periods, second and third lactation, respectively, did not affect the milk yield of Sapera goats. Furthermore, Suranindyah *et al*. (2018) reported that milk yield of three goat breeds in Turi, Sleman, Yogyakarta namely Saperong, Etawah crossbred, and Sapera goats were 1750.70, 1674.00, and 340.00 mL/head/day, respectively. Additionally, Assan (2015) explained that the first parity goats produced the lowest milk yield, but the third-parity goats exhibited the highest milk yield. This can be attributed to the fact that older goats possess a larger udder volume compared to those in their first lactation. The mammary alveoli developed during previous lactations do not completely regress but are supplemented by new alveolar development in subsequent lactations, thereby enhancing the secretory parenchyma (Assan, 2015; Ishag *et al*., 2012).

Table 1. Proximate Analysis of Etawah Crossbred Goat Milk at Different Parities

Parity	Moisture (%)	Ash (%)	Fat (%)	Protein (%)
First	87.70±0.29[a]	0.78±0.04	3.73±0.31[b]	3.73±0.25
Second	84.88±0.65[b]	0.87±0.04	6.44±0.85[a]	3.84±0.52

Different superscript in the same column indicate significant at $p<0.01$

Furthermore, Goetsch *et al*. (2011) reported that milk yield in goats generally peaks at the third or fourth parity, after which it gradually declines. Ishag *et al*. (2012) explained that the increasing trend in milk yield with advancing parity may be attributed to enhanced udder development and the continued growth in body size of the animals. In addition, Sutama (2009) explained that the milk yield is affected by the goat breeds, age, feed, lactation, and milking time. The daily milk yield of Etawah crossbred does range from 0.45 to 2.2 kg/day. Additionally, a recent study by Subagyo *et al*. (2025) reported that the daily milk yield of Etawah crossbred in Banyumas for early, mid, and late lactation is 803.62, 478.43, and 215 mL/day, respectively. Moreover, milk yield is influenced by various environmental factors, including herd-year, parity, and the season of kidding (Goetsch *et al*., 2011).

The total solid content of goat milk is composed of fat, protein, lactose, and minerals (ash), except moisture content. Furthermore, it is a key indicator of the milk's nutritional value, processing quality, and yield potential in dairy products such as cheese and yogurt. In contrast, moisture content reflects the proportion of water, which negative correlates with total solids as total solids increase, moisture decreases (Mayer & Fiechter, 2012; Park, 2017; Park *et al*., 2007). The total solid content of Etawah crossbred goat milk in this study differed from that reported by Subagyo *et al*. (2025), who found total solid contents of 11.25%, 12.41%, and 13.99% during early, mid, and late lactation, respectively, in Etawah

crossbred goats from Banyumas, Central Java, Indonesia.

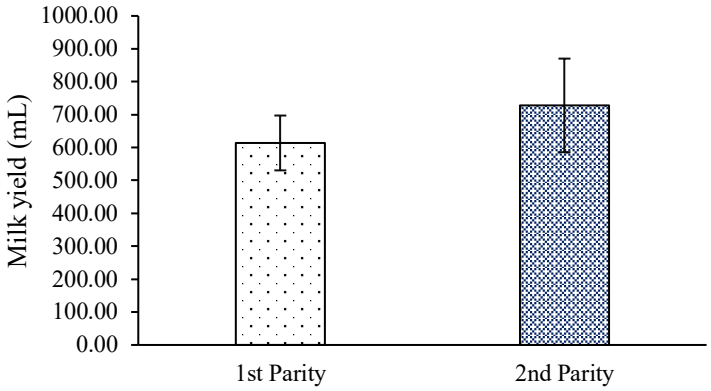


Figure 1. Milk yield of Etawah crossbred goat milk at different parities

Suranindyah *et al.* (2018) reported the total solid of goat milk from three breeds in Turi Sleman, Yogyakarta such as Etawah crossbred (15.42%), Sapera (13.59%), and Saperong (13.85%). Similarly, Roy *et al.* (2020) reported that the total solids of goat milk range from 11.9% to 16.3%. The total solid content of milk is influenced by several factors, including lactation period, breed, feed (nutrition and intake), and environmental conditions (Park, 2017).

