Original Research Article

Short Communication

Semen Characteristics of West African Dwarf and Red Sokoto Bucks in a Tropical Environment

***Akporhuarho, P.O., Udeh, I. and Etaredafe, G.**

Department of Animal Science, Delta State University
Asaba Campus, Asaba, Nigeria

*Corresponding author: okpakophilip@gmail.com

Received 6th March, 2018; Accepted 27th June, 2018

Abstract

This study was carried out at the Teaching and Research Farm of the Delta State University Asaba Campus, Asaba, Nigeria to compare the semen characteristics West African Dwarf (WAD) and Red Sokoto Goat (RSG) bucks using four bucks per breed. Semen was collected twice weekly for 12 weeks by the electro-ejaculator method. There were no significant differences between the semen of WAD and Red Sokoto goats with respect to semen volume and mass density. However, the WAD bucks were significantly superior to RSG bucks in sperm motility, mass action, sperm concentration and live:dead sperm ratio. This implies that the WAD bucks may have a higher fertility potential than the RSG bucks.

Keywords: West African Dwarf, Red Sokoto goats, buck, semen.

Introduction

Reproduction is one of the most important features of living organisms. Life would not exist on earth if plants and animals did not reproduce. By reproducing, a living organism can be sure that there is another individual of its kind to take its place when it dies. In this way a species of organisms guarantees its survival.

Evaluation of semen is an important aspect of the determination of the reproductive status of male animals. Studies carried out on the semen characteristics of bucks (Hafez, 1980; Hafez, 1995; Kondracki *et al.*, 2002) reported the minimum standard for classification of 'probable fertile' semen samples in a bull to be 500 million spermatozoa per ml, more than 50% of motile sperm make a forward progression and more than 80% of the spermatozoa conform to normal morphology. If any of these criteria is not met, particularly with samples of three or more ejaculates, the bull is

considered infertile. Hafez (1980) and Adedeji and Gbadamosi, (1990) also stated that the evaluation of the male for breeding soundness must be based on scrotal circumference, and morphology of spermatozoa.

It has been shown that young animals and those small in size within a species produce smaller volumes of semen. Frequent ejaculation results in lowered average volume (Hafez, 1995; Oyeyemi *et al.*,2002). Semen quality and its relationship to fertility are of major concern in animal production and breeding. Thus quality tests are routinely used to determined semen for breeding purposes

Conventionally, the principal laboratory tests for standard semen analysis at most artificial insemination centers use the light microscope to estimate sperm survival: percentage of motile (and progressively motile) spermatozoa (Meirose and Laing; 1970).

Many small scale farmers in Nigeria rear goats as sources of income and for traditional ceremonies especially in the humid zone of the country. Among the breeds of goats commonly reared are the West African Dwarf and Red Sokoto breeds. Information on the semen characteristics of these goats is scanty despite importance of good quality semen to reproductive performance of these goats. In view of the need to improve the productivity of livestock, there is need to study characteristics of semen so that we recommend animals that have good quality semen to local farmers in the villages. Therefore, this study was designed to compare the semen of the West African Dwarf and Red Sokoto bucks.

Materials and Methods

The Experimental Site

The experiment was conducted at the Poultry unit of the Teaching and Research Farm of the Department of Animal Sciences, Delta State University, Asaba Campus, Nigeria. Asaba is located on latitude 06° 49[1] North of the equator and longitude 06° 49E of the Greenwich meridian. Asaba has a rainy season which extends from April to October, and a dry season from November to March. Mean monthly rainfall is 1500.0-1849.3mm April to October. The dry season is characterized by very high temperatures, and a monthly average precipitation of 1117mm.

The Experimental Animals and their Care

Four West (WAD) and four Red Sokoto Bucks were bought from Asaba market for the study. The goats were housed in a dwarf-walled house for proper ventilation. Prior to the arrival of the goats, the house was thoroughly washed and disinfected, and allowed to stand for 3 days. The animals were acclimatised for two weeks before semen collection. They were dewormed with Livaget injection three times during the course of the experiment. The animals were also vaccinated against PPR virus (Peste de petits ruminants) with PPR virus vaccine, and fed with cut elephant and guinea grasses supplemented with groundnut hay *ad libitum*. They were occasionally allowed to graze around the pen. Water was provided at all time.

Semen collection

Semen was collected twice weekly from each of the bucks with an electro-ejaculator for a period of 3 months. Before the commencement of semen collection, all the glassware and other equipment needed for the study were washed with water, rinsed with distilled water and sterilized in hot air oven. Prior to semen collection, the prepuce area of each of the bucks was trimmed and cleaned with a disinfectant. Semen was collected by inserting the probe of the electro-ejaculator which was lubricated with petroleum jelly, gently into the rectum. Current was then gently applied at an incremental rate of one volt every seven seconds (Cameron, 1977) until ejaculation occurred and semen collected into a graduated test tube. The test tube was put into an insulated flask containing warm water at 37ºC.

Semen Evaluation

Each ejaculate was immediately evaluated for volume, sperm motility, mass action, sperm concentration, live/dead sperm ratio and mass density. The color was visually evaluated. Motility was determined by placing a drop of raw undiluted semen on a pre-warmed microscope slide, examining under a light microscope and evaluating it subjectively on a 0-100 scale.

Each ejaculate was immediately evaluated for volume, sperm motility, mass action, sperm concentration, live/dead sperm ratio and mass density. The color was visually evaluated. Motility was determined by placing a drop of raw undiluted semen on a pre-warmed microscope slide, examining under a light microscope and evaluating it subjectively on a 0-100 scale. Thereafter, a drop of fresh semen was mixed with a drop of Nigrosine-Eosin stain (Zaneveld and Polakoski, 1977) on a warm microscope slide, and a thin smear of semen was made with a second slide, air-dried and kept for determination of live-dead ratio. The sperm that took the stain (i e. dead cells) were determined by counting under three fields under the light microscope, and expressing the mean as a percentage of the total sperm counted.

