

# Sexual behaviour and Semen Characteristics of Young Male Boer Goats in Tropical Condition: A Case in Indonesia

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## II. MATERIALS AND METHODS

**Abstract**—Sexual behavior and semen characteristics were evaluated in young male Boer goats in tropical condition during time period of September to November 2009. The animal was let to have adaptation for five months after importation from Australian climate. A total of 20 bucks were observed for sexual behavior and ability of semen production. Out of this number, 4 failed to libido and 3 produced poor semen. The remaining 13 animals were divided into three groups according to the ages (11-13, 15-16 and 18-25 months). Sexual behavior consisting response time to female teaser, ejaculation time, fixing strength to female and erection status were normally observed in 13 bucks, and there was no significant difference between age groups. Semen characteristics from 13 bucks were in normal quality in the volume, sperm mass motility, individual motility, percentage of live- and abnormal sperm. We concluded that it is possible to collect semen of Boer goats during the period of September to November under tropical condition. Collection during other time period should be analyzed.

**Keywords**—sexual behavior, semen characteristics, Boer goats, tropical condition.

### I. INTRODUCTION

IN artificial insemination program, to optimize production system and to shorten the generation interval, the semen must be collected from the youngest male possible. To make semen collection process more efficient, collection of semen should be done throughout the year from each male goat. However, libido, sperm production, sexual behavior, climate, nutrition of feed consumed and hormonal condition may limit the intensive use of males [1, 2]. Sexual behavior consisting the parameters of reaction time of male to the female or teaser, sexual aggressiveness, and score of libido, mating ability reported to significantly intercorrelated among these parameters [3]. So far, sexual behavior expressed significant relationship with the age and body weight of buffalo bulls.

Age of animals was reported to have influence on the sexual behavior in bulls. The efficient sexual behavior was observed in the mature animal than in to young animal [4]. The ability to mount and to response to the female highly influenced by stimulus regulation of female as teaser and the role of hormonal stimulation in goats [2] and bulls [5]. For developing goat production in Indonesia, the Faculty of Animal Husbandry, University of Brawijaya, Indonesia has introduced certificated merit bucks of Boer goats from Australia. Our plan was, we wanted to produce semen throughout the year and distribute the frozen semen to the some regions of Indonesia to improve genetic quality of local goats.

The present study was to evaluate the sexual performances and semen characteristics after adaptation period of five months in the tropical conditions.

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#### A. Animals and handling

A total of 20 male Boer goats with the age between 11 – 25 months during September to November 2009 were used in this study. These animals were elite bucks certified by Australian Boer Goat Association and imported from Australia in March 2009. So the animals have 5 months to get adaptation in new condition of tropical climate after they leaved their original environmental condition in sub-tropic climate.

The animals were maintained in semi open pen group of 5 bucks per pen separated from females in the Teaching Farm Station of the Faculty of Animal Husbandry, University of Brawijaya with the tropical climate. Daily temperature was in the range of 24 – 27 °C at the day and 22 – 25 °C at the night. Mixed corn leaves and stem chopped 1-1.5 cm in size and drinking water were served ad libitum (3 – 4 kg/buck/day). Additional feed of manufactured concentrate and mays corn seeds 1.0 and 0.75 kg/buck/day, respectively, were provided to the ration.

#### B. Training of the buck and semen collection

One month before starting the semen collection all bucks were trained to mount a local female goat either in estrus or non-estrus animal as teaser [2, 6]. Semen was collected using normal artificial vagina (AV) specific for buck.

The space between outer and inner layer was filled with warm water of 45 °C to perform internal AV temperature of 42 – 43 °C. During the semen collection process, when the buck mounted the doe, his penis was gently guided inside the AV. Each buck was performed for semen collection of 10 – 15 times at the interval time of 3 – 4 days (twice weekly). Semen ejaculate was collected into Falcon tube and was directly placed in waterbath at 30 °C until assessment. Semen assessment was performed within approximately 20 min in the laboratory located directly to the semen collection area.

#### C. Semen evaluation

Within 20 minutes after collection, fresh semen was evaluated macroscopic- and microscopically. Semen color was evaluated visually and observed as milky and creamy, pH and volume were directly recorded for each ejaculate.

