



## Characteristics of West African Dwarf (Wad) Goats Fed Cassava Peel – Cassava Leaf Meal Based Diets

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### ABSTRACT

An experiment was conducted to determine the effects of cassava peel – cassava leaf meal based diets on growth performance and carcass characteristics of West African Dwarf (WAD) goats. Twelve weaner bucks aged 6 - 8 months and averaging 8.0kg in weight were divided into 4 groups of 3 and each group was randomly assigned to one of the treatment diets in a Completely Randomized Design. The four diets (A, B, C and D) were formulated to contain 0, 10, 20 and 30% cassava leaf meal respectively. Each animal received each diet for 60 days. Parameters measured were average daily weight gain (ADWG), feed conversion ratio (FCR) and dressing percentage. ADWG were 34.2, 50.0, 62.5 and 66.7g for diets A, B, C and D, respectively. These values were significantly different ( $P < 0.05$ ). The group on diet D had the least FCR (3.6) which was similar ( $P > 0.05$ ) to the group on diet C (3.7) but differed significantly ( $P < 0.05$ ) from the groups on diet B (4.6) and diet A (6.5). Dressing percentage did not differ significantly ( $P > 0.05$ ) among treatment groups. Diet C and D appear to be better fattening diets since they had better FCR and ADWG though their dressing percentage values were similar ( $P > 0.05$ ) to other diets.

**Keywords:** Cassava leaf meal, cassava peel, daily weight gain, dressing percentage, feed conversion ratio, West African Dwarf goats.

### INTRODUCTION

Goats are one of the most important domesticated small ruminants with a population of 28 million in Nigeria [1]. Goat production in Nigeria comprises largely of traditional rearing system which is characterized by lack of breeding control, basic housing, record keeping, health care, irregular and inadequate feeding. It is in this light that non – conventional feedstuffs which are cheap and not in high demand by humans [2] are presently being exploited for livestock and indeed for goat production in Nigeria. Cassava leaf has high protein content (16.7 – 39.9%) [3] with almost 85% of the crude protein as true protein [4]. Cassava peel is a major by-product of cassava tuberous root processing industry. It is largely under-utilized with an annual production of about 32 million metric tones [5]. This study therefore was designed to evaluate the growth performance and carcass characteristics of West African Dwarf (WAD) goats fed cassava peel – cassava leaf meal based diets.

### MATERIALS AND METHODS

Environment of study: The study was carried out at the Sheep and Goat Unit of the Teaching and Research farm of the Michael Okpara University of Agriculture, Umudike. Umudike is located at Latitude 5°29' North and 7°32' East and at an altitude of 122 meters above sea levels. The area falls within the tropical rain forest zone. Annual rainfall averages 2177mm. The monthly ambient temperature ranges between 20°C and 36°C. Relative humidity ranges from 50 – 95%. This experiment was conducted in the dry and rainy seasons.

The cassava peels used for this trial was sundried on a concrete floor for 3-5 days depending on the intensity of the sun. The sundried cassava peels were then milled. The cassava leaves were sundried on a concrete floor for 3 days, milled and bagged in sacks for feed formulation.

### Feeding trial

Twelve WAD bucks of 6-8 months of age and averaging 8kg body weight were quarantined for 21days, dewormed and treated with appropriate acaricides. Each animal was later housed individually in a well ventilated cement floored pen equipped with feeding and watering troughs. The animals underwent a 21days preliminary period to accustom them to the environment. All the animals were weighed and divided into four groups of three animals each. The four experimental diets (Table 1) were randomly allotted to the four animal groups. Each animal within a group received 1kg daily of an assigned diet for 60days. Portable drinking water was provided for each animal *ad libitum*. Voluntary feed intake was determined daily for each animal by subtracting the feed refusals from daily feed served. Daily feed intake and weekly weight were recorded for each animal.

### Slaughter technique

The slaughter technique was carried out as in Adebowale and Ademosun [6]. The goats were starved for 24hours before slaughter, after slaughter and after dressing. Dressing percentages were calculated as the weight of dressed warm carcass in relation to body weight before slaughter. A dressed (warm) carcass is defined as the weight of the animals less the head, skin, thoracic contents and pelvic cavities (including the diaphragm and kidney) and the limbs distal to the corpal and tarsal joints. The heart, the liver less the gall bladder, the lungs, the spleen, the pelvic fat and the four feet were weighed. The gut was weighed full and empty.

