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Doe Productivity and Preweaning Kid Growth of Local Goats in Palu, Indonesia

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Abstract: ***One approach that can be done to increase the productivity of local goat is through improving does conditions before mating. This research was conducted to determine the parent productivity factors (body weight, parity and Body Condition Score (BCS) on the preweaning productivity of kids (litter size, birth weight, number of weaned children and weaning weights) in Palu, Indonesia. Data collected from three main goat keeping areas (Layana, Tondo and Kawatuna). There were 76 goats were taken as samples from goat keepers determined purposively on the basis of animal ownership and goat keeping experience.Data collected were parturition time, doe body weight at the parturition, birth weight, birth type, litter size, and sex of the new born kids. The bpdy weight changes of the kids before weaning were also recorded. Data were analysed with a regressiona analysis to indicate the possible relationship between the parental factors before giving birth and the factors that were recorded after parturition. Results showed that the body weight of the doe (X1) signicantly affected the litter size (Y1) and tended to affect the average birth weight (Y2), total birth weight (Y3), and total weaning weight (Y6), but it did not affect the kids crop (Y4), and the average weaning weight of the kids (Y5). Maternal parity (X2) only affected the average birth weight (Y2), while the body condition score (BCS) of the doe (X3) did not have any relationship with the preweaning productivity of the kids under grazing conditions.***

Keywords: goats, preweaning productivity, birth weight, birth type, body condition score

1. Introduction

Goats are prolific animals with a high economic potential because of their ability to have multiple births. In traditional goat keeping practices by farmers in Indonesia, however, multiple birth is associated with a high mortality of the offsprings. This is in part due to the low quality of grazing fields used by farmers for their animals. When pregnancy occurs, does often experience malnutrition which will in turn affects the development of the foetus and resulting in low birth weight of the offsprings. The growth of the newborns prior to weaning is also sub optimal because of insufficient nutrients received by the does for milk production. The preweaning period is critical for the survival and growth of young kids, because they are entirely dependent on the milk produced by the doe. Kids dependence on milk lasts until 7-8 weeks of age or during the pre-weaning period between 1 - 10 weeks with the need for milk ranging between 1.2 - 1.6 l / h (Devendra and Burns, 1994).

Kids mortality is closely related to their parent productivity (Gall, 1981). Postpartum mortality before weaningin goat as in other animals greatly affects the overall livestock productivity (Sutama et al., 1993). Many factors affecting the preweaning mortality include the birth weight of the kids, genetic, mothering ability of the does, milk production, environment, nutrition, disease, and predators (Synman, 2010). Kids mortality of10 - 50% (Sutama et al., 1993; Adriani et al., 2003) will result in a huge loss for goat farming. Kid mortality in triplets and quadruplets (26 - 43%) is higher than in single births or twins (17-18%) (Sutama et al., 1993). The low birth weight, lack of good mothering ability of the does and low milk production are the main causes of kids mortality.

This study was done to evaluate the doe productivity and the preweaning growth of kidsin Palu.

2. Methodology

This study was done from October 2014 to June 2015 with data collected from three villages, namely Kelurahan Layana, Kelurahan Tondo, and Kelurahan Kawatuna. These villages are located in Palu, Central Sulawesi, Indonesia and are among of those areas with high goat populations. Data were collected from goat farmers whom were purposively selected as samples on the basis of goats ownership (at least 10 goats) and goat keeping experience (at least 2 years).

After respondents were selected, the pregnant does were monitored for the predicted parturition times. On the day of parturition, wights of both does and the new born kids were recorded immediately within the first 24 h after parturition. Data on birth type (single or multiple), *litter size*, and sex of the new born kids were also taken.

The body weight changes of the kids before weaning were then monitored and recorded once in every two weeks for the first three months of age. The weighing was done in the morning before the kids received milk from their mother. The weighing was also done for the does before they were allowed to graze in the field.

Data collected were tabulated and analysed with a multiple regression analysis.

3. Results and Discussion

Mean values of various variables obtained in this study are presented in Table 1 while the relationships between dependent and independent variables are shown in Table 2.

