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Growth Indices and Blood Profile of West African Dwarf Goats Fed Processed Earth Ball (*Icacina manni*) Meal Based Diets

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Abstract

*Performance and blood profile of West African Dwarf goats placed on processed *Icacina manni* meals were investigated in an eight-week feeding trial. A total of 16 West African Dwarf goats aged 6-8 months were assigned to four dietary treatments. Animals on treatment one (T_1) were placed on a diet with 0% inclusion level of *Icacina manni* meals, while those on treatment two-four ($T_2 - T_4$) had 20% of the same inclusion level of *Icacina manni* meals, respectively in their diets. Each treatment group had four goats. The experiment was laid out in a completely randomized design. Other ingredients used in equal parts in the 4 treatment groups were cassava peels, brewer dried grain, palm kernel cake, bone meal and salt. Data collected on the groups included: weekly weight gain, initial and last day blood from the animals, and daily feed intake. These were used to determine growth performance, and the blood profile of the animals. Result revealed that there were significant ($p < 0.05$) differences on growth performance parameters measured such as daily weight gain, daily feed intake, cost/kg of feed and cost/kg weight gain. The highest value of daily weight gain (38.93g/day) was observed in goats fed toasted IMM while the lowest value was obtained in goats fed 0%IMM (control diets). Goats placed on toasted IMM had the best cost/kg weight gain value (₦966.00). Significant differences ($p < 0.05$) were observed on all blood profile parameters measured except for monocyte, eosinophils, basophils and mean corpuscular volume (MCV). It can be concluded that WAD goats fed toasted IMM based diet yielded better results in their growth performance with no deleterious effect on their blood profile.*

Keywords: *Icacina manni*, Growth, Blood profile, Processing, West African dwarf goat

1.0 Introduction

In Nigeria, the savanna grassland forms a good valuable source of feed for ruminant animal development. However, quality, seasonal availability and management are the major setback on their use and outputs (Gabriel *et al.*, 2018). Therefore, the reduction in supply and quality of pasture during dry season, when natural grassland declines in nutritive value, has resulted in the weight loss of ruminant animals (Udo *et al.*, 2020).

There has been intensive research on the utilization of lesser known feed ingredients which are not food resources to man to ameliorate the effect of decline in quantity and quality of forage materials during dry season feeding (Gabriel *et al.*, 2018). One of such ingredient is *Icacina manni* commonly known as false yam or earth ball in English (Fay, 1987; Umoh, 2013). It is known in Nigeria as Urumbia or Eriagbo among the Igbos, Gbegbe by the Yoruba's and Efikisong by the Annang, Ibibio and Efik (Essien *et al.*, 2024; Azuzu and Abubakar, 1996; Etukudo, 2023; Ekeno, 2014). It belongs to the family *Icacinaceae* (Fay, 1987).

Icacina manni tuber, which is a great source of emergency moisture and food energy, can survive at least for a year without rain (NRCNAP, 2018). It is reported to have an average yield of 2-3 tonne/ha in Senegal, although in some parts of West Africa, yields were reported to reach 20 tonne/ha (Fay, 1987; Umoh, 2013). *Icacina manni* contains crude protein of 4.81 - 6.25% (Ekeno, 2014) and 3.45-3.78% (Essien and Sam, 2018) and metabolizable energy of 2817.89 – 3265.78kcal/kg (Ekeno, 2014). The presence of cyanogenic glycoside and phytic acid which form natural toxic compounds in *Icacina manni* meal has been reported (Fassiet, 1993). In another report *Icacina manni* contained a gummy substance-galactosamine that impedes its digestibility when consumed by animals (Ekpo and Udedibie, 2012). Hematological and serum components are valuable in monitoring feed toxicity (Gabriel *et al.*, 2018). In this, an attempt was made in assessing the growth performance, hematology and blood serum parameters of West African Dwarf (WAD) goats fed processed *Icacina manni* based diets.

2.0 Materials and Methods

2.1 Location of the Study

The experiment was conducted at the Goat Unit, Teaching and Research Farm, Department of Animal Science, Akwa Ibom State University, Obio Akpa Campus, Oruk Anam Local Government Area of Akwa Ibom State. The area is located between latitude 5° 17' and 5° 27' N and between longitude 7° 27' and 7° 58' E (AKSG, 2022). It has an annual rainfall ranging from 3500 - 5000mm. The average monthly temperature is 25°C and the relative humidity ranges between 60 – 90%. It is located within the tropical rainforest zone of Nigeria.

