JPPIPA 12(6) (2026)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Qualitative and Quantitative Traits of Thin Tail Ewes in Bojonegoro East Java, Indonesia

Irida Novianti[1*], Mashudi[1], M. Halim Natsir[1], Poespitasari H. Ndaru[1], Veronica Margareta Ani Nurgiartiningsih[1], Sambas Widiyanto[2]

[1] Faculty of Animal Science, Universitas Brawijaya, Malang, Indonesia.
[2] PT. Juara Agroniaga Sejahtera, Malang, Indonesia.

Received: July 13, 2025
Revised: April 26, 2026
Accepted: June 25, 2026
Published: June 30, 2026

Corresponding Author:
Irida Novianti
I_novianti@ub.ac.id

DOI: 10.29303/jppipa.v12i6.4662

Abstract: Thin-tail sheep is a local genetic resource widely raised by farmers and requires conservation through appropriate breeding programs. This study aimed to characterize quantitative and qualitative traits of thin-tail ewes reared at PT Juara Farm, Bojonegoro. A total of 66 ewes aged 1–4 years were observed, with quantitative traits including body weight, body length, body height, and chest girth, and qualitative traits focusing on tail shape. Data were analyzed descriptively. The results showed that all body measurements increased with age, with body weight ranging from 23.08 ± 3.83 kg in 1 – <2 years to 29.25 ± 3.79 kg in 3–4 years. Similar increasing trends were observed for body length, body height, and chest girth. Three tail shapes were identified: triangular (48.48%), straight (42.42%), and sigmoid (9.10%). The coefficient of variation indicated that body weight had higher variability compared to other traits. In conclusion, thin-tail ewes exhibit age-related increases in body size with moderate phenotypic variability, providing baseline information for breeding and conservation programs.

Keywords: Body height; Body weight; Chest girth; Thin-tailed sheep

Introduction

Sheep are farm animals that have prominent role in Indonesia. Farmers in Indonesia usually raised sheep not only for their meat production but also for their social status among smallholder farmers (Marshall et al., 2019). Farmers usually raise sheep because they have good adaptability and reproductive performance, making them suitable for sustainable livestock systems in developing countries (Mueller et al., 2015). Tail type is a trait that is utilized to classify the breed of sheep. Based on the type of tail there are two distinct types existed in Indonesia, they are: fat-tailed sheep and thin-tailed sheep (Sodiq & Ezzat., 2004). Considering their superiority, the productivity of the local sheep breed should be improved first. Before creating an improvement program, characterization of the sheep need to be conducted. Scientific learning approaches emphasize that structured observation and measurement are essential in data-based analysis and interpretation processes (Abdullah, 2024). The Indonesian National Standard for fat-tailed had been arranged. However, the Indonesian National Standard for thin-tailed sheep has not been documented. Development of structured learning models in science education highlights the importance of systematic data collection for improving analytical accuracy in research (Dewi et al., 2024; Putri et al., 2025; Leonia et al., 2025).

There is various strain of Indonesian Thin-tailed sheep (Sodiq & Ezzat., 2004). Generally, they are named based on their sub population location. PT. Juara Faram is a sheep breeding farm located in Bojonegoro, East Java Indonesia. There are 203 ewes kept in PT Juara Farm and 66 ewes were thin-tailed ewes. The aims of this study in to measure the quantitative traits of the ewes and identify the qualitative traits. Project-based learning in science education supports the importance of empirical measurement in developing scientific reasoning skills (Susilawati et al., 2024; Wulandari et al., 2024). The results of this study are expecting become preliminary

How to Cite:
Novianti, I., Mashudi, Natsir, M. H., Ndaru, P. H., Nurgiartiningsih, V. M. A., & Widiyanto, S. (2026). Qualitative and Quantitative Traits of Thin Tail Ewes in Bojonegoro East Java, Indonesia. *Jurnal Penelitian Pendidikan IPA*, *12*(6), 267–271. https://doi.org/10.29303/jppipa.v12i6.4662

information for the creation of national standard of thin-tailed sheep and contribute for the genetic improvement program arrangement. The importance of standardized characterization in livestock research is also emphasized in food product studies, where systematic measurement ensures consistency and comparability of results (Athththoriq et al., 2025).

Method

This study was conducted at PT Juara Farm, Bojonegoro, Indonesia. A total of 66 thin-tailed ewes aged between 1 and 4 years were used in this study. The animals were grouped into three age categories, namely 1 – <2 years, 2 – <3 years, and 3–4 years. Age determination was based on the number of permanent incisors that had replaced the milk teeth.

