Effect of Two Groups of Scrotal Circumference on the Sexual Performance and Their Correlation in Boer Bucks

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Abstract

The study was conducted at the Goat Farm, Biotechnology Centre of DVSS Keningau, Sabah, to determine the effect of two groups of scrotal circumferences on sexual performance and the correlation between scrotal circumference and sexual performance in Boer bucks. Ten healthy Boer bucks aged 1.5 years with an average body weight of 61.15±1.87 kg were randomly selected. They were divided into two groups according to their scrotal circumference. The scrotal circumference between 25 to 28 cm was grouped as G-I (n=5), while G-II (n=5) consisted of the scrotal circumference between 29 to 32 cm. Bucks were fed with commercial pellets and Napier grass according to the farm's routine practice. Data on the scrotal circumference and sexual performance, including latency to the first mount, number of mounts, latency to the first ejaculation, refractory period, number of ejaculations, and mating efficiency, were collected every two weeks for five consecutive weeks. Results indicated that Boer bucks with a scrotal circumference between 29 to 32 cm improved their sexual performance; the number of mounts significantly decreased ($P<0.05$), and the number of ejaculations and mating efficiency significantly increased ($P<0.05$) compared to the Boer bucks with a scrotal circumference between 25 to 28 cm. A high correlation was reported between scrotal circumference and the number of mounts ($r= -0.476$, $P<0.01$), while scrotal circumference correlated with mating efficiency ($r = 0.323$, $P<0.05$). In conclusion, scrotal circumference between 29 to 32 cm can influence the sexual performance of Boer bucks.

Keywords: Boer bucks, scrotal circumference, sexual performance.

Introduction

Previous research has demonstrated a correlation between scrotal circumference and the reproductive performance of bucks. Scrotal circumference is correlated to sperm quality, where the bucks with larger scrotal circumference will produce more semen and have a higher quality of sperm (Mellado, 2016; Mojapelo & Lehloenya, 2019). The bucks with larger scrotal circumferences also have higher testosterone levels (Karaca *et al.*, 2016). The bucks with larger scrotal circumferences were also reported to have higher libido (Ford *et al.*, 2009). Scrotal circumference is also correlated to growth performance, where increased body weight will increase scrotal circumference (Gemeda

& Workalemahu, 2017; Raji & Ajala, 2015). Scrotal circumference is also correlated to buck age, where matured bucks had bigger scrotal than younger ones (Kerketta *et al.*, 2014; Raji & Ajala, 2015).

Scrotal circumference is one of the essential measurements taken during breeding soundness examinations of farm animals (BSE) (Kerketta *et al.*, 2015). The scrotal circumference is the best method to measure the testicle size (Gemeda & Workalemahu, 2017). The measurement is taken at the largest diameter of the scrotum with flexible tape (Ebenezer *et al.*, 2021; Lukusa & Lehloenya, 2017). It is usually measured in centimetres (cm). The BSE guidelines in bucks are not well documented compared with rams (Mellado, 2016). Information based on the scrotal circumference of bucks is lacking (Tibary *et al.*, 2018). The available information is bucks aged more than 14 months with a scrotal circumference of more than 25 cm are acceptable for the breeding program and classified as excellent bucks (Tibary *et al.*, 2018). Therefore, this study was conducted to determine the effect of two groups of scrotal circumference on sexual performance and their correlation in local Boer bucks.

Materials and Methods

Experimental animals

This study was conducted at the Goat Farm, Biotechnology Centre of DVSS Keningau, Sabah. A total of ten Boer bucks, 1.5 years old with an initial body weight of 61.15±1.87 kg, were randomly selected. Bucks were grouped according to their scrotal circumference measurement, 25 to 28 cm as G-I (n=5) and 29 to 32 cm as G-II (n=5). Bucks were kept in individual pens and fed with commercial pellets (0.81 kg/head/day) and Napier grass (3.67 kg/head/day), calculated based on a 3% of body weight (DM basis) according to the routine farm practices. Drinking water was provided *ad libitum.*

Assessment of scrotal circumference

The Boer buck (n=10) was restrained in a standing position, and the scrotal was palpated to determine the presence of freely moving testes. The scrotal circumference was measured using a flexible tape at the widest scrotal diameter (Ebenezer *et al.*, 2021). The scrotal circumference recorded ranged from 25.5 to 31.5 cm. Later, the bucks were divided into two groups according to their scrotal circumference. The scrotal circumference of all bucks for both groups was measured every two weeks for 10 weeks (five times).