Sperm concentration was determined by diluting one part of the semen in 199 parts of physiological saline, introducing the mixture into the counting chamber of a Neubauer haemocytometer, and counting at 200X magnification under a light microscope, and multiplying the average number of sperm counted by an appropriate factor according to the procedure described by Zaneveld and Polakoski, (1977) to determine the concentration of sperm per ml of semen

Results and Discussion

Table 1 shows the mean and standard errors of semen characteristics of WAD and RSG bucks. The result showed that there was no significant difference between the semen of WAD and RSG goats with respect to volume and mass density.

Table 1. Means ± SE for semen characteristics for WAD and RED Sokoto Goats

Parameters	WAD	RSG	Significance
Volume (ml)	0.35±0.07	0.40±0.06	Ns
Motility (%)	61.67±3.07	43.33±2.11	**
Mass action	2.50±0.22	1.33±0.21	*
Concentration ($xl0^6$/ml)	4.33±9.89	5.33 ±1.09	*
Live/Dead ratio	1.83±0.24	0.74±0.18	*
Colour	creamy'	Creamy	Ns

ns = not significant * = significant ($p<0.05$); ** = highly significant ($p<0.01$)

However, there were significant differences in the sperm motility ($P<0.01$), mass action, sperm concentration and live/dead sperm ratio ($P<0.05$) between the two breeds. Austin *et al.* (1968) reported that semen samples obtained by means of artificial vagina tended to have higher sperm concentration than those obtained by electro-ejaculation. Greyling, and Grobbelaa, (1983) reported genetic variations in semen characteristics among goats. This may be the reason for the difference in sperm concentration obtained in this study. The values fell within the range reported by Akpa (2000).

Semen colour for the WAD and Red Sokoto goats maintained a constant creamy colouration throughout the period of the experiment. Arthur (1977) also reported creamy white colour for most breeds of goats. However Ali and Mustapha (1986) and Bearden and Fuquary (1992) reported creamy yellow semen in goats, which agreed with findings in this study.

Conclusion

The results obtained in this study indicate that bucks of WAD goats, if well managed, are likely to be more fertile when compared to Red Sokoto bucks.

References

Adedeji; O.S. and Gbadamosi, A.J. (1990). Relationship of Scrotal circumference to age, body weight and the right and left length in the red Sokoto (maradi) goats. Proceeding of 26^{m} Annual NSAP Conference, Ilorin, pp. 307-308.

Akpa, G.N. (2000). Factors affecting growth and body measurements of traditionally managed Red Sokoto goats. Proceedings of 25ta Annual Conference of NSAP, Umudike, pp. 262- 263.

Ali, B.H. and Mustafa, A.I. (1986). Semen characteristics of Anglo Nubian goats in Sudan. *Animal Reproduction Science* 12: 63-68.

Arthur, G.H. (1977). *Veterinary Reproduction and Obstetrics.* 4th Edition, Elos and Bailliere Tindall, London.

Asaba Meteorological Station (2003). Weather Report. Asaba: Meteorological Station. Federal Ministry of

Aviation.

Austin, J.W., Leidy, R.B., Kris, G.M. and Hupp, E.W. (1968). Normal value of semen Collected from Spanish goats by two methods. *Journal of Applied Physiology* 24:339-372.

Bearden, H.J. and Fuquaiy, J.W. (1992). Semen Evaluation. In: *Applied Animal Reproduction*. 3r Ed .Prentice Hall, Englewood Cliffs, New Jersey, pp. 163-173.

Austin, J.W., Leidy, R.B., Kris, G.M. and Hupp, E.W. (1968). Normal value of semen Collected from Spanish goats by two methods. *Journal of Applied Physiology* 24: 369-372.

Cameron, R.D. (1977). Semen collection and evaluation in Rams. The effect method of stimulation on response to electro ejaculation. *Australian Veterinary Journal* 53(8): 380-383.

Greyling, J.P.C. and Grobbelaa, J.A.N. (1983). Seasonal variation in semen quality of Boer and Angora goat rams using different collection techniques. *South African Journal of Animal Science* 13: 250-252.

Hafez, E.S.E. (1980). *Reproduction in Farm Animals.* 4th Edition Ch. 26 Lea and Febiger. Philadelphia.

Hafez, E.S.E. (1995). Artificial Insemination. In *Reproduction in Farm Animals.* 5th Edition. Lea and Febiger, Philadelphia. Pp 80:.394-395.

Kondracki, S. Banazewska, D. and Stolarczuk, D. (2002). Changes of sperm motility and pH of boar semen stored in high dilution. *Animal Science*. 2:131-136.

Meirose, D.R. and Laing, J.A. (1970). The characteristics of normal semen. In: J.A. Laing (Ed.), *Fertility and Infertility in Domestic Animals*. Ballière Tindall and Cassell, London, p. 128

Oyeyemi, M.O., Akusu, M.O. and Olaode, M.O. (2002). The effect of starvation on scrotal circumference and morphology of spermatozoa of West African Dwarf goat bucks. *Tropical Veterinarian* 21: 9-14.

Zaneveld, L.J.D. and Polanski; K.L. (1997). Collection and physical examination of the ejaculate. In: Hafez, E.S.E. (Ed). *Techniques of Human Andrology*. Elsevier, Amsterdam, The Netherlands.