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Carcass Yield, Meat Quality, Sensory Evaluation and Input Use Efficiency of West African Dwarf Goats Fed *Pleurotus tuber regium* Treated Cassava Root Sievate Based Diets

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Abstract

This study was conducted to evaluate the carcass yield, meat quality, sensory evaluation and input use efficiency of West African dwarf (WAD) goats fed *Pleurotus tuber regium* treated cassava root sievate (PTRCRS) based diets. Thirty-two WAD goats between six and eight months old were randomly divided into four groups of eight goats each. The four experimental diets were formulated to contain 0, 20, 40, and 60% dietary levels of inclusion of PTRCRS respectively. The groups were randomly assigned to the four experiment diets (T_1, T_2, T_3, and T_4) for 90 days in a completely randomized design. The results indicated that warm carcass weight, dressing percentage, loin and set weights were significantly ($p<0.05$) improved in T_3 and T_4. Liver weight was significantly ($p<0.05$) reduced in T_3 and T_4. Sensory evaluation, proximate composition and pH of the meat were not ($p>0.05$) statistically influenced. The total cost of feed, feed cost/weight gain, benefit per body weight gain and cost-benefit ratio were significantly ($p<0.05$) influenced. The study showed that the inclusion of PTRCRS in the diets of WAD goats enhanced carcass yield, and benefit per body weight gain of the goats, and hence could be included in goat diets up to 60%.

Keywords: biological treatment, Cassava by-products, dressing percentage, meat quality, benefit per weight gain

Introduction

Nigeria is currently suffering from severe food insecurity, in part because of the rapid population expansion and the recent alarming decline in per capita food output. The failure of countries like Nigeria to feed itself and control the rising cost of food has increased poverty levels and decreased both the quality and quantity of animal protein intake among its populace. While it is recommended that an average Nigerian should consume 65 grams of protein per day, of which 35 grams should come from animal sources (Imoh, 2000), only approximately 10 grams come from animal sources. The most important nutrient in the diets of citizens, particularly those who are young, pregnant, or elderly, is protein. Despite the enormous livestock resources in Nigeria, which include cattle, goats, sheep, rabbits, pigs, and poultry, as well as coasts and reservoirs for fish farming and fishing, they are still inadequate to supply the citizens with the needed animal protein in a suitable quantity. Animal protein is crucial to human nutrition because it contains essential amino acids that are more evenly distributed and easily accessible to satisfy human dietary needs than protein from plants.

One of the most significant suppliers of animal protein in the world today is goats. With a population of 53.8 million and 6.2% of the world's goat population, Nigeria is the leading goat producer in Africa (Jiwuba, 2021). According to Lawal-Adebowale (2012), the goat is the highest source of animal protein in the country in terms of number (34.5 million goats, 22.1 million sheep and 13.9 million cattle). The goat is a multipurpose animal that produces considerable amounts of milk and meat, their contributions to delivering animal protein cannot be overstated (Jiwuba *et al*., 2018a). As a result, rearing goats on readily available local feedstuffs like cassava root sievate could not ensure maximum productivity.

Cassava root sievate is a lignocellulosic substance that is distinguished by the low levels of protein, soluble carbohydrates, and minerals. It also exhibits poor rumen degradation due to its high lignin content. Saliu and Sani (2012) noted that pre-treatment has an impact on how well animal utilizes crop residues or wastes. When opposed to physical and chemical approaches, biological treatments utilizing microorganisms like fungi, such as white rot fungi, several advantages. Microbial enzymes are used in this instance to hydrolyze polysaccharides (Jiwuba *et al*., 2022). Solid-state fermentation promotes the growth and lignocellulosic enzyme production of white rot fungi because the conditions are more similar to those seen in their native environments (Huang *et al*., 2010; Sánchez-Corzo *et al*., 2021). Therefore, biodegradation could be important for enhancing goat nutrition due to the significant amount of cassava root sievate that is readily available at no cost.