2.2 Experimental Goats and their Management

A total of sixteen West African Dwarf goats between the ages of 6 and 8 months were allotted to four dietary treatments. Animals on treatment one (T₁) were placed on a diet with 0% inclusion level of *Icacina manni* meals, while those on treatment two-four (T₂ – T₄) had 20% of the same inclusion level of *Icacina manni* meals, respectively in their diets. Each treatment group had four goats with an animal being a replicate in its group. The experiment was laid out as a completely randomized design. The goats were intensively managed in which routine sanitation measures and medicare were provided to promote its welfare. Feed intake was measured weekly for day 0 up to day 56 of the experiment (excluding one month adjustment period). Each goat received 1kg of the experimental diet and was supplemented with 500g of guinea grass (*Panicum maximum*).

2.3 Processing Methods

2.3.1 Boiling of *Icacina manni*

Raw samples of peeled and sliced tubers of *Icacina manni* were introduced into a boiling water of 100°C temperature. Cooking continued and lasted for 30 minutes before the tubers

were descanted. The boiled tubers were peeled, cut into pieces and sundried before milling to obtain the boiled *Icacina manni* meal.

2.3.2 Toasted *Icacina manni*

Raw samples of peeled and sliced tubers of *Icacina manni* were grated with a mechanical grating machine. The grated mashed product of *Icacina manni* was bagged and then pressed with a hydraulic jack to remove excess water until the grated mash crumbled for 12 hours. The dried *Icacina manni* product was fried for thirty minutes to obtain toasted *Icacina manni* meal.

2.3.3 Sundried *Icacina manni*

Raw samples of peeled tubers were sliced to pieces for quick drying and were exposed to sun for 72 hours (three days) to reduce moisture content and thereafter it was milled to obtained sun dried *Icacina manni* meal.

2.4 Chemical Analysis

Proximate composition of differently formulated *Icacina manni* meal based diets was assayed using the AOAC (2005) procedure. Feed samples were analyzed to determine the gross energy using the procedures reported by McDonald *et al.* (2010).

2.5 Blood Sample Collection and Analysis

Collection of blood samples from the experimental goats were through the jugular vein. This was done on the last day (56th day) of the experiment. Some blood samples were put into labeled Ethylene diaminetetracetic acid (EDTA) sample bottles, with anticoagulant. The uncoagulated blood was used to determine haematological parameters, such as red blood count (RBC), white blood count (WBC), packed cell volume (PCV), hemoglobin (Hb) and differential white blood cell counts according to the procedure reported by Dacie and Lewis (1991). However, blood in the blood sample bottles without anticoagulant was used to determine blood serum biochemical indices such as total protein, albumin, globulin, glucose, bilirubin, cholesterol, creatinine, urea, alkaline phosphatase, alanine aminotransferase (ALT), aspartate aminotransferase (AST) using the method reported by Gabriel *et al.* (2018).

2.6 Data Collection and Statistical Analysis

Data recorded were subjected to the one-way analysis of variance (ANOVA) using GENSTAT version 12.10. The Duncan Multiple Range Test was used to separate significant differences among treatment means.

3.0 Results and Discussion

3.1 Proximate Composition of Experimental Diets

Table 3.1 shows the proximate composition and gross energy content of the experimental diets with processed *Icacina manni* meal. The crude protein contents ranged from 12.82 – 13.21% and the crude fiber ranged from 10.32 – 11.32%. The crude protein and crude fiber levels revealed in the diets may enhance the performance of ruminant animals. This is confirmed by Ikyume *et al.* (2018), who reported crude protein value range of 12-16% as adequate value for maintenance and moderate growth in goat while crude fiber range of 9.63 – 11.15%(Ikyume *et al.*, 2018) is comparable to the values reported in the present study.

