

Seminal characteristics of marota bucks in the northeast of Brazil

Características seminais de bodes Marota no nordeste do Brasil

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Abstract

The seminal characteristics of the Marota breed type, native of Brazilian Northeast are still unclear. Six Marota bucks aged between two and three years and average weight of 29.7, had their semen collected twice a week through artificial vagina, during one month in presence of female on induced rutting with estrogens. The characteristics of the collected semen related to: aspect, coloration, volume, pH, mass motility, concentration and sperm motility were observed. These animals presented yellowish, creamy semen aspect, medium volume of 0.5 ± 0.01 ml, pH of 6.5 ± 0.02 , mass motility of 3.5 ± 0.07 , and concentration of $1.5 \times 10^9 \pm 0.09$ spermatozoa/mL. In relation to morphology, the semen presented $93.8 \pm 0.2\%$ alive spermatozoa with normal acrosome, $1.2 \pm 0.1\%$ of alive spermatozoa with damaged acrosome and $5.0 \pm 0.1\%$ dead spermatozoa. Researches related to characterization of the Marota buck semen including biochemical analyses must be continued, keeping in mind the preservation of the native racial goat types in the Brazilian Northeast.

Keywords: caprin, seminal characteristics, Marota.

Resumo

As características seminais da raça Marota, nativa do nordeste do Brasil, não são ainda bem conhecidas. Seis bodes Marota com idades entre dois e três anos e peso médio de 29,7 kg, tiveram o sêmen coletado duas vezes por semana através de vagina artificial, durante um mês em presença de fêmea com cio induzido pela aplicação de estrógeno. As características avaliadas do sêmen coletado foram: aspecto, coloração, volume, pH, motilidade massal, concentração e motilidade espermática (espermatozoide vivo com cabeça normal e danificada) foram observados. Os animais apresentavam libido, sêmen de aspecto cremoso, volume médio de $0,5 \pm 0,01$ ml, pH de $6,5 \pm 0,02$, motilidade massal de $3,5 \pm 0,07$ e concentração de $1,5 \times 10^9 \pm 0,09$ espermatozoides/mL. Em relação à característica morfologia, o sêmen apresentou $93,8 \pm 0,2\%$ células vivas com acrossoma normal; $1,2 \pm 0,1\%$ dos espermatozoides vivos com acrossoma danificado e $5,0 \pm 0,1\%$ de espermatozoides mortos. Embora a caracterização do sêmen de caprinos Marota tenha sido realizada, ainda é necessária a inclusão de análises bioquímicas, pois estes tipos raciais de caprinos do nordeste do Brasil precisam ser preservados.

Palavras-chave: caprino, características seminais, Marota.

Introduction

In Brazil, the largest goat flock is found in the Northeast area, being equivalent to 88,5% of the national revenue (IBGE, 1996). This species, submitted to the ultra-extensive creation during centuries, originated highly rustic flocks such as the native breed types: Canindé, Gurguéia, Repartida and Marota (Gillet, 1990; Oliveira & Lima, 1994), besides the Moxotó race, well adapted to the adverse area conditions but without defined aptitude. These goats represent one of the main economic activities in the native semi-arid Brazilian Northeast (Medeiros et al., 1994; Pimenta Filho & Simplício, 1994), because their milk and meat are the main sources of animal protein for the population of low income, and their skin (which is destined mainly to exportation), constitutes an additional resource for obtaining goods which are not produced in the properties (Silva et al., 1994).

Due to the low productive potential of the Brazilian Northeast native animals, exotic breed animals have frequently been

introduced in that region, aiming the increasement of milk production mainly. These insertions, without a preestablished improvement genetic program, have caused damages to the genetic native material of the goat flock of Brazilian Northeast (Medeiros et al., 1994).

The Marota racial type presents small stature and reduced milk production, however its rusticity and adaptation provide them a capacity to survive and to produce in an unfavorable environment (Medeiros et al., 1990b). In spite of the unexistence of official description of its racial type, the Marota goats present very defined phenotypical characteristics, close to Saanen breed: the crossing have occurred in order to obtain larger milk production, besides skin uniformity and adaptation to the environment (Medeiros et al., 1990a).

