Correlation of Pregnancy Duration, Litter Size, Birth Weight and Sex Ratio of Saburai Goat In Sumberejo Subdistrict, Tanggamus Regency, Indonesia

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Abstract | The current aims to determine the correlation value of the pregnancy duration, litter size, birth weight, and sex ratio of Saburai Goat in Sumberejo Subdistrict, Tanggamus Regency by observing 50 pregnant doe delivered 72 head. This research was conducted in 2018. The survey was conducted using primary and secondary data collected by either direct observation in the field or from the records of Sumberejo subdistrict. The variables observed included pregnancy duration, litter size, birth weight, and sex ratio. The results revealed a pregnancy duration 145.93 ± 6.22 days, birth weight 3.54 ± 0.60 kg; litter size 1.64 ± 0.56 head, and sex ratio of goat kid 40.27% male and 59.73% female of Saburai Goat in Sumberejo Subdistrict, Tanggamus Regency. The pregnancy duration of saburai goat has correlation with litter size 0.766 (strong relationship), birth weight 0.398 (weak relationship) and sex 0.202 (weak relationship). The conclusions from this study indicate that the pregnancy duration of Saburai goat significantly affected litter size, birth weight, and sex.

Keywords | Saburai Goat, Pregnancy Duration, Litter Size, Birth Weight, Sex Ratio

INTRODUCTION

Saburai goats serve to provide a profitable meat and milk products. They carry many advantages including: easy to maintain, high reproductive abilities, high growth rates, and high adaptability against various macro climatic conditions (Sulastri et al., 2018).

Targeting Saburai goats for meat production purposes is of low chances, because of low productivity and low representation from total goats population in Tanggamus, as well as other breeds have a higher population representation (Sulastri and Adhianto, 2016). Another factor contributed low Saburai goat population is shortage in managemental factors including feeding issues. Improved feeding during pregnancy and lactation is expected to improve litter size and quality (Adhianto et al., 2017).

The low Saburai goat population is influenced by uncontrolled good maintenance management such as feed management, cages, and breeding. To increase goat productivity care must be given to breeding programs, improvement of reproductive efficiency, improvement of maintenance and attention to the body weight at the time of mating, pregnancy duration, litter size, birth weight, and correlation of these characteristics.

Pregnancy duration influenced by genetic, maternal, fetal, and environmental factors (Jainudeen and Hafez, 2000). The weight of doe has the possibility of having twinning higher than the lower (Johnston, 1983). Goats with a high birth weight have better daily body weight and weaning weight than goat with low birth weight.
The problem in breeding saburai goat is the limited information on basic data for the production and reproduction of goats as a basis for increasing productivity and until now research on pregnancy duration that can affect the birth weight of livestock, litter size and sex ratio in Saburai goats has never been done. Based on this, a correlation between pregnancy duration, litter size, birth weight and sex ratio Saburai goat was conducted in Sumberejo District, Tanggamus Regency.

MATERIALS AND METHODS

Material
Study material consisted of Saburai goats who were pregnant and gave birth in January – February 2018 as many as 72 in the Sumberejo District in breeder group. The tools used in this study are brand digital scales with a Portable capacity of 45 kg with accuracy of 0.01 kg, stationery, and cameras.

Methods
Research carried out by using survey method and sample determination was done by purposive sampling. The material was observed in the form of Saburai doe who was pregnant and gave birth to Saburai temple in January – February 2018. The changes observed consisted of pregnancy duration, litter size, birth weight, and sex ratio.

Data Analysis Data
Pregnancy duration, litter size, birth weight, and sex ratio of goats were analysis with correlation analysis using SPSS.16.0 (Santoso, 2002)

RESULTS AND DISCUSSION

Correlation of Pregnancy Duration with Birth Weight
The average birth weight of Saburai goat in this study was 3.54 ± 0.60 kg (Table 1). The average birth weight is higher than those reported by Sulastri et al. (2014) as 3.02 ± 0.66 kg. The difference is due to breed or genetic influences in this case is the male factor used.

The results of the analysis showed that the pregnancy duration correlation had a significant effect (P < 0.05) on the birth weight of the goat kid born (Saburai) which was equal to \( r = 0.398 \) (Table 2). This means that the longer of pregnancy duration, the higher the birth weight of the goat kid. (Prasjo et al., 2008) also found a strong relationship between pregnancy duration and birth weight, \( r = 0.248 \). Hunter (1995) added that the average birth weight depends on the age of the fetus.

