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Seasonal and Nutritional Effects on Growth Performance and Seminal Traits of Kano Brown Bucks

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Abstract
This investigation aimed at determining the seasonal and nutritional effect on growth parameters and seminal traits of Kano brown bucks. The study was carried out for a periods of 84 days (March – June, 2016). Sixteen Kano brown bucks with average initial body of 15 kg, 10 – 12 months of age were randomly allotted to four dietary treatments with four animals each per treatment in a complete randomize design. The result shows a significant ($p< 0.05$) difference with respect to body weight, T3 recorded the highest mean values of (16.32 kg) whereas T1 recorded the lowest mean values of (15.38 kg). No significant ($p< 0.05$) different was observed for semen color and volume, though T1 had highest mean values (3.25) for semen color and (7.45) for semen pH. Significant ($p< 0.05$) different was observed in live spermatozoa ($x10^6$)/ml and sperm motility, T3 recorded the highest mean value (2902.17 $x10^6$)/g/testis while T4 recorded the lowest mean values (2302.56 $x10^6$) sperm concentration. The study revealed that temperature and nutrition significantly affect body growth and seminal characteristics of Kano brown bucks. It can be concluded that animals should be allowed to go for grazing and supplemented twice a day.

Keywords: Temperature, humidity, growth, seminal traits, Kano brown bucks

Introduction

The over-riding environmental factor affecting the physiological functions of domestic animals is temperature (Cole, 1986). For most tropical farm animals a mean daily temperature of 28^0C is referred to as the "comfort zone" (Benerjee, 2007). In this range, the animal's heat exchange can be regulated solely by physical means such as constriction and dilation of blood vessels in the skin, ruffling up the fur or feather and regulation of the evaporation from lungs and skin. At the upper and lower critical temperatures, the physical regulation will not be sufficient to maintain a constant body temperature and the animal must, in addition, decrease or increase its metabolic heat production. A further decrease or increase in temperature will eventually bring the temperature to a point beyond which not even a change in heat production will be sufficient to maintain homeothermy, the process affect both oogenesis and spermatogenesis. (Rashid, 2008).

Humidity becomes increasingly important as do solar radiation and wind velocity. In a hot-dry climate evaporation is rapid, but in a hot humid climate the ability of the air to absorb additional moisture is limited and the inadequate cooling may result in heat stress in animals. Too low humidity in the air will cause irritation of the mucous membranes, while too high humidity may promote growth of fungus infections.

Materials and Methods

The study was carried out at the University Teaching and Research Farm for the feeding trial and semen collection whereas semen evaluation was done at the Laboratory of the Department of Animal Science, Bayero University, Kano. Kano is located within the longitude 9^o30 and 12^o30 N and the latitude 12^o30 E in semi-arid region of Nigeria. The annual temperature and relative humidity ranged between 38^0C to 43^0C 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).

A total of sixteen (16) Kano Brown bucks with average initial body weight of 15kg aged range between 10 to12were used for this study. The scrotum and testis for each buck were visualized andpalpated before the selection of experimental animals so as to rule out any form of abnormalities. Animals were given antibiotics prophylaxis also dewormed, they were vaccinated against Pneumo-enteritis Complex/PestePestits de ruminant (PPR)

Semen sample was collected from each buck fortnightly using artificial vagina. Semen volume was determine by collecting semen in a graduated test-tube. Calibrated Chemocraft(R) pH paper was used to determine semen pH.The color of the ejaculate wasdetermined by visual observation.Sperm motility was determined by microscopic observation. The concentration of spermatozoa was determined using hemocytometer (Zeneveld and Polakoski, 1997).

Data collected were coded and then subjected to analysis of variance (ANOVA) using general linear model (GLM) procedure of SAS (2002 version 9.1) in a randomized complete block design, where significance differences is observed, mean will be separated using Fishers Least significance Difference (LSD)method of analysis.