Table 2.1: Composition of processed *Icacina manni* meal based diets for each of the treatment

Ingredients	T₁ (0%)	T₂ (BIMM)	T₃ (SIMM)	T₄ (TIMM)
Cassava peel meal	32.50	32.50	32.50	32.50
BIMM	-	20.00	-	-
SIMM	-	-	20.00	-
TIMM	-	-	-	20.00
Palm kernel meal	20.00	20.00	20.00	20.00
BDG	25.00	25.00	25.00	25.00
Bone meal	2.00	2.00	2.00	2.00
Common salt	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00
Calculated composition (%):				
Crude protein (CP)	12.60	12.55	12.60	13.09
Metabolizable energy (Kcal/kg)	2218.90	2427.30	2375.28	2443.50
Crude fiber	10.11	10.93	11.21	11.07
Calcium	0.79	0.80	0.80	0.80
Phosphorous	0.37	0.37	0.37	0.37

BIMM= Boiled *Icacina manni* meal, SIMM= Sundried *Icacina manni* meal, TIMM= Toasted *Icacina manni* meal

Table 3.1: Proximate composition of experimental diets

Parameters	Control (T₁)	BIMM(T₂)	SIMM(T₃)	TIMM(T₄)
Dry matter (%)	89.96	89.77	89.71	89.68
Crude Protein (%)	12.85	12.82	12.87	13.21
Crude Fat (%)	5.92	5.72	5.71	5.55
Crude Fibre (%)	10.32	11.18	11.32	11.22
Ash (%)	5.82	5.45	5.37	5.39
NFE (%)	55.05	54.60	54.44	54.31
Gross Energy (Kcal/g)	4.01	4.01	4.01	4.01

NFE = Nitrogen free extract, BIMM = Boiled *Icacina manni* meal; SIMM = Sundried *Icacina manni* meal; TIMM = Toasted *Icacina manni* meal.

3.2 Growth Performance of WAD Goat Fed Processed *Icacina manni* Meals

The growth performance of WAD goat fed processed *Icacina manni* meals is presented in Table 3.2. Daily weight gain, daily feed intake, cost/kg of feed and cost/kg weight gain were influenced ($p < 0.05$) by the treatment groups. The final bodyweight, weight gain, feed intake per goat and feed conversion ratio were not significantly affected ($p > 0.05$) across the treatment groups. In daily weight gain and daily feed intake, animals fed toasted *Icacina manni* meal had highest numerical value of 38.93g and 373.20g than the values obtained for control diets (30.00g and 370.00g), boiled *Icacina manni* meals (38.57g and 370.20g) and soaked *Icacina manni* meals (33.04g and 354.50g). The significantly higher values obtained for WAD goats fed toasted *Icacina manni* meals may be attributed to a low level of toxic materials in the toasted meal. Eyoh (2020) reported that the toasting process enhances adequate nutrient utilization by WAD goats. Also high daily weight gain value obtained by WAD goats fed toasted *Icacina manni* meal may be attributed to increase in daily feed intake occasioned by palatability of the feed. The result obtained in this study agrees with the work

of Ocheja *et al.* (2014). The authors reported a feed intake range of 8.0 - 15.0kg for WAD goats fed graded levels of cashew nutshells.

Among the processed meals in this study, WAD goats fed soaked *Icacina manni* meal had least significant different ($p < 0.05$) value for both daily weight gain and daily feed intake, which may be due to the effect of inherent toxic factors such as galactosamine. It is reported that galactosamine (the gummy substance) present in *Icacina manni* tuberous root may reduce its nutrient digestibility when consumed by animals (Essien and Sam, 2018). According to Marek *et al.* (2015) galactosamine is a potent hepatotoxic substance, which can cause hepatocyte death by necrosis.

The feed conversion ratio (FCR) values were not influenced by the treatments means ($p > 0.05$). However, numerically, the FCR value, recorded for T₄ (Toasted *Icacina manni* meals) was the least (9.59) among others; implying that the animals utilized toasted tuber meal diet with higher efficiency than others. Values for cost per kg of feed were significantly ($p < 0.05$) superior in T₂ and T₄ compared to diets 1 and 3. This may probably be attributed to the extra energy input cost accounted for during processing of *Icacina manni* meals. The value for feed cost per kg weight gain was less (numerically) for WAD goats fed diet 4 (₦966.00) than other diets. The result agrees with the result of earlier study by Jiwuba *et al.* (2021) for West African Dwarf goats fed *Gmelina* leaf meal-based diets. Also the results demonstrate the financial gains and benefits of utilizing toasted *Icacina manni* meal as livestock feed.

