

The Appearance of Male *Sapera* Goat Production Based on *Indigofera sp.* as a Commercial Concentrate Substitute

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ABSTRACT

The purpose of this study was to examine the effect of *Indigofera sp.* fresh and hay on the growth of chest circumference, chest width, and body length in male *Sapera* goats. The study was conducted in vivo on male *Sapera* goats with P0 treatment, namely basal rations consisting of native grass (NG) and concentrate (C) with a ratio of 50%: 50%. P1 is 50% NG: 30% *Indigofera sp.* Fresh (IF): 20% C. P2 is 50% NG: 30% *Indigofera sp.* Hay (IH): 20% C. Feed is given as much as 4% of body weight based on dry materials. The research materials used are 18 male *Sapera* goats aged 6-8 months, drugs, native grass, commercial concentrates, *Indigofera sp.* Fresh and *Indigofera sp.* Hay. The tools used are analytical scales, spring scales, small shovels, metline, measuring stick, sput, and stationery. A research methodology is an experimental study using a Complete Randomized Design (CRD) with 3 treatments repeated 6 times. The parameters measured are chest circumference, chest width, and body length in male *Sapera* goats. The results showed that male *Sapera* goats were fed *Indigofera sp.*-based feed. It has not significant on chest circumference, chest width, and body length ($P > 0.05$). The average chest circumference of male *Sapera* goats fed P0, P1 and P2 are 71.60 ± 5.09 , 70.27 ± 3.06 , and 70.17 ± 2.50 . The average width of the chest of male *Sapera* goats fed P0, P1 and P2 are 15.03 ± 1.09 , 14.77 ± 0.73 , and 14.70 ± 0.92 . The average body length of male *Sapera* goats fed P0, P1 and P2 are 53.40 ± 3.96 , 49.50 ± 2.82 , and 52.00 ± 2.91 . The conclusion of this study is *Indigofera sp.*-based feed. It does not decrease productivity in male *Sapera* goats and can replace concentrates as a source of protein.

Keywords: Male *Sapera* goat, *Indigofera sp.*, Chest circumference, Chest width, Body length.

1. INTRODUCTION

Goats are one of the livestock that is widely maintained by the community because it requires relatively small capital, is an easy to maintenance system, and does not require a large place to build a cage. One of the goats that are being developed in Indonesia is the *Sapera* goat. *Sapera* goat is across from Peranakan Etawah goat from Indonesia and Saanen goat pure blood from Switzerland [1].

The characteristic of *Sapera* goats must have a pale white or beige fur, short stature, with black dots on the nose and ears. The forehead is wide, ears are medium-sized and erect. The nose is straight and the face is

triangular, which has a thin and short tail [2]. The average of *Sapera* goats heights range from 56-86 cm [3], body lengths range from 40-56 cm [3], chest circumference range from 75-92 cm [3] and chest width range from 15-18 cm [3].

The sizes of the body in livestock have the mountain to estimate body weight and provide an overview of the body shape of livestock as a characteristic of a breed [4]. In addition, the body size of livestock can be used for the visual selection of livestock. Some factors that affect the body size of livestock include genetic factors inherited by males [5], environmental factors including in terms of maintenance management and feeding [6].

Forage feeding can increase growth and productivity in goats [6]. Forage feed is a source of *fibres* that comes from plants in the form of foliage, grass, and Leguminosae. The farmer generally gives forage leguminous-type feed [7]. The example of Leguminosae forage is *Indigofera sp.*

Indigofera sp. is a type of tree Leguminosae that has protein content ranges from 22-29%, fiber content (NDF) ranges from 22-46% [9], TDN ranges from 75-78% [8]. According to Tarigan and Ginting [9] *Indigofera sp.* as much as 30-40% can increase the live weight of goats. Increased living weight in goats along with increasing body sizes [10]. This study aims to find out the effect of fresh and hay of *Indigofera sp.* on body sizes in male *Sapera* goats.

2. MATERIALS AND METHODS

This research was conducted at the Experimental Farm of General Soedirman University, Purwokerto, Central Java from April 26 - July 04, 2021. The data is retrieved 5 times during maintenance. The method used for research is an experimental method with a Complete Random Design (CRD) of 3 treatments. Each treatment is as follows:

- P0 : 50% Native Grass + 50% Commercial Concentrate
 P1 : 50% Native Grass + 20% Commercial Concentrate + 30% *Indigofera sp.* fresh
 P2 : 50% Native Grass + 20% Commercial Concentrate + 30% *Indigofera sp.* Hay

2.1 Data Measurement [11]

Body length: Measured from the shoulder protrusion (*Tuber humeri*) to the sitting bone (*Tuber ischii*). Chest circumference: Measured circular chest cavity through Os. Scapula and through the highest *gumba* using a measuring band. Chest width: Measured at the distance between the spin of the left and right scapula at the bottom, measured using a measuring stick.