Results and Discussion

The results of body growth parameters of Kano brown bucks are presented in Table 1. The mean vales of body weight differed significantly (p< 0.05) among the treatments. T3 recorded the highest mean values of (16.32 kg) whereas T1 recorded the lowest mean values of (15.38 kg). The mean values for chest circumference (cm), withers height (cm) and body length (cm) differed significantly (p< 0.05) among the treatments. T4 recorded the highest mean values (64.60 cm) chest circumference (cm), T1 (64.19 cm) withers height (cm) whereas lowest mean values (60.17 cm) was recorded in T1.No significant (p< 0.05) different was observed in semen color and volume, though T1 had highest mean values (3.25) for semen color and (7.45) semen pH. Significant (p< 0.05) different was observed in live spermatozoa and sperm motility. T3 recorded the highest mean values (2902.17 $x10^6$) while T4 recorded the lowest mean values (2302.56 $x10^6$) of sperm concentration. The mean values for live spermatozoa differed significantly (p< 0.05) among treatments observed. T3 had the highest mean values (98.30%) while T1 recorded the lowest mean values (76.95%).

Table 1: Nutritional effect on growth performance of Kano Brown bucks

Parameters	Treatment				SEM
	T_1	T_2	T_3	T_4	
Body weight (kg)	15.38^a	15.92^b	16.32^b	15.34^a	0.17
Chest circumference (cm)	63.60^b	60.00^a	60.71^a	64.60^b	0.39
Withers height (cm)	64.19^d	61.20^a	60.17^a	60.69^a	1.45
Body length (cm)	62.66^b	62.60^a	58.00^a	62.15^b	1.23
Neck length (cm)	24.66^a	19.64^b	19.45^a	19.80^b	0.31
Scrotal circumference	19.32^b	19.43^b	18.30^a	19.60^b	0.47

^{abc} means within the same rows with different superscript are significantly different (p< 0.05).

Table 2: Nutritional effect on growth performance of Kano Brown bucks

Parameters	Treatments				SEM
	T_1	T_2	T_3	T_4	
Semen color	3.10	2.85	3.10	3.45	0.30
Semen Ph	7.35	6.14	6.80	7.20	0.50
Semen volume (ml)	1.30	2.15	1.35	1.34	0.51
Sperm concentration ($x10^6$)	2338.18	1875.78	2368.62	2271.36	311.49
Live spermatozoa (%)	69.36^b	83.80^a	72.40^b	69.60^b	5.44
Sperm motility (%)	71.00	68.20	74.59	67.24	5.24

^{abc} means within the same rows with different superscript are significantly different (P < 0.05).

Livestock grazing in hot semi-arid environment is prone to extreme fluctuation in quantity and quality of feeds throughout the year (Martin *et al.,* 2004). The mean body weight of experimental animals differed significantly (p<0.05). This is probably due to the fact that animals were given supplementation in the morning and in the evening. The value obtained in the present study is in agreement with the values recorded by Adama *et al.* (2011). The result obtained for body chest circumference was below the values reported by (Eghahi *et al*., 2011) in West African Dwarf goat. The result is agreed with the findings of Zahid *et al.*(2003) who reported that an increase in feed intake, increases the chest circumference which resulted to an increased in body weight (Mallonee *et al*., 1985).

The color of ejaculate in the present study ranges from creamy to colorless. Hassan (2010) reported that color of ejaculate of bucks fed ground haulm was found to be creamy and milky. High protein diets provide highly concentrated semen and negatively correlated with semen volume (Garner and Hafez, 2000). Semen pH ranges from 4 to 8 in this study. This report was at variance with the findings of Hassan (2010) who reported the pH value of 6 to 7 of yearling bucks semen fed graded levels of groundnut haulms.The mean value of sperm concentration obtained in treatment 4 is within the normal range reported by Jibril *et al*. (2011) in Yankasa ram, this values concurs with those reported by Oyeyemi *et al.* (2009) in West African Dwarf goat and Nasir *et al.* (2014a) Red Sokoto bucks. Similarly, this observation confirmed earlier by the report of Negussie *et al.* (2000b).Nutrition affect all phases of semen production including sperm motility (Banks *et al.,*2005) and Obidi *et al.* (2008). However, values differed in week two and treatment three recorded the highest mean value. This may also be attributed to the supplementation given in the morning and the evening. This finding was supported by the findings of Hasan, (2010) who reported that there is an increase in sperm motility, concentration and volume as the protein level is increases for yearling Kano Brown bucks. Chiboki, (1980) reported that motility of 40% in West African Dwarf ram grazing on dry roughages was recorded which was later increased to 59% with improved grazing condition. This findings is also supported by the findings of Oldham *et al.* (1978) who noted a significant improvement in sperm motility of ram with increased.

Conclusion

It can be concluded that nutrition had a significant effect on growth performance and seminal traits at high temperature (46^0C) and humidity of (20%) of Kano Brown bucks.

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