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Chemical Quality Of Milk From Ettawa-Crossed Goats During Various Lactation Periods In Tunggulo Village, Limboto District, Gorontalo Regency

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Abstract

PE goats are a dual-purpose goat breed, used for both milk and meat production. Goat milk is a source of animal protein that is increasingly in demand by the public. The chemical quality of goat milk is thought to vary from farm to farm. This study aims to determine the quality of Ettawa crossbred goat milk during various lactation periods in Tunggulo Village, Limboto District, Gorontalo Regency. This research was conducted from January to March 2026 at the Animal Husbandry Laboratory, Faculty of Agriculture, Gorontalo State University. The method used was a case study. The data used consisted of primary and secondary data. The parameters tested were fat and protein content. The average protein content between the 1st, 2nd, 3rd, and 4th lactations was 5.38%; 5.15%; 5.03%; and 4.83%, respectively. The average fat content between the 1st, 2nd, 3rd, and 4th lactations was 5.11%; 4.16%; 4.44%; and 6.31%, respectively. It was concluded that the highest protein content was found in P1 (Lactation 1) at 5.38%, while the highest fat content was found in P4 (Lactation 4) at 6.31%.

Keyword: Ettawa Goat Milk, Chemical Quality, Lactation Period. Gorontalo, Limboto, Tunggulo

INTRODUCTION

Goat farming plays a significant role in Indonesia's livestock industry, as evidenced by statistical data showing that the goat population in Indonesia reached 19,397,960 head in 2022 (Badan Pusat Statistik, 2022). Goat farming is the business or activity of raising and breeding

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goats for the purpose of producing products such as meat, milk, hides, and manure, which can be used as organic fertilizer. Goat farming can be conducted on both a small and large scale and holds significant economic potential because the products it yields command high market prices. Goats are a livestock commodity closely tied to rural life, with dairy goats being one of the primary types. Dairy goats are capable of adapting to various environmental conditions and agroecosystems. The demand for animal protein among Indonesians continues to rise alongside population growth, rising incomes, and increased public awareness of the need to meet everyone's nutritional requirements. Goat milk is an animal protein source that is increasingly in demand. Goat milk has specific characteristics: its fat globules are small in diameter and homogeneous, making it easier for the human digestive system to process and less likely to cause diarrhea.

One of the most popular goat breeds in Indonesia, particularly for milk production, is the Peranakan Etawa goat, more commonly known as the PE goat. The PE goat is a dual-purpose breed, raised both for its milk and as a source of meat. One of the challenges in goat farming is the nutritional quality of the feed provided, particularly the protein content in the ration, which often fails to meet the animals' needs. Therefore, feed ingredients are needed that can serve as substitutes for forage or concentrates for livestock, with the aim of increasing milk production and livestock productivity at a low cost while maintaining good quality. The composition of milk varies among different livestock species depending on breed, lactation stage, feed, and milking frequency (Darmajati, 2008). Most essential nutrients are found in milk, making it a nearly perfect natural food in terms of nutritional content. Substances found in milk include protein, calcium, phosphorus, vitamin A, and thiamine (vitamin B1). The relatively high calcium content in milk and the presence of lactose greatly aid the absorption of milk in the digestive tract (Departemen Pertanian, 1991).

According to Siregar (1999), milk production during lactation is influenced by genetic factors, feed, husbandry practices, the lactation period, and age. The quality of goat milk is influenced, among other things, by livestock management and proper handling during and after milking. Milk quality can be determined through physical testing of the nutritional content in goat milk. Such testing is necessary to determine whether the nutrients present in goat milk meet the nutritional standards for goat milk established in the SNI (Indonesian National Standards). The primary objective in dairy farming is milk production. Several types of dairy goats in Gorontalo Province originate from the Peranakan Etawa (PE) and Rambon (Jawarandu) breeds; however, the milk production of Peranakan Etawa (PE) goats ranges from 0.5 to 1.5 liters per goat per day. Milk production remains suboptimal, so dairy goat farmers have begun to

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increase milk production by crossbreeding local dairy goats with exotic dairy breeds, including Saanen, Alpine, and Anglo-Nubian goats. Milk goats raised in Indonesia include those resulting from crossbreeding local goats with dairy goats from abroad. One example is the Sapera goat, which is a cross between the Saanen and the PE goat. Sapera goats produce approximately 760 kg of milk per lactation period.