Banskalieva *et al.* (2000) and Ahmed *et al*. (2010) noted that goat meat (chevon) is of superior value to mutton and beef since it has less saturated fat and comparatively more poly-unsaturated fatty acids. Lean meat is good for health-conscious consumers because it is nutritious and lower in calories and cholesterol than traditional meats. It also accounts for 63 per cent of the world's red meat consumption (Correa, 2008). Numerous studies have been published on the nutritional benefits of cassava by-products, but there has been little to no research on the carcass yield, meat quality, sensory evaluation, and input use efficiency of West African dwarf goats fed *Pleurotus tuber-regium* treated cassava root sievate based diets. The objective of this research was to evaluate the effect of different levels of *Pleurotus tuber-regium* treated cassava root sievate on the carcass yield, meat quality, sensory evaluation and input use efficiency of West African dwarf goats.

Materials and Methods

Experimental site

In Ishiagu, Ivo L.G.A., Ebonyi State, Nigeria, the experiment was conducted at the Federal College of Agriculture's sheep and goat unit. The distance between the College and Ishiagu main town is around three kilometres. The College is located at latitude 5.56^0 N and longitude 7.31^0 E, with an average annual rainfall of 1653 mm and temperatures that range from 28.50^0 C to 80 % relative humidity.

Sourcing and processing of cassava root sievate

The cassava root sievates used (TME419 variety) were obtained from the community of Akawa, Nneato, Umunneochi L. G. A. Abia State. Cassava root sievate is a by-product of processing cassava roots. They were obtained after the cassava roots intended for "*fufu*" production were peeled or not, cleaned, and immersed in clean water for 3-5 days to ferment to lower the hydrogen cyanide level to soften the roots before sieving. The soaked cassava roots were then sieved, the sievates (wastes) collected, and sun-dried for roughly 7 days to reduce the moisture levels to 10 to 15 % and any anti-nutrients that were not eradicated during the retting process. To lower the particle size and increase the surface area for microbial activity, the sun-dried cassava root sievates were coarsely ground using a blur mill.

Biological treatment of cassava root sievate with Pleurotus tuber-regium

Using Izal in water at a ratio of one litre Izal to four litres of water, the inoculation room was carefully swept, washed, and disinfected. To remove any remaining contaminants, the floor was mopped, and left to dry before being sealed up for two weeks. The milled cassava root sievates were then extensively mixed with water to permit complete wetting before being blended at a ratio of 1.0 kg sievate to 1.0 litre of water. *Pleurotus tuber-regium* (PTR) tubers were bought from a vendor at Orie Ugba market in Umuahia, Umuahia North L.G.A., Abia State, Nigeria. The PTR tubers were weighed, cleaned, cut into smaller pieces, and submerged in water for two hours. They were then removed and placed in white transparent buckets, where they were covered for three days to allow the tubers to grow spores. A wetted CSR was inoculated with PTR spores at a ratio of 1.0 kg spores to 3.0 kg CRS. Using masking tape, the ends of the poly-ethene sheets were pulled together and sealed to form an airtight microenvironment. After the water was spilt on the floor and some were left in buckets, the inoculation room doors were shut. After 45 days, the mass of composted CRS had become colonized by the fungi mycelium revealing whitish growths. To stop the fungi growth and to dry the material, the mass was removed from the inoculation trays and placed outside on a drying surface to the sun. Until they were needed, the items were placed in sacks and kept in storage.

Formulation of experimental diet

The experimental diets represented as T_1, T_2, T_3 and T_4 were formulated from non-treated cassava root sievate, brewers' dried grain, palm kernel meal, soybean meal, bone meal, salt, premix and contained 0, 20, 40 and 60% treated cassava root sievate (Table 1).

Procurement and adaptation of the experimental goats

Thirty-two WAD bucks weighing about 5.26 kg and aged 6 to 8 months were sourced from Nkwo Achara, Uturu, Isukwuato, L.G.A., Abia State. The goats were quarantined for 21 days before the study. Before the trial, the goats were administered Ivermectin (1 ml/10 kg body weight (injected subcutaneously) and Albendazole (0.1 mg/kg BW given orally) to treat external and internal parasites. The goats were vaccinated against *Peste' Petit de' Ruminante'* (PPR) with the PPR vaccine at a dosage of 1 ml per 10 kg of body weight. For a preliminary period of 21 days, each animal was fed the experimental diets on 3.5% of their body weight and got a designated treatment diet in the morning (8.00 hr) and 1 kg of chopped basal *Panicum maximum* in the evening (16.00 hr). This was done to increase the appetite of each goat for the concentrate diet. According to the authorization and instructions of the Federal College of Agriculture, Ishiagu, Ebonyi State, Nigeria Animal Ethics Committee, the experimental animals were acclimatized for 21 days before the start of the study.