Assessment of sexual performance

Individual buck was allowed to mate naturally with oestrus doe. All does were synchronized using CIDR (Eazi-Breed CIDR®, Pfizer, New Zealand). The doe was restrained in a testing pen to prevent movement. The buck was placed at the start point three meters away from a restrained doe, and then it was free to mate with the doe for 30 min (Kerketta *et al.*, 2014). The mounts and ejaculations that occurred during the 30 min were recorded. Latency to the first mount was recorded from the time the buck was released, went to the doe, and attempted the first mount with the erected penis (Ebenezer *et al.*, 2021; Suyadi, 2012). Bucks without mount, ejaculate or no refractory period were assigned a score of 1800 sec (Mariani et al., 2011). The latency to the first ejaculation was recorded from the time the buck was released until the first ejaculation was attempted (Ebenezer *et al.*, 2021). The time between the first ejaculation and the next mount was recorded as the refractory period (Kumar *et al.*, 2016). The total number of ejaculations divided by the total number of mounts was used to calculate mating efficiency (Kerketta *et al.*, 2014; Mariani *et al.*, 2011). Data on

sexual performance were collected every two weeks five times in the morning.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 26 (2019). An independent sample T-test was used to analyze data on sexual performance; latency to the first mount, number of mounts, latency to the first ejaculation, refractory period, number of ejaculations, and mating efficiency of both groups. The correlation between scrotal circumference and sexual performance was analyzed using Pearson correlation at a 99% confidence interval.

Results and Discussion

Sexual Performance

The sexual performance of the two groups is presented in Table 1. The latency to the first mount (sec) for G-I and G-II were 40.17±6.58 and 56.89±15.00, respectively. The latency to the first mount in the current study was not significantly affected (P>0.05) by the scrotal circumference. There was limited research on the effect of scrotal circumference on latency to the first mount of bucks. Latency to the first mount or also known as libido is not affected by age of the buck (Kerketta *et al.,* 2014; Suyadi, 2012). In this study, Boer buck in both groups showed a moderate libido (<65 sec), since > 65 sec is considered a low libido (Ford *et al.,* 2009).

Table 1. Effect of scrotal circumferences on sexual performance (±SEM) of Boer bucks.

Parameters	Scrotal circumferences	
	GI (25 to 28 cm)	GII (29 to 32 cm)
Number of bucks	5	5
Latency to the 1st mount (sec)	40.17±6.58 [a]	56.89±15.00 [a]
No. of mounts (n/30 min)	33.60±3.38[b]	22.16±2.30[a]
Latency to the 1st ejaculation (sec)	721.76±153.00 [a]	486.03±140.83 [a]
Refractory period (sec)	698.72±159.36 [a]	527.41±148.18 [a]
No. of ejaculations (n/30 min)	1.56±0.31[a]	2.56±0.30[b]
Mating efficiency	0.06±0.02[a]	0.17±0.03[b]

[a,b] means in the same row with different superscripts are significantly different (P<0.05), SEM–Standard error of the mean. The number of replicates for each parameter was 25.

The number of mounts was significantly affected (P<0.05) by the scrotal circumference. The number of mounts in Boer bucks with a scrotal circumference GII was significantly lower (P<0.05) as compared to GI, by more than 30%. There were also limited studies on the effect of scrotal circumference on the number of mounts in bucks. Kerketta et al. (2014) reported that the number of mounts is influenced by the age of the buck, where young bucks mount doe numerous times until they successfully ejaculated, while matured bucks with sexual experience had fewer mounts.

The latency to the first ejaculation in this study was not significantly affected (P>0.05) by the scrotal circumference, which was in an agreement with the study reported by Suyadi (2012). The only difference is that the time recorded is short compared to this study, it may be due to the quality of the buck used, which is involved the certified buck by the Australian Boer Goat Association (Suyadi, 2012). The shorter time of the first ejaculation showed that the bucks had high sexual

performance and mating frequency (Mojapelo & Lehloenya, 2019; Gemeda & Workalemahu, 2017). Conversely, Kimsakulvech *et al.* (2015) also reported that the latency of the first ejaculation > 300 sec showed that the buck had a low sexual performance. Therefore, Boer bucks in this study showed low sexual performance as their latency to the first ejaculation was higher.

The refractory period in this study was not significantly affected (P>0.05) by the scrotal circumference. There was limited information on the effect of scrotal circumference on the refractory period in bucks but according to Kerketta *et al.* (2014), the age of the buck did not affect the refractory period, in contrary, the refractory period reported in this study was longer. The shorter time of the refractory period showed that the bucks had high sexual performance (Mariani *et al.,* 2011). Thus, Boer bucks in this study showed low sexual performance as their refractory period was higher.

The number of ejaculations was significantly affected (P<0.05) by the scrotal circumference. The number of ejaculations in Boer bucks in G-II was significantly higher (P<0.05) as compared to Boer bucks in G-I (50% higher). The number of ejaculations was not affected by buck age (Kerketta *et al.*, 2014). Variations in the number of ejaculations may occur due to variations in breed, environmental conditions, physical conditions, and sex motivation (Karaca *et al.*, 2016). Boer bucks in both groups of this study showed low sexual performance as the number of ejaculations was < 3.5 (Mariani *et al.*, 2011).

