



Effect of estrous type of teaser female on caprine sexual behavior and semen parameters

[Efeito do tipo de estro da fêmeas manequim sobre o comportamento sexual e parâmetros seminais de caprinos]

"Artigo Científico/Scientific Article"

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Abstract

The objective was to address if different estrous types of teaser females affect sexual behavior and seminal parameters of Boer bucks under semen collection conditions. Six adult Boer bucks were submitted to 15-day semen collection sessions during a 60 day period. In the first session, the bucks were exposed to a female under natural estrous and subsequently, in the second session, to an estrous-induced teaser female. The reaction time and the quality of the libido were recorded. The total sperm concentration of the ejaculate was positively correlated with the volume, motility and percentage of live sperm when the female with natural estrous was used. In conclusion, the use of teaser female with hormonally induced estrous negatively affects the sexual behavior and semen quality of Boer bucks under semen collection conditions.

Key words: spermatozoa, oestrous, goat.

Resumo

O objetivo foi verificar se o tipo de estro da fêmea manequim afeta o comportamento sexual e os parâmetros seminais de bodes Boer em regime de coleta de sêmen. Seis bodes Boer adultos foram submetidos a duas sessões de coleta de sêmen de 15 dias durante um período de 60 dias. Na primeira sessão, os bodes foram expostos a fêmea em estro natural e, na segunda sessão, a fêmea em estro induzido. O tempo de reação e a qualidade da libido foram registrados. A concentração espermática total do ejaculado foi positivamente correlacionada com o volume, motilidade e porcentagem de espermatozoides vivos quando foi usada fêmea com estro natural. Em conclusão, o uso de fêmea manequim com estro induzido afeta negativamente o comportamento sexual e a qualidade do seminal de bodes Boer em regime de coleta de sêmen.

Palavras-chave: esperma; estro, cabra.

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Introduction

The introduction of exotic goat breeds has been intensified in recent years aiming to increase overall milk and meat production (SANTOS et al., 2005). However, there are still very few reports on the adaptation of these breeds to new environments and their utilization in breeding programs. Semen analysis is the most widely-used method for estimating buck fertility (BORQUE & SAGÜES, 1993). Semen production is influenced by several factors such as species, breed, age, season of year, and nutritional status and frequency of ejaculation (BRAVO et al., 1997; PRADO et al., 2003).

The objective was to analyze the seminal parameters and reproductive performance of Boer bucks raised in the Northeast of Brazil submitted to successive semen collections under different female stimuli.

Material and Methods

The experiment was conducted at EMEPA Experimental Station (Estação Experimental Benjamin Maranhão) located in Campo de Santana, Paraíba, Brazil, at 6°29'18" S and 35°38'14" W. The weather is hot and humid, with annual rainfall of 580 mm and mean temperature of 23 °C. The experiment was performed during march and april of 2005.

Six adult Boer bucks were used in the experiment, of which five were born in Brazil and one was imported from South Africa in 2001. Bucks had a mean age (\pm SD) of 3.0 (\pm 1.1) years, body condition score between 3.5 - 4.0, in an 1-5 scale, as suggested by GONZALEZ-STAGNARO (1991). Bucks were housed in individual covered pens, fed with tifton hay, water and mineral salt *ad libitum*. Animals were also supplemented with 0.8-1.0 Kg/day of concentrate supplement with 16% protein content.

Bucks were exposed to a 2-year old female under natural estrous during the

first session, and in the second session, to a estrous synchronized female by estradiol cypionate® (Tuco, Pfizer, Brazil) and 1 mL intramuscular injection two days prior to semen collection.

Buck was submitted to two 15-day semen collection sessions during a two-month period. Five semen collections were performed at each session with an interval of three days (A total of 10 semen collections per buck). There was a 20-day interval between the first and second session.

Bucks were weighted every 15 days and examined regarding their general sanitary condition, genital system, and submitted to andrological exams, as proposed by CBRA (1998). Prior to semen collection, the prepuce was washed with saline solution and dried. The ejaculates were collected with artificial vagina method (All bucks had been adapted to semen collection with artificial vagina).