Carcass and organ evaluation

Five goats were selected randomly from each treatment and deprived of feed for 24 hours before being slaughtered. Each of the randomly selected animals was weighed shortly before being slaughtered to determine their live weight at slaughter. After dressing and after being slaughtered, additional weights were taken. The weight of the dressed warm carcass to the live weight before slaughter was used to calculate the dressing percentages. The weight of the goats after the head, skin, contents from the thoracic and pelvic cavities, (including the diaphragm and kidney) and the limb distal to the carpal and tarsal joints have been removed was referred to as a dressed (warm) carcass. Each time, the guts were weighed, cleaned, and then reweighed to determine the weights of the full and empty gut weights respectively. To determine the organ weights, the heart, liver without the gall bladder, lungs, and kidney were weighed. To determine the offal weights, the limb (four feet) distal to the carpals and tarsals, skin, testicles, and guts were also weighed. While organ/offal weights were represented as percentages of the empty live weight. Meat cuts were expressed as percentages of the warm carcass. Empty live weight was defined as the live weight at slaughter minus gut content. Jointing the carcass (Meat cuts): This was done according to the procedure employed by Akinsoyinu (1974). Each dressed warm carcass was divided down the spinal column using a meat saw. Each half was weighed. The left half was subsequently divided into various cuts. The leg (thigh) was severed at the attachment of the femur to the acetabulum, the loin consist of the lumbar region plus a pair of ribs, the ends (spare ribs plus belly) consisted of six abdominal ribs, the shoulder consist of the scapula, and the sets made up of the breast and the neck. Each of the cuts was weighed and the weight doubled in each case before being expressed as a percentage of the dressed carcass.

Proximate analyses of meat

The goat meat samples were analyzed for **proximate composition** using AOAC (2000) procedure.

pH determination

Meat samples for pH determination were taken at the *Longissimus dorsi* of each carcass after dressing. The meat samples were minced and blended into paste, before measuring the pH. 1 g of ground meat sample was homogenized in 10ml of distilled water and the pH was measured with the ATC pH meter, model 2000.

Sensory evaluation

For the sensory evaluation, 100 g of samples of meat from the loin of each buck among the slaughter goats was collected, cut into chops of equal sizes and packed in transparent double layered polythene bags and tagged for identification. They were cooked in a water bath for 30 minutes and allowed to cool at room temperature before serving to ten trained panellists to score each sample for flavour, tenderness, juiciness and overall degree of acceptability. The evaluators scored each sample on a nine-point hedonic scale (Land and Shepard, 1988) for colour, juiciness, flavour, texture and tenderness. Overall acceptability was scored on a three-point scale (1= least acceptable, 2= more acceptable and 3= most acceptable).

Economics of production

The prevailing market prices of the feed ingredients at the time of the experiment were used to estimate the unit cost of the experimental diets. The variable costs of feeding the goats were considered the cost of feeds and all other costs (i.e., labour, capital investment and housing) were the same for all the treatments. The cost of sourcing, processing and inoculation of the biodegraded cassava root sievate was included as the feed cost. Feed cost (N) per kilogram, cost per kilogram of daily weight gain, and cost-benefit ratio were calculated accordingly. The cost-benefit ratio was determined by dividing cost/kg live weight with feed cost/weight gain (at the time of the experiment, 456 naira (N), Nigeria's National Currency was equivalent to One United States Dollar (N456.00 = US$ 1.00).

Proximate and fibre composition

Triplicate samples of fungi-treated cassava root sievate based-diets was analysed for dry matter (DM), crude protein (CP), crude fibre (CF), ash, ether extract, organic matter (OM) and metabolizable energy (ME) according to the methods of AOAC (2000). The fibre fractions such as neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (ADL) were determined according to the methods of Van Soest *et al*. (1991). Hemi cellulose was calculated as the difference between NDF and ADF and cellulose as the difference between ADF and ADL.