Quantitative and Qualitative Traits Measurements

Body weight (kg), body length (cm), body height (cm) and chest girth (cm) were the traits that were measured for this study. Moreover, the shape of the tail was also been observed as the qualitative traits.

Analysis

The collected data were analyzed descriptively. For quantitative traits, mean, standard deviation, and coefficient of variation were calculated to describe the variability within each age group. This descriptive statistical approach is consistent with evaluation methods applied in educational science research, which emphasize the importance of simple statistical tools to capture variability (Pradana & Sumarno, 2025). Qualitative data were analyzed by calculating the frequency distribution of each observed trait. The use of frequency distribution is widely recognized in scientific research to describe categorical patterns, as also demonstrated in educational studies applying distribution-based analysis (Simorangkir et al., 2025).

Result and Discussion

The quantitative traits measurement's result is showed in table 1. The body weight of the ewes that were observed in this study were higher than the study's result by Sodiq & Ezzat (2004) that observed the body weight of Javanese thin-tailed ewes under different parities. This finding is also consistent with local studies reporting differences in body weight among thin-tailed sheep populations in West Java (Solihati et al., 2017). Similar findings have also been reported in other Indonesian sheep populations under different management systems (Somanjaya et al., 2025; Putri & Kholidah, 2023). However, these results were lower compare to the body weight of African thin-tailed ewes (Deribe et al., 2021). These differences may be attributed to variations in genetic background, management practices, and environmental conditions, which are known to significantly influence growth performance in small ruminants (Mrode et al., 2019).

The coefficient of variation of the observed ewes were moderate for all group of age. This variability may be associated with differences in physiological status, such as age, reproductive stage, and nutritional intake, which are important factors affecting body weight in sheep (Kosgey et al., 2006). Similar moderate variation was also reported in Nigerian indigenous sheep populations (Yakubu et al., 2010). The use of descriptive statistics to capture variability is widely recognized in scientific research, including educational science studies (Pradana & Sumarno, 2025; Simorangkir et al., 2025), and project-based learning research in science education also emphasizes the importance of descriptive statistical tools to evaluate variability (Afriana et al., 2016). Moderate variability in morphometric traits has also been reported in Indonesian local sheep populations, indicating the influence of management systems (Suryani et al., 2023; Irfansyah et al., 2025). On the other hand, there were low coefficient of variation identified for morphometric traits (body length, body height and chest girth). These low coefficients of variations might indicate that the data might be used to form a standard for thin-tailed ewes. Similar findings of low morphometric variability have been reported in Ethiopian sheep breeds (Deribe et al., 2021) and Nigerian sheep (Kosgey et al., 2006). This condition suggests a relatively homogeneous population, advantageous for establishing breed standards and implementing selection programs (Yakubu et al., 2010).

This condition suggests a relatively homogeneous population, advantageous for establishing breed standards and implementing selection programs (Sumantri et al., 2007; Jakaria et al., 2012).

Table 1. Quantitative traits measurements of thin-tailed ewes

Age	Body Weight		Body Length		Body Height		Chest Girth	
	Mean ± SD (kg)	CV	Mean ± SD (cm)	CV	Mean ± SD (cm)	CV	Mean ± SD (cm)	CV
1 – <2	23.08 ± 3.83	0.17	52.19 ± 4.02	0.08	50.35 ± 3.73	0.07	70.02 ± 5.06	0.07
2 – <3	27.62 ± 3.79	0.14	55.98 ± 2.8	0.05	51.52 ± 2.66	0.05	74.22 ± 3.07	0.04
3 – 4	29.25 ± 3.58	0.12	57.92 ± 4.74	0.08	52.50 ± 3.55	0.07	73.17 ± 5.14	0.07

The morphometric traits that were measured including body length, body height and chest girth. The measurement procedure of these morphometric traits is illustrated in Figure 1. As shown in Figure 1, body length was measured from the point of shoulder to the point of buttock, body height from the highest point of withers to the ground, and chest girth as the circumference behind the forelegs. This standardized measurement approach ensures consistency and accuracy in morphometric data collection.

