

Conference Paper

Goat Saanen Productivity at the Dairy and Forage National Breeding Centre Baturraden, Central Java, Indonesia

Setya Agus Santosa^{1*}, Novita Hindratiningrum², Dattadewi Purwantini¹, Agus Susanto¹, and Dewi Puspita Candrasari¹

¹Faculty of Animal Science, Jenderal Soedirman University. Jl. Dr. Suparno No. 60, Purwokerto 53123, Central Java, Indonesia

²Department of Animal Science, Faculty of Science and Technology, Nahdatul Ulama University. Jl. Sultan Agung 42, Purwokerto 53145, Central Java, Indonesia

Abstract.

This study aimed to determine the productivity of the Saanen goat, which was carried out at the dairy and forage national breeding centre (BBPTU-HPT) in Baturraden, Central Java, Indonesia. The variables observed were birth weight, litter size and type of birth. This research used the historical survey method. Samples were taken using purposive sampling. The bucks and does mean birth weights were 2.81 ± 0.64 and 2.66 ± 0.66 kg, respectively. The average litter size was 1.35 ± 0.51 , where litter size parity 1, 2 and 3 were 1.15 ± 0.48 , 1.37 ± 0.63 and 1.53 ± 0.42 kids. Single birth is relatively lower (48%) than twins (52%). The conclusion of this research was that the birth weight of males was higher than females; the litter size increased with increasing parity; the type of single birth had a higher birth weight than twins.

Keywords: Saanen goat, birth weight, litter size, type of birth

Corresponding Author: Setya Agus Santosa

Published: 13 September 2022

Publishing services provided by Knowledge E

© Setya Agus Santosa et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICASI Conference Committee.

1. Introduction

Goats are the first livestock to be domesticated by humans, known as small ruminants and popular among Indonesian breeders, especially people on the island of Java [1]. The maintenance of Saanen goats is an alternative to diversify milk-producing livestock in addition to dairy cows as an effort to meet milk needs [2]. Saanen goat has the potential to be cultivated as a potential milk-producing livestock [3]. Goat milk has the advantage of being easier to digest than cow's milk because the grain size of the milk fat is smaller and is homogeneous [4]. The average production of first lactated milk for Saanen goat was 288.6 ± 124.8 liters [5]. According to [6] the Saanen goat can produce up to 3 liters of milk per head per day.

Productivity and ewes reproductive index are important productivity criteria [7] - [8]. The appearance of goat productivity is the result of the interaction between genetic

OPEN ACCESS

factors and the environment [9] - [10] - [11]. Goat productivity is influenced by climate, parity, litter size, lactation period [12] – [13], in addition to other non-genetic factors such as feed and management [14]. Does productivity is an important economic indicator in goat farming [15] - [16], and the level of production is influenced by various factors such as parity, litter size, kidding interval, low survival and the achievement of weaning weight [17] - [18] - [19] - [20]

Productivity of the ewes is an important indicator so it is necessary to know how much the value is, so this study is directed to determine the productivity of the Saanen goat based on birth weight, litter size, and type of birth at BBPTU-HPT Baturraden, Banyumas Regency, Central Java, Indonesia.

2. Materials and Methods

The research was conducted at BBPTU HPT Baturraden Banyumas, Central Java, Indonesia. The study used a historical survey method, namely observing the production records of Saanen goats kept from 2017-2019. The sample was taken by using purposive sampling method. The data obtained were analyzed using descriptive analysis to determine the mean and standard deviation. The amount of data used was 267 production records which included records of birth weight, litter size, and type of birth.

Birth weight is the weight of the kid at birth (kg). Litter size is the number of kid born, namely the number of kid born in each birth (tail). Type of birth is a type of birth that is single, twins or triplets at each birth.

3. Results and Discussion

3.1. Birth Weight

The description of the mean and standard deviation birth weight of the Saanen goat at BBPTU HPT Baturraden, Banyumas Regency for each parity at birth is presented in **Table 1**.