Mass motility, individual/progressive motility, percentage of live sperm and –abnormal sperm were assessed under microscope with 100X or 400x magnifications, and sperm concentration was determined with a hemocytometer using bright-field microscopy [6].

Live sperm were evaluated by eosin/nigrosin stain exclusion. Briefly, a drop of stain was mixed with a drop of pure semen and extended on the slide. One hundred spermatozoa were counted, and the unstained spermatozoa were determined as viable cells [2].

#### D. *Libido and Sexual behavior evaluation*

Libido was assessed based on the reaction time and duration of ejaculation (ejaculation time). Reaction time was defined as the interval from introducing the buck to the female teaser until the start of first mounting. Ejaculation time was recorded according to how long the semen ejaculation took after entering the buck in the collection area or introduction to female teaser or defined as the time from introduction of the buck to the test area (female teaser) to ejaculation process. Reaction time and ejaculation time were measured in seconds [2,5]. The number of mountings required for ejaculation was also recorded. Fixing strength was defined as the score of hind leg to fix the semi membrane muscle of female teaser during ejaculation process (scale : 3= strong fixing, 2 = medium fixing, and 1 = weak or no fixing the teaser. Erection status was defined as appearance of penis during erection (scale: 3 = penis color bright red with or without seminal plasma secretion, 2 = penis color pink to pale red, and 1 = penis not out from prepuce.

#### E. *Experimental Design*

Out of 20 bucks, 4 bucks showed no libido and 3 of them produced semen with poor quality. The remain 13 bucks were divided into three groups according to the age; Group A – young animal aged 11 – 13 months, Group B, medium aged 15 – 16 months and group C, mature animals aged 18 – 25 months. Each buck received the same treatment, initially each of them introduced to estrus doe. When the buck showed gut reaction to the teaser and going to ejaculation, we replaced the teaser with non-estrus female, and sometime with other buck.

#### F. *Statistical analysis*

Quantitative data were analyzed with unequal number per group ANOVA test, while the qualitative data were presented descriptively.

### III. RESULTS AND DISCUSSION

Sexual behavior data consisting libido status (reaction time and ejaculation time), mounting, fixing strength of male to the female and erection status obtained from different age groups (young, medium and mature) of Boer goats maintained in tropical condition for about five months is presented in Table 1. Before semen collection, all the bucks should be trained to have responses to the female or teaser. For younger animals required normally more exercise to get capability response to teaser, to mount the doe and ejaculation.

Training of the bucks was begun with introduction to estrus female, and then to non-estrus and when the bucks showed a normal sexual response could be replaced with other bucks. This procedure was conducted to get more possibility for semen collection and so that not depend on the available estrus female.

From 20 bucks, 4 bucks failed to show the libido and no reaction when introduced to female teaser either in estrus or non-estrus condition and 3 of them showed normal sexual behavior when introduced to female teaser but the semen quality produced were poor and excluded from the calculation. Sexual behavior showed no significant difference between group in all parameters observed.

Libido expressed by reaction time and ejaculation time tended to longer interval time in the group of medium age of bucks ( $13.30 \pm 4.06$ ,  $15.96 \pm 3.05$ ,  $13.83 \pm 6.31$  and  $28.53 \pm 5.96$ ,  $30.32 \pm 5.62$ ,  $31.12 \pm 7.12$ , respectively).

Number of mounting of bucks when introduced to teaser until ejaculation occur was lowest in mature animal of group C than those in young and medium ages of animal in groups A and B ( $4.43 \pm 2.12$ ,  $4.87 \pm 0.96$ ,  $2.90 \pm 0.87$ , for the respective groups), although the difference was not significant. During copulation and the buck mount the female, the front and hind legs of male fix the hind body part of female. This action expresses the strength of male to fix the female and might be can be used to evaluate the libido of male when introduced to female.

Table I showed non significant decrease of fixing strength of different ages of male to female when mounting ( $2.80 \pm 0.13$ ,  $2.66 \pm 0.32$ ,  $2.10 \pm 0.00$ , for group A, B, C, respectively). Erection status that indicates the strength of penis and volume of blood flow in the penis veins was not influenced by the age of bucks. Like for fixing strength, the erection status slightly decrease by the age of bucks ( $2.82 \pm 0.12$ ,  $2.81 \pm 0.15$ ,  $2.12 \pm 0.64$ , respectively). In the present study, in general the age of bucks had no influence on the sexual behavior, this might be the number of samples was too small and the range of the age was not too discreted.

