



Identification of Qualitative Characteristics of Dairy Goats in Abeli and Poasia Districts, Kendari City

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ABSTRACT

Genes and the environment influence the appearance of qualitative traits and can show variation in a population. The expression of qualitative traits such as coat color and body shape reflects the genetic characteristics of an individual livestock. This study aimed to identify the qualitative characteristics of dairy goats in Abeli and Poasia Districts, Kendari City. The study location was selected purposively based on the availability of Etawah Crossbred and Jawarandu goats, while samples were collected using a census method. A total of 129 dairy goats, consisting of 36 males and 93 females, were observed. The variables included coat color, horn type, ear shape, nose shape, and udder shape. Data were tabulated and analyzed descriptively using percentages. The results showed diverse coat colors, including white, brown, black, gray, and several color combinations such as white-brown, white-black, brown-white, brown-black, black-white, black-brown, and white-black-brown. Most goats were horned, although some had horn bumps or were hornless. Etawah Crossbred goats generally had drooping ears and convex noses, whereas Jawarandu goats commonly had semi-drooping ears and slightly convex noses. Most female goats had symmetrical udders. These findings provide baseline phenotypic information for breeding, selection, conservation, and development of local dairy goat genetic resources in Kendari City.

Keywords: Qualitative characteristics, dairy goat, Etawa Crossbred, Kendari City

ABSTRAK

Gen dan lingkungan memengaruhi munculnya sifat kualitatif dan dapat menunjukkan variasi dalam suatu populasi. Ekspresi sifat kualitatif seperti warna bulu dan bentuk tubuh mencerminkan karakteristik genetik ternak individu. Penelitian ini bertujuan untuk mengidentifikasi karakteristik kualitatif kambing perah di Kecamatan Abeli dan Poasia, Kota Kendari. Lokasi penelitian dipilih secara sengaja berdasarkan ketersediaan kambing persilangan Etawah dan Jawarandu, sedangkan sampel dikumpulkan menggunakan metode sensus. Sebanyak 129 ekor kambing perah, terdiri dari 36 jantan dan 93 betina, diamati. Variabel yang diamati meliputi warna bulu, tipe tanduk, bentuk telinga, bentuk hidung, dan bentuk ambung. Data ditabulasi dan dianalisis secara deskriptif menggunakan persentase. Hasil penelitian menunjukkan beragam warna bulu, termasuk putih, coklat, hitam, abu-abu, dan beberapa kombinasi warna seperti putih-coklat, putih-hitam, coklat-putih, coklat-hitam, hitam-putih, hitam-coklat, dan putih-hitam-coklat. Sebagian besar kambing bertanduk, meskipun beberapa memiliki benjolan tanduk atau tidak bertanduk. Kambing hasil persilangan Etawah umumnya memiliki telinga yang terkulai dan hidung cembung, sedangkan kambing Jawarandu umumnya memiliki telinga yang agak terkulai dan hidung yang sedikit cembung. Sebagian besar kambing betina memiliki ambung yang simetris. Temuan ini memberikan informasi fenotipik dasar untuk pembiakan, seleksi, konservasi, dan pengembangan sumber daya genetik kambing perah lokal di Kota Kendari.

Kata kunci: Karakteristik kualitatif, kambing perah, Peranakan Etawa, Kota Kendari

INTRODUCTION

Animal Genetic resources (AnGR) of goat livestock in Indonesia include: kacang goat (Batubara *et al.* 2012), kejobong (Sumardianto *et al.* 2013), etawah crossbreed (Rasminati 2013), jawarandu/bligon (Murdjito *et al.* 2011), gembrong (Pamungkas and Batubara 2012), kosta, marica, samosir, muara (Rusdiana and Sutedi 2016), panorusan samosir (Khairiah *et al.* 2021), and several other types of local goats. AnGR of goats is spread across various regions, including Southeast Sulawesi. Statistical data shows that the goat population in Southeast Sulawesi amounted to 183,725 heads in 2020 and there was an increase to 195,575 heads in 2021 (BPS 2022).

