









Productivity Indexes of Sumatera Cross Sheep from Birth to Weaning Lambs

Anita Hafid¹ (✉) , Chalid Talib¹ , Anneke Anggraeni¹ ,
Diana Andrianita Kusumaningrum¹ , Herdis¹ , Supardi Rusdiana¹ ,
and Andi Baso Lompengeng Ishak²

¹ National Research and Innovation Agency, Cibinong Science Center, Bogor, Indonesia
anitahafid1@gmail.com

² Indonesian Research Institute for Animal Production, Jl. Veteran III Banjarwaru, Ciawi,
Bogor, Indonesia

Abstract. The objective of this study was to calculate productivity indexes of Sumatera Cross Sheep (SC) ewes based on performances of birth weight, weaning weight, and daily weight gain. Study used 45 ewes that were naturally bred with a female to male of 7:1, mating three times in two years. Lambs were observed from birth to weaning until 2 mo. divided based on single litter size (LS1) and twins (LS2). Productivity indexes of the ewes were calculated from data of lambing interval, average birth weight and average weaning weight. Birth weight, weaning weight and daily weight gain from birth to weaning between LS1 and LS2 were also compared. The productivity index of SC ewes resulted for 7.99 kg. Lambs at LS 1 to LS 2 were significant differences ($P < 0.05$) on birth weight (3.0 ± 0.2 kg vs 2.2 ± 0.3 kg), weaning weight (9.4 ± 1.9 kg vs 6.6 ± 1.9 kg) and daily weight gain (6.4 ± 1.9 g vs. 4.4 ± 2.0 g). It was concluded that the productivity indexes of the SC ewes were moderate while the single lambs had higher performances than the twin lambs.

Keywords: body weight · productivity indexes · Sumatera cross sheep · weaning age

1 Introduction

Sheep in Indonesia have high productivity because they have a reproductive cycle that is not influenced by seasons so they can give birth throughout the year. Sumatera Cross ewe is a crossbred from Sumatera ewe and St. Croix ewe (50%:50%).

Sumateran ewe have resistance to worms [1] while St. Croix ewe have a good growth and easily adapt to various climates. In cold weather, St. Croix ewe can grow a thick winter coat which is then shed during warm weather. It's coat hair has a hollow which allows to shed water and able to tolerate heat and humidity as well as cold weather. They have superior resistance to parasites, good health but have a few nail problems. Considered by many as 'Parasitic Pasture Vacuums', St. Croix helps to eliminate parasites from pastures thereby reducing the need for frequent worming [2].

© The Author(s) 2023

E. Widodo et al. (Eds.): ICESAI 2022, ABR 28, pp. 169–174, 2023.

https://doi.org/10.2991/978-94-6463-116-6_22

Selection to select prospective ewe to be maintained in breeding area is carried out to improve performance that has economic value, including weaning weight. The productivity of ewe can be measured based on the weaning weight offspring produced at each parity and calving distance. Weaning weight per parity and calving distance are used to calculate the Ewe Productivity Index (EPI) which able to indicate the productivity of ewe.

Productivity indexes has been calculated on PO cow [3], etawa crossbreed goat [4], thin tail lamb [5], Komposit Sumatera and Barbados Cross sheep [6] but no studies have been conducted on Sumatera Cross Sheep. The objective of this study was to calculate productivity indexes of Sumatera Cross Sheep (SC) based on performances of birth weight, weaning weight, and daily weight gain.

2 Materials and Method

2.1 Animals

The research was conducted by survey method. Research material in the form of recording of birth, weaning, and weaning weights of Sumatera Cross Sheep (SC) ewes. Study used 45 ewes that were naturally bred with a female to male of 7:1, mating three times in two years. Lambs were observed from birth to weaning until 2 mo. divided based on single litter size (LS1) and twins (LS2). Productivity indexes of the ewes were calculated from data of lambing interval, average birth weight and average weaning weight. Birth weight, weaning weight and daily weight gain from birth to weaning between litter size (LS) 1 and LS 2 were also compared.

