

GROWTH, CARCASS AND ORGANS CHARACTERISTICS OF WEANER RED SOKOTO BUCKS FED DIETS CONTAINING DIFFERENT LEVELS OF *CROTALARIA RETUSA* (RATTLE BOX)

*M.Yusuf, S.M Yashim, and L.R Yakubu.

*National Animal Production Research Institute, Zaria.
Department of Animal Science, Ahmadu Bello University, Zaria.

*mustaphaayusuf@yahoo.com 08038870005

Abstract

A study was conducted to investigate the effect of feeding *Crotalaria retusa* on growth, carcass and organs characteristics of Red Sokoto goats. Twelve Red Sokoto goats with average initial weights of 8.7 kg were allocated to four dietary treatments which composed of three animals per treatment for thirteen (13) weeks in a complete randomized design. The four experimental diets were T₁ (0% *Crotalaria*), T₂ (10% *Crotalaria*), T₃ (20% *Crotalaria*), and T₄ (30% *Crotalaria*). Result showed that there was significant difference ($P < 0.05$) in all performance indices: body weight gain, feed intake and water intake. The result also showed that the daily weight gain (4.5-30.0g/day) and carcass weight (4.10-5.13kg) was affected by dietary treatments. Similarly, the organs were significantly ($P < 0.05$) affected by the dietary treatments, with 10% inclusion having the highest values. The results indicated that Red Sokoto goats can utilize *Crotalaria retusa* up to 30% inclusion in their diets without any deleterious effect on growth performance, carcass yield and organs although performance was highest in T₂ (10% inclusion level).

Introduction

A major constraint to livestock production in developing countries is the scarcity and fluctuating quantity and quality of feed supply year round. Providing adequate good-quality feed to livestock to raise and maintain their productivity is a major challenge to livestock farmers, Agricultural Scientists and Policy makers all over the world. The high cost of feed components as a variable in livestock enterprise is well established (Esonu *et al.*, 2006). The high cost is blamed on limited availability of conventional feedstuff which are also competed for by man. This has necessitated the search for alternative feed ingredients. One of such alternative feed ingredient is *Crotalaria retusa* leaf. *Crotalaria* is a genus of herbaceous plants and woody shrubs in the Family Fabaceae. *Crotalaria* can be consumed by livestock of various species although it is suggested that supplementation level in livestock should not exceed 10% of the daily ration (Rupper, 1984). The objective of this study was to determine growth, carcass and organs characteristics of weaner red sokoto bucks fed diets containing different levels of *crotalaria retusa* (rattle box).

Materials and Methods

Twelve Red Sokoto goats with average initial weights of 8.7 kg were assigned to four dietary treatment groups, with three animals per treatment in a complete randomized design. The Experiment was conducted at the Small Ruminant Unit of the Department of Animal

Science, Ahmadu Bello University, Zaria for a period of thirteen (13) weeks. The goats were kept individually in metabolic crates. The experimental material *Crotalaria retusa* was collected at the Institute for Agricultural Research Farm, Ahmadu Bello University, Zaria. The plant material was harvested and shade-dried for 5 days and thereafter stored for 2 weeks until it was used. The experimental diets consisted of the following ingredients: *Crotalaria retusa* included at different levels of 0%, 10%, 20%, and 30% representing T₁, T₂, T₃, and T₄ respectively (Table 1).

The animals were allowed to adjust to the experimental diets and the metabolic crates for a period of 10 days before the commencement of the trial. They were given 1800mls of water, fed the experimental diet at 3% body weight and the quantity of the feed and water consumed were recorded daily throughout the trial. At the end of the growth study, three (3) animals in each dietary treatment were taken and slaughtered. Feed and water were withheld for twenty four (24) hours prior to slaughter. They were skinned, and then the head, feet, skin, large intestine, small intestine, and the hot carcass were weighed. Other organs such as the Heart, Liver, Kidney, Spleen, Reticulo-rumen and fat around the organs were also weighed. The proximate analysis of *Crotalaria retusa* leaves and experimental diets was analyzed according to standard methods of AOAC (1990). Data were analyzed using analysis of variance in SAS (2002). The effect of treatment

was tested and significant differences between treatment means was established by Duncan's Multiple Range Test.

Results and Discussion

Table 2 shows the proximate composition of experimental diets. CP content varied from 9.0 in T_1 to 9.92 in T_4 and 10.25 in T_2 which is slightly higher than the 9.5 CP recommended by ARC (1984). The crude fibre values ranged from 14.48 in T_3 to 17.35 in T_4 which shows that crude fibre increases as the level of *Crotalaria retusa* increases in the diet, this result is in line with the report of Oddy and Saniz (2002) for tropical legumes. The ash values ranged from 7.63 in T_1 to 10.21 in T_3 , this could be attributed to higher proportion of *Crotalaria retusa*, a legume rich in mineral contents (Le Houérou, 1980).

Table 3 shows the performance characteristics of Red Sokoto goats fed different inclusion level of *Crotalaria retusa*. The animals had an average initial weight of 8.7kg, but at the end of the growth study, there was significant difference ($P < 0.05$) across treatments with T_2 having the heaviest final weight of 11.58kg and T_1 having the lightest final weight of 9.11kg. The water intake values ranged from 51.52 litres in T_1 to 69.13 litres in T_3 . This difference in water intake may be as a result of the Alkaloids contained in *Crotalaria retusa* which the animal need to detoxify hence increase in water intake as the level of *crotalaria* increases from T_2 to T_4 .