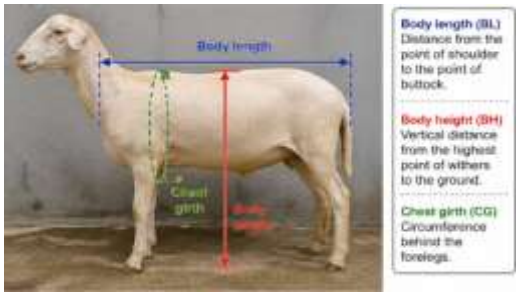

Figure 1. Measurement of morphometric traits in thin-tailed sheep, including Body Length (BL), Body Height (BH), and Chest Girth (CG)

Those morphometric traits were higher compare to a study by Putra et al. (2021) that observed the morphometric traits of thin tailed sheep in lowland and highland area. Meanwhile a comparison between the result of this research (for 3-4 years old ewe group) and a study by Sumantri et al. (2007) indicated that the ewe's body height in PT Juara Farm, Bojonegoro was shorter than the thin-tailed ewes in Jonggol. In contrast, the ewe's body length and chest girth in Bojonegoro were greater that thin-tailed ewes in Jonggol. Variation in morphometric traits has also been widely reported in sheep populations, indicating the influence of genetic and environmental factors (Aydoğdu et al., 2025).

These variations may reflect differences in genetic composition, environmental adaptation, and the influence of selective breeding practices (Mrode et al., 2019). This different result might indicate that thin-tailed ewes have some strains based on their local sub population (Sodiq & Ezzat., 2004). Supporting evidence of strain differences has also been reported in Central and West Java populations (Pratama et al., 2018), emphasizing the importance of community-based breeding programs (Mueller et al., 2015; Mrode et al., 2019). Morphometric variation across physiological age has also been observed in other Indonesian sheep breeds, confirming growth-related differences (Meliana et al., 2023).

Qualitative traits were also been recorded among the observed ewes. Most of the observed ewes has triangle (48.48%) and straight (42.42%) shape of tail, while only few ewes had sigmoid shape of tail. The dominance of certain tail shapes suggests a relatively consistent phenotypic pattern within the population. The variation of qualitative traits showed genetic and phenotypic variability in animals (Serpico, 2020). Similar qualitative trait variability has been reported in African sheep populations (Marshall et al., 2019; Yakubu et al., 2010). The use of frequency distribution to analyze qualitative traits is consistent with approaches in educational science research to describe categorical patterns (Simorangkir et al., 2025; Boma & Setiawan, 2023). Variability in growth and performance traits in sheep has also been evaluated in Indonesian studies, supporting the importance of phenotypic diversity in breeding programs (Mudawamah, 2023). This variation reflects underlying genetic diversity, which is essential for adaptation and long-term sustainability of livestock populations.

Conclusion

Thin-tailed ewes showed an increase in body weight and body measurements with advancing age, indicating normal growth patterns. The observed phenotypic variability was moderate for body weight and low for other quantitative traits, suggesting relatively uniform body conformation within the population. Three tail shapes were identified, with triangular shape being the most dominant. These findings provide baseline information for phenotypic characterization and can support the development of breeding and selection programs for thin-tailed sheep.

Acknowledgments
This study was funded by The Indonesia Ministry of Higher Education through Matching Fund (MF) Program 2022.

Author Contributions
I.N. planned, designed, carried out the experiment and wrote the manuscript. V. M. A. N., M. H. N., M., P. H. N., and S.W. planned the experiment and participated in the drafting manuscript. All authors give their contribution in this paper. Then, all authors have read, review and agree with the final manuscript.

Funding
This research was funded by Kedaireka Matching Fund 2022.

Conflicts of Interest
The authors declare no conflict of interest.

References

Abdullah, G. (2024). Utilization of Environment as Science Learning Resource. *Jurnal Penelitian Pendidikan IPA*, *10*(11), 8482–8489. https://doi.org/10.29303/jppipa.v10i11.8754

Afriana, J., Permanasari, A., & Fitriani, A. (2016). Project Based Learning Integrated to STEM to Enhance Elementary School's Students Scientific Literacy. *Jurnal Pendidikan IPA Indonesia*, *5*(2), 261–267. https://doi.org/10.15294/jpii.v5i2.5493

Athththoriq, A. H., Susilo, A., Evanuarini, H., Amertaningtyas, D., & Awwaly, K. U. A. (2025). Effect of Rice Bran Oil Addition on Chicken Corned Meat. *Jurnal Penelitian Pendidikan IPA*, *11*(7), 11591. https://doi.org/10.29303/jppipa.v11i7.11591

Aydoğdu, S., Koçyiğit, A., Kök, R. R., Arslan, M. S., Demircioğlu, İ., & Dayan, M. O. (2025). Comparison of Morphometric Measurements of Metacarpus in Different Sheep Breeds. *Veterinary Medicine and Science*, *11*(2), e70228. https://doi.org/10.1002/vms3.70228