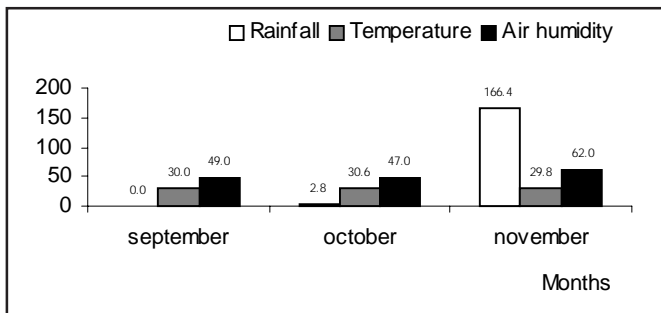
Considering the reduced number of information about this racial type, specially those related to reproduction, this work had as its aim the analyzis of the seminal characteristics of Marota racial reproducers native of Brazilian Northeast.

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Material and method

This experiment was done in the period from September to November 1998 in the Federal University of Piauí, located in the city of Teresina, state of Piauí, Northeast of Brazil, at 5° 5' of South latitude and 42° 49' West longitude, and 72 meters above sea level (Sudene, 1990).

According to the Köopen classification, the area possesses a savanna with AW typical climate, characterized by the dry and wet season. The temperature, rainfall and relative air humidity during the experiment are represented in the graphic 1 below (Instituto Nacional Meteorologia, 1998).



Graphic 1: Monthly data of rainfall (mm), temperature (°C) and air humidity (%) in Teresina, Piauí State, Brazil.

Six normal mature Marota bucks from the Embrapa Company of Agricultural Research located in northern Brazil were used. The average age was 2 or 3 years and the average weight was 29.7 kg, they were handled in an intensive system while received ration concentrated with 13% of gross protein and 70% of TDN, and a large quantity of *Pennisetum purpureum Schum cv napier* in the trough, water and mineral salt "ad libidum", in order to follow the nutritive necessities of the animals in reproduction.

The animals had an adaptation period of six weeks (from September to October), when they were trained to ejaculate in artificial vagina, in the presence of female goats in induced rutting with estrogen by weekly intramuscular application of 10 mg of estradiol (ECP – Tuco, Rhodia-Merieux, SP).

After this training period the experiment itself really began. The semen was collected twice a week (from October to November), in 48 collections (6 males ejaculated twice a week per 4 weeks). It was evaluated in quality traits including coloration, volume, seminal pH, concentration, mass motility and sperm morphology.

Aspect and coloration: they were evaluated through the visual observation, being considered normal the creamy aspect semen and yellowish coloration;

Volume: it was measured in the glass collector of the artificial vagina, graduated in milliliters;

Semen pH: it was measured with portable pHmetro;

Mass motility: it was observed through the placement of a fresh semen drop in a slide for verification in a common optic microscope in a 5x magnifications. The scores were given according to the scale suggested by Chemineau and collaborators (1991);

Concentration: it was determined through haemocytometer, using saline formol solution in the proportion of 1:200. The spermatozoas were counted in the microscope field corresponding to 80 smaller squares in 400x magnifications. The cells from the right and superior lines which are around the great square were not counted. The result was multiplied by 10,000 and given in spermatozoa semen number/ml.

Sperm morphology: immediately after the collection, three slides of each of the samples (to increase the accuracy) were prepared in new slides and previously heated up to 37°C. The used dyes were the saturated solution of red Congo and the gencian violet at 0.5%. The colored slide was taken to the phase contrast microscope in objective of 100x for cells observation. The spermatozoa were classified as alive (with normal or damaged acrosome) and dead spermatozoa. In each slide, 200 cells were counted. In order to observe the slides, the charriôt was used in diagonal movements from the left to the right and from the top to the bottom. The morphology results were taken from the average of the three slides.

Statistical Analysis: The averages of Marota buck semen characteristics, were obtained with standard error and coefficient variation for data according to the studied parameters.