Based on the data in **Table 1**, it is found that the average birth weight of male kid is 2.81 ± 0.64 kg and female kid are 2.66 ± 0.66 kg. The mean birth weight increased from parity 1 to parity 3 in both male and female kid. This increase is thought to be related to the readiness and maturity of the does and its reproductive organs. At the time of first birth (parity 1), cattle have a younger age so that their reproductive development is not

TABLE 1: Birth weight of Saanen goat at each parity.

Parity	Number of Sample	Birth weight (kg)			
		Male		Female	
		Average	Standart Deviation	Average	Standart Deviation
Parity 1	123	2.32	0.58	2.18	0.67
Parity 2	98	2.89	0.73	2.73	0.62
Parity 3	46	3.21	0.61	3.07	0.69
Total	267	2.81	0.64	2.66	0.66

as mature as at the next parity. Birth weight based on male sex at parity 1 was 2.32 ± 0.58 kg, parity 2 was 2.89 ± 0.73 and parity 3 was 3.21 ± 0.61 kg. Birth weight based on female sex at parity 1 mean 2.18 ± 0.67 kg, parity 2 is 2.73 ± 0.62 and parity 3 is 3.07 ± 0.69 kg. According to [7] the birth weight of the Saburai goat at the first and second parity was 3.09 ± 0.42 kg and 3.28 ± 0.54 kg. The increase in birth weight in increasing parity was also found in Kacang [21] and Boer goats [22]. According to [23] the average birth weight of male Saanen goats was 2.93 ± 0.78 and female 2.79 ± 0.68 kg.

The mean birth weight was higher than Kacang goat 1.78 ± 0.23 kg [21]) but lower than Boerawa goat 3.02 ± 0.29 kg [24]. The difference in birth weight is thought to be due to genetic differences between livestock and environmental influences. Birth weight is also influenced by the age and weight of the does during pregnancy, the feed and maintenance management provided.

The birth weight of male Saanen goats is relatively higher than that of females. This is thought to be due to the influence of different hormones in male and female livestock. The female hormone estrogen will limit the growth of pipe bones in the body, so that the female growth rate is limited [25]. The difference in birth weight of males and females is influenced by the size of the placenta, males are relatively larger than females so they have more nutrition [22]. Male Barbari goat birth weight is heavier than female [26].

3.2. Litter Size

The description of the mean and standard deviation of the litter size of the Saanen goat at BBPTU HPT Baturraden, Banyumas Regency for each parity at birth is presented in **Table 2**.

Litter size is the number of kid born, namely the number of kid born in each birth. The number of kid at birth will determine the rate of increase in the goat population. The high number of kid at birth will affect the population increase. Based on the results

TABLE 2: Litter size of the Saanen goat at each parity.

Parity	Number of Sample	Litter Size (tail)	
		Average	Standart Deviation
Parity 1	123	1.15	0.48
Parity 2	98	1.37	0.63
Parity 3	46	1.53	0.42
Total	267	1.35	0.51

of the study (**Table 2**), it was found that the average litter size at birth was 1.35 ± 0.51 . The average litter size at parity 1 was 1.15 ± 0.48 individuals, parity 2 was 1.37 ± 0.63 individuals and parity 3 was 1.53 ± 0.42 individuals. This result is lower than the results of research [27] in rural conditions, namely 1.76 heads, and 1.56 heads at the experimental station [28]. The number of kid born to PE goats in the seed source area of Purworejo Regency was 1.71 [29], Kacang goats were 1.23 heads [21] and local goats that were traditionally raised 1.21 [30].

The litter size tends to increase from the first parity with increasing age of the parent. This is thought to be related to the body's hormones, because the more mature the parent, the more perfect its hormonal mechanisms are. According to [31] litter size tends to increase with increasing age of the ewes from 2-6 years. This is not different from that reported by [32], that the mean number of kid at birth continues to increase until the sixth parity. This situation is supported by the observation [33] in young female goats, that the litter size is 1.04. According to [12] that the average ewes productivity increases very sharply with increasing litter size.

3.3. Type of Birth

Type of birth is single, twins or triplets at each birth. The description of the type of birth is presented in **Table 3**.