Boma, R., & Setiawan, A. (2023). Implementation of Moodle in Physics Learning: A Systematic Review. *Jurnal Penelitian Pendidikan IPA*, *9*(2), 201–210. https://doi.org/10.29303/jppipa.v9i2.201

Deribe, D., Belay, B., Beyene, D., Dagne, K., Getachew, T., Gizaw, S., & Abebe, A. (2021). Morphological Diversity of Northeastern Fat-Tailed and Northwestern Thin-Tailed Indigenous Sheep Breeds of Ethiopia. *Heliyon*, *7*(7), e07472. https://doi.org/10.1016/j.heliyon.2021.e07472

Dewi, R. K., Wati, D. D. E., Lasmana, O., Yerimadesi, Y., Festiyed, F., Ahda, Y., & Alberida, H. (2024). Development Research in Science Education: A Systematic Literature Review of Trends in Development Models and Instruments Used. *Jurnal Penelitian Pendidikan IPA*, *10*(5), 250–261. https://doi.org/10.29303/jppipa.v10i5.6876

Irfansyah, A., Hidayat, N., & Nurasih, A. D. (2025). Hubungan antara Pertambahan Ukuran Linier Tubuh dan Pertambahan Bobot Badan Harian Domba Ekor Tipis Jantan dan Betina di Griya Ternak Farm. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, *7*(2), 112. https://doi.org/10.20884/1.angon.2025.7.2.p112-116

Jakaria, J., Zein, M. S. A., Sulandari, S., Subandriyo, S., & Muladno, M. (2012). The Use of Microsatellite Markers to Study Genetic Diversity in Indonesian Sheep. *Journal of the Indonesian Tropical Animal Agriculture*, *37*(1), 1–9. https://doi.org/10.14710/jitaa.37.1.1-9

Kosgey, I. S., Rowlands, G. J., Arendonk, J. A. M. V., & Baker, R. L. (2006). Small Ruminant Production in Smallholder Systems: Opportunities and Constraints. *Small Ruminant Research*, *62*(1–2), 13–22. https://doi.org/10.1016/j.smallrumres.2008.02.005

Leonia, R. A., Rolina, N., & Suyantri, E. (2025). A Systematic Review of Scientific Literacy in Early Childhood Science Learning: Approaches, Methods, and Media. *Jurnal Penelitian Pendidikan IPA*, *11*(2), 38–46. https://doi.org/10.29303/jppipa.v11i2.10576

Marshall, K., Gibson, J. P., Mwai, O., Mwacharo, J. M., Haile, A., Getachew, T., Mrode, R., Kemp, S. J., & Moore, S. (2019). Livestock Genomics for Developing Countries – African Examples in Practice. *Frontiers in Genetics*, *10*(297). https://doi.org/10.3389/fgene.2019.00297

Meliana, D. A., Sodiq, A., Setyaningrum, A., Purwantini, D. D., & Susanto, A. (2023). Penampilan Morfometrik Domba Sakub Jantan pada Umur Fisiologis yang Berbeda. *Jurnal Ilmiah Fillia Cendekia*, *9*(1). https://doi.org/10.32503/fillia.v9i1.5089

Mrode, R., Ojango, J., Okeyo, A. M., & Mwacharo, J. (2019). Genomic Selection and Use of Molecular Tools in Breeding Programs for Livestock in Developing Countries. *Animal Frontiers*, *9*(1), 63–69. https://doi.org/10.3389/fgene.2018.00694

Mudawamah, M. (2023). Profil dan Estimasi Ripitabilitas Pertambahan Bobot Badan Domba Texel sebagai Dasar Culling. *Jurnal Sains dan Teknologi Industri Peternakan*, *4*(2). https://doi.org/10.55678/jstip.v4i2.1466

Mueller, J. P., Rischkowsky, B., Haile, A., Philipsson, J., Mwai, O., Besbes, B., Zárate, A. V., Tibbo, M., Mirkena, T., Duguma, G., & Sölkner, J. (2015). Community-Based Livestock Breeding Programmes: Essentials and Examples. *Journal of Animal Breeding and Genetics*, *132*(2), https://doi.org/10.1111/jbg.12136

Pradana, H. D., & Sumarno, A. (2025). Evaluation of Learning in AI Integration Training for Learning Assessment Among MTs Teachers. *Jurnal Penelitian Pendidikan IPA*, *11*(7), 1–8, https://doi.org/10.29303/jppipa.v11i7.11595