Results and discussion

Based on visual analysis of the semen, it was verified that the studied Marota bucks presented semen of good quality, with creamy aspect and yellowish coloration. The results for semen volume, mass motility, pH and semen concentration are shown in Table 1, which can be considered typical for the caprin species.

Table 1 – Analysis quanti-qualitative of the Marota buck semen soon after collection

Characteristics	Mean ± S.D.	CV (%)
Volume (ml)	0.5 ± 0.01	21.8
Mass motility (0-5)	3.5 ± 0.07	14.2
PH	6.5 ± 0.02	2.6
Concentration (×10 ⁹ sptz/mL)	1.5 ± 0.09	40.3

In this experiment, special attention was also given of the morphological characteristics the acrosome, due to its important role in the fertilization. The results of acrosome morphology are presented in table 2, where a high percentage of alive spermatozoa with normal acrosome can be verified.

Table 2 – Spermatic morphology of Marota bucks soon after collection

Spermatic morphology	cells (%)	CV (%)
Alive normal	93.8 ± 0.2	1.0
Alive damaged	1.2 ± 0.1	40.4
Deads	5.0 ± 0.1	12.1

Aspect and coloration: In the scientific literature, most of the authors don't mention the coloration and the semen bucks aspect in their work and relegate these parameters to a second plan. The semen of adult bucks has yellowish coloration and creamy aspect (Hafez, 1995; Mies Filho, 1987; Nunes, 1982), and the ejaculations out of this standard must be discarded.

It was verified through those ejaculations visual analysis that the studied Marota bucks presented good quality semen, according to the patterns for this species. These results suggest the clinical-andrological conditions of the reproducers because an altered coloration of the semen can be related to chronic or recent lesion on the genital apparatus (Mies Filho, 1987), which could endanger its quality and influence in the conservation of the semen. On the other hand, a low volume and a high sperm concentration of the semen aspect (Traldi, 1983) can indicate a good functioning of the additional sexual glands and the reproducers proper spermatogenesis accomplishment.

Volume: The medium seminal volume found in this experiment (0.5 ml) was inferior to 0.7 ml for the same racial type, described by the authors (Marinho e Nunes, 1991; Vinha e Megale, 1974) and to Repartida and Moxotó breeds in which experiments, the artificial vagina to collect semen method was used (Marinho e Nunes, 1991), and it was inferior to 0,8 ml for Marota and Moxotó breeds in which the eletroejaculation method was used. It was however, superior to the one of Moxotó breed (Traldi et al., 1984), also born in brazilian northeast.

In relation to the imported races (Silva et al., 1994; Souza, 1984; Vinha e Megale, 1974) or half-blooded bucks of native with imported breeds (Rodrigues, 1997) the volume that was found in Marota breed was inferior, as expected, due to the reduced size of the native animals.

Mass motility: The mass motility is a fast and easy manner of quality measurement, effective enough to detect ejaculations in which the spermatozoa are dead or to evidence low quality of the sperm motility (Baril et al., 1993; Chemineau et al., 1991). In this experiment, the mass motility found was superior to the obtained values for the native breed types Canindé, Repartida, Marota and Moxotó (Marinho e Nunes, 1991) and also to the mixed breed Pardo Alpino/Anglo Nubiano/Moxotó (Rodrigues, 1997), what suggests the presence of larger number of alive and mobile spermatozoa, with potential capacity of reaching an oocyst even through this parameter does not keep a positive correlation with fertility (Silva & Nunes, 1987).

Sperm concentration: The goat semen is characterized by high sperm concentration, in a invert proportion to the seminal volume. In this work, the obtained concentration was within the limits of 10^9 a $3,5 \times 10^9$ spztz/ml, for adult bucks sexually mature (Nunes, 1982). Our result was, however, inferior to the standard values for Canindé, Repartida, Marota and Moxotó goats (Marinho & Nunes, 1991) and Parda Alpina/Moxotó mestizzos (Rodrigues, 1997), of 2,2, 2,7, 2,2, 2,6 and $1,9 \times 10^9$ spztz/mL, respectively. For the fact of existing an inverse correlation between the ejaculation volume and sperm concentration, it was expected that the found concentration were superior to the one obtained by the authors, for they report superior volumes to the ones obtained in this work. These inferior results can be related to the differences among breeds or to the high temperatures of the area at the time of this work, which influenced in the spermatogenesis process negatively.