The results of the carcass and organs characteristics are shown in Table 4. The live weight, slaughter weight and carcass weight were highest in T_2 containing 10% *Crotalaria retusa*. T_3 has the highest values of head, legs and skin with T_1 having the lowest values. The carcass weight ranged from 4.10kg to 5.25kg with the highest in T_2 (5.25kg) and lowest in T_1 (4.10kg). Values obtained for the weights of the organs in this study showed significant differences ($P < 0.05$) among treatment groups with T_2 having the highest values which implies that the organs in the body also becomes bigger in relation to the body size of an animal. Observations regarding kidney, liver, spleen, lungs, heart, reticulo-rumen, fats, and testis in Red Sokoto goats fed with experimental diets containing varying level of *Crotalaria retusa* suggest that the test material did not contain any appreciable deleterious effect when included up to 30% in the feed of goats.

Conclusion

The study showed that *Crotalaria retusa* had good

level of nutrients and can be fed up to 30% inclusion level in the ration of Red Sokoto goats without having any deleterious effect on their growth, carcass and organs, although, optimum performance was observed in the animals fed 10% inclusion level of *Crotalaria retusa*.

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Table 1: Feed composition of the Experimental diets (%)

Treatment	T ₁	T ₂	T ₃	T ₄
Maize Offal	61.50	53.00	44.70	36.30
Cotton Seed Cake	15.00	13.50	11.80	10.20
<i>Crotalaria retusa</i>	0.00	10.00	20.00	30.00
Rice bran	10.00	10.00	10.00	10.00
Cowpea husk	10.00	10.00	10.00	10.00
Bone meal	3.00	3.00	3.00	3.00
Salt	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00
Crude protein	13.02	13.03	13.00	13.00
Crude Fibre	12.13	12.81	13.62	14.36
Energy (kcal/kg)	3865	3807.65	3831	3864.85

Table 2: Proximate composition of experimental diets

Parameters	Treatments			
	T ₁	T ₂	T ₃	T ₄
Dry matter	95.09	95.05	94.56	94.56
Crude protein	9.00	10.25	9.56	9.92
Crude fibre	14.58	14.58	14.58	17.35
Ether extract	0.84	1.56	1.91	1.28
Ash	7.63	8.96	10.21	8.90
Nitrogen free extract	67.95	64.65	63.38	62.55

Table 3: Performance characteristics of Red Sokoto goats fed different inclusion level of *Crotalaria retusa*

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Initial weight (kg)	8.70	8.73	8.73	8.74	0.28
Final Weight (kg)	9.11 ^b	11.58 ^a	10.92 ^a	10.42 ^a	0.52
Weight gain (kg)	0.41 ^b	2.85 ^a	2.19 ^a	1.68 ^a	0.38
ADWG (g)	4.50 ^c	30.00 ^a	20.00 ^b	18.00 ^b	4.10
Feed intake (kg)	14.83 ^b	20.33 ^a	20.06 ^a	19.00 ^a	1.26
Average Daily feed intake (kg)	0.16 ^a	0.22 ^a	0.22 ^a	0.21 ^a	0.10
Water intake (litres)	51.52 ^c	60.72 ^b	69.13 ^a	65.26 ^{ab}	2.99
Feed Conversion efficiency	0.028	0.14	0.11	0.09	

Means within row with different superscript are significantly different ($P < 0.005$), SEM= Standard Error of mean, ADWG=Average daily weight gain

Table 4: Carcass and organs of red Sokoto goats fed different inclusion level of *Crotalaria retusa*

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Live weight (kg)	10.45 ^c	12.24 ^a	11.23 ^b	11.00 ^b	0.21
Slaughter Weight (kg)	9.10 ^c	11.68 ^a	10.75 ^b	10.48 ^b	0.20
Head (kg)	0.93 ^b	0.93 ^b	1.00 ^a	1.03 ^a	0.02
Legs (g)	380 ^c	350 ^d	430 ^a	400 ^b	0.70
Skin (kg)	0.80 ^c	0.90 ^b	1.03 ^a	1.03 ^a	0.03
Carcass weight (kg)	4.10 ^c	5.25 ^a	4.78 ^b	5.13 ^a	0.10
Kidney (g)	23.50 ^d	42.00 ^c	62.50 ^a	52.00 ^b	2.68
Liver (g)	152.00 ^d	243.50 ^a	229.00 ^b	172.50 ^c	4.19
Spleen (g)	9.00 ^c	25.50 ^a	13.50 ^b	15.50 ^b	1.35
Lungs (g)	146.50 ^c	208.50 ^a	174.00 ^b	176.00 ^b	6.35
Heart (g)	31.00 ^c	54.50 ^a	48.50 ^b	48.00 ^b	2.05
Reticulo-rumen (g)	228.00 ^b	308.00 ^a	317.50 ^a	315.00 ^a	19.51
Fats (g)	163.00 ^c	559.00 ^a	283.50 ^b	252.50 ^b	29.92
Testis (g).	137.00 ^d	149.50 ^b	145.00 ^c	165.00 ^a	1.69

^{a, b, c} means within row with different superscript are significantly different ($P < 0.005$), SEM= Standard Error of mean