Nitrogen-free extract was determined as:

% NFE =100 – (% crude protein + % crude fibre + % ether extract + % ash).

Organic matter was calculated as

OM (%)=% crude fibre + % crude protein + % ether extract.

Gross Energy determination: The gross energy was calculated using the formula

$T = 5.72Z_1 + 9.50Z_2 + 4.79Z_3 + 4.03Z_4 \pm 0.9\%$; according to Nehring and Haelein (1973)

Where;

T= Gross energy, Z_1= Crude protein, Z_2= Crude fat, Z_3= Crude fibre, Z_4= Nitrogen-free extract.

Experimental design and statistical analysis

Data obtained were analyzed using analysis of variance (ANOVA) as described by SAS (2008). Significant means were separated using the Duncan multiple new range test (Duncan, 1955) at $p<0.05$.

Results and Discussion

Chemical composition of the experimental diets

The chemical composition of experimental diets containing varied levels of *Pleurotus tuber regium*-treated cassava root sievate is shown in Table 2. The diets had a significant ($p<0.05$) influence on CP, ash, NFE, NDF, and ADF, but had no effect significant ($p>0.05$) on DM, CF, EE, and gross energy (GE). Crude protein values of T_3 and T_4 were significantly ($p<0.05$) higher than T_1 and T_2. The ash values for the treatment diets increased significantly ($p<0.05$) as PTRCRS was increased in the diets. Increased levels of *Pleurotus tuber regium* treated cassava root sievate in the diets resulted in decreased ($p<0.05$) values of NDF and ADF.

The CP of the treatment diets increased with incremental levels of PTRCRS in the diets. The crude protein content of all the diets was above the acceptable 7% CP for ruminant maintenance as recommended by ARC (1980) and 8% suggested by Norton *et al.* (1994) for ruminal function. The higher CP observed in the treatment diets could balance for the imbalance of amino acids produced during protein degradation. Ash values for the treatment diets increased ($p<0.05$) with increasing of PTRCRS in the diets. The observation in this study could be attributed to the mycelia biomass of the fungus during bioconversion. The variations in the NFE values could be attributed to the influence of graded levels of PTRCRS on the diets. NFE contains both starches some proportion of hemicellulose and lignin (Khan *et al.,* 2003). There was decreasing ($p<0.05$) trend in NDF and ADF with increasing levels of *Pleurotus tuber regium* treated cassava root sievate in the diets. The decrease in NDF was nevertheless not too fast as to cause any challenge as Lalman (2012) noted that to maintain optimum roughage digestion, ruminant diets should contain a minimum of 20 % NDF on DM basis. The neutral detergent fibre fraction is made up of hemicellulose, cellulose and lignin resulting in improved fibre that is effective in stimulating rumen motility. The reduction in ADF highlighted the nutritional superiority of the biological treatment. In an earlier study, Lalman (2012) reported that diets with lower values of ADF are of good nutritional quality. Perhaps, the lower NDF and ADF values in PTRCRS-containing diets indicated that *Pleurotus tuber regium* solubilized and utilized the cell walls as carbon sources and hence altered the ratio of insoluble to soluble carbohydrates in the diets, compared with the control diet containing non-biodegraded cassava root sievate.

