Carcass characteristics of West African dwarf bucks fed processed jackfruit seed meal diets

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Abstract
Effect of processing of Jackfruit seed meal on the carcass characteristics of West African dwarf (WAD) goats was investigated. The WAD goats were grouped into four and randomly fed with the four experimental diets (A – D) formulated as 0% JFS, 5% raw JFS, 5% soaked JFS and 5% toasted JFS respectively. The experiment lasted for 56 days. Loin and rack showed significant (P<0.05) differences among the treatment groups. However, dressing percentage (45.07 – 45.08%) were statistically similar (p>0.05) among the treatments. In the same way, the relative weight of organs were also not significantly affected by the diet. It was therefore concluded that jackfruit seed meal can be used in feed for goats without any adverse effect on carcass yield.

Keywords: WAD goats, jackfruit seed meal, carcass characteristics

Introduction
Quantitative malnutrition is the challenge faced by one third of humanity (FAO, 1982). It has been observed in recent years that there is a rapid growth in the population of developing countries including Nigeria with resultant increase in the demand for protein of animal origin (Eyoh *et al*., 2015). Consumption of protein can be increased through improvement in the production of local goat breeds like West African dwarf which is mostly found within the tropics. It is therefore pertinent to supply adequate feed in quantity and quality for optimal performance by livestock. Rearing of goats offers ample opportunity for availability of meat. Goats are easy to keep and have a significant role in socioeconomic life of the people as they contribute about 35% Nigerian meat supply (Mahmood, 2010). To address the nutritional needs of goats, there is need to harness non-conventional feedstuffs which offer cheaper and less competitive alternatives to farmers especially during scarcity periods. Jackfruit is a multiple fruit composed of hundreds to thousand of individual flowers and the fleshy petals of the unique fruits are eaten (Mourya, 2016). Mature fruit contains about 100 – 500 seeds and is normally discarded after licking the flesh. The seeds contain appreciable amounts of energy protein. Minerals and vitamins (Swami *et al*., 2012). The use of jackfruit seed is hindered by some allelochemicals hence should be properly processed. This study was aimed at evaluating the effects of processing jackfruit on the carcass characteristics of West African dwarf goats.

Materials and methods

Animal management
Sixteen West African dwarf (WAD) bucks of 6 – 8 months of age and averaging 7kg (range 6 – 8kg) in weight were purchased from reputable smallholder goat farmers

around the villages within the university environs. These animals were first quarantined for 21 days prior to the commencement of the experiment. They were dewormed with ale feeder and drinker. Each animal was offered 0.5kg of the experimental to build up each animal's appetite for concentrate diet regimen. After the preliminary feeding period, all the animals were weighed and randomly divided into four groups of four animals each.

Processing of jackfruit seeds

Jackfruit (*Artocarpus heterophyllus*) seeds were purchased from early morning village market in Uyo, Akwa Ibom State. Matured pods of *Artocarpus heterophyllus* were collected from fallow lands around the university environment. The seeds were removed manually and sun dried for 30 mins after which it was divided into groups namely raw, soaked and toasted.

Two (2kg) kilogrammes each of the sample was processed thus, raw - the seeds were sundried for 30 minutes, soaked – the seeds were soaked in 2 litres of water for 30 minutes after which it was decanted while for toasted – the seeds were placed on a pan and toasted for 30 minutes.

Experimental diets and parameters measured

Jackfruit seeds were processed as raw, soaked, toasted and used as treatments. Each treatment had 5% inclusion of the processing method with treatment 1 with 0% JFS as the control. The treatments were designated as diets A, B, C and D (Table 1). The four experimental diets were allotted randomly to 4 animal groups. Each animal within a group received 1kg of an assigned diet daily for 90 days. Fresh clean water was liberally provided. At the end of the feeding trial, 12 animals (i.e. 3 animals per treatment group) were slaughtered for carcass evaluation.

Slaughter of goats and handling of carcass

Goats were starved 24 hours prior to slaughter. Each animal was weighed just before slaughter, after slaughter and after dressing. The dressed carcasses were chilled in a deep freezer at 5^{o}C for 24 hours. Dressing percentage was calculated as the weight of dressed chilled carcass in relation to live weight before slaughter. Dressed carcass is the weight of the goat after removal of the head, skin, contents of the thoracic and pelvic cavities (including diaphragm and kidney), the limbs distal to the carpel and tarsal joints. Each gut was weighed, cleaned and re-weighed. The weight of the heart, liver, lungs, spleen, limbs distal to carpels and tarsal were also recorded.

Meat cuts

This was carried out according to procedures outlined by (Eyoh, 2016). Each carcass was divided through the spinal column by a neat saw and each half was weighed. The left half was subsequently divided into various cuts. The thigh was served at the attachment of the femur to the acetabulum, the loin consists of the scapula and the sets made up of the breast and neck. Each of the cuts except the sets was weighed. The weight of breast was first doubled and added to the weight of the neck to derive the weight of the sets. The leg plus loin cuts were dissected into muscles and bones with ligaments to obtain the meat/bone ratio.

