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Nutritional Effect of Cotton Seed Cake and Season on Seminal Traits and Testicular Histometry of Red Sokoto Bucks

M. Nasir¹, A.M. Hassan¹, M.H. Zango¹, A.A. Sabo², S.S. Saidu¹, A.G¹. Khaleel¹,
S. Haladu³, S. Madaki¹, M.S. Tamburawa¹

¹Department of Animal Science, Kano University of Science and Technology, P.M.B 3045, Wudil, Nigeria.

²Department of Biology, Saadatu Rimi Collage of Education Kumbotso, Kano PMB 3218; ³Department of Centre for Entrepreneurship Development, Federal Polytechnic Ede, PMB 231 Ede, Osun State

Corresponding author: M. Nasir; E-mail: mudassirnasir3@gmail.com Tel: +12348065433534

Abstract

This study was conducted at University Teaching and Research Farm of the Department of Animal Science, Bayero University, Kano, to evaluate the nutritional effect of cotton seed cake on seminal traits and testicular histometry of Red Sokoto bucks. Sixteen (16) Red Sokoto bucks with an average body weight of 15 kg were used for this study and allotted to four dietary treatments with four animals each per treatment in a completely randomized design. The result shows that bucks in treatment four recorded the lowest mean value (1.05) for semen volume whereas bucks in treatment three had the highest mean value (1.26). The result for testicular histometry revealed the photomicrograph of a section of the testis of a buck fed 30% cotton seed cake showed congested testis, reduced number of spermatogenic cells layers in seminiferous tubules, scanty primary spermatids, congested intertubular space (H and E x400). It is therefore recommended that cotton seed cake could be used in the diets of goats up to 20% level of inclusion without any deleterious effects on seminal traits and testicular histometry of Red Sokoto bucks.

Keywords: Cotton seed cake, Red Sokoto buck, goats, semen

Introduction

Goats have successfully been raised by mankind as a source of meat, milk, hair, mohair, skin (leather) and other products including blood, bones and manure. Even though goats are frequently objects of neglect and prejudice, they provide a flexible financial reserve for the rural population (Sumberg and Cassaday, 1989), and milk production as a secondary function is common with many owners. The importance of goat meat lies in its suitability for domestic consumption. Therefore, a substantial increase in population of goats could be quickly achieved, despite the prejudice in some areas against them (FAO, 1986). Cottonseed cake is used as an alternative to soy because of its low cost and accessibility in areas, where it is grown (Romney *et al.*, 1993). However, cotton seed presents a substance with toxic potential in its composition. The gossypol is a phenolic yellow pigment produced by pigment glands found in cotton roots, branches, leaves, and seeds (Robert, 1971) that confers resistance of the plant of pathogens (Marai *et al.*, 2000). Multiple factors may influence the presence of gossypol in the plant. Among them, weather conditions play a significant role and gossypol concentration is positively correlated with rainfall and negatively with temperature.

This study determined the nutritional effect of cotton seed cake and season on seminal traits and testicular histometry of Red Sokoto Bucks

Materials and Methods

The study was carried out at the University Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Bayero University, Kano; lies between longitude 9°30 and 12°30 North and latitude 8° 42 and 9°30 East in the semi-arid region of Northern Nigeria. The climate of Kano is hot during dry seasons and cold during harmattan. The ambient temperature ranges from 16.6°C to 42°C in the months of January to June and 23°C to 26.7°C in July to December. The annual rainfall ranges between 787-960 mm. Sixteen (16) Red Sokoto bucks yearlings with an average body weight of 15 kg were used for this study. The scrotum and the testis for each buck were visualized, palpated and carefully inspected before selection, to rule out any form of abnormalities. Treatment diets were formulated using cottonseed cake, groundnut cake, rice bran, maize offal, sorghum husk, wheat offal, bone meal and salt. Semen was collected and evaluated fortnightly using electro-ejaculator (Lane manufacturing) for the period of ten (10) weeks prior to orchidectomy (Castration). Semen volume (ml) was determined by collecting the semen sample in a graduated tube. The color of ejaculate was determine by visual observation immediately after semen collection. Semen pH was determined by the use of pH paper, while sperm mortality was determined by placing a drop of semen on pre-warmed (34°C to 37°C)

glass slide and covered with 22 x 32 mm coverslip (Rekwot *et al.*, 1997) and examine at ×40 eyepiece object magnification.

Statistical analysis: Data collected were coded and then subjected to analysis of variance (ANOVA) in a Randomize Complete Block Designed (RCBD) using SAS package version 9.1 (2000) where significant differences are observed means were separate using LSD method of analysis.

