

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****THE EFFECT OF THE SUPPLEMENT OF COBALT MINERAL WITH CASSAVA
LEAF IN THE DIET OF CORN BRAN FED TO SHEEP**

Enefola I. Martins,* Eboh Sule*, Joshua Onuche*, Yissa Lasisi Jatto

Kogi State Polytechnic Itakpe Campus, Kogi State. Department of Animal Health and Production
Technology. enefolamartins@gmail.com**ABSTRACT**

A 56-day feeding trial was carried out to study the influence of cassava leaf meal and cobalt mineral supplement on the feeding value of cassava peeling waste-based diet in the sheep. Sixteen (16) weanling West African Dwarf sheep of average initial live weight; 9.27 ± 2.94 kg were divided into four similar groups. Each group was randomly assigned to one of four treatment diets in a 2×2 factorial experiment. The animals were fed at 3% of their body weights. They had unrestricted access to clean drinking water and mineralized salt lick throughout the 56-day feeding trial. Dietary treatments consisted of two inclusion levels (7.74 and 37.53%) of cassava leaf meal; and two levels (0, and 1.0 ppm) of cobalt supplement. The diets were in four treatments; A (Low inclusion level of cassava leaf meal (7.74%) without cobalt supplement), B (Low inclusion level of cassava leaf meal (7.74%) with 1ppm cobalt supplement), C (High inclusion level of cassava leaf meal (37.53%) without cobalt supplement), and D (High inclusion level of cassava leaf meal (37.53%) with cobalt supplement) respectively. Response criteria were; average dry matter and nutrient intake, nutrients digestibility, body weight gain, nitrogen retention, urinary and serum thiocyanate levels, serum total protein and urea-nitrogen concentrations. All measurements were taken at the 4th and 8th weeks of the feeding trial. Body weight gains in the sheep were; 19.21, 8.28, 23.75, and 34.46 g/day at the 28th day measurement and 8.93, 5.36, 24.82, and 26.34 g/day at the 56th day measurement for dietary treatments A, B, C, and D respectively. The body weight gain values obtained in sheep on diet D were higher ($P < 0.05$) than for those on diets A and B at the 28th and 56th days measurements. Similar trends were obtained for nitrogen retention in the sheep. Sheep receiving dietary treatment D had higher ($P < 0.5$) serum thiocyanate level at the 56th day measurement when compared to those on dietary treatment A or B. Similar trends were obtained for urea- nitrogen. Effect of the treatments on serum total protein and urinary thiocyanate levels were not significant ($P > 0.05$) among the four treatment groups. It was concluded that sheep consuming high level of cassava leaf meal in cassava peeling waste-based diet, benefited from dietary cobalt supplement in terms of body weight gain and nitrogen retention.

INTRODUCTION

Cobalt is considered an essential trace element, because it is required in the human diet and of some animal species in very small amounts, close to 100 mg per kg of dry matter (Brewer *et al.*, 2016; Miller *et al.*, 2020; Viglierchio *et al.*, 2000). As such, cobalt has no known nutritional function, except as a component of vitamin B12, so when we refer to the Co status, we are really referring to the vitamin B12 status (Herd and Ho, 2011; Weiss, 2011). The inadequacy of some of these trace minerals may mar some vital functions of the tissues or organs leading to much distress (Awolaja *et al.*, 1997). The only known animal requirement of cobalt is as a constituent of vitamin B12 which has 4% Co in its chemical structure (Anon, 2006). The deficiency of cobalt does not usually immediately affect the production of Vitamin B12 in sheep but it is only when long standing (Underwood, 1977).