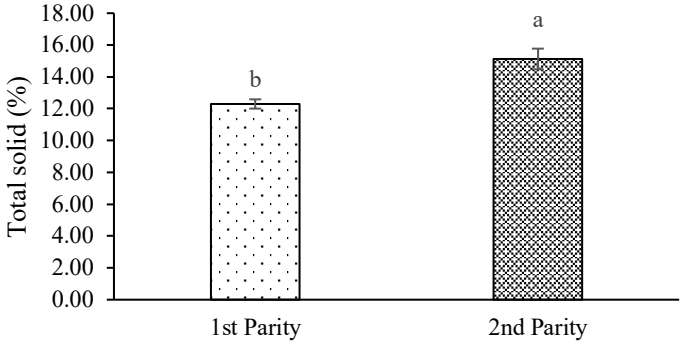
Milk fat is one of the key parameters used to evaluate milk quality. From nutritional, economic, sensory, and physical characteristics, fat is considered the most variable component of milk, both qualitatively and quantitatively (Nayik *et al.*, 2022). In this study, the milk fat content of Etawah crossbred does in the second parity (6.44%) was higher than that in the first parity (3.73%) (Table 1). These results indicate that milk fat in the second parity was increased as much as 72.67% compared to first parity. This finding is consistent with Rokhayati *et al.* (2022), who reported that milk fat content was highest in the third parity, followed by the second, and lowest in the first parity. Suranindyah *et al.* (2018) reported that milk fat content of Etawah crossbred, Sapera, and Saperong goats from Sleman Yogyakarta were 5.80, 4.30, and 4.25%, respectively.

According to Sutama (2009), the milk fat content of Etawah crossbred goats ranges from 4.39% to 6.54%. Goetsch *et al.* (2011) reported that milk fat content was 6.4% in Nigerian Dwarf goats and 3.0% in Sable goats. Furthermore, Assan (2015) observed that milk fat content increased significantly with advancing parity, and goats in the third parity exhibited the highest concentration of milk fat. Overall, milk fat content is affected by various factors, including season, feed, genotype, age, breed, lactation stage, and milking time (Sutama, 2009; Nayik *et al.*, 2022).

Protein represents the most important macronutrient in goat milk and is widely regarded as a key indicator of the nutritional quality of dairy products. The protein content in milk is influenced by breeds, species, lactation

period, udder health, feed (including nutrition and intake), and environmental conditions (Nayik *et al*., 2022). In this study, the milk protein content of Etawah crossbred was similar between the first (3.73%) and second parities (3.84%) (Table 1). The similarity in protein content may be attributed to comparable feed quality; however, feed quality was not specifically evaluated in this study.

Generally, the protein content of goat milk is around 3.5% (Nayik *et al*., 2022). Subagyo *et al*. (2025) also reported that the protein content of Etawah crossbred goat milk in Banyumas was 3.3% during early lactation, 4.09% during mid lactation, and 4.61% during late lactation. Furthermore, Suranindyah *et al*. (2018) reported that milk protein of three goat breeds in Turi Sleman, Yogyakarta was as follows: Etawah crossbred (3.63%), Sapera (3.71%), and Saperong (3.75%).



Different symbols indicate significant at p<0.01

Figure 2. Total solid of Etawah crossbred goat milk at different parities

The milk ash of goats is described as the mineral content of milk, whereas the ash content of first (0.78%) and second (0.87%) parities in our study were similar (Table 1). The milk ash of goat generally is 1% (Nayik *et al*., 2022); however, several studies reported that their content varies, for example, 0.8% (Park, 2017; Park *et al*., 2007), 0.77% to 0.92% (Mayer & Fiechter, 2012), and 0.7% to 0.9% (Roy *et al*., 2020). Milk ash content is primarily influenced by breed, diet, lactation stage, and animal health, with additional effects from environmental and management factors (Mayer & Fiechter, 2012; Park, 2017).

CONCLUSION AND RECOMMENDATION

The different parity significantly affected on total solid, moisture, and fat, however, did not effect on the milk yield, protein, and ash. The milk yield in second parity tend to increase compared to first parity. Based on the results, it can be recommended that the strategic to increase the milk yield and composition must be improved the feed quality and management practices milking time, animal handling, control quality product.

