

**NSAP****47th Annual Conference (JOS 2022)****CONFERENCE PROCEEDINGS**THEME
SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES**GONADAL AND EXTRA-GONADAL SPERM RESERVES OF KANO BROWN BUCKS AS AFFECTED BY TEMPERATURE, RELATIVE HUMIDITY CHANGES AND FEEDING REGIME**

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ABSTRACT

An experiment was carried out to determine the gonadal and extra-gonadal sperm reserves of Kano Brown bucks as affected by temperature, relative humidity changes and feeding regime during the periods of dry season (March – June, 2021) in Sudan savanna region of Nigeria. Sixteen Kano Brown bucks with average body weight of 15 kg, aged 10 – 12 months were allotted to four dietary treatments with four animals per treatment in a complete randomize block design. Four bucks from each treatment were orchidectomised for gonadal and extra-gonadal sperm reserve. Significant ($P < 0.05$) difference was observed among the treatment groups studied. Treatment three recorded the highest mean values (3349.00 and 3478.67 $\times 10^6$) whereas treatment one had the lowest mean values (2474.67 $\times 10^6$) for right and left testis respectively. The results of extra-gonadal sperm reserves of Kano Brown bucks are presented in table 2. Right caput and left caput epididymides value ranges from 519.00 to 1419.00 and 417 to 1112.33 $\times 10^6$ observed in treatment one and four respectively. It could be concluded that high environmental temperature significantly affect spermatogenesis of Kano Brown bucks.

Key word: Gonadal and extra Gonadal, Sperm Reserves, Kano Brown Bucks, Temperature Feeding Regime

INTRODUCTION

The external environments in which animals have to live in can greatly affect an animal's ability to maintain and regulate internal body temperature. As stated by Mader *et al.* (2002) regulation of body temperature is essential for survival under excessive heat load and involves both physiological and behavioral changes). With high relative humidity animals fail to cool down efficiently therefore, the animal's heat load builds up and this is when management strategies must be implemented to cool down the animals. Goat being selective feeders balances its nutritional requirement through grazing on good pastures where grazing lands are available. Gefu, (2002) reported that goat production in Nigeria has been characterized by low productivity due to poor management practice, diseases as well as seasonal variation in feed supply. Poor feed resource causes progressive weight loss and decreased fertility as well as milk yield for up to 4-5 months of the year.

MATERIAL AND METHODS**Study area**

The study was carried out at the University Teaching and Research Farm and Laboratory of the Department of Animal Science, new site of Bayero University, Kano. Kano is located within the longitude 9°30 and 12°30 North and the latitude 9°30 and 8°42 East in Sudan Savannah region of Nigeria. The annual temperature and relative humidity ranged between 38°C to 43°C and 40 to 51.3%, respectively (Olafin, 2007). The region is characterized by tropical wet and dry climate; wet season (May to September) and dry season (October to April) with annual rainfall that ranges between 787 - 960mm (KNARDA, 2001).

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A total of sixteen (16) Kano Brown bucks with average initial body weight of 15 kg, aged range between 10 to 12 months were purchased at Wudil Market of Kano State were used for this study. The scrotum and testis for each buck were visualized, palpated and carefully inspected before the selection of experimental animals so as to rule out any form of abnormalities. The general health status of experimental animals was observed. Animals were quarantined before the commencement of the study. Animals were given antibiotics prophylaxis using 20% Oxytetracycline (long acting) at the dose rate of 10 mg per kg⁻¹ body weight, animal were also dewormed using Albendazole suspension at the dose rate of 7.5 mg per kg⁻¹ body weight, they were vaccinated against Pneumo-enteritis Complex/Peste Pestis de ruminant (PPR) using PPR Vaccine at dose rate of 0.5 ml subcutaneously.