The chemical quality of goat milk is believed to vary from one smallholder farm to another. Smallholder dairy goat farmers still rely on traditional husbandry systems. These systems are characterized by inadequate feed management. The feed provided consists of locally sourced materials and agricultural or plantation waste. Consequently, the production and quality of the resulting goat milk are suboptimal or may vary. This variation occurs because the quality of goat milk depends on its compositional components, which are influenced by several factors. Factors affecting the compositional components of milk include the breed of livestock, lactation stage, age of the livestock, livestock health, feed or nutrition, environment, and milking process. This study aims to determine the quality of Etawa crossbreed goat milk across various lactation periods in Tunggulo Village, Limboto Subdistrict, Gorontalo Regency. The chemical quality of goat milk can be determined through its constituent components, known as Total Solids (TS), which consist of fat and protein content.

METHOD

A. Research Period and Location

This study was conducted from January to March 2026 at the Animal Science Laboratory of the Faculty of Agriculture, Universitas Negeri Gorontalo

B. Research Materials and Equipment

The equipment used in this study included a dropper pipette, a cool box, a pH meter, test tubes, a test tube rack, a measuring cylinder, test tube clamps, Erlenmeyer flasks, a Bunsen burner, a beaker, filter paper, a 500-ml beaker, and a lactodensimeter.

C. The materials used in this study were 200 ml of fresh goat milk from 15 goats sourced from a dairy goat farm in Gorontalo Regency. *Research Methodology*

The method used was a case study. The data used consisted of primary and secondary data. The parameters tested were fat and protein content.

D. *Research Procedures*

The research procedure is as follows :

1. Conduct a preliminary survey to assess the condition of the research site before the study begins

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2. Select goats that meet the established criteria as experimental units
3. Collect samples to identify the 15 goats to be observed in this study
4. Milk the 15 goats
5. Conuct chemical tests to determine the fat and protein content of PE goat milk

The Goat Milking Process

The goat milking process is as follows:

1. Wash your hands before milking and wash them again after milking; then proceed to milk the goat again
2. Milking is performed in a designated milking area
3. Wash the teats and udder with warm water, then dry them with a soft, clean cloth
4. Use a glass or stainless steel container to collect the milk
5. Direct the flow of milk onto the sides of the container, but do not collect the first stream of milk.

RESULTS AND DISCUSSION

Protein Content of Ettawa Crossbreed Goat Milk

The results of the analysis of the protein content of Ettawa crossbreed (PE) goat milk in Tunggulo Village, Limboto Subdistrict, Gorontalo Regency are shown in Figure 1.



The average protein content for lactations 1, 2, 3, and 4, respectively, was 5.38%, 5.15%, 5.03%, and 4.83%. According to SNI (1998) and TAS (2008), the protein content values for fresh premium-grade goat milk are 2.7% and above 3.7%, respectively. The protein content of goat milk during the third lactation period was the lowest because most of the observed goat samples during the third lactation period were collected in the third and sixth months of lactation. Milk production during lactation reaches its peak, so milk production increases but the milk protein content decreases. This is consistent with the statement by Qisthon and Husni (2007) that at the

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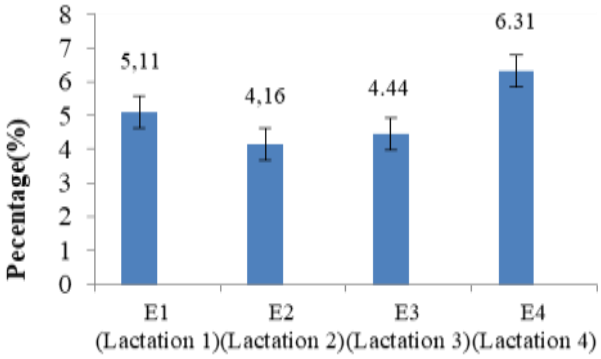
beginning of lactation, milk protein is high, then decreases rapidly and reaches a minimum at 2–3 months of lactation, and then increases again until the end of lactation.