Table 3.2 Growth performance of WAD goat fed processed *Icacina manni* meals

Parameters	(T ₁)Control	(T ₂) BIMM	(T ₃) SIMM	(T ₄) TIMM	SEM
Initial weight (kg)	7.60	7.62	7.58	7.66	0.00
Final weight (kg)	9.33	9.76	9.43	9.82	0.90
Weight gain (kg)	1.66	2.16	1.85	2.18	0.17
Daily weight gain (g)	30.00 ^b	38.57 ^a	33.04 ^b	38.93 ^a	1.68
Feed Intake (kg)	20.68	20.73	19.85	20.90	1.28
Daily feed intake (g)	370.00 ^a	370.20 ^a	354.50 ^b	373.20 ^a	2.26
Feed conversion ratio	12.33	9.60	10.73	9.59	1.37
Cost/kg of feed (₦)	90.75 ^b	100.75 ^a	90.75 ^b	100.75 ^a	1.24
Cost/kg weight gain (₦)	1131.00 ^a	967.00 ^b	974.00 ^b	966.00 ^b	5.82

a,b means in a row with different superscripts are significantly ($P < 0.05$) different. BIMM = Boiled *Icacina manni* meal, SIMM = Sundried *Icacina manni* meal, TIMM = Toasted *Icacina manni* meal, SEM = Standard error of mean

3.3 Hematological Indices of WAD Goats Fed Processed *Icacina manni* Meals

Haematological parameters of WAD goats fed processed *Icacina manni* meals are presented in Table 3.3. Clinical screening of blood parameters of animals after feeding trials becomes necessary to diagnose disorders caused by pathogens, anti-nutrients, environmental impact and stress associated with it (Gabriel *et al.*, 2018). Significant ($p < 0.05$) differences were observed for haemoglobin (Hb), packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin

concentration (MCHC), lymphocytes and neutrophils. The parameters measured were within the normal range (Hb=7 – 15g/dl, PVC = 21 -35%, RBC = 5-13.5 x10⁶/ul, WBC= 6.80 - 20.10x10⁹/ul, MCHC= 30.0 – 44.7%) as reported by Mitruka and Rawnsley (1977); Merck (1998); Ibu (2005); Daramola *et al.* (2005); Opara *et al.* (2010) and Eyoh *et al.* (2016) except for PCV that had value above the normal range for diet 4, MCH and lymphocytes were below the normal range (MCH = 9.44 – 12.14 pg; Lymphocytes = 28.67 – 34.00%) for all the diets and neutrophils value was above the normal range (Neu = 56.67 – 62.67%) for all the diets. Packed cell volume (PVC) is involved in the transport of oxygen and absorbed nutrients (Isaac *et al.*, 2013). A high value above the normal range is as a result of loss of plasma which causes an increase in the concentration of cellular elements in the blood (Gabriel *et al.*, 2018). The significantly ($p>0.05$) lower values for MCH could imply the presence of haematological features of microcytosis as a result of reduction in the size of RBC due to iron deficiency (Ibu, 2005; Opara *et al.*, 2010). Low level of lymphocytes and high level of neutrophils for all the diets may result from stress conditions responsible for the development of cellular immunity carrying-out phagocytic functions against invading foreign parasites. However, any resultant condition which enhances low or high levels may prevent their primary functions thereby exposing the WAD goats to pathogens (Ibu, 2005; Daramola *et al.*, 2005; Eyoh *et al.*, 2016).

Table 3.3: Hematological indices of WAD goats fed processed *ICACINA MANNI* meals

