RUMEN MICROBIAL LOAD AND GROWTH PERFORMANCE OF SHEEP FED NAPIER GRASS AND DIFFERENT PROPORTIONS OF COCOA POD HUSK WITH SOUR SOP PULP MEALS

M. I. OKORUWA[1], O. M. EDOROR[1] AND C. A. IGENE[2]

[1]*Department of Animal Science, Ambrose Alli University, P.M.B. 14, Ekpoma, Nigeria*

[2]*Department of Agricultural Economics and Extension, Ambrose Alli University P.M.B. 14, Ekpoma, Nigeria.*

Correspondence:odionokos@yahoo.com, okosmich@gmail.com;08054655356

ABSTRACT

This study was conducted to determine rumen microbial load and growth performance of sheep fed napier grass and varying levels of cocoa pod husk with soursop pulp meals. Twenty four (24) West African Dwarf sheep with average weight of 7.00 ± 0.55kg were assigned to three treatment diets with eight (8) animals per treatment in a completely randomized design. The treatment diets were: A(70% napier grass and 30 % concentrate diet was the control group), B(45% cocoa pod husk with 25% soursop pulp and 30% concentrate diet) and C(50% cocoa pod husk with 20% soursop pulp and 30% concentrate diet). The results indicated that total protozoa count (5.39 x 10^4 CFU/ml), average daily feed intake (221.79g) and feed conversion ratio (8.68) were significantly ($P < 0.05$) highest in diet A than diets B and C. Final body weight 911.02kg), average daily weight gain (43.57g), total bacteria and fungi counts (7.04 and 4.86 x 10^4CFU/ml) were ($P < 0.05$) higher in diet C compared with diets A and B. Initial body weight and rumen pH were not significantly ($P > 0.05$) affected by treatment diets. It was concluded that 50% cocoa pod husk with 20% soursop pulp and 30% concentrate diet has the potential to maximize nutrient from the rumen microbes that facilitate digesta flow to enhance growth in sheep.

Keywords: agro-industrial by-products, rumen microbes, performance, sheep.

INTRODUCTION

Inadequate supply of good quality native pastures needed to sustain ruminants most especially during the dry season has been the major problem hampering their productivity in Nigeria. The escalating high cost of available feedstuffs that have resulted in stiff competition between man and other livestock has worsen the situation of irregular supply of high quality feeds for ruminants with concomitant increase in the cost of their products. Thus, this trend has forced the attention of many researchers toward the exploitation of alternative feed resources that are under-utilized, cheap and readily available for sheep production.

Cocoa pod husk and soursop pulp are such alternative feed ingredients that are potentially valuable, which can supply considerable amount of nutrient to sheep when combine as feeds (Wulandari *et al.*, 2014; Akomolafe and Ajayi, 2015). However, they can create the possibility of reducing feeds cost and decrease dependence on scarce feed ingredients when properly harness as ruminant livestock feeds. Though cocoa pod husk and soursop pulp are high in fiber content, ruminants have a highly efficient anaerobic fermenting vat located in the rumen that allows digestion of fibrous feeds. Rumen microbial yield from breakdown and digestion of plant fiber materials in the rumen make protein and energy easily available to sheep consumption daily (Eryavuz *et al.*, 2003). However, there is paucity of information regarding the potential of combining cocoa pod husk with soursoup pulp meal in sheep feeding. Hence, the objective of this study is to determine rumen microbial load and growth performance of sheep fed napier grass and varying levels of cocoa pod husk with soursop pulp meals.

MATERIALS AND METHODS

The study was conducted at the Sheep and Goat Unit of the Teaching and Research Farm, Ambrose Alli, Ekpoma. Napier grass was obtained within the Farm, wilts and chopped into small sizes. Cocoa pod and soursop pulp were collected within Ekpoma, sun-dried and crushed into cocoa pod husk and soursop pulp meals.

Concentrate diet that comprised 78.00% wheat offal, 20.00% dried brewery grain, 0.75% limestone, 0.50% bone meal, 0.25% salt and 0.50% vitamin premix was also formulated.

The three prepared experimental diets were: A (70% Napier grass and 30% concentrate diet was the control), B(mixture of 45% cocoa pod husk with 25% soursop pulp and 30% concentrate diet) and C (combination of 50% cocoa pod husk with 20% soursop pulp and 30% concentrate diet).