Based on **Table 3**, there are more types of multiple births than single births (52 vs 48%). This is presumably because the selection has been made, namely choosing the parent who gave birth to twins to be kept so that the resulting child is also twins. The birth weight of a single child is heavier than that of twins or triplets. This situation is thought to be because during the prenatal or fetal growth period during the womb, a single fetus gets more food from its does than twin fetuses. This can occur because in twin fetuses there is competition for nutrients. Thus the growth rate of each individual fetus while in the womb is experiencing obstacles. This will cause the birth weight of

TABLE 3: Type of birth and birth weight.

Type of Birth	Number of Sample	Birth weight (kg)			
		Male		Female	
		Average	Standart Deviation	Average	Standart Deviation
Single	127	3.12	0.75	2.98	0.81
Twins	134	2.82	0.83	2.65	0.94
Triplets	6	2.49	0.48	2.34	0.51
Total	267	2.81	0.69	2.66	0.75

twins to be lower than that of only kid. According to [22] the mean of single births was 3.00 ± 0.61 and twins 2.56 ± 0.59 .

The average birth weight for single births is higher but productivity is generally better for multiple births because it will result in more weight than single births. According to [12] the type of birth affects the productivity of the parent. Type of birth significantly increases the productivity of the ewes. Type of birth quadruplets capable of producing 32.8 kg more than a single birth.

Non-genetic factors such as sex, season and type of birth affect the productivity of the does goat [34] - [35] - [36] - [37]. Productivity improvement can be done through selection by selecting more than one parent to be bred, in addition to efforts to shorten kidding distances. According to [38] efforts to increase goat productivity can be done through breeding programs, improvement of reproductive efficiency, maintenance and care management. Breeding programs can be carried out by selection or crossing with superior males from outside. According to [39] knowledge of genetic factors and principles that affect productivity characteristics is needed to implement breeding and livestock selection to be successful.

Based on the data in **Table 3**, it is also known that there are fewer types of single births than twins, this is presumably because the goats being kept have been selected properly. According to [40] a research institute in Australlia has tried to do the selection by means of multiple births. Experiments using Merino sheep by classifying sheep whose whole is born twins and the other group is born single. The twin group produced 131 percent of kid, while the single group produced 103 percent. The experiment continued using lambs in each group, the twins group produced 119 percent of kid and 95 percent of the single group. Similar cases have also been tried on Booroola sheep and the conclusions are the same.

4. Conclusions

Based on the discussion, it was concluded that (1) the birth weight of males was higher than females, (2) the litter size increased with increasing parity, and (3) the type of single birth had a higher birth weight than twins.

5. Acknowledgement

Thank to the Chairperson of Lembaga Penelitian dan Pengabdian Masyarakat, Jenderal Soedirman University who has funded this research with contract number 4513/UN23.14/PN/2018.

References

- [1] Karstan AH. 2006. Respon fisiologis ternak kambing yang dikandangkan dan ditambatkan terhadap konsumsi pakan dan air minum. *J. Agroforestri*. **1(1)**:63-73.
- [2] Irawati N, D Purwantini, and A Sodiq. 2020. Estimating genetic parameter of Saanen goat production characteristics using paternal half sib correlation. *J. Anim.Prod.* **21(1)**:16-21.
- [3] Zurriyati Y, RR Noor and RRA Maheswari. 2011. Analisis molekuler genotipe Kappa Kasein (k-kasein) dan komposisi susu kambing Peranakan Etawah, Saanen dan persilangannya. *Jurnal Ilmu Ternak dan Veteriner*. **16(1)**:61-70.
- [4] Jennes R. 1980. Composition and characteristic of goat milk: Review 1968-1979. *J. Dairy Sci.* **63**:1605-1630.
- [5] Fayuma R. 2008. Evaluasi Potensi Produksi Susu pada Kambing Saanen di PT Taurus Dairy Farm. Skripsi. Fakultas Peternakan. Institut Pertanian Bogor. Bogor.
- [6] Susilowati DR, S Utami and HA Suratim. 2013. Nilai berat jenis dan total solid susu kambing Sapera di Cilacap dan Bogor. *Jurnal Ilmiah Peternakan*. **1(3)**:1071-1077.
- [7] Pratama A, Dakhlan, Sulastri and MDI Hamdani. 2020. Saburai does selection based on most probable producing ability of birth weight and weaning weight. *Jurnal Ilmiah Peternakan Terpadu*. **8(1)**:33-40.
- [8] Urdaneta LD, GT Hernandez, CMB Perez and OG. Betancourt. 2000^a. Milk production and lactation length on Alpine and Nubian goats. *Small Rum. Res.* **36**:91-95.
- [9] Ahmadu B and CEA Lovelace. 2002. Production characteristics of local Zambian goats under semi-arid conditions. *Small Rum. Res.* **45(2)**:179-183.