Protein and fat percentages are at their lowest when production peaks during lactation and gradually increase toward the end of lactation. Additionally, a factor influencing protein content is feeding. The highest protein content in goat milk is achieved during the first lactation. This is due to the type of feed given to the goats. The goats were fed tofu pulp. Tofu pulp is a source of energy, providing ample energy for the formation of amino acids derived from microbes. Increased availability of amino acids enhances milk protein synthesis. The lowest milk protein content occurs during the third lactation period because the feed provided consists of forage and cocoa husks.

According to Sukarini (2006), a combination of forage and concentrate produces milk with a higher protein content compared to goats fed only forage without concentrate. Furthermore, the results of Sukarini's (2006) study indicate that the protein content of goat milk from goats fed a diet of 50% forage and 50% gamal was lower (2.92%) than that of goat milk from goats fed a diet of 71.70% forage and 28.30% concentrate, which reached 3.64%. The difference in goat milk protein content between this study and other studies is attributed to variations in the type and composition of feed provided to the goats. The milk protein content from this study is lower than the goat milk protein content in Umbaran Sari (7.53%) and in Alam Raya (7.03%) reported by Zain (2013) but higher than the goat milk protein content in Cilacap (3.41%) and in Bogor (3.88%) reported by Sagitarini et al., (2013).

Fat Content of Ettawa Crossbreed Goat Milk

The results of the analysis of the fat content of Ettawa crossbreed (PE) goat milk in Tunggulo Village, Limboto Subdistrict, Gorontalo Regency are shown in Figure 2.



The average fat content for lactations 1, 2, 3, and 4 was 5.11%, 4.16%, 4.44%, and 6.31%, respectively. According to SNI (1998) and TAS (2008), the fat content of milk should be 3.0% and

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above 4.0%, respectively. The fat content of milk from the third lactation period showed an increase, making it higher than that of the second lactation period. This was due to the fact that the third lactation period included many samples from the third and sixth months of lactation. By the third and fourth months, the peak of lactation had already passed, accompanied by an increase in milk fat content. According to Qisthon and Husni (2007), the fat content at the beginning of the lactation period decreases rapidly and reaches a minimum at 2–3 months of lactation, then increases again until the end of lactation. Additionally, according to Sudono (2003), milk fat content begins to decrease after 1–2 months of lactation; then, at 2–3 months of lactation, the milk fat content stabilizes, and subsequently increases slightly.

According to Devendra and Burns (1994), solid matter content increases after the peak of production. In addition, feeding practices are a factor influencing fat content. The average fat content in the second lactation was low because the feed given to the goats consisted of forage, cocoa husks, and tofu residue. The protein content of forage and cocoa husks is lower than that of tofu residue. Dixon and Parra (1984) stated that the addition of concentrates causes a decrease in rumen pH, resulting in a significant increase in VFA production and a marked decrease in acetic acid production. Conversely, the fat content of milk in the fourth lactation (6.31%) was the highest because the feed consumed by the goats consisted of forage and cocoa husks. Forage is a source of acetic acid. Acetic acid is a precursor for the formation of various fatty acids and milk fatty acids.

According to Heresign (1981), forage is a source of acetic acid, and acetic acid is a precursor for the formation of various fatty acids. Another factor influencing fat content is the time of milking. According to Budiwiyanto (1980), milking time has a very significant effect on milk fat content. The fat content of milk collected in the afternoon is higher than that collected in the morning. Mardalena (2008) reported that the average fat content of milk collected in the afternoon (3.69%) was higher than that collected in the morning (3.71%).

CONCLUSION

Based on the results of a study on Peranakan Ettawa goat milk in Tunggulo Village, Limboto District, Gorontalo Regency, it was concluded that the highest protein content was found in P1 (Lactation 1) at 5.38%, while the highest fat content was found in P4 (Lactation 4) at 6.31%. The protein and fat content meet the standards set by SNI and TAS.

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