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Reproductive characteristics of Rayini male goats of Kerman province in Iran

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Abstract

An artificial vagina was used to collect semen from 14 native Iranian Rayini goats, at 15-day intervals starting on 1 July and ending on 30 December 2000. Testicular size, semen volume, sperm concentration, percent live sperm, percent normal sperm, and total number of live-normal sperm were significantly higher during the summer months. The average semen volume, percent live sperm and percent abnormal sperm during the sampling period varied between 1 and 1.4 mL, 60 and 78%, and 7 and 13%, respectively. The total number of live and normal sperm in the ejaculate during the sampling period varied from 1000 to 2500 million. Testicular size, semen volume and the total number of live and normal sperm were significantly greater in bucks weighing 55–60 kg as compared with 50–54 kg. Seminal fluid pH values were significantly lower from July to October (pH <6) than the values from November to December (pH >6.1). Lowest level of lactate dehydrogenase in the seminal fluid was recorded in early September (2.2 U/mL) and the highest level in November (2.5 U/mL). Seminal fluid K ion level increased gradually from July (52 mg/dL) to the November (97 mg/dL). Variation of seminal fluid Na ion concentration (71–74 mg/dL) was not significant during the sampling period. The correlation coefficients of total number of live-normal sperm with seminal fluid K level ($r = -0.65$) and LDH ($r = -0.36$) were negative ($P < 0.01$). The data indicated that the semen quality and quantity of Rayini bucks were higher during summer and early autumn.

Keywords: Goat; Semen characteristics; Lactate dehydrogenase; Sodium; Potassium

1. Introduction

Compared with other farm animals, less attention has been paid to physiology of reproduction in male goats (Gordon, 1997). Seasonal variations in testicular weight, sperm production,

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mating activity and fertility of goats have been studied in several locations (Ahmed et al., 1997; Al-Ghalban et al., 2004; Al-Hazab and Basiouni, 1988; Chemineau et al., 1987; Greyling and Grobbelaar, 1983; Hibbert et al., 1986; Karagiannidis et al., 2000; Martemucci et al., 1998; Okere et al., 1986; Pandey et al., 1985; Roca et al., 1992a,b; Sinha and Singh, 1982); however, comprehensive information is lacking on many aspects of reproduction in bucks. Some studies have measured only a few of the many chemicals in the buck semen. Concentrations of fructose and citric acid were studied in the seminal fluid of Nubian (Ali and Mustafa, 1986) and Murciano-Granadina (Roca et al., 1993) goats. Ali and Mustafa (1986) also reported on the activity of alkaline phosphatase in the seminal fluid of the Nubian bucks. Mendoza et al. (1989) found high concentration of fructose and lactic acid in the seminal fluid of Angora goats but glucose was present only in trace amounts.

There are about 25 million goats in Iran, of which about 5 million are cashmere goats, including 700 000 in the city of Baft, in Kerman province. Flocks have been established aimed at preserving and breeding Iranian native goats. The program involves, oestrous synchronization and artificial insemination, based on information published in the literature because there are no published information on the reproductive characteristics of Iranian native goats. This study was therefore undertaken to investigate some of the reproductive characteristics of Rayini he-goats (bucks) in Baft Research Station for Rayini goats.

2. Materials and methods

Rayini goat breeding station is located in the city of Baft, 180 km south-west of Kerman city, Iran. It is about 2270 m above sea level with an altitude of 56°36′ and latitude of 29°17′. Initially 20 fertile bucks (3-years-old) were randomly selected and put into a training program for semen collection through an artificial vagina. The male flock had been genetically selected over 3 years according to the program designed for the station. Overall, 14 bucks could be successfully trained to serve the artificial vagina over a 2-week training period. Each buck received a daily allowance (as fed basis) of 2.5 kg good quality alfalfa hay and 0.3 kg barley grains, according to the managerial practices in the station. As calculated, the daily feed supplied 4.8 Mcal metabolizable energy and 320 g crude protein. The experimental bucks weighed between 50 and 60 kg at the start of the experiment. Semen was collected from 1 July to 31 December, 2000 at 15-days interval, on 13 occasions.

The ejaculate volume, sperm concentration (photometer, IMV, L'Aigle, France), percent live sperm (eosin–nigrosin method), and percentage of normal sperm in stained smear were determined (Sorensen, 1979). Scrotal circumference was measured by using a tape-measure, and combined testes width, and testis length in the scrotum were determined by using a caliper. Seminal pH was measured by using a pH-meter (Testo-230-GmBH, Germany). The ejaculate was then centrifuged (10 000 rpm for 30 min) and seminal fluid was separated for chemical analysis. Lactate dehydrogenase (LDH) activity in the seminal fluid was determined immediately after centrifugation by using a commercial kit (Pars-Azmoon Co., Tehran; LDH analyzer, Kone Co., Finland) The remaining seminal fluid was kept frozen at −20° C until analyzed for sodium (Na^+) and potassium (K^+) ion concentrations (Flame photometer; Seac-FP20, Italy). Concentrations of Na^+, K^+ and LDH were determined for the first 10 semen samples.

For data analysis the experimental bucks were grouped into two weight categories; 50–54 kg ($n = 9$) and 55–60 kg ($n = 5$) with a mean body weight (±S.D.) of 52.0 ± 1.9 and 56.8 ± 2.2, respectively ($P < 0.0004$). The percentage data were transformed to arcsine, and all data were subjected to repeated measures ANOVA (Littell et al., 1998) using Proc Mixed of the SAS (SAS,