Table 1: Mean Values of Various Dependent and Independent Variables Observed in this Study

Variables	Initials	Average	n	Values	
				Max	Min
Doe Body Weight (kg)	X_1	29.30 ± 7.44	76	52.58	18.50
Maternal Parity (times)	X_2	2.86 ± 1.43	76	7.00	1.00
Body Condition Score	X_3	2.91 ± 0.73	76	4.00	2.00
Liter Size (head)	Y_1	1.61 ± 0.54	76	3.00	1.00
Individual Birth Weight (kg)	Y_2	2.22 ± 0.35	76	3.30	1.50
Total Birth Weight(kg)	Y_3	3.50 ± 1.17	76	7.18	1.90
Kid Crop (head)	Y_4	1.31 ± 0.47	54	2.00	1.00
Individual Weaning Weight (kg)	Y_5	8.02 ± 1.62	54	13.05	4.28
Total Weaning Weight (kg)	Y_6	10.13 ± 3.12	54	18.75	4.28

Notes: Doe body weight (X_1) affected litter size (Y_1); $p < 0.01$
Doe body weight (X_1) tended to affect mean birth weight (Y_2); $p = 0.08$
Doe body weight (X_1) affected total birth weight (Y_3); $p<0.01$
Doe body weight (X_1) affected total weaning weight (Y_6) $p<0.06$, but not the mean weaning weight (Y_5)
Maternal parity (X_2) affected mean birth weight (Y2); $p<0.05$

Table 2: Equations for the Relationship between Dependent and Independent Variables Observed in this Study

Dependent Variables	Equations	r
Litter size	$Y_1 = 0.339 + 0.048X_1 + 0.055X_2 – 0.106X_3$	0.6367
Mean Invidual Birth Weight	$Y_2 = 2.008 + 0.011\ X_1 – 0.060\ X_2 + 0.018\ X_3$	0.3392
Total Birth Weight	$Y_3 = 0.159 + 0.125\ X_1 + 0.042\ X_2 – 0.153\ X_3$	0.754
Kid Crop	$Y_4 = 0.865 + 0.018\ X_1 + 0.001\ X_2 – 0.018\ X_3$	0.2437
Mean Individual Weaning Weight	$Y_5 = 7{,}890 + 0.022\ X_1 – 0.093\ X_2 – 0.073\ X_3$	0.0971
Total Weaning Weight	$Y_6 = 6.397 + 0.148\ X_1 + 0.036\ X_2 – 0.178\ X_3$	0.3049

Litter Size

The litter size was found to be 1.6 ± 0.54 kids per birth which is higher than that reported by some authors, for example Kostaman and Sutama (2006) for Ettawah corssbreed (1.21 ± 0.46), Devendra and Burns (1994), or Sodiq and Sumaryadi (2002). The results was, however, lower that that reported by Atabany's (2001). Many factors affects the litter size, for example the occurence of multiple births, ovulation rates, kid's prenatal survival rates, and the nutritional conditions of does (Subandriyo et al., 1994).

Regression analyses showed that the litter size was highly affected by does body weight (X1), by not by does parity (X2) or BCS (X3) following an equation of Y = 0.339 + 0.048X1 + 0.055X2 – 0.106X3 (r = 0.6367). This means that an in increase 1 kg in does body weight will result in an increase in litter size of 0.48 kids per birth.Abdulgani (1981) also reported a significant high correlation between does body weight and litter size (r = 0.41). Local (Kacang) goats are high prolific animals (Obst et al., 1980; Sakul et al., 1994) and higher body weight does will have a higher probability of twinning than those with lower body weights (Johnston, 1983).

Birth Weight

The birth weight (2.22 ± 0.35kg for individual kid and3.50 ± 1.17 kg for total birth weight; Table 1) was higher than that reported by other authors, e.g Doloksaribu et al. (2014) and Setiadi and Sitorus (1984), but lower when compared to Astuti *et al*. (1984), Kostaman dan Sutama (2006), Tiesnamurti *et al*. (1995) and Setiadi *et al*. (1997).

Regression analysis showed the correlation of doe body weight (X1), parity (X2) and BCS (X3) with the mean birth weight of the kid following a regression equation of Y = 2.008 + 0.011 X1 - 0.060 X2 + 0.018 X3 (r = 0.3392), while the corresponding correlation for total birth weight of followed a regression equation of Y = 0.159 + 0.125 X1 + 0.042 X2 - 0.153 X3 (r = 0.7540). This means that an increase of 1 kg in does body weight will be followed by an increase in the average birth weight of 0.011 kg and a total birth weight of 0.125 kg. The results indicated that doe body weight (X1) tended to affect (P <0.08) mean birth weight and significantly affect (P <0.01) the total birth weight of local goats. Parity (X2) also has a significant effect (P <0.05) on average birth weight and no effect (P> 0.05) on total birth weight, whereas BCS (X3) did not influence (P>0.05) the average and total weight of the birth weight.