Pratama, A. A., Purbowati, E., & Lestari, C. M. S. (2018). Hubungan antara Ukuran-Ukuran Tubuh Terhadap Bobot Badan Domba Wonosobo Jantan di Kabupaten Wonosobo Jawa Tengah. *Jurnal Ilmu Ternak*, *18*(2), 120–128. Retrieved from https://scispace.com/pdf/hubungan-antara-ukuran-ukuran-tubuh-terhadap-bobot-badan-dgf6tqbmlv.pdf

Putra, W. P. B., Alwi, G. Y., & Suryani, H. (2021). Morphometrics Characterization of Thin-Tail Sheep in Lowland and Highland Areas. *Tropical Animal Science Journal*, *44*(4), 386-398. https://doi.org/10.5398/tasj.2021.44.4.386

Putri, A. R. I., & Kholidah, S. N. (2023). Comparison of Phenotypic Characters between Fat-Tailed Sheep (DEG) and Thin-Tailed Sheep (DET) in Dampit District, Malang Regency. *Jurnal Sain Peternakan*

Indonesia, *18*(2), 93–97. https://doi.org/10.31186/jspi.id.18.2.93-97

Putri, G., Irwandani, I., & Hidayah, N. (2025). Systematic Literature Review: The Effectiveness of the Self-Organized Learning Environment (SOLE) Model in Science Education. *Jurnal Penelitian Pendidikan IPA*, *10*(1), 1–11. https://doi.org/10.29303/jppipa.v10n1.

Serpico, D. (2020). Beyond Quantitative and Qualitative Traits: Three Telling Cases in the Life Sciences. *Biology & Philosophy*, *35*(3), 1-26. https://doi.org/10.1007/s10539-020-09750-6

Simorangkir, S. T., Kemal, I., Rachmatullah, R., & Setyanto, E. (2025). Teacher Strategies in Improving Elementary School Students' Critical Thinking Skills by Using the Giving Question and Getting Answer Learning Model. *Jurnal Penelitian Pendidikan IPA*, *11*(7), 76–81. https://doi.org/10.29303/jppipa.v11i7.11904

Sodiq, A., & Ezzat S. T. (2004). Productivity and Breeding Strategies of Sheep in Indonesia: A Review. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, *105*(1), 71-82. Retrieved from https://www.jarts.info/index.php/jarts/article/view/52

Solihati, N., Rasad, S. D., Yusrina, A., & Dimyati, Y. I. (2017). Identifikasi Morfometrik Sperma Domba Lokal sebagai Dasar Aplikasi Sexing Sperma. *Jurnal Ilmu Ternak*, *17*(2). https://doi.org/10.24198/jit.v17i2.15138

Somanjaya, R., Imanudin, O., & Setiadi, S. (2025). Karakteristik Kuantitatif Domba Garut pada Sistem Pemeliharaan Berbeda Berdasarkan Umur dan Jenis Kelamin. *Jurnal Peternakan Indonesia*, *27*(1), 9–17 https://doi.org/10.25077/jpi.27.1.9-17.2025

Sumantri, C., Einstiana, A., Salamena, J. F., & Inounu, I. (2007). Keragaan dan Hubungan Phylogenik antar Domba Lokal di Indonesia Melalui Pendekatan Analisis Morfologi. *JITV*, *12*(1), 42-54. Retrieved from https://www.researchgate.net/publication/317233070_Keragaan_dan_Hubungan_Phylogenik_antar_Domba_Lokal_di_Indonesia_melalui_Pendekatan_Analisis_Morfologi

Suryani, H. F., Mustofa, M. H., & Luthfi, N. (2023). Korelasi Ukuran Morfometrik dengan Bobot Badan pada Domba Ekor Tipis Betina Dara di Kabupaten Semarang. *Wahana Peternakan*, *7*(2), 172–178. https://doi.org/10.37090/jwputb.v7i2.981

Susilawati, S., Harjono, A., & Firdaus, F. (2024). Improving Students' Science Process Skills Through Project-Based Learning Models: A Systematic Review. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 721–730. https://doi.org/10.29303/jppipa.v10i10.9381

Wulandari, T., Wicaksana, E., & Anggereini, E. (2024). The Influence of the Project-Based Learning Model on Students' Science Process Skills and Critical Thinking. *Jurnal Penelitian Pendidikan IPA*, *10*(9), 6090–6095. https://doi.org/10.29303/jppipa.v10i9.8367

Yakubu, A., Salako, A. E., & Imumorin, I. G. (2010). Multivariate Analysis of Morphostructural Characteristics in Nigerian Indigenous Sheep. *Small Ruminant Research*, *93*(2–3), 75–81. https://doi.org/10.4081/ijas.2011.e17