The Correlation Between Scrotal Circumference, Scrotal Volume, and Semen Quantity and Quality on Fat Tailed Rams

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ABSTRACT

This study aimed at knowing the correlation between scrotal circumference with scrotal volume, and scrotal volume with the quantity and quality of semen produced by fat-tailed rams (FTR) in Sapudi Island, Sumenep, East Java. The methods of the study include measurement of scrotal circumference and scrotal volume, data collection and data analysis. The variables observed were a scrotal circumference, scrotal volume, semen quantity and quality. The data obtained were analyzed using correlation model. The results showed that there was a significant correlation ($P<0.05$) between scrotal circumference and scrotal volume with a correlation coefficient of 0.852. While between scrotal volume and semen quantity, there was also a significant correlation ($P<0.05$) with a correlation coefficient of 0.774. Between scrotal volume and semen quality (concentration, motility, viability and abnormality) there was no significant correlation. It was concluded that there was very strong and positive correlation between scrotal circumference and scrotal volume, and there was a strong and positive correlation between scrotal volume and semen quantity, but there was no significant correlation between scrotal volume and semen quality (concentration, motility, viability and abnormality).

Keywords: Fat-tailed rams, Scrotal circumference, Scrotal volume, Semen quantity, Semen quality

INTRODUCTION

Fat-tailed rams (FTR) is commonly found in East Java with a relatively low population. The base of the tail of FTR is big because of fat deposits. This becomes their difficulty in natural mating, so it is necessary for males that have libido as well as good semen quantity and quality. For practical implementation in the field, a short and simple way is needed to determine the semen quantity and quality as selection criteria for FTR for increasing the percentage of successful mating that will be directly proportional to the increase of their population. Based on this, the study is conducted to know the relationship between scrotal circumference with scrotal volume, and scrotal volume with semen quantity and quality of FTR.

MATERIALS AND METHODS

This study was conducted at a community farm on Sapudi Island, Sumenep, East Java from November to December 2016 using nine (9) male FTR aged 2 years old. The variables observed were scrotal circumference, scrotal volume, semen quantity and semen quality (concentration, motility, viability, abnormality),

The measurement of scrotal circumference is done using a tape that is looped around the scrotum. The measurement of scrotal volume is performed using a 500 ml measuring cup filled with water. The scrotum of FTR is then put into the measuring cup containing the water. Spilled water is counted as the sheep scrotal volume. Artificial vagina is used to collect the sperm that is performed in the morning, ie at 07:00 to 10:00 AM. The examination of the sperm quality is done as the method used by Toelihere (1985).

Data obtained are scrotal circumference, scrotal volume, semen quantity, semen quality (concentration, motility, viability, and abnormality) analyzed using Pearson Correlation.

RESULTS AND DISCUSSION

Based on the data collection, the data obtained are shown in Table 1.

Table 1. Scrotal circumference, scrotal volume, semen quqntity, and characteristics of sperm (concentration, motility, viability, abnormality) of FTR.

Number	Scrotal circumference (cm)	Scrotal Volume (ml)	Semen Quantity (ml)	Sperm Concentration (million/ml)	Sperm Motility (%)	Sperm Viability (%)	Sperm Abnormality (%)
1	29	390	1.8	3,756	75	80	10
2	22	300	1.1	3,365	80	78	11
3	30	400	2.8	3,700	75	80	10
4	27	215	0.6	3,650	80	78	13
5	25	250	0.6	3,650	75	75	12
6	22	200	0.4	3,200	80	76	13
7	20,5	375	1.3	3,600	70	82	13
8	25	350	1	3,800	85	84	12
9	27	262,5	0.7	3,850	85	82	13
Average	25.28 ± 3.29	304.72 ± 76.76	1.14 ± 0.76	3,619 ± 210	78.3 ± 5.0	79.4 ± 3.0	11.9 ± 1.3

Correlation of scrotal circumference with scrotal volume

Based on the results of the study, it is known that the size of the scrotal circumference of FTR ranged from 20.5 to 30 cm, while the scrotal volume of FTR ranged from 215 to 400 ml. Data analysis using Pearson Correlation obtained a correlation coefficient of 0.852, which means that the scrotal circumference has a positive and very strong correlation level with the scrotal volume. This is in accordance with Sugiyono (2007) that the correlation coefficient of 0.001 to 0.200 means correlation is very weak, correlation coefficient 0.201 to 0.400 means weak correlation, correlation coefficient 0.401 to 0.600 means correlation strong enough, correlation 0.601 to 0.800 means strong correlation, correlation coefficient 0.801 to 1,000 means very strong correlation.

The results of this study are in accordance with the study of Hastono and Arifin (2006) which states that one of the attempts to know the volume of testes is by measuring the circumference of the scrotum, meaning that the greater the volume of the scrotum or testes the greater the circumference of the scrotum. Noran and Mukherjee (1997) added that the circumference of the scrotum has a very close relationship with testicular volume and can provide an accurate estimate that males have the ability to produce spermatozoa. Kostaman

(2004) mentions that to know indirectly the size of testes is to measure the size of the scrotum.

Factors that can affect the high and low correlation (relationship) between the scrotal circumference with the scrotal volume on the results of a study are different types of scrotal shape. It is known that the shape of the scrotum tends to elongate with a small circumference, it can have a larger volume compared with the scrotum that tends to be short in width (having a large scrotal circumference). Rams with the same breed can have different forms of testes. This is supported by the opinion of Frandson (1992) which states that testes (testicles) vary somewhat from species to species in terms of shape, size, and location, but have the same basic structure. Each testes consists of numerous seminiferous tubules that are surrounded by many fibrous capsules or trabeculae passing in from tunica albuginea to form a skeleton or stroma, to support the seminiferous tubules.