Treatments

Treatment I:

Treatment II:

Treatment III:

Treatment IV:

Feeding regime

Browsing only (zero supplementation)

Supplementation in the morning with browsing

Supplementation in the morning and in the evening with browsing

Supplementation only (Zero browsing)

Experimental feeds

Treatment diet was formulated using cotton seed cake, cowpea husk, rice bran, maize offal, sorghum chaff, wheat offal and salt, clean water and mineral salt lick was given *ad-libitum* to only treatment four throughout the experimental period. The composition of the supplement include 19% maize offal, 30% cotton seed cake, 30 % wheat offal, 20 % cowpea husk and 1% salt which will give 16% CP and 2381 kcal/1kg energy

Feeding and management

Experimental bucks were divided into four dietary treatments of four animals each. Treatment one browse only (zero supplementation), treatment two browse and supplementation in the morning only, treatment three browse and supplementation in the morning and in the evening and treatment four zero browsing (Supplementation only). Basal diet of groundnut hay was given to only treatment four. Water and mineral salt lick were provided *ad-libitum*. The live weight changes (weekly) feed intake and left over feed were recorded on daily basis.

Determination of gonadal and extra gonadal sperm/spermatid reserve

Four Kano Brown bucks one from each treatment was orchidectomised, labeled and appropriately used to determine the gonadal and epididymal sperm/spermatids reserves. Testicular length, volume, density and weight were recorded accordingly. The whole epididymis was removed from the testis, tunica albuginea and viseral vaginal tunic were removed from each testis using scalpel blade. Each testis was homogenized in 50 ml normal saline containing antibiotic (streptomycin and Benzyl Penicillin G) to prevent the microbial contamination. The Homogenate volume were measured after rinsing the blender with 20 ml of normal saline, it is further diluted with 80 ml of normal saline after transferring 5 ml of the homogenate to a conical flask. The homogenate were stored overnight at 5°C. The sperm/spermatid concentration were determined with a hemocytometer (Retwotet *et al.* 1997), the caput, corpus and cauda epididymides length and weight were measured, minced in 20 ml of saline with Sharpe scissors and stored overnight at 5°C. The caput, corpus and cauda epididymides will be filtered through gauze and filtrate volumes were measured. One millimeter of epididymal filtrate was diluted with 2ml of saline. Sperm concentrations were determined using hemocytometer. Sperm reserve was expressed in billions using the procedure of Osinowo *et al.*, (1982) and (Retwot, *et al.*, 1997). Testicular and epididymal weight were obtained using electronic weighing scale while length will be measured using a meter ruler (cm).

Chemical analysis

Dietary experimental sample were analyzed for dry matter (DM), crude protein (CP), ether extract (EE), mineral matter content (Ash), crude fibre (CF), using official method of analysis of the association of



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official analytical chemist A.O.A.C. (2005). Determination of fibre fraction, neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL), cellulose and hemicellulose were determine according to Van Soest, *et al.* (1991).

Statistical analysis

Data collected were coded and then subjected to analysis of variance (ANOVA) using general linear model (GLM) procedure of SAS (2008) in a factorial randomized complete block design, where significance differences is observed mean will be separated using Fishers Least significance Difference (LSD) method of analysis

RESULT

The results of gonadal sperm reserves of Kano Brown bucks were presented in Table 1. Significant ($P < 0.05$) difference was observed among the treatment groups studied. Treatment three recorded the highest mean values (3349.00 and 3478.67×10^6) whereas treatment one had the lowest mean values (2474.67×10^6) for right and left testis respectively. The results of extra-gonadal sperm reserves of Kano Brown bucks are presented in Table 2. Significant ($P < 0.05$) difference was observed for right and left caput, corpus and cauda epididymides. Right caput and left caput epididymides value ranges from 519.00 to 1419.00 and 417 to 1112.33×10^6 observed in treatment one and four respectively. Highest mean values of 1345.67×10^6 treatment one while the lowest values of 1011.00×10^6 was recorded in treatment four for right corpus epididymides. However, the mean value for right cauda epididymides was higher compared to its counterpart mean values.

Table 1: Seasonal and nutritional effect on gonadal sperm/spermatid reserve ($\times 10^6$) of Kano Brown bucks.

Parameters ($\times 10^6$)	Treatments				
	T ₁	T ₂	T ₃	T ₄	SEM
Right testis	2115.33	2519.00	2720	2049.33	0.21
Left testis	2013.00	2688.33	2803.33	2019.00	1.60

^{abc} means within the same rows with different super script are significantly different ($P < 0.05$). SEM standard error of means.