2.2 Methods

Sampling method using purposive sampling with ewe restriction which has a recording at first and second parity, a number of 45 heads of Sumatran Cross ewes. The research method was done by looking and observing the recording data that has been collected. The observed variables include litter size, lambing interval, and weaning weight of lamb. Data obtained from research results tabulated, corrected and calculated the EPI value. Data weaning weight correction for sex, ewe age and 60 days of weaning weight, using formula according to recommendation of [7] as follows:

$$CWW = \left\{ \left[\frac{WW - BW}{WA} (60) \right] + BW \right\} \{SCF\} \{EACF\} \quad (1)$$

Description:

CWW: Corrected Weaning Weight

WW: Weaning Weight

BW: Birth Weight

WA: Weaning Age

SCF: Sex Correction Factors

EACF: Ewe Age Correction Factors

The corrected weaning weights were used for calculate the EPI value of each ewe with formula according to recommendation of Hardjosubroto [7] as follows:

$$EPI = \frac{12(CWW)}{LI} \quad (2)$$

Description:

EPI: Ewe Productivity Indexes

LI: Lambing Interval

CWW: Corrected Weaning Weight

2.3 Statistical Analysis

The birth weight, weaning weight, and daily weight gain was analyzed using one-way analysis of variance (ANOVA). The model used was as follows:

$$Y_{ij} = \mu + T_i + \varepsilon_i$$

Differences were considered significant at $P < 0.05$.

3 Results and Discussion

3.1 Trend of the Birth Weight to Weaning Weight

Based on the results of the study, it was found that there was a significant difference ($P < 0.05$) in birth weight, weaning weight and daily weight gain between single lambs and twin lambs (Table 1).

3.2 Corrected Weaning Weight

The results show that the corrected weaning weight (CWW) for single lambs was higher ($9.4 \text{ kg} \pm 1.9$) than twin lambs ($6.6 \text{ kg} \pm 1.9$) ($P < 0.05$) (Fig. 1).

The tendency of higher weaning weights in single lambs compared to twin lambs could be due to the lack of competence to obtain food. The single lambs get more food while still in the fetal state compared to twin one. So that the birth weight of the single lambs is tend to be higher. The birth weight will affect to weaning weight. Hafid et al. [8] also reported that birth weight and weaning weight in goat would decrease when litter size was higher (Fig. 2).

Table 1. Comparison of birth weight, weaning weight and daily weight gain between single lambs and twin lambs.

Birth Type	Birth Weight (Average \pm SD)	Weaning Weight (Average \pm SD)	Daily Weight Gain (Average \pm SD)
Single	3.0 ± 0.2^a	9.4 ± 1.9^a	6.4 ± 1.9^a
Twin	2.2 ± 0.3^b	6.6 ± 1.9^b	4.4 ± 2.0^b

^{a,b}Different letter in the same coloumn show significantly different ($P < 0,05$).

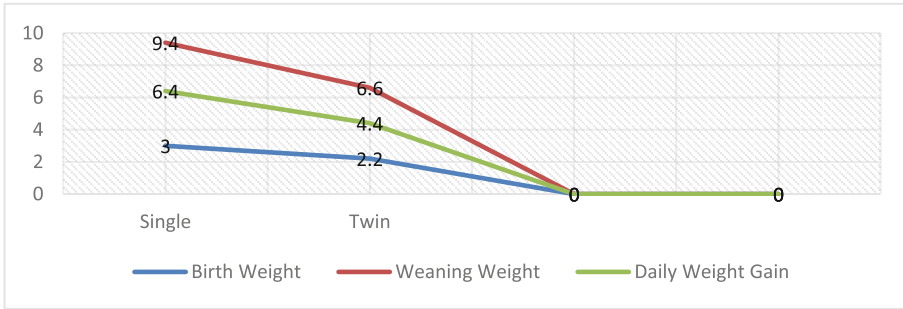


Fig. 1. A comparison of birth weight, weaning weight and daily weight gain between single and twin lamb.

