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Hemoglobin Comparison in Sapera, Saanen and Ettawa crossbred goats in Different Physiological Status

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ABSTRACT
Research aimed to investigate the effect of breed and physiological status on hemoglobin. This research uses a total of 279 apparent healthy Sapera, Saanen, and Ettawa crossbred goats with different physiological status (adult buck, pregnant does, dry does, post-weaning, female kids, male kids, lactating does). Breed influence the hemoglobin in this research ($P<0.05$). Sapera (9.87±1.61 g dl^{-1}) higher than Ettawa crossbred goats (9.10±1.47 g dl^{-1}) ($P<0.05$), and Sapera and Saanen (9.58±1.51 g dl^{-1}) not different ($P>0.05$). Hemoglobin was 10.25±1.18 g dl^{-1} in adult bucks was higher than 9.25±1.50 g dl^{-1} in lactating does, and 8.98± 1.66 g dl^{-1} in male kids ($P<0.05$). At the same time, not different with 10.10±1.96 g dl^{-1} in post-weaning, 9.65±1.41 g dl^{-1} in dry does, and 9.35±1.18 g dl^{-1} in pregnant does, and 9.32±1.77 g dl^{-1} in female kids. Based on this result concluded that assessment on hemoglobin must be related to breeding and physiological status.

Keywords: *Hemoglobin, Sapera, Physiological status, breed*

1. INTRODUCTION

They were crossbreeding the local Ettawa crossbred goats female to Saanen male resulting in Sapera goats currently widely cultivated as dairy goats in Indonesia. As a new breed, it is essential to make a data hemoglobin profile to assess its severity of anemia. The primary function of hemoglobin is to transport oxygen from the lungs to tissues and carry carbon dioxide from tissues to the lung. Therefore, many factors affect hemoglobin, i.e., age [1], breed [2], gestation, partus, and the postpartum period [3].

Until now, no hemoglobin data established on the comparison in the hematological profile in the different physiological status of Sapera, Saanen, and Ettawa crossbred goat.

Research aimed to investigate the effect of breed and physiological status on hemoglobin of Sapera, Saanen, and Peranakan Ettawa goats.

2. MATERIAL AND METHOD

All of the methods approved by The Ethics Committee of Ethical Clearance for Preclinical Research, Integrated Research, and Laboratory Testing at Gadjah Mada University, Yogyakarta, Indonesia, reviewed and approved all of the protocols in this study under license number 00032/04/LPPT/VII/2021.

Animal

This research use a total of 279 tail goats consist of Sapera, Saanen and Ettawa crossbred goats with different physiological status (Sapera: adult buck=22, pregnant does=21, dry does- 10, post-weaning=13, female kids=13, male kids=23, and lactating does=21; Saanen goats: adult buck=8, pregnant does=10, dry does= 3, post-weaning=14, female kids=3, male kids=11, and lactating does=5; and Ettawa crossbred goats : adult buck=15, pregnant does =16, dry does=16, post-weaning=10, female kids=15, male kids=12, and lactating does=16).

Table 1. Hemoglobin profile (g dL^{-1}) in Sapera, Saanen and Ettawa crossbred goats in different physiological status

Breed	Overall	Physiological status						
		adult buck	Pregnant does	dry does	post weaning	female kids	male kids	Lactating does
Sapera	9.54± 1.58	10.29± 1.15 ab	9.61± 0.98 ab	10.86± 1.13 a	10.21± 2.97 ab	10.19± 1.47 ab	9.27± 1.27 ab	9.40± 1.73 ab
Saanen		9.96± 1.35 ab	9.68± 1.25 ab	8.13± 0.74 b	10.01± 1.34 ab	8.97± 1.01 ab	9.06± 2.08 ab	10.10± 1.54 ab
Ettawa crossbred		10.32± 1.23 ab	8.85± 1.27 ab	9.18± 1.08 ab	10.08± 0.86 ab	8.46± 1.80 ab	8.34± 1.87 b	8.79± 0.98 ab

Sampling and analysis

Blood samples were taken with minimum physical disturbance from the jugular vein into 10 ml vacutainer tubes containing ethylene diamine tetra-acetic acid (EDTA). Hemoglobin analysis hemoglobin (Hb) by the Sahli method.