The results obtained were similar to those reported by Liwa (1994) with a correlation coefficient r = 0.20 (P>0.05). It is suspected that the birth weight of kids tends to be influenced by birth type, sex, parent age, parent nation, male nation, and season at birth (Williamson and Payne, 1993; Gatenby et al., 1994).

Kid Crop

This study showed that there were 54 kids weaned with a mortality rate of 28.95% of the total kid born. This mortality rate was much higher than that of Erlangga et al. (2014) in the grazing system (9.50%). This high mortality rate was probably because that the breastfeeding does depended solely on the native grass available in the grazing system which was thought to be insufficient for an optimal milk production.

Regression analysis showed that the correlation between doe body weight (X1), parity (X2) and BCS (X3) and the number of kids weaned followed an equation of Y = 0.865 + 0.018 X1 + 0.001 X2 - 0.018 X3 (r = 0.2437). It was indicated that doe body weight (X1), parity (X2) and BCS (X3) have no effect (P> 0.05) on the number of kids weaned.

Weaning Weight

The average weaning weight was 8.02 ± 1.62 kg, while the total weaning weight was 10.13 ± 3.12 kg (Table 1). The average weaning weights obtained from this study were lower than those reported by Elieser et al. (2012) for Kacang goats (10.2 ± 0.79 kg). Maylinda (2010) states that differences in weaning weights are largely influenced by environmental factors including the goat keeping management and milk production. Lu (2002) added that weaning weights varied depending on genetic influence, weaning age, health and maintenance management, especially the aspect of feeding which greatly influences the ability of the does to produce milk during the pre weaning growth period of the kids.

The weaning weights obtained in this study (0.82 kg) was below the ones reported previously by others (Ngadiono *et al*., 1984; Setiadi and Sitorus, 1984 and Elieser et al., 2012). The daily growth rates (64.44 g) was comparable to that reported by Astuti et al. 1984) which was 53.2 g.

Regression analysis showed a correlation of does body weight (X1), parity (X2) and BCS (X3) with weaning weight average of children following an of equation Y = 7.890 + 0.022 X1 - 0.093 X2 - 0.073 X3 (r = 0.0971), while the corresponding equation for al weaning weight was Y = 6.397 + 0.148 X1 + 0.036 X2 - 0.178 X3 (r = 0.3049).

4. Conclusions

I can be concluded that the body weight of the doe (X1) signicantly affects the litter size (Y1) and tends to affect the average birth weight (Y2), total birth weight (Y3), and total weaning weight (Y6), but it does not affect the kids crop (Y4), and the average weaning weight of the kids (Y5). Maternal parity (X2) only affects the average birth weight (Y2), while the body condition score (BCS) of the doe (X3) does not have any relationship with the preweaning productivity of the kids under grazing conditions.

References

[1] Abdulgani, I.K. 1981. Beberapa Ciri Populasi Kambing di Desa Ciburuy dan Desa Cigombong serta Kegunaannya Bagi Peningkatan Produktivitas. Disertasi. Program Pascasarjana, Institut Pertanian Bogor, Bogor.

[2] Adriani, A. Sudono, T. Sutardi, W. Manalu dan I.K. Sutama. 2003. Optimasi Produksi Anak dan Susu Kambing Peranakan Etawah dengan Superovulasi dan Suplementasi Seng. Forum Pascasarjana. Sekolah Pascasarjana, Institute Pertanian Bogor 26 (4): 335-352.

[3] Astuti, M. , M. Bell, P. Sitorus dan E. Bradford. 1984. The Impact of Altitude on Sheep ang Goat Production Working Paper No 30. Balai Penelitian Ternak/Small Ruminant-Collaborative Research Support Program. Bogor

[4] Atabany, A. 2001. Studi kasus produktivitas kambing Peranakan Etawah dan kambing Saanen pada peternakan kambing perah Barokah dan PT. Taurus Dairy Farm. Tesis. Program Pascasarjana, Institut Pertanian Bogor, Bogor.

[5] Devendra, C. And M. Burns. 1994. Produksi Kambing di Daerah Tropis. Terjemahan. IDK Harya Putra. Penerbit ITB, Bandung.

[6] Doloksaribu, M., S. Elieser, F. Mahmilia, dan FA Pamungkas (2014). Produktivitas kambing kacang pada kondisi dikandangkan, JITV 19 (3) 2014.

[7] Elieser, S., Sumadi dan Subandriyo. 2012. Productivity Comparison Between Boer and Kacang Goat Dam. Journal of The Tropical Animal Agriculture. Vol 37 pp 15-21.

[8] Erlangga Bayu Anggara, Moch. Nasich, Hary Nugroho dan Kuswati, 2014. Produktivitas Induk Kambing Kacang Di Kecamatan Kedungadem Kabupaten Bojonegoro. Universitas Erlangga.