### Analytical procedure

The feeding trial was a Completely Randomized Design Experiment. Data obtained were analyzed using analysis of variance (ANOVA) procedures [7]. Where ANOVA detected significant treatment effects, means were separated using Duncan's multiple range test [8]. Meat cuts, offal weights and organ weights were expressed as percentages of the slaughter weight.

## RESULTS AND DISCUSSION

The proximate constituents of the experimental diets, the cassava peels and cassava leaf meal used in this study are presented in Table 1.

Table 1. Feed constituents and proximate composition of the experimental diets.

Ingredients	Diets (%)					
	0%CLM	10%CLM	20%CLM	30%CLM	DCP	CLM
DCP	62	57	52	47		
CLM	0	10	20	30		
Palm kernel cake	19	16	12	8		
Brewers' dried grain	10	8	7	6		
Soya bean meal	5	5	5	5		
Bone meal	3	3	3	3		
Common salt	1	1	1	1		
Total	100	100	100	100		
Analyzed contents (%)						
Dry matter	87.52	87.52	89.62	89.64	87.60	93.00
Crude protein	12.56	13.00	13.00	13.52	4.90	25.10
Crude fiber	19.35	18.65	18.60	16.15	16.60	7.90
Ether extract	1.05	1.30	1.45	2.20	2.10	5.50
NFE	43.77	43.00	42.87	43.62	71.00	51.90
Ash	12.30	12.60	13.70	14.15	8.50	6.10
ME (MJ/KgDM)	1.48	1.47	1.44	1.44	1.82	1.80

Where DCP = Dried cassava peels, CLM = Cassava leaf meal, NFE = Nitrogen free extract

The proximate values for the cassava peels fell within the range reported by Ifut [9] and Ahamefule et al [10]. The proximate constituents of the cassava leaf meal were within the range of values obtained by Ravindran [4]. The dry matter percent was similar for diets with 0% CLM and 10% CLM and tended to increase as the level of inclusion of cassava leaf meal increased from diets with 0% CLM to that with 30% CLM. The crude protein content was highest in diet with 30% CLM followed by that with 20% CLM and 0% CLM with the lowest in the diet with 10% CLM. The crude fiber contents were declining with increase in cassava leaf meal levels. The ether extract, ash and

energy values increased from diets with 0% CLM to 30% CLM while the nitrogen free extract values did not show any consistent trend among the diets.

Table 2 shows the performance of WAD goats fed cassava peels – cassava leaf meal based diets. Total feed intake tended to increase with increasing level of CLM in the diets. Increased level of CLM in the diets relatively increased the crude protein content of the diets and perhaps the palatability. However, feed intake had been observed to be governed by some other factors apart from dietary CP and palatability. These include gut fill, body fat and changes in the body chemical constituents [11]. The total body weight gain differed significantly ( $P<0.05$ ) among treatment groups. The CLM diets tended to support more live weight gains than the control. Diets with 30% CLM and 20% CLM supported higher live weight gains than the other diets. This followed the same trend as the feed intake. The feed conversion ratio differed significantly ( $P<0.05$ ) among treatment groups with diets with 20% CLM and 30% CLM being similar ( $P>0.05$ ). Goat on 30% CLM diet consumed more feed than those on 20% CLM diet and supported comparable ( $P<0.05$ ) feed conversion ratio as those fed 20% CLM diet.

Table 2. Performance of WAD goats fed cassava peel – cassava leaf meal based diets.

Parameters	Diets				
	0%CLM	10%CLM	20%CLM	30%CLM	SEM
Average initial body weight (kg)	8.1	7.8	7.7	8.0	0.01
Average final body weight (kg)	10.1	10.8	11.5	12.0	1.29
Average mean body weight (kg)	9.1	9.8	10.7	10.8	0.20
Average total feed intake (kg)	13.3	13.7	13.8	14.3	0.25
Average feed intake (g/day)	291.6	305.9	310.0	313.4	2.61
Average total body weight(kg)	2.1 <sup>c</sup>	3.00 <sup>b</sup>	3.8 <sup>a</sup>	4.0 <sup>a</sup>	0.71
Average daily weight gain	34.2 <sup>c</sup>	50.0 <sup>b</sup>	62.5 <sup>b</sup>	66.7 <sup>a</sup>	0.69
Feed conversion ratio	6.5 <sup>a</sup>	4.6 <sup>b</sup>	3.7 <sup>c</sup>	3.6 <sup>c</sup>	0.40