Local goats generally have advantages, including being able to survive on low-quality feed, being able to withstand local climate pressures, having high resistance to local diseases and parasites such as infectious scabies or the sarcoptes scabiei mite, being more productive at very low costs, supporting agricultural and cultural food diversity, and being more effective in achieving local food security goals (Ilham 2014). Goat farming consists of two types of production, namely the meat and dairy types. However, most goats are still used as beef livestock to meet meat needs, while the potential of goats to produce milk has not been developed much.

According to the Ministry of Industry of the Republic of Indonesia (2016), the majority of domestic raw material needs for fresh milk (79%) still have to be imported in the form of skim milk powder, anhydrous milk fat, and butter milk powder from various countries such as Australia, New Zealand, the United States, and Europe. Thus, opportunities for dairy goat farming in the country are still wide open and have considerable potential for development. Sundari and Efendi (2010) stated that the dairy goat farming business, in terms of the consumption development aspect, has great potential and is more profitable than the beef goat farming business.

Dairy goats in the world are grouped based on their region of origin, production characteristics, and milk production characteristics as milk producers. According to Akshith *et al.* (2024), milk-producing goats require lower capital investment and low production costs, can develop quickly in various environments and climates, so they can be found throughout the world. In Indonesia, several types of dairy goats that are widely developed include the etawah crossbreed goat (Sudrajat *et al.* 2021), jawarandu/bligon (Warman *et al.* 2021), sapera (Pamungkas *et al.* 2021; Pramono *et al.* 2024), and senduro (Almaida *et al.* 2020).

Information on genetic resources for dairy goats in Southeast Sulawesi, particularly in Kendari City, remains very limited, both in terms of species, breeds, and qualitative and quantitative traits. Exploring genetic resources for dairy goats is crucial and necessary for preserving and developing the dairy goat business in the future. Qualitative traits are traits that cannot be measured but can be grouped. Qualitative traits are controlled by one or more gene pairs, where environmental influences are relatively small or even non-existent. Therefore, the expression of qualitative traits

such as coat color and body shape in animals reflects the genetic characteristics of individual livestock (Noor 1996; Rusdin *et al.* 2025).

Initial observations indicate that dairy goat breeds such as the Etawah Crossbred breeds in Kendari City can be found in the Abeli and Poasia sub-districts. These two sub-districts are centers for dairy goat cultivation using a smallholder farming system, with relatively large populations compared to other sub-districts in Kendari City. However, genetic resource information, specifically on qualitative traits for dairy goats in the Abeli and Poasia sub-districts of Kendari City, has not been identified, necessitating further research. This study aims to identify the qualitative characteristics of dairy goats in Abeli and Poasia Districts, Kendari City.

MATERIALS AND METHODS

Research Material

This research was carried out in Abeli and Poasia Districts, Kendari City, Southeast Sulawesi. The research population was dairy-type goats, namely etawah crossbreed and jawarandu/bligon goats in Abeli and Poasia Districts, Kendari City. The research samples were 129 etawah crossbreed and jawarandu/bligon goats, which were reared intensively, consisting of 23 male offspring and 27 female offspring as well as 13 male adults and 66 female adults aged 6-36 months.

Location Determination Techniques

The research location was determined using a purposive sampling method based on the availability of dairy goats, namely, Etawah crossbreed and Jawarandu goats. The determination of sample collection in this study was carried out using a census method.

Types and Techniques of Data Collection

The types of data used in this research are primary and secondary data. Primary data is data obtained through observing the qualitative characteristics of etawah crossbreed and jawarandu goats in Abeli and Poasia District, Kendari City. Primary data information was also obtained through interviews with livestock owners. Meanwhile, secondary data is data obtained from relevant agencies at the district or city, sub-district or village level, as well as information sourced from books, journals, and websites that are relevant to this research study.