Experimental design and analytical procedure

Completely randomized design (CRD) with four diets randomly assigned to four groups of four goats per group was used. Data obtained were analyzed using the one-way analysis of variance (ANOVA) (Steel and Torrie, 1990). Significant means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Results and discussion

The proximate composition of the various processing methods of the experimental diets used in this study is presented in Table 2. There were significant ($P<0.05$) differences observed in all the parameters tested for proximate constituents. The dry matter percent of the processing methods compared favourably with that of the control diet (A). The crude protein and ether extract values of the processed meals were relatively higher than those of control diet and tended to increase in the various processing methods (i.e. toasted and soaked). Crude fibre and ash followed similar pattern, soaked method having the highest (9.60% EE and 5.36% Ash) respectively. Nitrogen free extract and gross energy did not show any consistent trend among the diets.

Table 3 shows that carcass characteristics of WAD goats in this study. The values obtained for liveweight at slaughter, dressed weight and dressing percentage did not differ ($P<0.05$) significantly among the dressing percentage (DP) were 45.07, 45.08, 45.08 and 45.07% for diets A, B, C and D respectively. These values are within the range 40.47 – 50.29%, Eyoh and Ayuk (2019) for WAD goats fed selected forages, and also within the range of 50.4 – 52.6% (Ahamefule, 2005). However, the DP obtained in this study was higher than the range 37.22 – 45.40% reported by Udo *et al* (2018) for WAD goats fed rubber seed based diets. The meat cuts were also not significantly ($P<0.05$) different among the treatment groups except for loin and rack. The loin meat cut was best for goats in diet A (control) (16.56) while diet D (6.26) recorded the least. The meat cuts differentiated into racks and loin tended to be heavier for goats fed processed JFS diets than the control group. JFS therefore can be used effectively in goat fattening programmes to enhance better weights of meat cuts. The weight of flank, sets, ends, shoulder, thigh and head did not follow any consistent trend but varied in comparison to the control diet. However, they are comparable with what had earlier been reported for WAD goats (Eyoh and Ayuk, 2019). The organ weights did not differ significantly ($P<0.05$). This implies that the weights of the kidney and liver were not affected by the processing methods employed in the jackfruit seed meal; since the antinutritional factors might have been reduced to tolerable level by the various processing methods used.

Conclusion and recommendation

This study revealed that using different methods of processing has enhanced the utilization of jackfruits as feed for livestock, and it is ideal for fattening WAD goats. Thus, making animal protein readily available for the teaming population.

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Table 1: The Composition of Jackfruit Seed Based Diets.

	DIETS			
Ingredients (%)	A (control)	B(raw)	C(soaked)	D(toasted)
Spent grains	20	15	15	15
Rice meal	20	20	20	20
Palm Kernel cake	20	20	20	
Jackfruit meal	0	5	5	5
Rice bran	35.50	35.50	35.50	35.50
Oyster shell	2.0	2.0	2.0	2.0
Limestone	2.0	2.0	2.0	2.0
Salt	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00
Calculated composition:				
CP (%)	14.65	13.78	14.19	14.23
ME (kcal/g)	2265.5	2795.0	3938.9	3824.7

Table 2: Proximate Composition of the Experimental Feed

Parameters (%)	**A(control)**	**B(raw)**	**C(soaked)**	**D(toasted)**
Dry matter	89.85	89.96	90.06	90.10
Crude protein	15.44	15.64	15.52	15.84
Ether extract	3.84	3.95	4.06	4.10
Crude fibre	9.51	9.44	9.60	9.37
Ash	5.27	5.21	5.36	5.24
NFE	55.80	55.73	55.57	55.57
Gross energy (Kcal/kg)	4.02	4.03	4.01	4.03

Table 3: Carcass Characteristics of West African Dwarf Goats Fed Differently Processed JFS Meal Based Diets.

Parameters	A(control)	B(raw)
C(soaked)	D(toasted)	SEM
Live weight (kg)	6.70	6.90
6.70	7.37	1.09
Dressed weight	3.02	3.11
3.02	3.32	0.49
Dressing (%)	45.07	45.08
45.08	45.07	0.02
Loin	16.56[a]	6.70[d]
10.15[c]	16.26[b]	1.20
Flank	0.99	0.83
0.89	0.57	0.00
Sets	9.93	6.43
6.62	6.02	0.00
Ends	13.64	7.97
9.21	8.17	0.00
Rack	4.55[d]	4.74[c]
4.77[b]	4.83[a]	0.01
Shoulder	16.56	16.08
16.56	15.06	0.00
Thigh	10.61	7.97
9.21	8.17	0.00
Bone to lean ratio	2.10	2.15
2.46	2.34	0.00
Head	16.67	22.50
18.50	18.17	0.00
Skin	16.56	16.08
16.56	15.06	0.00
Tail	1.80	1.87
1.85	1.93	0.00
Right limb	7.56	4.74
6.64	4.83	0.00
Left limb	4.55	4.77
6.64	4.83	0.00
Full gut	79.47	67.52
89.40	60.24	0.00
Empty gut	23.17	19.29
19.89	15.06	0.00
Liver	5.12	3.13
2.28	2.43	0.00
Kidney	2.30	3.13
4.33	4.67	0.00
Heart	2.48	3.13
2.28	2.43	0.00
Lungs	3.79	3.13
2.05	2.27	0.00

[a, b, c, d] means on the same row with different superscripts differ ($P<0.05$) significantly.