<sup>abc</sup>Means on the same row with different superscripts differ significantly ( $P<0.05$ )

Carcass yield of WAD goats fed cassava peel – cassava leaf meal based diet is presented in Table 3. Live weight at slaughter, empty body weight and carcass weights were not significantly different among treatments though the values for the CLM diets seemed higher than the control diet. Dressing percentage was highest for goats on 20% CLM diet followed by those on 30% CLM diet, 0% CLM and 10% CLM diets though there were no significant differences among them. These values were within the range of 45 – 52% reported for WAD goats by Nuru (121985) but below the range of 50.4 – 52.6% reported by Ahamefule (112005) and a percentage of 50% reported by Hassan and Idriss (132002). The meat cuts were expressed as percentage of slaughter weight. Except for the leg, the percentages for the loin and the sets did not differ ( $P>0.05$ ) among treatment. For the leg, diets with 10% CLM, 20% CLM and 30% CLM were similar ( $P>0.05$ ) but different ( $P<0.05$ ) from diet with 0% CLM. High feed conversion ratio usually indicates poor ability of animals to maximize feed by failure to optimally utilize feed for meat production. Goats fed diets with 20% CLM and 30% CLM performed better in terms of feed conversion ratio. The kidney percentage was significantly ( $P<0.05$ ) different. Toxicity of feed was indicated by the weights of some internal organs like the liver and kidney. This was evident in goats that fed the CLM diets.

Table 3. Carcass yield of WAD goats fed cassava peel – cassava leaf meal based diets.

Parameters	Diets				
	0%CLM	10%CLM	20%CLM	30%CLM	SEM
Body weight at slaughter (kg)	10.1	10.8	11.5	12.0	0.90
Bled weight (kg)	10.1	10.2	11.0	11.7	0.32
Empty body weight (kg)	8.1	8.1	9.2	9.2	0.61
Warm carcass (kg)	4.5	4.7	5.5	5.5	0.48
Dressed weight (%)	45.0	43.8	47.8	45.7	0.72
Meat cuts (expressed as % of slaughter weight)					
Leg	9.5 <sup>b</sup>	10.0 <sup>ab</sup>	10.4 <sup>a</sup>	10.2 <sup>a</sup>	0.08
Loin	8.0	9.5	7.9	9.1	0.97
Sets	8.3	9.5	10.0	9.2	0.62
Ends	4.2 <sup>b</sup>	5.5 <sup>b</sup>	5.7 <sup>a</sup>	6.1 <sup>a</sup>	0.22
Shoulder	13.4	13.6	14.2	14.4	0.67

CAbdominal fat	0.2	0.2	0.2	0.2	0.003
Bone to lean ratio	0.008	0.006	0.006	0.005	0.000
Offal weights (% of slaughter weight)					
Head	9.8	10.4	10.2	8.6	1.29
Skin	7.6	8.0	7.8	8.1	0.97
Feet	4.0	3.9	3.8	3.1	0.29
Full gut	25.3	25.8	31.1	24.6	0.86
Empty gut	7.1	7.8	8.5	6.4	0.86
Organ weights (% of slaughter weight)					
Liver	1.8	1.9	1.8	1.9	0.04
Kidney + pelvic fat	0.3 <sup>b</sup>	0.3 <sup>ab</sup>	0.3 <sup>ab</sup>	0.4 <sup>a</sup>	0.001
Heart	0.7	0.7	0.7	0.8	0.02
Spleen	0.2	0.2	0.2	0.2	0.003
Lungs	1.7	1.7	1.6	1.8	0.60
Testicles	0.7	0.8	0.8	0.9	0.04

<sup>ab</sup>Means on the same row with different superscripts differ significantly (P<0.05)

## CONCLUSION AND RECOMMENDATION

Conclusively, the incorporation of cassava leaf meals in cassava peel based diets improved average daily weight gain and feed conversion ratio when compared to the control diet and therefore the CLM diets are recommended.

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