[9] Gall, C. 1981. Goat Production. Academic Press Inc. London

[10] Gatenby, R.M., G.E. Bradford, Ralaksanto, E. Romjali, A.D. Pitono dan H. Sakul. 1994. Growth, mortality and wool cover of Sumatera sheep and cross within Virgin Island, Barbados Blackbelly and Javanes fat tail breed. Working Paper 153. CRSP. Balai Penelitian Ternak, Bogor.

[11] Johnston, R.G. 1983. Introduction to Sheep Farming. Granada Publishing Ltd. London, Toronto, Sydney, New York.

[12] Kostaman, T dan I-K. Sutama., 2006. Laju Pertumbuhan Kambing Anak Hasil Persilangan antara Kambing Boer dengan Peranakan Etawah pada Periode Prasapih. Jurnal Ilmu Ternak dan Veteriner.: 06 – 12.

[13] Liwa, A.M. 1994. Korelasi umur dan berat induk dengan berat lahir dan tipe kelahiran anak kambing Peranakan Etawah yang dipelihara secara semi intensif. JIPNAK Gowa 2: 151 –156.

[14] Lu, C.D. 2002. Boer Goat Production: Progress and Perspective. Vice Chancellor of Academic Affairs, University of Hawai'i. Hilo, Hawai. http://www.uhh.hawaii.edu/uhh/vcaa/.

[15] Maylinda, S., 2010. Pengantar Pemuliaan Ternak.Universitas Brawijaya Press. Malang.

[16] Ngadiono, N., P. Basuki dan G. Murdjito. 1984. Beberapa data performans ternak kambing yang dipelihara secara tradisional di pedesaan sejak lahir sampai dengan umur sapih. Pros. Pertemuan Ilmiah Ruminansia kecil. Puslitbang Peternakan, Bogor.

[17] Obst, J.M., T. Boys and T. Chaniago. 1980. Reproductive performances of Indonesia sheep and goats. Proc. Aust. Soc. Anim. Prod. 13: 321 – 324.

[18] Sakul, H., G.E. Bradford and Subandriyo. 1994. Prospects for genetic improvement of small ruminants in Asia. Proc. Symposium Strategic Developmeny for Small Ruminant Production in Asia and Pasific. SR-CRSP Univ. Calif. Davis.

[19] Setiadi, B. dan P. Sitorus. 1984. Penampilan reproduksi danproduksi kambing Peranakan Etawah. Pros. Domba danKambing di Indonesia. Pusat Penelitian danPengembangan Peternakan. Bogor. hal. 118-121.

[20] Setiadi, B., I.K. Sutama dan I.G.M. Budiarsana. 1997. Efisiensi Reproduksi dan Produksi Kambing PE Pada Berbagai Tatalaksana Perkawinan. JiTV 2(4): 233-236.

[21] Sodiq, A. dan M. Y. Sumaryadi. 2002. Reproductive performance of Kacang and Peranakan Etawah goat in Indonesia. Animal Production. 4(2): 52-59.

[22] Subandriyo, B. Setiadi, T.D. Soedjana dan P. Sitorus. 1994. Produktivitas usahaternak domba di pedesaan. J. Penel. Peternakan Indonesia 1: 1 – 7.
[23] Sutama, I.K., I.G. Putu dan M. Wodziscatomaszweska. 1993. Peningkatan Produktivitas Ternak Ruminansia Kecil Melalui Sifat Rreproduksi yang Lebih Efisien. Di dalam M. Wodzisca- Tomaszewska, IM. Mastka, A. Djajanegara, S. Garner dan T. Wiradarya. Reproduksi kambing dan domba di Indonesia. Sebelas Maret University Press, Surakarta.
[24] Synman, M.A. 2010. Factors affecting pre-weaning kids mortality in South African Anggora. Outh African Journal of Animal.
[25] Tiesnamurti, B., E. Juarini, I.G.M. Budiarsana dan I-K. Sutama. 1995. Pertumbuhan dan perkembangan seksual kambing PE pada sistem pemeliharaan yang berbeda. Kumpulan Hasil-Hasil Penelitian APBN Tahun Anggaran 1994/1995. Ternak Ruminansia Kecil. Balai Penelitian Ternak, Pusat Penelitian dan Pengembangan Peternakan, Bogor. hlm. 271-278.
[26] Williamson G., and W.J.A. Payne, 1993. An Introduction to Animal Husbandry in the Tropics. Third Edition. Longman Group Ltd, London.