

Estimates of Genetic and Phenotypic Trend for Growth Traits in Etawah Grade Goat

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Abstract The aim of this study was to estimate genetic parameter consisting of heritability and genetic and phenotypic trends of growth traits. Growth traits studied were birth weight (BW), weaning weight (WW), 6 months of age weight (6WM), 12 months of age weight (12WM) and 18 of age weight (18WM). Data used in this study were collected from Breeding Center of Etawah Grade goat in Pelaihari from 2007 to 2011. The heritability were estimated using Mixed Model Least Square and Maximum Likelihood procedure. The genetic and phenotypic trends were calculated using regression equation. Estimation of heritability for BW, WW, 6WM, 12WM and 18WM were 0.54; 0.35; 0.37; 0.68 and 0.63, respectively. The genetic trend of BW and WW were decreased 0.019 and 0.020 kg. In contrast for 6WM, 12WM and 18 WM were increased 0.003; 0.009 and 0.005 kg, respectively. The phenotypic trend for all growth traits including BW, WW, 6WM, 12WM and 18WM decreased 0.02; 0.53; 1.11; 2.23 and 5.18 kg, respectively. The heritability of growth traits were considered as moderate to high (0.35-0.68) which means that selection program will be more efficient and effective to improvement the genetic merits in Etawah Grade goats.

Keywords Etawah Grade Goat, Genetic and Phenotypic Trends, Growth Traits, Heritability

1. Introduction

Etawah Grade goats are one of several Indonesian local goat that plays major role for milk and meat production (dual purpose). Etawah Grade goats are descended originally from crossing between the Kacang and Etawah goats [1]. Improvement of growth performance traits are important traits influencing economically advantage in the majority of meat production system. In addition, growth traits are effectively affected program selection because of moderate to higher heritability [2]. Heritability estimation of growth traits of different goat breeds have been reported by several studies [2-4]. That is why for designing local goat such as Etawah Grade goats, improvement genetic program are very important to realize. However, information of genetic parameter such as heritability related to growth trait for Indonesian local goat such as Etawah Grade goat are very rare. Therefore, the estimation of genetic analysis such as heritability and genetic trend for growth traits and important in designing breeding program for maximizing genetic improvement. The aim of this study were to estimate genetic analysis of growth trait of Etawah Grade goat in Breeding Center at Pelaihari, South Kalimantan.

2. Material and Methods

Data used in this study were collected from Breeding Center of Etawah Grade goat at Pelaihari, South Kalimantan province from 2007 to 2011. The records number of BW, WW, 6WM, 12WM and 18WM were 316; 316; 259; 259 and 165 heads, respectively. To evaluate the

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genetic analysis, the estimation of heritability were calculated Mixed Model Least Square and Maximum Likelihood procedure (SAS.9.2). The genetic and phenotypic trends were conducted using the regression mean breeding values on birth year [5].

3. Results and Discussion

3.1. Heritability

Estimated of heritability of BW, WW, 6WM, 12WM and 18WM were 0.54; 0.35; 0.37; 0.68 and 0.63 (Table 1). Heritability of BW in this study is higher than those usually in several study in different goat breeds [2,3,6]. [6] reported 0.50 for BW of Dwarf goat in West African. Estimation heritability of BW was reported in Syrian Damascus goat and Boer goat to be 0.41 and 0.30 respectively [2,3]. The heritability estimated for WW and 6WM were moderate and within the range of published values[2,4]. Estimation heritability of weaning weight was reported in Emirati and Syrian Damascus goat to be 0.45 and 0.21 respectively [2,7]. Heritability of 12WM and 18WM were higher 0.68 and 0.63, respectively. [6] reported that heritability for 12 WM in Dwarf goat were 0.30. Differences found among result are probably due to the difference in goat breed, environment and management, statistical method, data structure and sampling error [3]. High heritability value of 12WM suggest that selection on the basis of individual performance will be effective in achieving gain in 12WM.

Table 1. Estimated heritability and standard errors for BW, WW, 6WM, 12WM and 18WM for Etawah Grade goat

Traits	Number of animal	$h^2 \pm SE$	V_A	V_E	V_P
BW	316	0.54±0.12	0.022	0.175	0.197
WW	316	0.35±0.07	0.034	1.534	1.568
6WM	259	0.37±0.09	3.579	6.063	9.642
12WM	259	0.68±0.16	3.846	28.132	31.978
18WM	165	0.63±0.19	0.012	15.743	15.755

3.2. Genetic and phenotypic trends

The genetic trend of BW, WW, 6WM, 12WM and 18WM were -0.019; -0.02; 0.003; 0.009 and 0.005 kg/year, respectively (Table 2). [6] reported that genetic trend for BW, W120 and W180 were 0.01; 0.02 and 0.08 kg/year, respectively. The phenotypic trend for BW, WW, 6WM, 12WM and 18WM were -0.02; -0.53; -1.11; -2.23 and -5.18 kg/year, respectively (Table 2). The genetic trends for traits of BW and 18MW were fluctuating decreased (Fig. 1a). However, the WW, 6MW 12MW were fluctuating increased (Fig 1a). The same pattern were shown for the phenotypic trends that indicated fluctuating decreased, except for BW and WW showed a constant between 2007 to 2011 (Fig 1b). Differences between estimated genetic and phenotypic values for these traits in comparison with other studies in general is due to difference in animal breeding standard and follow that different program selection, difference between models and calculation method and also effects of environmental and breed factors [8,9].