Table 2: Seasonal and nutritional effect on extra gonadal sperm/spermatid reserve of Kano Brown bucks ($\times 10^6$)

Parameters	Treatments				
	T ₁	T ₂	T ₃	T ₄	SEM
Right caput epididymides	519.00 ^d	917.00 ^c	1215.66 ^b	1419.00 ^a	0.5
Left caput epididymides	417.67 ^c	892.33 ^b	1112.33 ^a	919.67 ^b	24.50
Right capusepididymides	1345.67 ^a	1030.00 ^c	1103.33 ^b	1001.00 ^d	1.40
Left Capusepididymides	1216.00 ^a	1039.00 ^b	1208.33 ^a	988.00 ^b	13.10
Right caudaepididymides	1815.67 ^b	1719.00 ^c	1941.33 ^a	1220.00 ^d	13.12
Left caudaepididymides	1717 ^c	1764.00 ^b	1917.00 ^a	1125.67 ^d	0.95

^{abc} means within the same rows with different super script are significantly different ($P < 0.05$). SEM standard error of means.

DISCUSSION

The mean value of gonadal sperm reserve obtained in the present study shows significant ($p < 0.05$) difference though the value were within the reference values reported by Nasir *et al.* (2014). This observation is consistent with similar work in rodents (Retwot, *et al.*, 1997). High sperm concentration was observed in treatment three for right and left testis. This could be due to high protein diet given as

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morning and evening supplementation while the lowest mean value was obtained in treatment one. This may be as a result of no supplementation of protein throughout the experimental period. This statement was supported by the findings (Retwot, *et al.*, 1997) who observed that increase in dietary protein level increases semen, volume color and concentration in yearling Kano Brown bucks fed graded level of ground haulms. The result of extra gonadal sperm/spermatid reserve of Kano Brown bucks shows significant ($P < 0.05$) difference in right and left caput, capus and cauda epididymides this report agreed with the findings of Nasir *et al.* (2014) the disparities could be attributed as a result of differences observed in testicular weight.

CONCLUSION

Based on the results of this investigation, it could be concluded that seasonal temperature changes and feeding regime has positive effect on gonadal and extra-gonadal sperm reserves of Kano brown bucks, increased in nutritional diet increases testicular weight (g) and length (cm) respectively.

REFERENCE

- Gefu, J. O. (2002). Socio economic consideration in Small ruminant production. In: Lakpini, C. A. M. Adamu, A. M., Ehoche, O. and Gefu, J. O (eds) small Ruminant production training workshop manual NAPRI, 13th-18th Jan., 2002 Pp 45-51.
- KNARDA (2001).Kano State Agricultural and Rural Department Authority. Metrological station report book. Page 11 - 13.
- Mader, T. L., S. M. Holt, G. L. Hahn, M. S. Davis, and D. E. Spires. (2002). Feeding strategies for managing heat load in feedlot cattle. *Journal of Animal Science*, 80:2373-2382.
- Nasir, M., Njidda, A. A., Duwa, H. and Chibuogu, C.I (2014). Testicular Morphometry of Red Sokoto buck fed cotton seed cake. *Schoolar Journal of Agriculture and Veterinary Sciences*, (4a) 242-248.
- Olofin, E. A. (2007). Some aspect of physical geography of Kano region and related human resources. Departmental Lecture note series Vol. 1 Pp 50, Geography Department, Bayero University, Kano
- Osinowo, O. A., Bale, J. O., Oyedipe, E. O., and Eduvie, L.O. (1982). Semen Quality of Yankasa Rams. *Tropical Animal Health and Production*, 14 (3): 189-192.
- Rekwot, P. I., Oyedipe, E. O., Akereiola, O. O., Kumi-Diaka, J and Umoh, J. E. (1997). The effect of protein intake on the onset of puberty in Bunaji and Friesian crossbred bull in Nigeria. *Theriogenology*, 28: 427 - 434.
- Van soest, P. J., Robeertson, J. B. and Lewis, B. A. (1991).Method for dietary fibre, neutral detergent fibre and non-starch polysaccharides in relation to animal nutrition.*Journal of dairy Science*.74. 3583: 3597.