Result and Discussion

The result of inclusion level of cotton seed cake on semen characteristics of Red Sokoto bucks is presented in Table 1. There was no significant ($p > 0.05$) effect observed on semen volume (ml), treatment one had the highest value (1.26 ml) whereas treatment four having the lowest value (1.05 ml). This result is in harmony of the findings of Nasir *et al.* (2014) for seminal traits of Red Sokoto bucks fed cotton seed cake in semi-arid zone of Nigeria. Sperm concentration significantly differs ($p < 0.05$) among the treatments. The mean values ranging from $(1705.7 \times 10^6)/\text{ml}$ for bucks in treatment four whereas $(2762.6 \times 10^6)/\text{ml}$ for bucks in treatment one. This report was supported by the findings of Hassan (2010) in Kano Brown buck fed groundnut haulms, this is also consistent with the findings of Nasir *et al.* (2014)

The result of the present study shows that animals in treatment one had prominent spermatogenic cells in normal layers. Intact seminiferous tubules. A large number of primary spermatids towards the lumen of primary spermatids. Intact intertubular spaces (H and E, 400) as presented in figure I. Similarly, figure II showed the photomicrograph of a section of a testis of a buck fed 10% cotton seed cake showed normal cell layer of spermatogenic cell. Moderate number of primary spermatids, intact intratubular spaces and a moderate number of spermatogenic cell (H and E x400) this report is consisted with the findings of Nasir *et al.* (2014) and Rekwot *et al.* (1997). Figure III. The photomicrograph of a section of the testis of a buck fed 20% cotton seed cake showing a reduced number of spermatogenic cells layers. Moderate numbers of primary spermatids. Intact seminiferous tubules and intratubular spaces (H&E x400) this report was supported with the findings of Nasir (2014) for RSG goats. Figure IV revealed the photomicrograph of a section of the testis of a buck fed 30% cotton seed cake showed congested testis this report was at variance with the findings of Nasir *et al.* (2014) who observed no deleterious effect on testicular histometry of Red Sokoto bucks fed 20% cotton seed cake. Reduced number of spermatogenic cells layers in seminiferous tubules. Scanty primary spermatids. Congested intertubular space (H&E x400). This report is at variance with report of Rekwot *et al.* (1997) in Broiler chickens fed graded level of cotton seed cake.

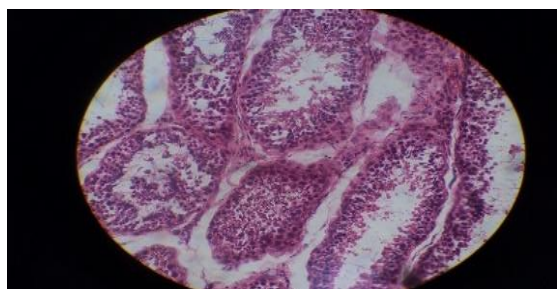


Fig.I: (0%)



Fig. II: (10%)

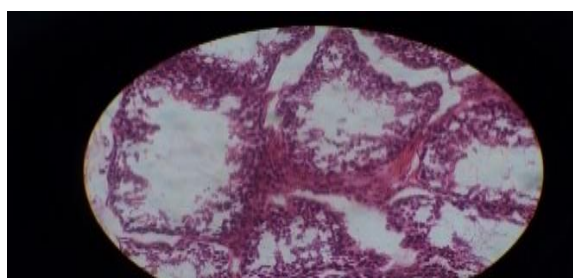


Fig.III: (20%)

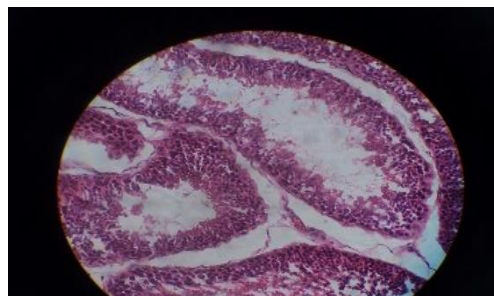


Fig.IV: (30%)

Table 1 Nutritional effects of cotton seed cake on seminal traits of Red Sokoto bucks

Parameter	T1	T2	T3	T ₄	SEM
Semen volume (ml)	1.26	1.14	1.21	1.05	0.12
Sperm concentration (x10 ⁶)	2762.6 ^a	2610.8 ^a	2184.9 ^b	1705.7 ^c	98.98
Sperm motility (%)	66.10 ^a	65.35 ^a	53.40 ^b	46.55 ^c	2.83
Semen color	3.45	3.30	3.30	3.15	0.16
Semen pH	7.05 ^b	8.00 ^{ab}	7.90 ^{ab}	8.25 ^a	0.25
Live and Dead Ration (%)	50.38 ^a	47.86 ^b	50.60 ^a	52.33 ^a	1.06

^{abc}Means within the same rows with different super scripts are significantly different. (P< 0.05).SEM = Standard error of mean.

Conclusion

Based on the result of this study it is concluded that cotton seed cake could be used up to 20% inclusion level in the diets without deleterious effect on seminal traits and testicular histometry of Kano Brown bucks. It is therefore recommended that cotton seed cake could be used in the diets of goats up to 20% level of inclusion.

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