Research Variable

The variables observed in this study were qualitative traits, including coat color, ear shape, presence or absence of horns, nose shape, and udder shape. Identification of qualitative characteristics using visual observation methods according to Rumfot *et al.* (2023) is as follows: a) Coat color: a combination of coat colors across the entire body surface; b) Ear shape: erect, semi-hanging, and drooping; c) Horn type: horned, protruding, and hornless; d) Nose shape: slightly convex and convex; e) Udder shape: symmetrical and asymmetrical.

Data Analysis

Data on the qualitative traits of dairy goats obtained from the research results will then be tabulated and analyzed descriptively based on the percentage values of the observed variables using the formula as follows:

$$\text{Character A} = \frac{\sum \text{character A}}{n} \times 100\% \quad (1)$$

A = observed trait

n = number of samples.

RESULTS AND DISCUSSION

Coat Color

The results of observations on the qualitative characteristics of dairy goat coat color are presented in Table 1. Table 1 showed that the coat color of dairy goats in Abeli and Poasia Districts, Kendari City, there are 12 (eleven) kinds of colors, namely white, black, brown, white and black, white and brown, black and white, black and brown, brown and white, brown and black, white, black and brown. The distribution of male PE goat coat color in Abeli Regency is dominated by brown and white, with as many as 2 heads (13.33%), while the combination of white-black-brown is not found. In female PE goats, white is dominated by 5 heads (15.15%), while white and black are not found. The coat colors of male and female Jawarandu goats in Abeli Regency are dominated by brown and white, with 3 heads (20%), and by brown, with 8 heads (24.24%). In the Poasia District, male PE goats are dominated by white and brown (6 heads or 28.57%), and white and black are not found. In female PE goats, white and brown are dominant (13 heads or 21.66%). The coat color of male Jawarandu goats is dominated by brown (3 heads or 14.28%). In female

Jawarandu goats, brown is dominant (7 heads or 11.66%). Black and brown, as well as brown and black feather colors, are not found in either males or females.

Another coat color phenotype found in this study was a combination of brown and white, which was thought to be caused by the age of the goats, so that the coat color of the goats had faded. Meanwhile, the plain color is thought to be caused by the influence of the expression of genes from the etawa crossbreed goats in the Abeli and Poasia Districts. The results of coat color in this research are the same as the report by Amin *et al.* (2021), that the coat color of Jawarandu goats in Siompu District is the most common, namely brown and white (19.4%), while the lowest color pattern is white with brown spots (0.6%). According to Wasati and Faizal (2018), the coat color of the etawa crossbreed goat varies from cream to black, white with black stripes, or brown stripes, which is quite dominant. Batubara *et al.* (2016) stated that the coat color of etawa crossbreed goats was a combination of white, black, and white and black, or white and brown. The dominant white color is found in the Etawa crossbreed goats compared to black and brown. In grade A etawa Kaligesing crossbreed goats, the coat was dark black from head to neck (Rasminati 2013). According to Marinda *et al.* (2022), the coat color of etawa crossbreed goats is dominated by black and white (84.61%) and white brown (15.38%).

The factor that really determines the differences in color patterns in etawa crossbreed, Jawarandu, and kacang goats, as well as the results of cross-breeding, is the genetic factor. Genetic variations in each type of goat arise because each individual has different genes. Genetic variation increases as offspring receive unique combinations of genes and chromosomes from their parents through gene recommendations that arise during sexual

Table 1. Coat color of dairy goats in Abeli and Poasia Districts, Kendari City

Coat Color	Abeli district				Poasia district			
	Male		Female		Male		Female	
	∑	%	∑	%	∑	%	∑	%
PE Goat								
White	1	6.66	5	15.15	4	19.04	10	16.66
White and Black	1	6.66	3	9.09	0	0	6	10.00
White and Brown	2	13.33	3	9.09	6	28.57	13	21.66
White, Black, and Brown	0	0	2	6.06	3	14.28	1	1.66
Total PE Goat	4	30.77	13	44.83	13	72.22	30	53.57
Jawarandu Goat								
Black	1	6.66	1	3.03	0	0	2	3.33
Brown	2	13.33	8	24.24	3	14.28	7	11.66
Black and White	1	6.66	4	12.13	1	4.76	3	5.00
Black and Brown	1	6.66	1	3.03	0	0	0	0
Brown and White	3	20.00	1	3.03	1	4.76	14	23.33
Brown and Black	1	6.66	1	3.03	0	0	0	0
Total Jawarandu Goat	9	69.23	16	55.17	5	27.78	26	46.43
Total	13	100	29	100	18	100	56	100