2.2 Research Materials

The material used in this study was 18 male *Sapera* goats aged 6-8 months from HPDKI Banyumas Regency. Feed provided as much as 4% of body weight consists of airy grass, commercial concentrate, *Indigofera sp.* Fresh, and *Indigofera sp.* Hay. Tools used in this study include analytical scales, spring scales, plastic, small shovels, metline, measuring sticks, calculators, drugs, syringe, stationery.

2.3 Data Analysis

The research methodology was an experimental study using a complete random design (CRD) with 3 repeated treatments 6 times. The results of the study were analyzed using variance analysis and if the effect is real ($P < 0.05$) is summarized by the Duncan Multiple Range Test (DMRT)

3. RESULTS AND DISCUSSION

Changes in the body size of livestock can be used as one of the indicators of livestock growth. Changes in body size indicate whether the livestock is growing or not [12]. Increasing the body size of livestock, can lead to an increase in the weight of livestock. This is in accordance with Rasminati's opinion [12] that a slight increase in body size will lead to a proportional increase in body weight because body weight is a function of volume. Trisnawanto *et al.* [10] stated that the value of body size increases as the weight of livestock increases.

The use of body size as a weight restoration has been widely used in various types of livestock, especially in ruminant cattle. Measurement of livestock body can be used for the restoration of the body weight of livestock and is also used as a technical parameter of determining livestock seedlings using various formulations of body weight determination based on body sizes has been widely known even various kinds of studies have corrected the formula and adjusted to environmental circumstances, genetic influences and time [16].

According to [5] that the size of the body in livestock is strongly influenced by the environment, including in terms of maintenance management and feeding on livestock. In addition to maintenance management factors, other factors that are thought to affect the body sizes of livestock are genetic factors inherited by elders, especially males. This is in accordance with [6] that the genetic trait of the elder will be passed down to his son, especially the trait passed down by the male.

The body sizes in goats will increase according to the increase in age. Results from [13] that the body sizes of goats that increase at the age of 12-24 months and relatively fixed age 36-60 months are the length of the body, chest circumference, and the chest. The average body size of livestock is presented in Table 1.

3.1 Body Length

Body length in livestock is obtained from measurements of the distance of the shoulder protrusion (*Tuber humeri*) to the sitting bone (*Tuber ischii*) [11]. According to [10] the growth of body length is a reflection of the presence of spinal growth that continues to increase with age.

Table 1. Average Body Length, Chest Circumference and Chest Width in Male *Sapera* Goats fed *Indigofera sp.*-based feed as replacement for commercial concentrates.

Treatment	Body Length (cm)	Chest Circumference (cm)	Chest Width (cm)
P0	53.40 ± 3.69	71.60 ± 5.09	15.03 ± 1.09
P1	49.50 ± 2.82	70.27 ± 3.06	14.77 ± 0.73
P2	52.00 ± 2.91	70.17 ± 2.50	14.70 ± 0.92

Indigofera sp. with various forms on male *Sapera* goats have not significant ($P > 0.05$) on the body length of male *Sapera* goats. This can be seen in Table 1, namely the provision of *Indigofera sp.* in various forms does not decrease. The longest body length measure is obtained on the control treatment. The body length obtained from the results of the study has been in accordance with [3] research on the body length of *Sapera* goat aged 1-2 years, which is 46.15 ± 4.14 .

3.2 Chest Circumference

The circumference of the chest in livestock is obtained from the circular measurement of the chest cavity through Os. Scapula and through gumba highest using measuring band [11]. According to [14] that the circumference of the chest shows the growth of ribs and muscles in the ribs. Based on Table 1. *Indigofera sp.* with various forms on male *Sapera* goats have not significant ($P > 0.05$) on the chest circumference of male *Sapera* goats. The largest size of chest circumference was obtained on the control treatment. The chest circumference obtained from the results of the study is not in accordance with [3] research about the chest circumference of *Sapera* goat aged 1-2 years, which is 75.79 ± 7.09 .

3.3 Chest Width

Chest width in livestock is obtained from measuring the distance between the Spin of the left and right scapula at the bottom, measured using a measuring stick [11]. Based on the results of the study in Table 1, *Indigofera sp.* with various forms on male *Sapera* goats have no significant ($P > 0.05$) on the width of the chest of the male *Sapera* goat. The largest size of chest width is obtained on the control treatment. The width of the chest obtained from the results of the study in accordance with (4) research on the width of the chest of *Sapera* goat aged 1-2 years is 15.17 ± 1.80 .