The time elapsed from the moment the buck was introduced in the collection area to the moment of ejaculation (reaction time) and libido quality were recorded, in accordance with PRADO (2003). Macroscopic analysis was performed immediately after collection, in which every ejaculate was evaluated regarding its visual aspect (marbled, milky, opaque, and even watery), color (white, yellow and citrine yellow), volume, mass motility and vigor were evaluated according to BETINI et al. (1998).

Sperm concentration was evaluated utilizing a hemocytometer, as described earlier by SORENSEN (1982) and sperm pathologies were classified within major defects: in the acrosome and mid-piece, proximal protoplasmic droplets, strongly bent or curled tail; and minor defects: detached acrosome, distal cytoplasmatic droplet, bent or curled tail and normal isolated head, being viewed following eosin-nigrosin staining, in agreement with GALLOWAY (1974) and in agreement with GALLOWAY

(1974) and CBRA (1998). All evaluations during the experimental period were performed by the same technician.

All data were analyzed using SAS (SAS, Inc., Cary, NC, USA). The effect of female stimuli (natural estrous or induced estrous) for body weight, scrotal circumference, volume of testicle, semen volume and sperm concentration was analyzed by the GLM procedure and comparisons were performed by the paired t test. For the other parameters,

the NPAR1WAY procedure was used and the differences were analyzed by the Wilcoxon signed rank test. Correlation testing was assessed using the Spearman test. Values were expressed as mean ± SEM.

Results

The values for body weight, scrotal circumference, and testicular volume are presented in Table 1.

Table 1. Body weight, scrotal circumference (SCR) and paired testes volume^c (PTV) of Boer bucks under different female teasing stimuli

Measured Parameters	Natural Estrous	Induced Estrous	Sign
Weight (kg)	94.88 ±3.63	96.41 ±3.97	NS
SCR (cm)	32.83 ±0.45	32.54 ±0.39	NS
PTV (cm ³)	320.85 ±8.85	315.00 ±7.56	NS

^cPTV = 0.0396 x average testis length x SCR² from Godfrey et al. (1990). p < 0.05, NS = not significant.

No difference was observed between these physical parameters on bucks after changing the female stimuli for successive semen collections. Several seminal characteristics were influenced by female stimuli change (Table 2). It was observed that when a female in natural estrous was used as teaser, the libido and seminal volume, as

well as sperm concentration, consistency and motility, were higher (P <0.05) than estrous-induced female teaser. When sperm pathologies were considered (Table 2), it was observed that the percentage of defects was higher (P<0.05) when using the estrous-induced teaser.

Table 2. Semen and reproductive characteristics of Boer bucks under different female teasing stimuli

Measured Parameters	Natural Estrous	Induced Estrus	Sign
Reaction time (s)	83.53 ±48.68	129.17 ±41.40	NS
Libido	1.87 ±0.08	1.57 ±0.09	*
Semen volume (mL)	1.57 ±0.10	1.30 ±0.09	*
Sperm concentration (x 10 ⁹ x sperm mL)	4.16 ±0.25	3.25 ±0.26	*
Consistency	2.87 ±0.09	2.67 ±0.12	*
Color	1.80 ±0.19	1.67 ±0.17	NS
Motility	4.30 ±0.13	4.03 ±0.10	*
Live sperm	3.97 ±0.13	4.07 ±0.12	NS
Normal spermatozoa (%)	67.35 ±3.55	70.80 ±1.70	*
Abnormal spermatozoa (%)	1.61 ±0.17	5.48 ±0.47	*

*p < 0.05, NS = not significant.

The seminal characteristics showed that sperm concentration was positively correlated to the volume, motility and

percentage of live sperm when the female with natural estrous was used (Table 3).