Notes; ∑ = Amount, % = percentage



Figure 1a. The coat colors phenotype of PE goat in Abeli and Poasia Districts (1. White, 2. White and black, 3. White and brown, 4. White, black and brown)



Figure 1b. The coat colors phenotype of jawarandu goats in Abeli and Poasia Districts (1. Black, 2. Brown, 3. Black and White, 4. Black and Brown, 5. Brown and White, 6. Brown and Black)

reproduction. Genes are exchanged between chromosomes during meiosis, and new combinations are created when chromosomes from both parents are combined to form genetically unique offspring (Primack *et al.* 2007). Coat color is a qualitative trait that is influenced by genetics from chromosomes or gene arrangement, and genetic factors are passed on to offspring (Iham *et al.* 2020). Genes that play an important role in coat color variation in goats include the ASIP, AHCY, and ITCH genes on chromosome 13. The ASIP and AHCY genes are associated with black coat color, and the ITCH gene influences the expression of white coat color (Zhang *et al.* 2025). On the other hand, the dominance of light colors shows that these goats easily adapt to humid and hot environments (Rotimi *et al.* 2018). The coat color phenotype of the dairy goats in this study can be seen in Figure 1.

Horn Type

The types of horns of dairy goats in the Abeli and Poasia Districts, Kendari City, can be seen in Table 2. There are three types of horns in dairy goats in the Abeli and Poasia Districts, namely horned, hornless, and bumpy horns. The type of horns of dairy goats in Abeli Regency in male PE goats is very much dominated by the horned type (3 heads or 75.00%), followed by bumpy horns (1 head or 25.00%), and no hornless ones were found. Female PE goats in Abeli Regency are dominated by 10-horned goats (76.92%), followed by 3-bumpy-horned goats (23.08%), while no hornless goats were found. Male jawarandu goats in Abeli District are dominated by the horned type (8 heads or 88.89%) and bumpy horns (1 head or 11.11%). Male PE goats in Poasia Regency were dominated by horned goats (12 or 92.31%), followed by horned goats with

Table 2. Types of dairy goat horns in Abeli and Poasia Districts, Kendari City

Horn type	Abeli district				Poasia district			
	Male		Female		Male		Female	
	Σ	%	Σ	%	Σ	%	Σ	%
PE Goat								
Horn	3	75	10	76.92	12	92.31	22	73.33
No horn	0	0	0	0	0	0	2	6.67
horn bumps	1	25	3	23.08	1	7.69	6	20
Total PE goat	4	100	13	100	13	100	30	100
Jawarandu Goat								
Horn	8	88.89	12	75	3	60	16	61.54
No horn	0	0	1	6.25	0	0	3	11.54
horn bumps	1	11.11	3	18.75	2	40	7	26.92
Total jawarandu goat	9	100	16	100	5	100	26	100
Total	13	100.00	29	100.00	18	100.00	56	100.00

Description; Σ = Total, % = Percentage

bumps (1 or 7.69%), while hornless goats were not found. Meanwhile, female PE goats were dominated by horned goats (22 or 73.33%), followed by horned goats with bumps (6 or 20.00%) and hornless goats (2 or 6.67%). Male and female jawarandu goats were dominated by horned goats (3 or 60.00% and 16 or 61.54%), followed by horned goats with bumps (7 or 26.92%), and hornless goats were only found in females (3 or 11.54%). Rasminati (2013) stated that Kaligesing crossbreed etawa grade A goats have horns that curl backwards to the ears. According to Batubara *et al.* (2016), the horns of male and female etawa crossbreed goats are small and curved backwards. The phenotype of horn type in dairy goats can be seen in Figure 2.