Carcass evaluation

The carcass characteristics of West African Dwarf goats fed graded levels of *Pleurotus tuber regium* treated cassava root sievate-based diets are presented in Table 3. Diets had a significant ($p<0.05$) influence on live weight at slaughter, warm carcass weight, dressing percentage, loin and set weights while empty weight, shoulder, leg, end and shank weights were not significantly influenced ($p>0.05$) by the treatments. The animals on T_1 had the lowest ($p<0.05$) live weight at slaughter in comparison with the treatment groups (T_2, T_3 and T_4). This may be attributed to the lower final weight of the T_1 animals in relation to other treatments. The warm carcass weight of 3.64 – 6.75 kg herein compared with 4.43 - 7.17 kg reported by Jiwuba *et al*. (2018b), 2.9-9.81 kg by Marichal *et al*. (2003) and 3.40-4.65 kg reported by Odoemelam *et al*. (2014). The warm carcass weights are in agreement with the findings of Odoemelam *et al.* (2014) and Jiwuba *et al*. (2018b) who reported significant effects on warm carcass weights in WAD goats. Devendra and Burns (1983) earlier noted that dressing percentage is affected mainly by the plane of nutrition and other factors. The differences observed in this present study may be due to the plane of nutrition and live weight at slaughter. Goats in the treatment groups had better dressing percentage, which may be attributed to better nutrient balance, intake and utilization by the animals. Jiwuba and Ogbuewu (2019) in an earlier study attributed increased dressing percentage to nutrient balance and an increase in feed intake and utilization. Noteworthy, the dressing percentage recorded in this study fell within the 38 to 56 % baseline reported by Anjaneyulu and Joshi (1995) for goats. This further explained that the PTRCRS diets were nourishing and supported the deposition of lean meat. Jiwuba *et al.* (2018a) identified meat cuts as an important factor in the evaluation of meat yield in goats. T_2, T_3 and T_4 produced higher ($P<0.05$) loin and set weights than the control group. This may indicate that PTRCRS diets had a positive and better influence on the development of these cut parts than the control group.

Offal and organ studies

The offal and organ weights of West African Dwarf goats fed graded levels of *Pleurotus tuber regium* treated cassava root sievate-based diets are presented in Table 4. All examined parameters were not significantly ($p>0.05$) affected by the treatments except liver weight which showed significant ($p<0.05$) reduction with increasing levels of PTRCRS. In feeding trials, some organs like kidneys and liver are used as indices of feed quality and feed toxicity. Bone (1979) and Jiwuba (2021) noted that toxic elements in feeds would lead to abnormalities in organs due to increased metabolic activities of the organs in attempts to neutralize the toxic factors. This increases the weights of such organs. The reduced weights of the liver reported in this study for the treatment groups gave a clear indication of the absence of toxic factors among the group as a result of the biodegradation using *Pleurotus tuber regium*.

Meat proximate evaluation

The proximate composition of meat from West African dwarf goats fed *Pleurotus tuber regiu*-treated cassava root sievate-based diets is presented in Table 5. All examined parameters were not significantly affected ($p>0.05$) by the treatment diets. The similarity of the pH and the chemical composition of the meat is in agreement with the reports of Marichal *et al*. (2003) for goats slaughtered at 6, 10 and 25 kg BW respectively. The non-significant difference observed in these parameters showed that the meat is safe for human consumption.

Sensory evaluation

The mean scores for the sensory evaluation of meat from WAD goats fed *Pleurotus tuber regium* treated cassava root sievate-based diets are presented in Table 6. Panellists rated the sensory indices of the meats the same ($p>0.05$) across the treatments. This may be attributed to the similarity in the age of the experimental goats. The non-significant effects observed in the overall acceptability of the goat meat indicate that the replacement of non-treated cassava root sievate with PTRCRS did not compromise the quality of the meats.

Economics of production

The economics of production of West African dwarf goats fed *Pleurotus tuber regium* treated cassava root sievate-based diets are presented in Table 7. All the parameters differed ($p<0.05$) significantly across the groups. As the level of inclusion of PTRCRS in the diets increased from 0% (T_1) to 60% (T_4), the cost of 100 kg of feed and cost/kilogram increased linearly. The total (N2278.13) and daily (N25.31) cost of feed was highest in T_4 in comparison to the other treatments. This result is in disagreement with earlier reports by Jiwuba *et al*. (2018b) who reported a reduced feed cost when cassava root sievate-cassava leaf meal-based diets were fed to WAD goats. The increase in feed cost may be attributed to the additional cost of procuring the *Pleurotus tuber regium* tubers and biodegradation. Feed cost per body weight gain was lowest ($p<0.05$) for the goats fed theT_4 diet (N325.45). Financial benefit per body weight gain showed significantly ($p<0.05$) higher values for the treatment groups when compared with the control. The higher income realized for the treatment groups may be attributed to higher body weights recorded for the respective treatments. The result is in agreement with the findings of Barde *et al*. (2015) for WAD goats fed *Pleurotus tuber-regium* biodegraded Cassava (*Manihot esculenta*) peels-containing diets. Cost-benefit ratio showed significant ($p<0.05$) differences with WAD goats on diet T_4 having the best value (1:3.69). This result was in agreement with the results of Jiwuba *et al*. (2018a) for WAD goats fed yellow root cassava peel - centrosema leaf meal-based diets. The result demonstrates the qualitative benefits and financial returns of using PTRCRS diets, with T_1 having the highest ratio and T_4 having the lowest value. This entails an expected benefit of N1 for every N1.90 in cost for the T_4 diet. This finding is following the results of Barde *et al*. (2015) who reported that the inclusion of *Pleurotus tuber-regium* biodegraded Cassava (*Manihot esculenta*) peels in the diets of WAD goats produced the best cost: benefit in comparison with the control.