Table 3. Correlation between various semen characteristics of Boer bucks under different female teasing stimuli

Semen characteristics	Natural Estrous	Induced Estrous
Semen volume x Sperm concentration	0.60 *	0.23
Motility x Sperm concentration	0.56 *	0.04
Live sperm x Sperm concentration	0.68 *	0.24

*p < 0.05, NS = not significant.

Discussion

Body score condition, weight (as measurement of body development) and scrotal circumference are relevant indicators of caprine reproductive potential. The Boer bucks selected for the experiment displayed these parameters compatible with descriptions for adult bucks of different breeds (BILASPURI e SINGH, 1992; VILAR

FILHO et al., 1993; AHMAND & NOAKES, 1996).

More importantly, no variation was observed in body score condition, weight or scrotal circumference throughout the experiment described here.

Few reports have aimed to describe sexual behavior of bucks, such as libido evaluation under natural mating or

semen collection settings (MACHADO et al., 1994; SANTOS et al., 2003). The reaction time found here is similar to what was described earlier, where reaction times ranged from 106 to 129 seconds (ROCA et al., 1991). A higher intensity in pre-mating manifestations in adult animals is expected due to sexual experience. This fact causes a longer reaction time that when adult bucks are able to test female receptivity before a mating attempt. It has been observed a positive correlation between reaction time, stimulation of the accessory sex glands and volume of ejaculate in goats (ALMQUIST, 1973). It was also reported that the expression of the libido and reaction time can be improved by changing the teaser female (PRADO et al., 2003). According to Thiery & Signoret (1978), the stimulus of the female after several matings seems to be the main factor that leads to the progressive increase of sexual activity in the male. The reaction time tended to be shorter with a larger ejaculate volume than when bucks were exposed to induced-estrous teaser female. It may be suggested that this stimulus, influenced by estrous type drove the differences in buck sexual behavior differences by unidentified factors.

The estrous of female teaser also affected semen quality of Boer goats. It can be hypothesized that the collection regimen may have influenced semen quantity and quality described here. The volume and number of spermatozoa per ejaculate decreases significantly in a collection program in sheep (AMIR et al., 1986), due to the continuity of the stimulus and available fluid, although sheep can ejaculate many times daily for several weeks before spermatozoa reserves in the epididymus become severely depleted. In bucks collected five times a day (every five successive days) displayed a marked decline in semen volume, sperm concentration, and

number of live sperm (RITAR et al., 1992). However, the males showed no sexual or physical effects collected within intervals of three days in the present report. Therefore, the variations found in the seminal parameters were solely due to the change of teaser female stimulus.

The lower motility of the sperm collected from the male with induced-estrous goat was probably due to the higher percentage of sperm pathologies, mainly bent tail with droplet and strongly bent or curled tail, which represented most pathologies.

It is also noteworthy that although the seminal variables do not directly influence fertility, such variables are decisive for determining if the ejaculate is rejected (ABOAGLA and TEREDA, 2003). Even after changing the female teaser stimulus, the values are within the normal range of goat seminal quality parameters (CBRA, 1998). Evaluation of sperm pathologies is an important parameter for assessing semen quality and overall fertility (COLAS, 1983; CHEMINEAU et al. 1991; MIEUSSET et al. 1992). The values of sperm pathologies are in accordance to established parameters set by CBRA (1998), where sperm pathologies should not exceed 15% for goat semen.

The interactions between genders exercise an important function in the stimulus and maintenance of the sexual behavior in goats of both sexes. The characteristic of sexual behavior can be influenced by factors such as genetics, season of year, breed, hormonal levels (androgens), hygiene, management, dominance, and age (SANTOS et al., 2006). Based on the results described here, it was possible to establish that estrous type of teaser female influences semen quality, possibly due to diminished but yet unidentified libido stimulating factors. Further research is

needed in order to investigate these elusive libido stimulating factors that was beyond the scope of the present research.

Conclusion

The exposure of Boer bucks to a teaser female with hormonally induced estrous during semen collection negatively affects sexual behavior and seminal quality.

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