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CONTRIBUTION STATEMENT

The authors confirm that the contribution as follows: NLM Writing – original draft, Writing – review & editing, Visualization, Resources, Data curation. TWM, Conceptualization, Funding acquisition, Methodology, Investigation, Writing – review & editing. AWR, ARN, and SN, Investigation and Data curation.

REFERENCES

Adriani, A., Yurleni, Y., & Andayani, J. (2024). The effect of protected Nothopanax scutellarium Merr on milk production and mastitis in Etawah crossbreed goats. *Iranian Journal of Applied Animal Science, 14*(3), 429–435. https://doi.org/10.71798/ijas.2024.1184939

Albi, F., Wanniatie, V., Muhtarudin, M., & Qisthon, A. (2024). Pengaruh imbangan hijauan dan konsentrat terhadap kualitas fisik susu kambing perah Peranakan Etawa. *Jurnal Riset Dan Inovasi Peternakan (Journal of Research and Innovation of Animals)*, *8*(3), 523–530. https://doi.org/10.23960/jrip.2024.8.3.523-530

AOAC. (2005). *Official Method of Association of Official Analytical Chemist. 18th Edition*. Association of Official Analytical Chemist. Benjamin Franklin Station. ISBN 978-0-935584-75-2

Assan, N. (2015). Significance of parity, year-season and prolificacy in influencing goat milk production traits. *Agricultural Advances*, *4*(1), 1–6. https://doi.org/10.14196/aa.v4i1.1764

Goetsch, A. L., Zeng, S. S., & Gipson, T. A. (2011). Factors affecting goat milk production and quality. *Small Ruminant Research*, *101*, 55–63. https://doi.org/10.1016/j.smallrumres.2011.09.025

Ishag, I., Abdalla, S. A., & Ahmed, A. (2012). Factors affecting milk production traits of Saanen goat raised under Sudan-semi arid conditions. *Online Journal of Animal and Feed Research*, *2*(5), 435–438. http://www.science-line.com/index/;

Jaelani, A., Malik, A., & Ni'mah, G. (2021). The potential of swamp forage-based feeding to on the qualities of digestibility and milk production in goat Etawa crossbreed. *Advances in Animal and Veterinary Sciences*, *9*(4), 544–548. https://doi.org/10.17582/journal.aavs/2021/9.4.544.548

Liang, J. B., & Paengkoum, P. (2019). Current status, challenges and the way forward for dairy goat production in Asia - conference summary of dairy goats in Asia. *Asian-Australasian Journal of Animal Sciences*, *32*(8), 1233–1243. https://doi.org/10.5713/ajas.19.0272

Ma'rufah, N. L., Murti, T. W., Widyobroto, B. P., & Astuti, S. D. (2023). Evaluation of body weight, morphometry, and physiology status of Etawah crossbred doeling on two different farms management. *Buletin Peternakan*, *47*(1), 7–11. https://doi.org/10.21059/buletinpeternak.v47i1.75771

Marufah, N. L., Nii, T., Suzuki, N., Jaisue, J., & Isobe, N. (2025). Interleukin 1 receptor antagonist (IL-1ra) production and expression dynamics in mammary glands after lipopolysaccharide infusion. *Animal Science Journal*, *96*, e70047. https://doi.org/10.1111/asj.70047

Mayer, H. K., & Fiechter, G. (2012). Physical and chemical characteristics of sheep and goat milk in Austria. *International Dairy Journal*, *24*(2), 57–63. https://doi.org/10.1016/j.idairyj.2011.10.012

Nayik, G. A., Jagdale, Y. D., Gaikwad, S. A., Devkatte, A. N., Dar, A. H., & Ansari, M. J. (2022). Nutritional profile, processing and potential products: A comparative review of goat milk. *Dairy*, *3*(3), 622–647. https://doi.org/10.3390/dairy3030044

Park, Y. W. (2017). Goat milk-chemistry and nutrition. In Y. W. Park, G. F. W. Haenlein, & W. L. Wendorff (Eds.), *Handbook of Milk of Non-Bovine Mammals* (2nd Edition). John Wiley & Sons Ltd. https://doi.org/10.1002/9781119110316.ch2.2