A total of 24 West African Dwarf (WAD) sheep aged between 7 and 8 months old with average body weight of 7.00 ± 0.55kg were allotted to the three dietary treatments of four replicates with two animals per replicate in a completely randomized design. The animals were offered the experimental diets at 5% of their body weight daily. Animals were also having unrestricted access to fresh clean water. However, feed intake for each animal was measured daily by differences between the daily feed supplied and leftover while change in live weight of the animals were taken on weekly basis during the experiment. Rumen liquor was collected from the animals to determine rumen pH and microbial counts on every two weeks interval before the termination of the experiment. Notwithstanding, the study lasted for 84days excluding 14-days adjustment period. The proximate compositions of the experimental feeds were determined according to (AOAC). Data collected from the parameters assessed were subjected to analysis of variance (SAS, 2000) and where significant difference occurred means were separated using Duncan multiple range test of the same package.

RESULTS AND DISCUSSION

Presented in Table 1, is the proximate composition of the experimental feeds, while Table 2, indicated the rumen microbial count of sheep fed experimental diets. Rumen pH values in this study were within the values (6.00 to 7.00) reported by Okoruwa and Igene (2014) for optimum rumen microbial fermentation. Total bacteria and fungi count values that ranged between 6.73 and 7.04 x 10^4 CFU/ml and 3.81 and 4.86 x 10^4 CFU/ml respectively were significantly ($P < 0.05$) higher in diet A compared with other diets. This variation could probably associate with the levels of cocoa pod inclusion in the treatment diets. Wulandari *et al.* (2014) reported that the cellulosic from bacteria microbial inoculum growing in fermented cocoa pod is capable of degrading fiber. Fungi have been reported (Akinlade and Ososanya, 2015) to have an additional advantage of better penetration of the lignocelluloses feeds over the cellulose-degrading bacteria because of the presence of different fibres. The increased in protozoa production from 4.03 x 10^4 CFU/ml in diet C to 5.39 x 10^4 CFU/ml) in diet A in the rumen content at the expense of bacteria and fungi could not be influenced by cocoa pod husk with soursop pulp, hence reduction of protozoa biomass was noticed in the rumen of sheep fed diets B and C.

Table 3. indicates the growth performance of sheep fed experimental diets. Final body weight and average daily weight gain were significantly ($P < 0.05$) higher in diet C (11.02kg and 43.57g) while average daily feed intake and FCR recorded the highest values in diet A (221.79g and 8.68). The lower FCR and higher weight gain of sheep on diet C could probably explain the level of the diet superiority over others. Kissada *et al.* (2010) reported that improve performance in ruminants is connected with high nutrient retention and utilization of feeds.

CONCLUSION

Based on the results obtained from this study, it is therefore concluded that feeding cocoa pod husk with soursop pulp meals has the potential to influence the rumen microbial activity to facilitate digesta flow and fiber utilization in the rumen to enhance growth performance in sheep. The response was well pronounced in sheep fed 50% cocoa pod husk with 20% soursop pulp and 30% concentrate diet.

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Table 1. Proximate composition (%DM) of the experimental feedstuffs and concentrate diet

Nutrients	Napier grass	Cocoa pod husk	Soursop pulp	Concentrate diet
Dry matter	74.11	70.11	69.89	86.48
Crude protein	8.10	7.69	3.88	20.03
Ether extract	1.14	3.85	1.63	1.09
Crude fiber	29.57	28.97	24.32	14.01
Ash	9.95	9.81	2.29	7.99
Nitrogen free extract	51.24	49.68	67.88	56.92

Table 2. Rumen microbial count (x10^4 CFU/ml) of sheep fed experimental diets

	Diets			
Parameters	A	B	C	SEM ±
Rumen pH	6.50	6.63	6.58	0.04
Total bacteria	6.73^b	6.94^b	7.04^a	0.10
Total fungi	3.81^b	4.13^a	4.86^a	0.09
Total protozoa	5.39^a	4.11^b	4.03^b	0.20

^{a,b,c} Means within rows with unlike superscripts are significantly different from each other ($P < 0.05$).