Conclusion

In conclusion, live weight at slaughter, dressing percentage, loin and set weights were improved in the treatment groups, while T_3 and T_4 produced the highest warm carcass weights. The cost of 100 kg of feed and cost/kg of feed was reduced in T_1. Total feed cost was higher in T_4. The treatment groups showed the best-feed cost/weight gain, benefit per BW gain and cost/benefit. T_4 (60% PTRCRS) gave higher warm carcass weight, dressing percentage, loin and set weights, benefit per BW gain, cost/benefit ratio and hence recommended for enhanced WAD goat production.

Conflict of interest

The authors declare that they have no conflict of interest.

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Table 1: Gross composition of the experimental diets

Ingredients (%)	**T_1**	**T_2**	**T_3**	**T_4**
Non-treated cassava root sievate	60.0	40.0	20.0	0.0
Treated cassava root sievate	0.0	20.0	40.0	60.0
Palm kernel meal	14.0	14.0	14.0	14.0
Brewers dried grain	15.0	15.0	15.0	15.0
Soya bean meal	7.0	7.0	7.0	7.0
Bone meal	3.0	3.0	3.0	3.0
Salt	0.5	0.5	0.5	0.5
Premix*	0.5	0.5	0.5	0.5
Total	100	100	100	100

Vitamin and mineral premix contributed the following to each kilogram of diet: vitamin A 500 IU, vitamin D 1500 IU, vitamin E 3 IU, vitamin K 2 mg, riboflavin 3 mg, pantothenic acid 6 mg, niacin 15 mg, vitamin B12 0.8 mg, choline 3 mg, folic acid 4 mg, manganese 8 mg, zinc 0.5 g,
iodine 1.0 mg, Co 1.2 mg

Table 2: Chemical composition of the experimental diets

Parameters (%)	**T_1 (0%)**	**T_2 (20%)**	**T_3 (40%)**	**T_4 (60%)**	**SEM**
Dry matter	91.33	91.90	91.55	91.84	0.83
Crude protein	9.28^{b}	9.82^{b}	14.12^{a}	16.06^{a}	1.11
Crude fibre	14.57	13.35	11.52	9.62	1.00
Ether extract	0.84	0.72	0.72	1.02	0.19
Ash	8.26^{c}	12.17^{b}	12.71^{ab}	13.03^{a}	0.73
Organic matter	83.08	79.73	80.7	78.81	0.95
Nitrogen free extract	58.39^{a}	55.85^{ab}	52.49^{b}	52.12^{b}	1.04
Gross Energy (Kcal/g)	3.66	3.51	3.54	3.59	0.77
Neutral detergent fibre	55.57^{a}	49.30^{b}	34.44^{c}	31.18^{c}	3.84
Acid detergent fibre	49.50^{a}	39.15^{b}	29.78^{c}	21.91^{d}	3.92

$^{a-c}$ means within the same row with different superscripts are significantly different (P<0.05)

Table 3: Carcass characteristics of West African Dwarf goats fed graded levels of *Pleurotus tuber regium* treated cassava root sievate-based diets

Parameters	T_1	T_2	T_3	T_4	SEM
Live weight at slaughter (kg)	8.50^{c}	10.00^{b}	10.92^{b}	12.13^{a}	2.42
Empty weight (kg)	5.18	7.07	8.68	9.57	1.53
Warm Carcass Weight (kg)	3.64^{b}	4.70^{b}	5.79^{a}	6.75^{a}	1.18
Dressing Percentage (%)	42.82^{c}	47.00^{b}	53.02^{a}	55.65^{a}	5.23
Meat cuts expressed as a percentage (%) of warm carcass weight					
Loin	17.83^{c}	21.82^{b}	23.32^{a}	23.94^{a}	3.44
Set	18.15^{c}	22.55^{b}	24.16^{a}	25.61^{a}	4.01
Shoulder	9.18	8.69	10.29	9.21	2.29
Leg	20.92	22.55	21.63	23.54	4.21
End	4.46	5.36	5.39	6.58	1.48
Shank	9.50	9.15	9.78	9.91	1.92

a-c means within the same row with different superscripts are significantly different (P<0.05)