- [10] Günes H, P Horst, M Evrim and A Valle-Zárate. 2002. Studies on improvement of the productivity of Turkish Angora goats by crossing with South African Angora goats. *Small Rum. Res.* **45**(2):115-122.
- [11] Greyling JPC. 2000. Reproduction traits in the Boer goat doe. *Small Rum. Res.* **36**:171-177.
- [12] Awemu EM, LN Nwakalo and BY Abubakar. 2002. *The Biological Productivity of the Yankasa Sheep and the Red Sakoto Goat in Nigeria*. Dept. of Animal Science, University of Nigeria, Nigeria.
- [13] Crepaldi P, M Corti and M Cicogna. 1999. Factors affecting milk production and prolificacy of Alpine goats in Lombardy. *Small Rum. Res.* **32**(1999):83-88.
- [14] Akingbade AA, IV Nsahlai and CD Morris. 2004. Reproductive performance, colostrum and milk constituents of mimosine-adapted South African Nguni goats on *Leucaena leucocephala*-grass or natural pastures. *Small Rum. Res.* **52**(3):253-260.
- [15] Luginbul JM. 2002. Monitoring the body condition of goats: A key to successful management. Publication of the Extension Animal Husbandry, Department of Animal Science, NCSU.
- [16] Ezekwe MO and J Lovin. 1996. Aseasonal reproductive performance of Virginia Brush goats used for meat production. *J. Anim. Sci.* **74**:245 (Suppl 1).
- [17] Madibela OR, BM Mosimanyana, WS Boitumelo and TD. Pelaelo. 2002. Effect of supplementation on reproduction of wet season kidding Tswana goats. *South African Journal of Animal.* **32**(1):1-22.
- [18] Steve DC and FB Marco. 2001. Reproductive success in female mountain goats: the influence of age and social rank. *Animal Behaviour.* **62**:173-181
- [19] Haenlein GFW. 2000. *Goat Mangement: Nutritional Value of Dairy Products of Ewe and Goat Milk*. College of Agriculture and Natural Science. University of Delaware.
- [20] Urdaneta LD, GT Hernandez, CMB Perez, OG Betancourt, FG Cossio, MO Arce and OG Betancourt. 2000^b. Comparison of Alpine and Nubian goats for some reproductive traits under dry tropical condition. *Small Rum. Res.* **36**:91-95.
- [21] Doloksaribu M, S Elieser, F Mahmilia and FA Pamungkas. 2005. Productivity of Kacang Goat at Condition Penned. 1. Birth Weight, Weaning Weight, Litter Size and Mobility of Post-Weaning. National Seminar on Animal Husbandry and Veterinary 2005. p:581-584. <http://lolitikambing.litbang.pertanian.go.id> (in Indonesian with abstract in English)
- [22] Mahmilia F, M Doloksaribu and S Nasution. 2010. Effect of Non-Genetic Factors on Birth Weight of Boer Goat at Research. Station for Goat Production,