Correlation of scrotal volume with semen quantity

Based on the results of the study, that the semen quantity of FTR ranged from 0.4 to 2.8 ml. The variation of semen quantity in this study was higher when compared with the study reported in Wijono (1997), that the sheep semen volume between 0.8 to 1.2 ml. Wijono (1997) adds that the volume of FTR semen reaches 0.1 to 0.4 ml. The differences in the results of this study may be influenced by genetic and environmental factors.

Scrotal volume has a positive and strong correlation with the semen quantity, with a correlation coefficient of 0.774. The results of this study was in line with the results of the study of Ismaya (1999) which states that the magnitude of the scrotum positively correlated with the sperm volume ($r = 0.81$).

Measurement of the scrotal circumference is easier than that of the scrotal volume. Therefore it is expected that by measuring the scrotal circumference it can be infered the scrotal volume, so that the semen quantity of FTR can be predicted by measuring the scrotal circumference.

In terms of genetic, FTR has a high ability to produce offspring. It can be interpreted that the semen quantity and quality possessed by the male FTR is good enough. This is consistent with Anonymous (2014) opinion that in terms of genetic factors, FTR has high productivity with average reproductive performance, including birth rate 156%, fertility 75 to 80%, and lamb crop 80%. Anonymous (2014) states that Indonesia which has a tropical climate with sufficient solar intensity affects high fertility, so that local sheep in Indonesia can produce many young sheep.

In addition to genetic factors, the environment is one of the determinants of the productivity. Environmental factors may consist of temperature, humidity, number of population in one cage, and so on. Too high temperatures with too narrow cage capacity may cause stress on rams so rams are not able to produce semen as it should be. Too low temperatures may also disrupt the spermatogenesis process of rams. Prasetyaningtyas et al. (2006) states that the right environmental factors are one of the determinants for optimal semen quantity and quality. Environmental factors should be prepared including a good feed, minimal stress, avoiding extreme temperature and humidity changes as well as proper collection procedures.

Rams that produces semen quantity that does not conform to the normal range may occur due to reproduction disorder which can be caused by a nutrient deficiency of feed given. Rams requires energy intake to promote growth and development on the body. According to Hotzel et al. (1998) the size of the testes may be affected by the treatment of rations, In Merino sheep that is treated with high protein rations, there is an increase in length and diameter of the testes. Yendraliza (2013) states that feed is inadequate is probably the biggest cause of reproductive disorders. Hernaman et al. (2014) adds that young males that

are inadequate for nutrient and energy needs will experience a decrease in body weight that affects smaller body sizes and are not ready for mating, and may have low semen quantities.

Correlation of scrotal volume with semen quality

Based on the results of the study, it can be seen that the spermatozoa concentration of FTR ranged from 3,200 to 3,850 million/ml with an average of 3,619 ± 210 million/ml. The scrotal volume has no correlation to spermatozoa concentration. Motility ranged between 70 to 85% with the average of 78.3 ± 5.0%, the scrotal volume has no correlation with sperm motility. Spermatozoa viability ranged between 75 to 84% with the average of 79.4 ± 3.0%, the scrotal volume has no correlation with the spermatozoa viability. Spermatozoa abnormalities ranged from 10 to 13% with the average of 11.9 ± 1.3%, and the scrotal volume has no correlation with the spermatozoa abnormality.

The results showed that there was no correlation between the scrotal volume with the spermatozoa quality, in particular with concentration, motility and viability, and abnormality. This is because the semen quality in this case the sperm concentration may be influenced by the rams breed as reported by Herdiawan (2004) that the spermatozoa concentration of Priangan rams is 3.897 to 4.107 million/ml, 3528.85 ± 777.11 in Garut rams (Sujoko et al., 2009).

While spermatozoa motility may be affected by the quantity and quality of feed given (Sujoko et al., 2009). Feeding with low quality and quantity can inhibit reproductive function through its influence on the secretion of gonadotropin hormone adenohipofisa gland. In the case of the tubules seminiferi less affected than the interstitial cells that produce testosterone. This was reported by several studies that the average percentage of motility of Garut sheep was 74.17 ± 4.92% (Herdis et al., 2002), 76.67% ± 2.36 (Rizal et al., 2003) while in Priangan sheep was 86-87% (Herdiawan, 2004).

Viability is strongly influenced by factors such as the sun, pH, osmotic pressure, electrolyte and non-electrolyte effects, germs, storage temperature, and dilution (Toelihere, 1985). While spermatozoa abnormalities are the main cause of imperfect spermatogenesis. This may be due to genetics or disease or inappropriate environmental conditions (Peter and Ball, 1994). For example, high environmental temperatures have been reported to cause an increase in the number of abnormal sperm (Gwazdauskas, 1980 cit. Peter and Ball, 1994). Abnormal spermatozoa are often unable to fertilize the ovum because there are abnormalities in spermatozoa head, spermatozoa tail, and accur cytoplasmic droplets. Abnormal heads are often unable to fertilize the ovum because the acrosome hood protecting the anterior portion of the nucleus is deformed, damaged or lost. Akrosom contains enzymes that serve to penetrate corona radiata and pellucida zones during fertilization, if the acrosome is abnormal then the spermatozoa will no longer be able to fertilize the ovum. Abnormal tails are often unable to fertilize an ovum because most spermatozoa with abnormal tails are not motile and therefore can not reach the oviduct for fertilization (Bearden and Fuquay, 1997)

CONCLUSIONS

There is positive and strong correlation between the scrotal circumference and the scrotal volume and there is positive and strong correlation between the scrotal volume and the semen quantity, and there is no correlation between the scrotal volume and spermatozoa quality (concentration, motility, viability), but there is negative correlation with the abnormality of FTR in Sapudi Island, Sumenep, East Java.

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