Table 2. Genetic and phenotypic trends of growth traits for Etawah Grade goat

	Regression equation	R ²
Genetic trend	EBV BW = 0.02 - 0.019x	16.3
	EBV WW = 0.06 - 0.023x	59.4
	EBV 6WM = -0.01 + 0.003x	41.3
	EBV 12WM = -0.03 + 0.009x	69.4
	EBV 18WM = 0.019 + 0.005x	78.7
Phenotypic trend	BW = 3.82 - 0.02x	15.3
	WW = 12.0 - 0.53x	74.2
	6WM = 19.5 - 1.11x	47.5
	12WM = 29.2 - 2.23x	65.8
	18WM = 56.9 - 5.18x	90.5

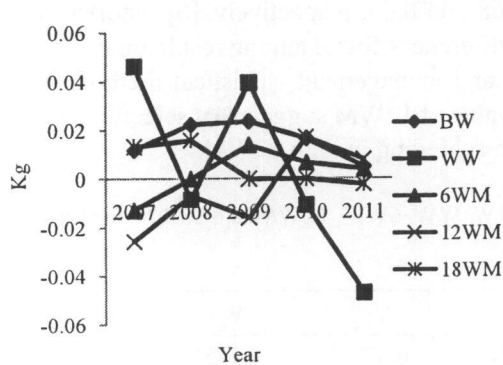


Figure 1a. Genetic trend of growth trait

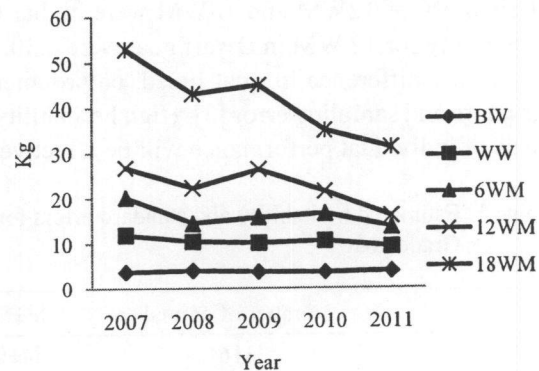


Figure 1b. Phenotypic trend of growth trait

4. Conclusion

The estimates heritability all traits of growth traits were consistently moderate to high were range 0.37 to 0.68. Selection for body weights in Etawah Grade goat should be successfully on the basis that these traits had high heritability. In generally, the genetic and phenotypic trends of body weight were fluctuation.

5. References

- [1] A. Sodiq, Non genetic factors affecting pre-weaning weight and growth rate of Etawah Grade goats. *Med. Pet*, 35 (2012) 21-27.
- [2] C.-Y. Zhang, Y. Zhang, D.-Q. Xu, X. Li, J. Su, L.-G. Yang, Genetic and phenotypic estimates for growth traits in Boer goat. *Livest. Sci*, 124 (2009) 66-71.
- [3] Al-Saef, Genetic and phenotypic parameters of body weights in Saudi Aradi goat and their crosses with Syrian Damascus goat, *Small. Rumin. Res.* 112 (2013) 35-38.
- [4] I. Boujenane, A. El Hazzab, Genetic parameters for direct and maternal effect on body weights of Draa goats. *Small Rumin. Res.* 80 (2008) 16-21.
- [5] R.-A.-T. Filho, R.-A. Torres., P.-S. Lopes, C.-S. Pereira., R.-F. Euclides, C.-V. Araujo, M.-A Silva,

- Genetic trends in the performance and reproductive traits of pigs, *Genet. Mo. Bio.* 28 (2005) 97-102.
- [6] N.-A. Bosso, M.-F. Cisse, E.-H. van der Waaij, A. Fall, J.-A.-M. van Arendonk, Genetic and phenotypic parameters of body weight in West African Dwarf goat and Djallonke sheep. *Small Rumin. Res.* 67 (2007) 271-278.
- [7] S.-A. Al-Shorepy, G.-A. Alhadrami, K. Abdulwahab, Genetic and phenotypic parameters for early growth traits in Emirati goat. *Small Rumin. Res.* 45(2002) 217-223.
- [8] I. Shaat, S. Galal, H. Mansour, Genetics trends for lamb weight in flocks of Egyptian Rahmani and Ossimi sheep, *Small Rumin. Res.* 51 (2004) 23-28.
- [9] J.-J. Jurado, A. Alonso, R. Alenda, Selection response for growth in Spanish Merino flock. *J. Anim. Sci.* 72 (1994) 1433-1440.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

Furthermore, it is noted that regular audits are essential to identify any discrepancies or errors early on. By conducting these checks frequently, the organization can prevent small mistakes from escalating into larger financial issues.

In conclusion, the document stresses that a robust system of record-keeping is fundamental to the success of any business. It provides a clear framework for how to manage financial data effectively and responsibly.

Prepared by: [Name] Date: [Date]