Ear Shape

The ear shape of dairy goats (PE and jawarandu) in Abeli and Poasia Districts, Kendari City consists of two shapes, namely semi-hanging and hanging down (Table 3). The ear shape of male and female PE goats is dominated by hanging down ears in Abeli District (4 and 13 heads) and Poasia (13 and 30 heads). Meanwhile, the ear shape of jawarandu goats is dominated by semi-hanging ears in Abeli District (9 and 16 heads) and Poasia (5 and 26 heads). The stand ear shape was not found in either the Abeli District or the Poasia District.

Due to the influence of genes from etawa crossbreed goats, it is possible that local goats that have the dominant



Figure 2a. The phenotype of horn type of PE goats in Abeli and Poasia Districts (1. Horn, 2. Horn bumps, 3. No horn)



Figure 2b. The phenotype of horn type of Jawarandu goats in Abeli and Poasia Districts (1. Horn, 2. Horn bumps)

Table 3. Ear shape of dairy goats in Abeli and Poasia Districts, Kendari City

Ear shape	Abeli district				Poasia district				
	Male		Female		Male		Female		
	Σ	%	Σ	%	Σ	%	Σ	%	
PE Goat									
Stand	0	0	0	0	0	0	0	0	0
Half dangle	0	0	0	0	0	0	0	0	0
Dangle down	4	100	13	100	13	100	30	100	100
Total PE goat	4	100	13	100	13	100	30	100	100
Jawarandu Goat									
Stand	0	0	0	0	0	0	0	0	0
Half dangle	9	100	16	100	5	100	26	100	100
Dangle down	0	0	0	0	0	0	0	0	0
Total jawarandu goat	9	100	16	100	5	100	26	100	100
Total	13	100.00	29	100.00	18	100.00	56	100.00	100.00

Description; Σ = Total, % = Percentage

ear type, drooping ears or hanging downwards, are descendants of etawa crossbreed goats. The results of this study are not much different from the results of research by Amin *et al.* (2021), who reported that 42 heads of Jawarandu goats in Siompu District, 74.9% of them had half-dangle ears, while 25.1% had dangle down ears. The shape of the ears of the Jawarandu goat is half dangle, while the shape of the dangling ears was a dominant trait inherited from the crossbreed Etawa goat. Jawarandu goats have long, soft, dangling ears, and the tips are slightly folded (Sutama *et al.* 2010). The length of the etawa crossbreed goat ears is between 15 and 30 cm, long ears dangle down (Mulyono 1999). According to Wasiati and Faizal (2018), the etawa crossbreed goat ears are relatively long (18-30 cm) and drooping. Rasminati (2013) stated that 72.22% of etawa crossbreed goats had their ears folded forward, and 27.78% had their ears folded inward. Kaligesing etawa crossbreed grade A goats have ears attached to the face with forward folds of around 30 cm. According to Marinda *et al.* (2022), the ear shape of PE goats is dominantly long folded (76.92%) and short folded (23.07%). The ear shape phenotype of dairy goats can be seen in Figure 3.

Nose Shape

The nose shape of goats in the Abeli and Poasia Districts, Kendari City, can be seen in Table 4. The nose shape of male and female PE goats in Abeli District, Kendari City, tends to be dominated by a slightly convex nose shape (4 and 13 goats or 100%), as well as in Poasia District (13 and 30 goats or 100%). Meanwhile, the nose shape of male and female Jawarandu goats tends to be dominated by a slightly convex nose shape in Abeli District (9 and 16 goats or 100%) and Poasia District (5 and 26 goats or 100%). The curved or convex nose type is thought to originate from the etawa crossbreed goats. Etawa crossbreed goats have the characteristic of a curved upward nose (Mulyono, 1999). The nose shape phenotype of dairy goats can be seen in Figure 4.