The ejaculation time in present study was similar to those reported ranged 19 to 49 sec [2]. Libido of bull was significantly influenced by age and season [4]. The reaction time was longer in animal group older than young animal, the means the reactivity of male to the female decrease by increasing the age of male [4, 7]. Long day period (summer season) decreased the libido and increased the reaction time. The libido performance affected by hormonal status on male was reported [5, 8]. The animal injected with cloprostenol increased the libido and therefore decreased the reaction time than the normal male. This was indicated that this injection could be an alternative to increase and the libido of male that have low one.

Table II showed there was no significant correlation between sexual behavior and semen production of Boer goat in this present study. All of the correlation values were low except between erection status and fixing strength of male to female, although the value was not significant. This indicated that male sexual aggressiveness supported the fixing strength to the male through the maleness hormonal stimulation. The results of this study was contradictive to the other authors [3] in buffalo bulls. They reported that libido significantly correlated with mating ability, and sexual behavior expressed significant relationship with age and body weight.

Semen from different age of Boer goats was collected during the period of September to November in Indonesian climate condition (no climate throughout the year). Table 3 showed the normal semen characteristics including volume, sperm concentration, live sperm, motility and abnormal sperm. No significant differences of semen characteristics between different age groups were observed. However, in general the semen production in group C was slightly higher than the other groups. This might be the animals in group A and B were not sufficient mature for semen production compared to group C.

TABLE I  
SEXUAL BEHAVIOR AND SEMEN VOLUME IN DIFFERENT AGES OF MALE BOER GOATS (mean±SD)

Variables	Group A (11–13 months)	Group B (15–16 months)	Group C (18–25 months)
Reaction time (sec)	13.30±4.06	15.96±3.05	13.83±6.31
Ejaculation time (sec)	28.53±5.96	30.32±5.62	31.12±7.12
No of mounting	4.43±2.12	4.87±0.96	2.90±0.87
Fixing strenght	2.80±0.13	2.66±0.32	2.10±0.00
Erection status	2.82±0.12	2.81±0.15	2.12±0.64
Volume of semen (ml)	0.97±0.21	0.74±0.43	1.07±0.12

TABLE II  
CORRELATION BETWEEN SEXUAL BEHAVIOR AND VOLUME OF SEMEN COLLECTED FROM YOUNG MALE BOER GOATS

Variables	Reaction time	Mounting	Fixing strenght	Erection status
Mounting	0.08	-	-	-
Fixing strenght	0.15	0.25	-	-
Erection status	0.16	0.16	0.68	-
Volume of semen	-0.09	0.02	0.29	0.22

TABLE III  
SPERM CHARACTERISTICS COLLECTED FROM YOUNG BOER BUCKS (mean±SD)

Variables	Group A (11–13 months)	Group B (15–16 months)	Group C (18–25 months)
Volume of semen (ml)	0.97±0.21	0.74±0.43	1.07±0.12
Sperm concentration (x10 <sup>6</sup> /ml)	28.71±160.94	2968.00±209.82	3119.40±66.89
Live sperm (%)	77.74±2.26	82.37±3.97	80.05±5.44
Individual sperm motil (%)	70.02±2.53	75.97±3.7	72.50±5.94
Mass sperm motil (%)	2.08±0.16	2.53±0.32	2.35±0.49
Abnormal sperm (%)	9.44±0.73	8.85±1.10	9.45±0.92

Maturity of buck for semen production were extreme interbreed differences in the age, depending on whether the animal belongs to an early- or late-maturing breeds [1]. Volume and sperm concentration of ejaculate were influenced by seasons and environmental temperature.

In subtropical and tropical climate, temperature may limit reproductive ability. The volume and concentration of spermatozoa were found to be decreased by high temperature and by high relative humidity and rainfall [1, 9, 10, 11, 12].

#### IV. CONCLUSION

It was concluded that five months adaptation periode of Boer goats to the tropical condition was sufficient for showing normal sexual behavior and semen production. With the short interval of ages, there was no significant different both sexual behavior and semen production in the young Boer goats. The evaluation throughout the year in tropical condition should be analyzed to make possibility more efficient semen production along of the year.

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