Park, Y. W., Juárez, M., Ramos, M., & Haenlein, G. F. W. (2007). Physico-chemical characteristics of goat and sheep milk. *Small Ruminant Research*, *68*, 88–113. https://doi.org/10.1016/j.smallrumres.2006.09.013

Pramono, A., Altiara, D. N. P., & Cahyadi, M. (2023). The effect of differences in lactation period and milking time on milk production and quality of Saanen Etawa Crossbreed Goats (Sapera). *IOP Conference Series: Earth and Environmental Science*, *1200*(1), 012007. https://doi.org/10.1088/1755-1315/1200/1/012007

Ramadhan, D. P., Wanniatie, V., Liman, L., & Farda, F. T. (2022). Substitusi silase daun singkong dengan rumput Pakchong (Pennisetum purpureum cv Thailand) terhadap kadar protein dan laktosa susu kambing Peranakan Etawah. *Jurnal Riset Dan Inovasi Peternakan (Journal of Research and Innovation of Animals)*, *6*(3), 258–265. https://doi.org/10.23960/jrip.2022.6.3.258-265

Rokhayati, U. A., Gubali, S. I., & Dako, S. (2022). Uji kadar lemak dan protein air susu kambing Etawa dengan pemeliharaan secara tradisional. *Gorontalo Journal of Equatorial Animals*, *1*(2), 66–72. https://ejurnal.ung.ac.id/index.php/gijea/article/view/15384/4738

Roy, D., Ye, A., Moughan, P. J., & Singh, H. (2020). Composition, structure, and digestive dynamics of milk from different species - A review. *Frontiers in Nutrition*, *7*, 577759. https://doi.org/10.3389/fnut.2020.577759

Sari, D. N., Sudrajat, A., Astuti, N., & Christi, R. F. (2024). *Pengaruh kecukupan pakan terhadap produksi susu dan kualitas susu kambing di Kecamatan Turi Kabupaten Sleman Yogyakarta*. *12*(01). https://doi.org/10.31949/Agrivet/v12i1.9892

Sholeh, M. I., Sulastri, Qisthon, A., & Husni, A. (2021). Kualitas susu kambing Peranakan Etawa pada berbagai periode laktasi ditinjau dari sifat fisik (Studi kasus di peternakan kambing perah Telaga Rizky, Yosodadi, Kota Metro). *Jurnal Riset Dan Inovasi Peternakan*, *5*(3), 157–167. https://doi.org/10.23960//jrip.2021.5.3.157-167

Sitepu, T. A. H. B., Sukada, I. M., & Bebas, W. (2025). The effect of milking time on the production of Etawa goat milk at Raka Etawa Farm, Singapadu, Sukawati Sub District, Gianyar Regency. *Buletin Veteriner Udayana*, *17*(3), 574–580. https://doi.org/10.24843/bulvet.2025.v17.i03.p02

Subagyo, Y., Widodo, H. S., Ifani, M., Syamsi, A. N., Sumaryadi, M. Y., Nugroho, S., & Algani, M. Z. A. (2025). Physico-biochemical and milk production characteristics of Peranakan Etawa (PE) goats in Banyumas Regency, Indonesia. *Journal of Animal Health and Production*, *13*(4). https://doi.org/10.17582/journal.jahp/2025/13.4.1035.1045

Suranindyah, Y. Y., Khairy, D. H. A., Firdaus, N., & Rochijan. (2018). Milk production

and composition of Etawah crossbred, Sapera and Saperong dairy goats in Yogyakarta, Indonesia. *International Journal of Dairy Science, 13*, 1–6. https://doi.org/10.3923/ijds.2018.1.6

Sutama, I.-K. (2009). Productive and reproductive performances of female Etawah crossbred goats in Indonesia. *Wartazoa*, *19*(1), 1–6. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Sutama%2C+I.-K.+%282009%29.+Productive+and+reproductive+performances+of+female+Etawah+crossbred+goats+in+Indonesia.+Wartazoa%2C+19%281%29%2C+1%E2%80%936.&btnG=