Statistical analyses

Hemoglobin analyses by General Linear Model (GLM) then Tukey's Studentized Range found significant differences between physiological status.

3. RESULT AND DISCUSSION

Overall hemoglobin from three breeds of goats was 9.54±1.58 g dl^{-1} in the standard with textbook [4], [5]. This result was within 9.30±1.01 g dl^{-1} in Aspromontana goats [6]; 10.40±1.92 g dl^{-1} in Omani breeds [7]; 9.97±2.73 g dl^{-1} in Barbari goats; 8.43±0.38 g dl^{-1} in Black Ardii goats, and 10.65±0.35 g dl^{-1} in White Aardi goats [8]. This result was higher than 6.97±0.26 g dl^{-1} in Damascus and lower than 15.80±62.30 g dl^{-1} in Spanish Ibex [9].

Breed influences on hemoglobin ($P<0.05$) showed that Sapera (9.87±1.61 g dl^{-1}) was higher than Ettawa crossbred goats (9.10±1.47 g dl^{-1}) ($P<0.05$), at the same time between Sapera and Saanen (9.58±1.51 g dl^{-1}) not different ($P>0.05$). This result indicated that Sapera goats have the higher oxygen-carrying component of red blood cells [10]. Breed effect to hemoglobin also reported in Sokoto red, Kano Brown, Borno white and West African Dwarf goats Mubi in North and South local government areas and beyond for sale at the Mubi central cattle market in Nigeria [11]. The lowest hemoglobin was found in Aspromontana and Girgentana goats, while Messinese, Maltese, and Argentata dell' Etna goats showed the highest [6]. The hemoglobin was slightly higher in both Jabali and Jabal Al-Akhdar goats than Sahrawi and Sahrawi Musandam goats [7]. There is no breed influence on hemoglobin in Barbari goats, Black Ardii goats, and White Aardi goats [8].

The physiological status effect showed that hemoglobin was higher in adult bucks (10.25±1.18 g dl^{-1}) than lactating does (9.25±1.50 g dl^{-1}) and male kids (8.98± 1.66 g dl^{-1}) ($P<0.05$), but not different with post-weaning (10.10±1.96 g dl^{-1}), dry does (9.65±1.41 g dl^{-1}), pregnant does (9.35±1.18 g dl^{-1}) and female kids (9.32±1.77g dl^{-1}) ($P>0.05$). Higher hemoglobin in male than female Angora rabbit [12] and rabbit in Nigeria [13], pigeon [14], and Mallard duck [15]. Due to increasing fetal growth, metabolic rate, and oxygen demand, higher hemoglobin in pregnant women stimulates the release of erythropoietin by kidney tissue, increasing the hemoglobin [16, 17]. Elevation hemoglobin in adult buck due to effect of androgens, which stimulate erythropoiesis and, thus, cause an increase in the number of circulating Hb concentration [18]. Other researchers found no interaction breed and hemoglobin higher in males than females in Kanni goats in Tamil Nadu [19]. Still, goats in Pakistan found no difference between buck and female goats [10]. Goats in Nigeria reported that increased with age in both sexes in Arid zone Nigeria [20], but goats in Punjab, Pakistan said no influence age on hemoglobin [10], Girgentana goats [21] and Spanish ibex [9]. No interaction breed and physiological statuses on hemoglobin ($P>0.05$).

4. CONCLUSION

Based on this result concluded that assessment on hemoglobin must be related to breeding and physiological status.

AUTHORS' CONTRIBUTIONS

All of the author's contributions on this research and manuscript; Sarmin was design analysis, Irkham Widiyono was collecting data, and Devita Anggareni has performed the analysis.

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