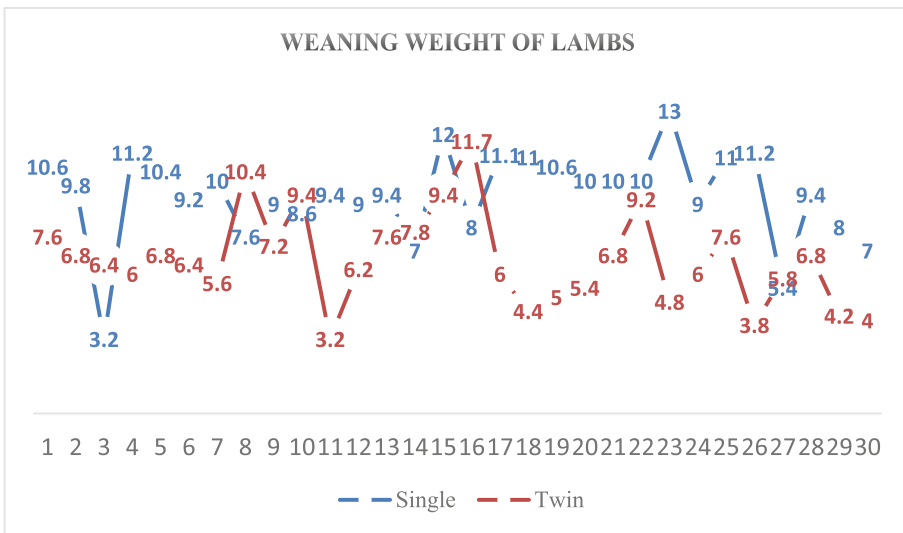


Fig. 2. Weaning weight trend of lambs

3.3 Ewe Productivity Indexes

Based on the results of the study, the productivity index of Sumatera Cross Ewe is 7.99 ± 2.41 . This means that Sumatera Cross Ewes can produce lambs with a weaning weight of 7.99 kg for one year. Productivity indexes can be affected by litter size, lambing interval and birth weight which will affect to weaning weight.

The differences in genetic conditions and age differences can affect litter size. The difference in age determines the litter size value. The increasing of age will increase the number of litter size [5]. Weaning weight also affects to productivity indexes and the weaning weight can be affected by milk consumption. Previous study reported that the days open are affected to milk production in ongoing lactation, and also affect the success of breeding and lambing intervals [9]. Furthermore Najmuddin and Nasich [5] also reported the highest productivity index is found in ewe with low lambing interval.

The doe which has first parity usually has the kid birth weight lower, this is because the first parity of the doe has yet the average body weight for first mating. So that the feed consumed is not only used for fetus but also for the growth of the doe [10].

4 Conclusion

The productivity indexes of the SC sheep were moderate while the single lambs had higher performances than the twin lambs.

References

1. R. A. Sani, G. D. Gray, and R. L. Baker: Worm Control for Small Ruminants in Tropical Asia. Aust. Cent. Int. Agric. Res. Canberra, Aust. (2004).
2. L. O'Neill.: St. Croix Hair Sheep Handbook Table of Contents. St. Croix Hair Sheep Breeding Inc. (2022).
3. A. F. Saly, S. Sulastri, M. D. I. Hamdani, and A. Dakhlan: Perbandingan Nilai Indeks Produktivitas Induk Sapi Peranakan Ongole Di Desa Wawasan Dan Desa Purwodadi Dalam Kecamatan Tanjung Sari. J. Ris. dan Inov. Peternak. (Journal Res. Innov. Anim., 4 (2), 79–84 (2020).
4. Y. Asmara, Sulastri, and I. Harris.: Seleksi Induk Kambing Peranakan Etawa Berdasarkan Nilai Indeks Produktivitas Induk Di Kecamatan Metro Selatan Kota Metro. Jur. Peternakan, Fak. Pertanian, Univ. Lampung, 1 (3), 5–9 (2013).
5. M. Najmuddin and M. Nasich: Produktivitas Induk Domba Ekor Tipis di Desa Sedan Kecamatan Sedan Kabupaten Rembang. TERNAK Trop. J. Trop. Anim. Prod., 20 (1), 76–83 (2019).
6. S. B. dan Subandriyo: Produktivitas Domba Komposit Sumatera dan Barbados Cross pada Kondisi Lapang. Jurnal Ilmu Ternak dan Veteriner 12(4), 306–310 (2007).
7. W. Hardjosubroto: Aplikasi Pemuliabiakan Ternak di Lapangan. PT Grashindo. Jakarta (1994).
8. A. Hafid, A. Anggraeni, and A. B. L. Ishak: The Effect of GnRH to Litter Size, Colostrum and Milk Production in Nulliparous Sapera Goat Synchronized by PGF2a. Int. In: editor. Semin. Livest. Prod. Veterinary Technol, 220–213. (2021). [https://doi.org/10.14334/Proc.Int sem.LPVT-2021-p.21](https://doi.org/10.14334/Proc.Int.sem.LPVT-2021-p.21)
9. S. Leblanc: Overall Reproductive Performance of Canadian Dairy Cows : Challenges We Are Facing Cows or Management that is Reducing Reproductive. Adv. Dairy Technol. 17, 137–148, (2005).
10. M. Hamdani: Perbandingan berat lahir, persentase berat lahir, anak dan sifat prolifk induk kambing Peranakan Etawah pada paritas pertama dan kedua di Kota Metro. Jurnal Ilmiah Peternakan Terpadu 3 (4), 245–250 (2015).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