- Sei Putih. National Seminar on Animal Husbandry and Veterinary. p:477-481. <http://lolitkambing.litbang.pertanian.go.id> (in Indonesian with abstract in English)
- [23] Santosa, SA and W. Wintarsih. 2018. Analysis of the reproductive characteristics of Saanen Goats in BPTU-HPT Baturraden. *Jurnal LPPM Unsoed*. **8**(1):123-132 <http://jurnal.lppm.unsoed.ac.id>. (in Indonesian with abstract in English)
- [24] Adhianto K, N Ngadiyono, K Kustantinah and IGD Budisatria. 2012. Lama kebuntingan, litter size, dan bobot lahir kambing boerawa pada pemeliharaan perdesaan di Kecamatan Gisting Kabupaten Tanggamus. *Jurnal Penelitian Pertanian Terapan*. **12**(2):131-136
- [25] Nalbandov AV. 1980. *Fisiologi Reproduksi pada Mamalia dan Unggas*. UI-Pres, Jakarta
- [26] Bharathidhasan A, R Narayanan, P Gopu, A Subramanian, R Prabakaran and R Rajendra. 2009. Effect non genetic factors on birth weight, weaning weight and pre weaning gain of Barbari goat. *J. Vet. Anim. Sci*. **5**(3):99-103.
- [27] Knipscheer HC, J De Boer and TD Soedjana. 1983. The economic role of sheep and goats in west Java. *Bulletin of Indonesian Economics Studies*. **XIX**(3):74.
- [28] Subandriyo, B Setiadi and P Sitorus. 1986. *Ovulation Rate and Litter Size of Indonesian Goats*. Working Paper no. 73. SR-CRSP, Balai Penelitian Ternak, Bogor.
- [29] Subandriyo, B Setiadi, D Pwyanto, M Rangkuti, WK Sejati, D Anggraeni, RSG Sianturi, Hastono, and OS Butar-Butar. 1995. Analisis Potensi Kambing PE dan Sumberdaya di Daerah Sumber Bibit Pedesaan. Pusat Penelitian dan Pengembangan Peternakan, Bogor.
- [30] Nurjani, LO Ba'a, LOA Sani. 2020. Observation of reproductive potential of traditionally farmed female goats in Siompu District, Buton Selatan Regency. *Jurnal Ilmiah Peternakan Halu Oleo*. **2**(1):74-81.
- [31] Setiadi B. 1994 . Repitabilitas kinerja produktivitas induk kambing PE pada kondisi stasiun pembibitan dan pedesaan. Prosiding Pertemuan Ilmiah Hasil Penelitian Peternakan Lahan Kering. Sub Balai Penelitian Ternak Grati. p:366-372.
- [32] Sodiq A. 2012. Non genetic factors affecting pre-weaning weight and growth rate of Etawah grade goats. *Media Peternakan*. **35**(1):21-27.
- [33] Utama IK, IGM Budiarsana, H Setiyanto and A Priyanti. 1995. Productive and reproductive performances of young Etawah-cross does. *J. Ilmu Ternak dan Vet*. **1**(2):81-85.
- [34] Kumar A, U Singh and AKS Tomar. 2007. Early growth parameters of Kutchi goats under organized farm. *Indian Vet. J*. **83**:105-106.

- [35] Liu W, Y Zhang and Z Zhou. 2005. Adjustment for non-genetic effects on body weight and size in Angora goats. *Small Rum. Res.* **59**(1):25-31.
- [36] Nagpal AK, D Singh, VSS Prasad and PC Jain. 1995. Effect of weaning age and feeding system on growth performance and carcass traits of male kids in three breeds in India. *Small Rum. Res.* **17**(1):45-50.
- [37] Sudewo ATA, SA Santosa and A. Susanto. 2012. Etawah breed goat productivity based on litter size, type of birth and mortality in the Village Breeding Center, Banyumas Regency. *Jurnal LPMM Unsoed.* **3**(1):1-7. <http://jurnal.lppm.unsoed.ac.id> (in Indonesian with abstract in English).
- [38] Inounu I, N Hidayati, A Priyanti and B Tiesnamurti. 2002. *Peningkatan Produktivitas Domba Melalui Pembentukan Rumpun Komposit*. Balitnak, Ciawi, Bogor.
- [39] Zhang CY, Y Zhang, DQ Xu, X Li, J Su and LG Yang. 2009. Genetic and phenotypic parameter estimates for growth traits in Boer goat. *Livest. Sci.* **124**:66-71.
- [40] Hardjosubroto W. 1994. *Aplikasi Pemuliabiakan Ternak di Lapangan*. Grasindo, Jakarta.