



## COMPARATIVE EVALUATION OF SOME AGRO-INDUSTRIAL BY-PRODUCTS ON THE GROWTH PERFORMANCE AND SERUM BIOCHEMICAL PARAMETERS OF WEST AFRICAN DWARF GOATS

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### ABSTRACT

A ninety days feeding trial was conducted to assess the effects of feeding different Agro- industrial by-products at an inclusion level of 30% feed on the growth performance and serum biochemical parameters of West African dwarf (WAD) goats. Twelve WAD goats were used for the experiment, using *Panicum maximum* as the basal diet. The experiment had four treatments with three animals per treatment. The total body weight gain of the animals were significantly ( $P<0.05$ ) higher than the control. Average daily feed intake was not significantly different ( $P>0.05$ ) but higher in the control group. Serum parameters such as Albumin, globulin, globulin, Glucose and Aspartate amino transferase were also significantly ( $P<0.05$ ) different. The inclusion of 30% of Agro-industrial by-products improved performance characteristics and serum biochemical parameters of WAD goats.

### Introduction

Inadequate nutrition is one of the major factors contributing to the insufficiency in goats production.

In Nigeria today, the cost of ingredients required to formulate diets for goats has risen greatly due to the competition between humans, livestock and agro-industries.

Apart from the incidences of diseases and high cost of feeds, the major problems of ruminant production in the under-developing countries today are the poor nutritive value of some post-harvest crop residues and the rapidly declining quality and adequacy of natural pasture during the dry season from the roadside and communal grazing land (Adegbola, 2002). These problems have tended to reduce the rate of expansion of small ruminant production industry and have contributed to the level of animal protein nutrition of Nigerians. Efforts to reduce the high cost of feeds and therefore the cost of small ruminants production in Nigeria have concentrated on using feeds formulated from available and cheap alternative and/or unconventional feedstuffs of no nutritional value in human diets.

Agro-industrial by-products in Nigeria vary from primary processing of farm produce wastes to wastes from agro-allied industries. Some wastes are left unutilized, often causing environmental pollution and hazard. Those that are utilized do not have their full potentials harnessed. (Devendra, 1982). Pagot (1992) also showed that agro-industrial by-products have high nutrient content to sustain ruminant animals despite their high fibre level. Tegbe *et al.* (1995) indicated that except for rice offals and cassava root peels, the crude protein content of most agro-industrial by-products are higher than that of maize. Agro-industrial by-products are potential feed resource which can be used as conventional feedstuff for the production of ruminant animal. The aim of this work was, therefore, to assess the effects of Agro-industrial by-products on the growth performance and serum biochemical parameters of West African Dwarf goats..

### Materials and Methods

The experiment was carried out at the Small Ruminant Unit of the Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria. Four experimental concentrate diets were compounded with different Agro-industrial by-products such as wheat offal, rice bran, malted sorghum sprout and palm kernel cake at 30% each levels of inclusion respectively. Other fixed ingredients in the diets includes Corn cob, Bone meal, Premix, Salt. The gross composition of the experimental diets is as presented in Table 1. Twelve WAD goats aged 6 -7 months were used for



the experiment. The goats were given prophylactic treatments before the commencement of the experiment and randomly allotted to four treatment groups of 3 animals per treatment having balanced them for weight. The experimental design was a completely randomized design and lasted for 3 months. Fresh water was supplied *ad-libitum* while feeding was done at 07.00 hrs and 16.00 hours Daily feed intake and weight gain were monitored and recorded. Blood sample was collected from each goat via the jugular vein punctured using hypodermic syringe into a labeled plastic tube for serum analysis before feeding. The blood was collected to know the serum metabolites such as glucose, urea, globulin, albumin, creatinine, aspartate amino transferase and Alanine amino transferase. Data obtained were subjected to one-way Analyses of Variance and significant means were separated by Duncan's Multiple Range Test (Duncan, 1955).

#### **Chemical Analysis**

The proximate composition of experimental diet was carried out according to method of A.O.A.C (1995) while fibre fractions analysis was done according to Van Soest *et al.* (1985)

#### **Statistical Analysis**

Data obtained was subjected to one-way analysis of variance in a completely Design using SPSS (1990). Significant means were separated using Duncan Multiple Range Test (Duncan, 1955)

#### **Results and Discussion**

Ingredients composition of experimental concentrate diet are shown in Table 1. The chemical composition of the experimental diets (Table 2) shows that the CP contents ranged between 139.7g/kg DM in 0% inclusion level to 145.9g/kg DM in treatment 4 and was not consistent with the values of 9500 g/kg DM to 1000 g/kg DM obtained by ARC (1990). The performance characteristics (Table 3) shows that total weight gain and average daily feed intake were significantly different ( $P < 0.05$ ). The results obtained from the experiment based on weight gain agrees with the earlier findings of (Oduguwa *et al.*, 2001) which says body weight changes is a reflection of the nutritive status of the animals. Also, the inclusion of Agro-industrial by-products in the concentrate feed had a positive effects on weight gain which is in line with what was reported by (Okoruwa and Njidda 2012) that Agro-industrial by-products increases weight gain in goats