Factors that are thought to influence pregnancy duration and birth weight are feed nutrition, environment, fetus, the number of vegetables contained, the sex of the fetus. Saburai goat breeders in Sumberejo sub-district provide sufficient forage feed, routine fermentation, and concentrates such as tofu dregs, so that nutrition can be fulfilled during pregnancy. This is in line with Priyanto (1994) who reported that good quality and quantity of feed at the end of pregnancy will result in a higher birth weight of goat kid and greater body weight of the doe will give higher birth weight of goat kid.

Another factor that affects birth weight is parity of doe. Parity of doe in Sumberejo sub-district is more than one. According to Farid and Fahmy (1996) parity has a significant effect on birth weight. Parity is related to age of doe. The higher parity means the more complete the anatomical and physiological functions of the reproductive organs. The maximum anatomical and physiological functions of the reproductive organs will further support the growth of the fetus.

The Correlation of Pregnancy Duration with Litter Size
Litter size has an important role in determining the rate of increase in goat population, because higher number of delivered goat kids will influence the population increasing pattern (Doloksaribu et al., 2005). The current results were in line with those reported by Adhianto et al. (2011) who revealed a litter size of Saburai goat about 1.6 ± 0.6 tails. Factors that can affect litter size are parent age, parent body weight, male influence, season, and nutrient level. Mahmilia and Elieser (2008) add that the number of kid depends on the number of ovulated cells, the number of eggs that can be fertilized and embryonal mortality rate.

The results showed that correlation of pregnancy duration had a significant effect (P < 0.05) on litter size (Table 2). This means that the age of pregnancy will be shorter with the increase in the number of kid in birth. The magnitude of the relationship is 0.766 (strong relationship according Sugiyono, 2014). The same situation was also reported by Mahmilia and Elieser (2008) that the increasing number of litter size, pregnancy duration is getting faster. It is suspected that the number of more than one fetus in the uterus causes the development of the uterus to be faster, besides that the hormones needed for the birth process are more numerous than the single birth.

The Correlation Pregnancy Duration with Sex
Gender is determined at conception (Berry and Cromie, 2007). In mammals, the sex of goat’s kid depends on the maintenance of the ovum that carries the X chromosome by the sperm carrying X or Y chromosomes. If the zygote consists of pairs of X and Y chromosomes it will develop into male individuals, whereas the zygote consisting of the
Based on the results of the study (Table 1), it was shown that these sex ratio of Saburai goats was 40.27% (male) and 59.73% (female). From the number of births as many as 72, with 29 male less than female goat kid (43 heads). The results are different from the data of this study (Adhianto et al., 2014). This difference is thought to be due to the influence of goat, season, level of selection carried out by breeders, age and parity of female and male parents used (Demural et al., 2007); Vaginal pH (Cole and Cupps, 1977); feed and parent nutrition (Rosenfeld and Roberts, 2004; Green et al., 2008) and time of artificial insemination (Rorie, 1999).

The results of the study showed that correlation of pregnancy duration had a significant effect (P <0.05) on the sex, with the results of the correlation analysis were 0.202 (weak relationship according Sugiyono, 2014) which means that the gestational age is longer then the female born tends to be male, and vice versa (Table 2). This is supported by the statement Prasojo et al. (2008) that gestational age in male Balinese cows shows a significant difference in gestational age in Balinese females, i.e. kid who are sexually challenged tend to have a longer gestational age. Other factors that affect the length of pregnancy with sex are the age of the parent, the season, genetic traits and geographical location.

Table 1: Average pregnancy duration, birth weight, litter size, and sex ratio

| Parameters             | Mean± SD     |
|------------------------|--------------|
| Pregnancy duration (days) | 145.93 ± 6.22 |
| Birth weight (kg)      | 3.54 ± 0.60  |
| Litter size (tail)     | 1.64 ± 0.56  |
| Sex ratio (%)          |              |
| male                   | 40.27        |
| Female                 | 59.73        |

Table 2: Correlation coefficient between pregnancy duration with birth weight, litter size, and sex

| Parameter | Correlation value |
|-----------|-------------------|
| Birth weight | 0.398             |
| Litter size   | 0.766             |
| Sex           | 0.202             |

CONCLUSIONS AND RECOMMENDATIONS

Based on the research that has been done, it can be concluded that pregnancy duration has a correlation with litter size, birth weight, and sex ratio of Saburai goats in Sumberjo District, Tanggamus Regency.

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CONFLICT OF INTEREST

All authors declare there is no conflict of interest.

AUTHORS CONTRIBUTION

K Adhianto, designed the study, data analysis and wrote the manuscript draft, RA Lestari, performed sample collection and data analysis, S Siswanto, supervised the experiment and revised the manuscript and S Sulastri, supervised the experiment and revised the manuscript. All the authors have read and approved the final manuscript.