4. CONCLUSION

Indigofera sp. does not decrease the productivity of livestock as seen from the body sizes of male *Sapera* goats and can replace concentrate as a source of protein.

AUTHORS' CONTRIBUTIONS

The author hopes that this research can expand the nutritional science of small ruminant livestock, especially goats.

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REFERENCES

- [1] Saputro AL, Hamid IS, Prastiya RA, Thohawi M, Purnama E. Hydroponic Agriculture Maize Fooder as Feed Substitution on Livestock to Increase *Sapera's* Goat Production. *J Med Vet* [Internet]. 2018;1(2):48–51. Available from: <http://journal.unair.ac.id>
- [2] Rusdiana S, Praharani L, Sumanto D. Kualitas dan Produktivitas Susu Kambing Perah Persilangan di Indonesia. Vol. 32, *J. Litbang Pert.* Bogor; 2015 Apr.
- [3] Victori A, Purbowati E, Lestari CMS. Hubungan Antara Ukuran-Ukuran Tubuh dengan Bobot Badan Kambing Peranakan Etawah Jantan di Kabupaten Klaten. *Jurnal Ilmu-Ilmu Peternakan* [Internet]. 2016;26(1):23–8. Available from: <http://jiip.ub.ac.id/>
- [4] Abdurrahman A. Hubungan Antara Ukuran Tubuh Terhadap Bobot Badan Kambing *Sapera*. [Bogor]; 2018.
- [5] Permatasari T, Kurnianto E, Purbowati E. Hubungan Antara Ukuran-Ukuran Tubuh dengan Bobot Badan Pada Kambing Kacang di Kabupaten Grobogan, Jawa Tengah. *Animal Agriculture Journal*. 2013;2(1):28–34.
- [6] Warwick EJ, Astuti JM, Hardjosubroto W. *Pemuliaan Ternak*. Yogyakarta: Gadjahmada University Press; 1990.
- [7] Hartatik T, Trifena, Budisatria I, G, S. Perubahan Fenotip Sapi Peranakan Ongole, Simpo, dan Limpo Pada Keturunan Pertama dan Keturunan

- Kedua (Backcross). Buletin Peternakan. 2011 Feb 11;35(1):11–6.
- [8] Rahmawati PD, Pangestu E, Nuswantara KL, Christiyanto M. Kecernaan Bahan Kering, Bahan Organik, Lemak Kasar dan Nilai Total Digestible Nutrient Hijauan Pakan Kambing. *Jurnal Agripet* [Internet]. 2021 Apr 1;21(1):71–7. Available from: <http://jurnal.unsyiah.ac.id/agripet/article/view/18449>
- [9] Purbowati E, Rahmawati I, Rianto E. Jenis Hijauan Pakan dan kecukupan Nutrien Kambing Jawarandu Di kabupaten Brebes Jawa Tengah. *Pastura*. 2015;5(1):10–4.
- [10] Hassen A, Rethman NFG, van Niekerk WA, Tjelele TJ. Influence of season/year and species on chemical composition and in vitro digestibility of five *Indigofera* accessions. *Animal Feed Science and Technology*. 2007 Aug;136(3–4).
- [11] Abdullah L, Suharlina. Herbage Yield and Quality of Two Vegetative Parts of *Indigofera* at Different Times of First Regrowth Defoliation. *Media Peternakan*. 2010;33(1):44–9.
- [12] Tarigan A, Ginting SP. Pengaruh Taraf Pemberian *Indigofera sp.* terhadap Konsumsi dan Kecernaan Pakan serta Pertambahan Bobot Hidup Kambing yang Diberi Rumput *Brachiaria ruziziensis*. *JITV*. 2011;16(1):25–32.
- [13] Trisnawanto, Adiwintarti R, Dilaga WS. Hubungan Antara Ukuran-Ukuran Tubuh dengan Bobot Badan Dombos Jantan. *Animal Agriculture Journal*. 2012;1(1):653–68.
- [14] BSN. Bibit kambing-Bagian 1: Peranakan Ettawah [Internet]. Jakarta; 2015. Available from: www.bsn.go.id
- [15] Rasminati N. Grade Kambing Peranakan Ettawa pada Kondisi Wilayah yang Berbeda. *Sains Peternakan*. 2013;11(1):43–8.
- [16] Santosa U. Tata Laksana Pemeliharaan Sapi. Jakarta: Penebar Swadaya; 2001.
- [17] Setiawati T, Sambodho P, Sustiyah A. Tampilan Bobot Badan dan Ukuran Tubuh Kambing Dara Peranakan Ettawa akibat pemberian Ransum dengan Suplementasi Urea yang Berbeda. *Animal Agriculture Journal*. 2013;2(2):8–14.