Udder Shape

The udder shape of dairy goats in Abeli and Poasia Districts, Kendari City, can be seen in Table 5. The results in Table 5 show that the udder shape of PE goats in Abeli District is dominated by symmetrical udder shapes (12 goats or 92.31%), while asymmetrical udder shapes are only found in 1 goat (7.69%). The udder shape of Jawarandu goats in



Figure 3. Ear shape phenotype of dairy goats in Abeli and Poasia Districts (1. Dangle down (PE goat); 2. Half dangle (jawarandu goat)

Table 4. The nose shapes of dairy goats in Abeli and Poasia Districts, Kendari City

Nose shape	Abeli district				Poasia district			
	Male		Female		Male		Female	
	Σ	%	Σ	%	Σ	%	Σ	%
PE goat								
Slightly convex	0	0	0	0	0	0	0	0
Round	0	0	0	0	0	0	0	0
Convex	4	100	13	100	13	100	30	100
Total PE goat	4	100	13	100	13	100	30	100
Jawarandu goat								
Slightly convex	9	100	16	100	5	100	26	100
Round	0	0	0	0	0	0	0	0
Convex	0	0	0	0	0	0	0	0
Total jawarandu goat	9	100	16	100	5	100	26	100
Total	13	100.00	29	100.00	18	100.00	56	100.00

Description; Σ = Total, % = Percentage



Figure 4. Nose shape phenotype of dairy goats in Abeli and Poasia Districts (1. Convex (PE goat); 2. Slightly convex (jawarandu goat))

Table 5. The udder shape of dairy goat udders in Abeli and Poasia Districts. Kendari City

Udder shape	Abeli district		Poasia district		Total	%
	Female		Female			
	Σ	(%)	Σ	(%)		
PE goat						
Symmetrical	12	92.31	27	90	39	90.7
Unsymmetrical	1	7.69	3	10	4	9.3
Total PE goat	13	100	30	100	43	100
Jawarandu goat						
Symmetrical	14	87.5	19	73.08	33	78.57
Unsymmetrical	2	12.5	7	26.92	9	21.43
Total jawarandu goat	16	100	26	100	42	100
Total	24	100.00	42	100.00	66	100.00

Notes; Σ = Amount. % = percentage

Abeli District is dominated by symmetrical udder shapes (14 goats or 87.50%), while asymmetrical udder shapes are only found in 2 goats (12.50%). In Poasia District, symmetrical udder shapes in PE and Jawarandu goats are dominated by symmetrical shapes (27 goats or 90% and 19 goats or 73.08%), while the rest are asymmetrical udder shapes (3 goats or 10.00% and 7 goats or 26.92%). According to

Rasminati (2013), etawa crossbreed Kaligesing goats grade A have a symmetrical udder shape and length. Palayukan et al (2020) stated that bottle-shaped udders had higher milk production, namely $1,119.91 \pm 219.35$ ml/day. The shape of the udder in livestock is influenced by genetic factors, age, and lactation period. The udder shape phenotype of dairy goats can be seen in Figure 5.



Figure 5. The udder shape phenotype of dairy goats at the research location (1. Symmetrical (good udder) – PE goat); 2. Unsymmetrical (bad udder) – jawarandu goat))

CONCLUSION

The study concluded that the qualitative characteristics of dairy goats in Abeli and Poasia Districts, Kendari City, are relatively diverse. Coat colors include white, brown, black, and gray. Furthermore, coat color combinations include white-brown, white-black, brown-white, brown-black, black-white, black-brown, and white-black-brown. Male and female dairy goats generally have horns, while some have only protrusions and are hornless in a small percentage. Ears are mostly drooping, as is characteristic of the Etawa crossbreed, but semi-drooping and standing ears are also found in a small percentage. A slightly convex nose is more dominant than a convex nose, while a round nose is not found. Meanwhile, the udder shape is generally symmetrical (good), with only a small percentage having an asymmetrical udder shape (bad).

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organizations related to the material discussed in the manuscript.

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