The value of cassava leaves in these regards is further accentuated by the low rumen degradability of the protein fraction. Ravindran (1993) report a high true protein level of 85% for cassava leaf that was attributed (Wanapat, 1995) to the formation of protein-tannin complex within the digestive tract cannot sustain production



MATERIALS AND METHODS

3.1 Housing and pre-experimental treatments

Metabolism cages were constructed with wood to house the experimental animals. Each sheep was housed in a 1 x 0.6m². Cassava leaves were obtained from cassava farm during harvest. The leaves were sun-dried for 2 to 3 days. Corn bran used was, obtained from corn milling mills and stored. Bone meal and table salt were bought from a feed mill, while cobalt chloride salt was bought from a chemical shop

3.3 Animals and dietary treatments

Sixteen (16) weanling lambs of 7-8 months old with an average initial body weight of 9.27 ± 2.94 kg were divided into four groups, balanced for weights and assigned randomly to four treatments. Each animal represented a replicate. Dietary treatment consisted of sun dried cassava leaf meal at two inclusion levels, in a corn bran based concentrate diet that was fed with or without 1ppm cobalt supplement. The resulting treatment diets were;

A= Low inclusion level of cassava leaf meal (7.74%) without cobalt supplement.

B= Low inclusion level of cassava leaf meal (7.74%) with 1ppm cobalt supplement.

C= High inclusion level of cassava leaf meal (37.53%) without cobalt supplement

D= High inclusion level of cassava leaf meal (37.53%) with cobalt supplement

Animals were fed at 3% of their body weights which allowed for feed refusals in all the treatment groups. Feeds were offered at 0800 and 1400 hrs daily after being mixed with 5 drops of water to reduce dustiness. Clean drinking water was made available to each lamb free –choice throughout the 56-day growth and digestibility trial.

RESULT AND DISCUSSION

Average total dry matter intake by sheep on control diet during the first 28 days of the feeding trial was 269 g/day. Dry matter intake by sheep fed diets B, C and D were 249, 323, and 268 g/day, respectively during the same period. Total crude protein intake by sheep receiving test diets C and D were 49 and 41 g/day, respectively. The values were relatively higher than the crude protein intake for sheep on Diet A or Diet B (Table 1.1). There were no ($P>0.05$) significant differences in crude protein intake between treatment C and treatment D or between treatment A and treatment B.

. The proximate composition of the experimental diets showed that Diet A (control) has 8.51% crude protein; Diet B has 8.31% crude protein; Diets C and D have 15.20% crude protein.

Table 1.1 Effects of treatments on some performance characteristics in sheep

Parameters	Diets					Significance
	A	B	C	D	± SEM	
<i>At the 28th day</i>						
Mean initial live weight (kg)	10.33	9.94	11.77	9.56	5.88	NS
Mean final live weight (kg)	10.86	10.18	12.43	10.53	0.71	NS
Mean live weight gain (kg)	0.54 ^b	0.23 ^c	0.67 ^{ab}	0.97 ^a	0.10	S
Mean live weight gain (g/day)	19.21 ^b	8.28 ^c	23.75 ^{ab}	34.46 ^a	3.47	S
Feed efficiency ratio gain (g)/ feed (g)	0.08 ^{ab}	0.04 ^b	0.07 ^{ab}	0.13 ^a	0.017	S



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Total dry matter intake (g/day)	269	249	323	268	33.20	NS
Total crude protein intake DM/(g/day)	23 ^b	21 ^b	49 ^a	41 ^a	3.76	S
Total crude fiber intake DM(g/day)	38 ^b	36 ^b	56 ^a	48 ^{ab}	5.18	S
At the 56th day						
Mean final live weight (kg)	10.83 ^{ab}	10.24 ^b	13.16 ^a	11.04 ^{ab}	0.72	S
Mean live weight gain (kg)	0.50 ^b	0.30 ^b	1.390 ^a	1.475 ^a	0.14	S
Mean live weight gain (g/day)	.93 ^b	5.36 ^b	24.82 ^a	26.34 ^a	2.53	S
Feed efficiency ratio gain(g)/ feed(g)	0.03 ^b	0.02 ^b	0.08 ^a	0.09 ^a	0.0089	S
Total dry matter intake (g/day)	296	269	304	308	25.12	NS
Total crude protein intake DM/(g/day)	26 ^b	23 ^b	46 ^a	47 ^a	3.27	S
Total crude fiber intake DM(g/day)	42 ^b	39 ^b	53 ^{ab}	55 ^a	4.10	S