Table 4 shows the serum parameters of West African Dwarf goats fed different Agro- industrial by-products. There were significant differences ( $p > 0.05$ ) in the Albumin, Globulin, Glucose and Alanine amino transferase respectively. Treatment 4 which had 30% inclusion of Palm kernel cake had the highest total protein which was in agreement with the findings of Daramola *et al.* (2005) and the serum urea level which compared favorably with values reported by (Tanwar *et al.*, 2000) which may be due to catabolic increase for gluconeogenesis thus resulting in high serum urea levels.

#### **Conclusion**

It can be concluded from this research work that inclusion of different Agro-industrial by-products in the diet of WAD goats did not have any negative influence on performance characteristics and serum biochemical parameters.

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**Table 1; Percentage(%) composition of the Experimental Concentrate diet**

<b>Ingredients (%)</b>	<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>
Maize bran	49.50	39.50	53.50	47.50
Brewers dried grain	10.00	20.00	6.00	12.00
Wheat offal	30.00	-	-	-
Rice bran	-	30.00	-	-
Malted sorghum sprout	-	-	30.00	-
Palm kernel cake	-	-	-	30.00
Corn -cob	7.00	7.00	7.00	7.00
Bone meal	3.00	3.00	3.00	3.00
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated analysis				
Crude protein	12.56	12.06	13.79	13.00
Crude fibre	12.87	14.87	12.06	14.08
M.E (MJ/KGDM)	8.96	9.98	7.07	8.66

**Table 2: Percentage composition of Experimental concentrate diets**

<b>Parameters (%)</b>	<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>
Dry matter	91.61	91.54	90.89	91.73
Crude fibre	12.84	12.94	12.70	12.61



Crude protein	13.97	14.28	14.15	14.59
Ether extract	3.54	3.65	3.51	3.68
Nitrogen free extract	55.22	54.81	54.42	54.93
Neutral detergent fibre	64.89	65.28	62.72	62.47
Acid detergent fibre	53.59	54.68	51.45	51.38
Acid Detergent Lignin	15.97	16.21	13.43	13.28
Cellulose	37.62	38.47	38.02	38.10
Hemicellulose	11.30	10.60	11.27	11.09

**Table 3: Performance characteristics of West African Dwarf Goats fed graded levels of Malted sorghum sprout with enzyme supplementation**

Parameters	Treatments				SEM
	T1 0%	T2 10%	T3 20%	T4 30%	
Initial body weight (kg)	7.33	7.00	7.10	7.17	0.37
Final body weight (kg)	10.63	10.07	10.37	11.17	0.38
Total weight gain (kg)	3.30 <sup>b</sup>	3.07 <sup>b</sup>	3.27 <sup>b</sup>	4.00 <sup>a</sup>	0.13
Growth rate (g/d)	39.29 <sup>b</sup>	36.51 <sup>b</sup>	38.51 <sup>ab</sup>	47.62 <sup>a</sup>	1.49
Average concentrate intake (g/d)	222.85	210.22	216.09	235.95	4.89
Average grass intake (g/d)	266.84 <sup>c</sup>	311.01 <sup>b</sup>	317.62 <sup>b</sup>	353.20 <sup>a</sup>	10.13
Average daily intake (g/d)	489.68 <sup>b</sup>	521.23 <sup>ab</sup>	533.70 <sup>ab</sup>	589.15 <sup>a</sup>	12.83
FCR	12.47	14.47	13.79	12.43	0.39

Means along the same row with different superscripts are significantly different (P<0.05)

**Table 4: Serum Biochemical parameters of West African Dwarf Goats fed Diets containing different Agro-industrial by-products.**

Parameters(%)	T1	T2	T3	T4	SEM±
TP (g/dl)	8.01	7.96	7.68	8.88	0.51
AIB (g/l)	1.83	1.97	2.11	2.52	2.20
Globulin (mg/dl)	6.18	5.99	5.57	4.13	0.26
Glucose (mg/dl)	120.35	102.50	66.07	62.86	9.77
Urea (mg/dl)	33.94	34.74	44.94	34.10	2.21
Creatinine (mg/dl)	0.94	0.88	1.06	0.77	0.51
AST (IU/L)	71.05	75.87	61.46	54.70	3.39
ALT (IU/L)	14.66	12.73	9.36	9.52	1.01