The found result in this experiment was superior to the one found for the Marota and Moxotó bucks, of 1,1 and $0,8 \times 10^9$ spztz/mL, respectively, with the use of the electroejaculation method (Vinha & Megale, 1974). This fact can be due to the differences among collection techniques used in the two experiments, for some authors report that the electric stimulation on the bucks's genital tract leads to a great deal of semen volume, even though with a low sperm concentration, in comparison to the collection through artificial vagina (Greyling & Grobbellaar, 1982; Memon et al., 1986; Prasad et al., 1970), while other authors (Rodrigues, 1997) don't mention differences between these two collection techniques.

pH: The buck semen pH varies from 6,2 to 6,8 and it presents fundamental importance in the *in vitro* quality of the ejaculations, for variations in the limits of acidity or alkalinity decrease the resistance of the incubated spermatozoa in 37 °C (Nunes, 1982). The medium pH value of the Marota buck semen in this experiment is in compliance with the typical values for the species (Nunes, 1982; Nunes & Freitas, 1989; Nunes et al., 1997), being, however, inferior to the one obtained for Canindé, Repartida, Marota and Moxotó bucks, of 6,8, 6,8, 7,2 and 6,9, repectively (Marinho & Nunes, 1991) and for Parda Alpina/Anglo Nubiana/Moxotó mestizzos of 7,5 and for Boer bucks of 6,7 (vagina (Greyling & Grobbellaar, 1982). The bucks used in this experiment just presented a small variation in relation to this parameter, confirmed by the reduced variation coefficient (2.6%). These results don't show relation to other studied parameters.

Sperm morphology: The animals that had their semen evaluated in this experiment presented a small rate of dead spermatozoa (5%), inferior to the 20 to 30% referred as acceptable maximum limit of sperm mortality for semen giver bucks (Baril et al., 1993). This value, associated to the reduced number of alive spermatozoa with damaged acrosome, allows good results expectance in relation to the *in vitro* quality and *in vivo* of this semen, for the presence of dead/damaged spermatozoa in the ejaculation, and later, in the diluted semen, can result adverse effects on its potential fertility.

The acrosome alteration, intrinsically correlated with the *in vitro* fertility, affects significantly the *in vitro* fertility (Marinho & Nunes, 1991) for it possesses an important function in the spermatozoa connection to the oocyst, at the fertilization moment (Bazer et al., 1995). The lesions in the acrosome can be caused by spermatozoa aging due to the extended abstinence, by improper procedure involving the treatment of sperm during the experiment or by sperm pathologies (Mies Filho, 1987).

The citations exclusively related to the acrosome are reduced, being generally related to head defects. In this experiment it was found a low number of spermatozoa with damaged acrosome, in spite of high temperatures of the region. This rate was inferior to the reported one for bucks of the Saanen breed, in the northeast of Brazil (Souza, 1984), but superior to the ones mentioned for native animals of the region (Vinha & Megale, 1974). However, this should not jeopardize, the fertility results of this breed in suggesting the adaptation of these animals to the high temperatures they were submitted (Santos & Simplício, 1993). One should keep in mind that other sort of sperm abnormalities were not considered in this work as the ones which cause alterations in the sperm motility on hindering the arrival of the spermatozoa in the oocyst.

Conclusions

From these obtained results, one may conclude that the Marota breed type is well adapted to the area conditions in which the experiment was conducted, presenting compatible semi-

nal characteristics to the species continuity. Marota bucks semen characterization requires further study, including biochemistry analyses, keeping in mind the preservation of the native racial types of the Brazilian northeast bucks, as adapted germ plasm bank source.

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