Table 1.2 Effects of treatments on apparent dry matter and nutrients digestibility (%)

Item	Diets				± SEM	Significance
	A	B	C	D		
At the 28 th day						
Dry matter	58	64	64	63	2.96	NS
Crude protein	71	66	72	72	3.58	NS
Crude fiber	38 ^b	47 ^a	56 ^a	54 ^a	2.79	S
At the 56 th day						
Dry matter	66	67	69	69	3.08	NS
Crude protein	80	80	82	82	1.83	NS
Crude fiber	. 54	55	61	59	4.48	NS

At the end of the 28th day feeding period, apparent dry matter digestibility coefficient for sheep on diets A, B, C and D were 58, 64, 64, 63%, respectively. Apparent dry matter digestibility coefficient for sheep on diet B, C, or D was higher than the value for the sheep on diet A (Table 1.2). The apparent crude protein digestibility for sheep on diet A, C, or D was higher ($P<0.05$) than for sheep on diet B. At the 56th day measurements, apparent dry matter digestibility coefficient for sheep on diet B, C or D was higher ($P<0.05$) than for those on diet A. Similar trends were obtained for the digestibility of crude protein and crude fibre. The results of the dry matter crude fibre and crude protein digestibility were similar to those reported by Pathoummalansy *et al* (2006); Him Aun (2002) and Wanapat (1997).

Table 1.3: Effects of Treatments on Nitrogen Metabolism in the Sheep

Parameters	Diets				± SEM	Significance
	A	B	C	D		
At the 28 th day						
Average nitrogen intake (g/day)	3.67 ^b	3.31 ^b	7.85 ^a	6.52 ^a	0.44	S
Average fecal nitrogen (g/day)	1.07 ^b	0.83 ^b	2.21 ^a	1.94 ^a	0.17	S
Average urinary nitrogen (g/day)	0.37 ^b	0.40 ^b	1.02 ^a	1.03 ^a	0.045	S
Average nitrogen retention (g/day)	2.23 ^b	2.08 ^c	4.62 ^a	3.65 ^{ab}	0.45	S
At the 56 th day						
Average nitrogen intake (g/day)	4.04 ^b	3.58 ^b	7.40 ^a	7.46 ^a	0.51	S
Average fecal nitrogen (g/day)	0.808 ^b	0.664 ^b	1.331 ^a	1.450 ^a	0.091	S

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Average urinary nitrogen (g/day)	0.6164 ^{bc}	0.3513 ^c	1.004 ^a	0.8254 ^{ab}	0.099	S
Average nitrogen retention (g/day)	2.62 ^b	2.56 ^b	5.06 ^a	5.21 ^a	0.41	S

At the 28th day measurements, the average nitrogen intake for sheep on diets A and B were not ($P>0.05$) significantly different (Table 1.3). The values were significantly ($P<0.05$) lower than those for sheep on diet C or D. At the end of the 56th day, average nitrogen intake and retention, for sheep on diets A and B were not ($P>0.05$) significantly different (Table 1.3). The average nitrogen intake and retention, for sheep on diet C or D was higher ($P<0.05$) than those for sheep on diet A or B.

CONCLUSION AND RECOMMENDATION

The results shows that offering cassava leaf meal with cobalt supplement at a high inclusion level as used in the present study causes;

1. An increase in live weight gain and in feed efficiency ratio in the sheep.
2. An increase in dry matter, crude protein and crude fibre intakes
3. An increase in digestibility of crude protein and crude fibre.

The present study shows that dietary cobalt mineral supplement improved the performance of sheep fed cassava peeling waste based- diets at high level of inclusion of cassava leaf meal. However sheep receiving diets at low level (7.74 % DM) of inclusion of cassava leaf meal did not respond favourably to dietary cobalt supplement. Cobalt is not present in appreciable quantity in forage based diets. It is recommended to offer cobalt supplement to sheep on high cassava leaf meal-based diets. This will stimulate the propagation of rumen microbes, enhance microbial activity and improve performance of the animals.

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