REFERENCES

• Adhianto K, K Ngadiyono, N Kustantinah, IGS Budisatria (2011). Length of pregnancy, litter size, and birth weight of Boerawa goats in rural maintenance in Gisting District, Tanggamus Regency. JPTP. 12: 131-136.
• Adhianto K, S Sulastri, MDI Hamdani, D Nowriani, L Yuliani (2017). Performance Of Saburai doe In Village Breeding Center Tanggamus Region Lampung Province. J. Ilmu-Ilmu Peternakan. 2017: 9-16.
• Berry DP, AR Cromie (2007). Artificial insemination increases the probability of a male calf in dairy and beef cattle. Theriogenology. J. Anim. Reprod. 67: 346 - 352. https://doi.org/10.1016/j.theriogenology.2006.08.003
• Cole HH, PT Cupps (1977). Reproduction in Domestic Animal. New York. Academic Pr.
• Demural O, M UN, M Abay, T Bekyurek (2007). The effect of artificial insemination timing on sex ratio of offspring and fertility in dairy cows. Turk. J. Vet. Anim. Sci. 31:21- 24.
• Doloksaribu M, S Eleser, F Mahmilia, Fitriz A Pamungkas (2005). Productivity of goat nuts in the conditions on the ground. Birth weight, weaning weight, number of children born and the life force of pre-weaned children. Pros. National Seminar Anim. Husb. Vet. Technol. Bogor, 12-13 September 2005. Puslitbang Peternakan, Bogor.
• Farid AH, MH Fahmy (1996). The East Friesian and other European breeds, in: Prolific sheep. Fahmy, MH (Ed.). CAB. International.
• Green MP, LD Spate, TE Parks, K. Kimra, CN Murphy, JE Williams, MS Kerley, JA Green, DH Keisler, RM Roberts (2008). Nutritional skewing of conceptus sex in sheep: Effect of a maternal diet enriched in rumen-protected polyunsaturated fatty acids (PUFA). Reprod. Bio. Endocrin.
Hunter RHF (1995). Physiology and Technology for Reproduction of Domestic Female Animals. Publisher of the Bandung Institute of Technology, Bandung.

Jainudeen MR, ESE Hafez (2000). Gestation, prenatal physiology and parturition. In: Reproduction in Farm Animals 7 Ed.Hafez, ESE and B. Hafez (Eds.). Lippincott. Williams & Wilkins.

Johnston RG (1983). Introduction to Sheep Farming. Granada Publishing Ltd. London, Toronto, Sydney, New York.

Mahmilia F, S Elieser (2008). The old correlation of pregnant women with birth weight, litter size and viability of Boerka-1 Pros goats. National Seminar Anim. Husb. Vet. Technol. Puslitbang Peternakan, Bogor.

Prasolo G, I Arifiantini, K Muhammad (2008). Correlation between length of pregnancy, birth weight and calf sex results of artificial insemination in Balinese cattle. J.Vet. 11: 41-45.

Priyanto D (1994). Prospects for sheep business towards rural agroindustry. J. Poul. Ind. 160: 54-57.

Reed KC (1985). Modification of the Sex Ratio. In Biotechnology in Animal Production Industries. Univ of New England.

Rorie RW (1999). Effect of timing of artificial insemination on sex ratio. Theriogenology. J. Anim. Reprod. 52: 1273 - 1280.

Rosenfeld CS, RM Roberts (2004). Maternal diet and other factors. Affect the offspring sex ratio: A Review. J. Bio. Reprod. 71: 1063 - 1070. https://doi.org/10.1095/biolreprod.104.030890

Sariadi Dasril, M Akmal (2014). Sex ratio of Ettawa Breeders (PE) goats from artificial insemination using spermatozoa swim up. Agripet. 14: 132 - 138. https://doi.org/10.17969/agripet.v14.2.1890

Santoso S (2002). SPSS version 16 Professionally Processing Statistical Data. Third edition. Gramedia, Jakarta.

Sugiyono (2014). Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung : Alfabeta.

Sulastri S, T Hartatik, N Ngadiyono (2014). Growth performance of Boerawa goats in the village breeding center, Dadapan Village, Sumberajo District, Tanggamus Regency, Lampung Province. JSP: 12: 1-9.

Sulastri, K Adhianto (2016). Potential Population of Four Goats in Lampung Province. Plantaxia. Lampung.

Sulastri S, Siwanto S, Adhianto K (2018). Genetic Parameter For Growth Performance Of Saburai Goat In Tanggamus District, Lampung Province, Indonesia. Adv.Anim. Vet. Sci. 6(11): 486-491. https://doi.org/10.17582/journal.aavss/2018/6.11.486.491