Table 4: Offal and organ weights of West African Dwarf goats fed graded levels of *Pleurotus tuber regium* treated cassava root sievate-based diets

Parameters (%)	T_1	T_2	T_3	T_4	SEM
Head	7.75	7.13	6.72	8.38	1.01
Skin	5.65	5.34	5.06	7.24	0.75
Full Gut	23.46	19.32	19.05	21.78	2.64
Empty Gut	7.51	6.27	6.64	7.24	0.77
Feet	2.28	1.93	2.09	2.87	0.38
Testes	1.07	0.77	0.84	0.91	0.06
Heart	0.51	0.27	0.42	0.43	0.05
Liver	1.77^{a}	1.64^{b}	1.53^{c}	1.53^{c}	0.23
Lung	1.85	1.80	1.51	1.36	0.16
Kidney	1.73	1.67	1.61	1.58	0.19

a-c means within the same row with different superscripts are significantly different (P<0.05)

Table 5: Proximate composition of meat of West African dwarf goats fed Pleurotus tuber regium treated cassava root sievate-based diets

Parameters	T_1	T_2	T_3	T_4	SEM
Dry matter (%)	30.28	29.17	31.58	30.17	1.64
Crude Protein (%)	29.48	30.75	30.90	30.00	0.41
Ether Extract (%)	2.14	2.66	2.34	2.34	0.09
Ash (%)	2.13	2.31	2.31	2.32	0.05
pH	5.29	5.39	5.39	5.32	0.02

a-d means within the same row with different superscripts are significantly different (P<0.05)

Table 6: Sensory evaluation of West African dwarf goats fed *Pleurotus tuber regium* treated cassava root sievate-based diets

Parameters (%)	T_1	T_2	T_3	T_4	SEM
Colour	6.50	7.00	7.50	6.50	0.23
Flavour	7.00	7.50	8.00	7.00	0.18
Tenderness	7.50	7.00	7.50	6.50	0.23
Juiciness	7.00	7.50	8.00	7.00	0.26
Texture	7.00	7.00	7.50	6.50	0.19
Overall acceptability	7.50	7.50	8.00	7.50	0.18

a-c means within the same row with different superscripts are significantly different (P<0.05)

Table 7: Economics of production of West African dwarf goats fed *Pleurotus tuber regium* treated cassava root sievate based diets

Parameters (%)	T_1	T_2	T_3	T_4	SEM
Cost of 100kg of feed (₦)	4473.63^{b}	4671.08^{ab}	4792.62^{a}	4873.77^{a}	16.34
Cost/kg of feed (₦)	44.73^{b}	46.71^{ab}	47.92^{a}	48.73^{a}	4.3
Total feed consumed (kg)	39.43^{b}	41.73^{b}	44.53^{a}	46.75^{a}	6.4
Total cost of feed (₦)	1763.70^{c}	1949.21^{bc}	2132.44^{b}	2278.13^{a}	7.34
Daily feed cost (₦)	19.60^{b}	21.66^{b}	23.69^{a}	25.31^{a}	3.5
Body weight gain (kg)	3.60^{c}	5.11^{bc}	5.71^{ab}	7.00^{a}	0.41
Feed cost/weight gain (₦)	489.92^{a}	381.45^{b}	373.46^{b}	325.45^{c}	6.11
Cost/kg live weight (₦)	1200	1200	1200	1200	-
Benefit per body weight gain (₦)	4320.00^{c}	6132.00^{b}	6852.00^{b}	8400.00^{a}	19.21
Cost benefit ratio	1:2.45^{c}	1:3.15^{b}	1:3.21^{b}	1:3.69^{a}	1.22

a-c means within the same row with different superscripts are significantly different (p<0.05)