The mating efficiency was significantly affected (P<0.05) by the scrotal circumference. The mating efficiency in Boer bucks with a scrotal circumference between G-II (0.17±0.03) was significantly higher (P<0.05) as compared to G-I (0.06±0.02). The mating efficiency in the G-II was in the range of mating efficiency (0.10 to 0.18) in Saanen crossbred bucks (Karaca *et al.,* 2016).

In this study, both groups (G-I, G-II) demonstrated poor sexual performance, as measured by the number of ejaculations < 3.5, higher latency to the first ejaculation, and higher refractory period. Numerous studies indicated that the appropriate diet affected the sexual performance of bucks (Mariani *et al.*, 2022; Bano *et al.*, 2019). Therefore, strategic feeding is necessary to improve the low sexual performance of the local Boer bucks.

The correlation analysis between scrotal circumference and sexual performance of Boer bucks is presented in Table 2.

Table 2. Correlation (r) between scrotal circumference and sexual performance of Boer bucks

	SC	LFM	M	LFE	RP	E
LFM	0.133					
M	-0.476**	-0.210				
LFE	-0.108	0.292*	0.110			
RP	-0.046	0.281*	0.014	0.939**		
E	0.190	-0.131	-0.237	-0.660**	-0.646**	
ME	0.323*	-0.066	-0.586**	-0.457**	-0.382**	0.757**

Notes:

** Significant at (P<0.01), * Significant at (P<0.05), r -value for correlation. SC- scrotal circumference, LFM- latency to the first mount, M- number of mounts, LFE - latency to the first ejaculation, RP - refractory period, E – number of ejaculations, and ME - mating efficiency. The number of replicates for each parameter was n=50.

Scrotal circumference is strongly correlated with the number of mounts (r = -0.476, P<0.01), which showed that a bigger scrotal circumference had a lower number of mounts. Scrotal circumference also correlated with mating efficiency (r = 0.323, P<0.05), whereas big scrotal circumference had high mating efficiency. Meanwhile, the scrotal circumference did not correlate with latency to the first mount (r = 0.133, P>0.05), latency to the first ejaculation (r = -0.108, P>0.05), refractory period (r = -0.046, P>0.05) and the number of ejaculations (r = 0.190, P>0.05). Ford et al. (2009) reported that scrotal circumference had a higher correlation with latency to the first mount (libido) (r = 0.555, P<0.01) in Boer and Kiko bucks, where bigger scrotal circumference had high libido, which in contrast to the results in this study. Kerketta et al. (2015) reported that scrotal circumference correlated with the number of ejaculation (r = 0.471, P<0.05) in Rohilkhand local bucks which is also in contrast to the results in this study. The variation in the responses could be due to various factors, including breed, age, body condition, hormonal status, animal management, environment, seasons, and nutrition (Karaca *et al.*, 2016). A larger sample size is required to obtain more variability and a strong correlation.

The correlation between parameters of the sexual performance of Boer bucks is also presented in Table 2. A strong correlation was observed between mating efficiency with the number of mounts (r = -0.586, P<0.01), latency to the first ejaculation (r = -0.457, P<0.01), refractory period (r = -0.382, P<0.01), and the number of ejaculations (r = 0.757, P<0.01). Latency to the first ejaculation also had a strong correlation with the refractory period (r = 0.939, P<0.01), and the number of ejaculations (r = -0.660, P<0.01). The refractory period also had a strong correlation with the number of ejaculations (r = -0.646, P<0.01). Latency to the first mount correlated with latency to the first ejaculation (r = 0.292, P<0.05) and refractory period (r = 0.281, P<0.05). Meanwhile, no correlation was observed between latency to the first mount with the number of mounts (r = -0.210, P>0.05), the number of ejaculations (r = -0.131, P>0.05), and mating efficiency (r = -0.066, P>0.05). No correlation was also observed between the number of mounts with latency to the first ejaculation (r = 0.110, P>0.05), refractory period (r = 0.014, P>0.05), and the number of ejaculations (r = -0.237, P>0.05). There was also limited information on the correlation between parameters of sexual performance in goats. The current study was in agreement with Suyadi (2012), who reported that latency to the first mount (libido) did not correlate with the number of mounts (r = 0.08, P>0.05) in Boer bucks. It means that libido is not affected by the number of mounts. This study was in agreement with Kumar et al. (2016), who reported that latency to the first mount (libido) correlated with the refractory period (r = 0.12, P<0.05) in Jakhrana bucks. According to Kumar *et al.* (2016), the libido could be used to estimate the refractory period based on the correlation between latency to the first mount and the refractory period. A larger sample size is also required to obtain more variability and a strong correlation between parameters of the sexual performance of Boer bucks.

Conclusion

Boer bucks with a greater scrotal circumference (between 29 and 32 cm) improved sexual performance; decreased the number of mounts, increased the number of ejaculations, and increased mating efficiency compared to Boer bucks with a scrotal circumference between 25 to 28 cm.

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