Parameters	(T ₁)Control	(T ₂)BIMM	(T ₃)SIMM	(T ₄)TIMM	SEM
Haemoglobin (g/dl)	9.70 ^b	11.00 ^a	9.37 ^b	11.40 ^a	0.14
PVC (%)	26.00 ^c	33.67 ^b	24.00 ^d	37.33 ^a	0.47
RBC (x 10 ⁶ /ul)	8.32 ^c	10.80 ^b	7.72 ^d	12.07 ^a	0.14
WBC(X10 ⁹ /ul)	7.19 ^c	9.79 ^a	8.02 ^b	10.09 ^a	0.18
MCV (FL)	31.36	31.26	31.25	31.02	0.43
MCH (PG)	11.66 ^a	10.19 ^b	12.14 ^a	9.44 ^c	0.17
MCHC (%)	37.32 ^b	32.68 ^c	39.04 ^a	30.54 ^d	0.41
Lymphocytes (%)	28.67 ^b	31.00 ^{ab}	34.00 ^a	29.33 ^{ab}	1.37
Neutrophils (%)	62.33 ^a	60.67 ^a	56.67 ^b	62.67 ^a	1.09
Monocytes (%)	4.67	4.33	4.67	4.33	0.33
Eosinophils (%)	3.33	3.00	3.67	2.67	0.29
Basophils (%)	1.00	1.00	1.00	1.00	0.00

a,b,c,d means on the same row with different superscripts are significantly ($P<0.05$) different, SEM – standard error of mean, MCV – Mean Corpuscular volume, MCH – Mean corpuscular hemoglobin, MCHC – Mean corpuscular hemoglobin concentration, BIMM – Boiled *ICACINA MANNI* meals, SIMM – Soaked *ICACINA MANNI* meals, TIMM – Toasted *ICACINA MANNI* meals

3.4 Serum Biochemistry Parameters of WAD Goats Fed Processed *ICACINA MANNI* Meals

Table 3.4 shows the Serum biochemical indices of WAD goats fed processed *ICACINA MANNI* meals. All the parameters, except bilirubin and alkaline phosphatase differed significantly ($p<0.05$) across the treatments. Serum parameters help to maintain osmotic pressure between the circulating fluid, and the fluid in the tissue space so that the exchange of materials between the blood and cell could be facilitated (Isidahomen *et al.*, 2012). The total protein (TP) and albumin values ranged between 4.34 - 5.75g/dl and 2.59 -3.38g/dl respectively. These values fell within the normal range of 4.40 – 8.50g/dl for total protein and 2.8 – 4.30 g/dl for albumin reported by Daramola *et al.* (2005) and Opara *et al.* (2010) for WAD goats.

This is an indication of adequate protein in the diets (Saka *et al.*, 2016). It also enhances good excellent clotting ability of the blood thereby preventing haemorrhage (Gabriel *et al.*, 2018).

The values of globulins ranged between 1.75 g/dl in (T₁) and 2.37g/dl in (T₄). These values were above the normal range of 0.16 – 1.60g/dl reported by Daramola *et al.* (2005) for WAD goats. The highest values of globulin concentration were observed in goats fed T₂, T₃ and T₄. This implied that *Icacina manni* meals supplementation improved immunity in goats because globulin plays important roles in immunological functions (Ibu, 2005).

In this study, the cholesterol values obtained varied significantly ($p < 0.05$) across the dietary treatments. Goats placed on diet 3 (soaked *Icacina manni*) had the highest value (95.00mg/dl) while goats fed without processed *Icacina manni* (T₁) had the least value (79.67mg/dl). However, the values obtained in this study were within the normal range of value 65-136mg/dl reported by Fraser and May (1986), but higher than values reported by Saka *et al.* (2016) for healthy WAD goats. According to Ogunbosoye *et al.* (2018), the quantity and quality of protein supplied in the diet affects the level of cholesterol in the serum. This is an indication that the protein levels in the processed *Icacina manni* meals have met the nutritional needs of the animals in quantity and quality.

The creatinine values of 0.96 – 1.20mg/dl were comparable to 0.90-1.50 mg/dl values reported by Saka *et al.* (2018). The removal of creatinine from the blood is chiefly done by the kidneys and basically by glomerular filtration. Increase creatinine content in blood is as a result of low filtration in the kidney. Therefore, creatinine clearance is estimated by determining creatinine level in blood and which is correlated with the rate of glomerular filtration (Gabriel *et al.*, 2018). The present study indicates normal range for creatinine values (0.70-1.50mg/dl) as reported by Fraser and May (1986). This suggests that the organ is performing optimally.

Glucose concentration in the blood of goat significantly differed ($p < 0.05$) across the treatments. The concentration of blood glucose of goats fed soaked *Icacina manni* meal diet (71.00mg/dl) differed significantly from goats fed T₄ (TIMM) (64.33mg/dl), T₂ (BIMM) (55.67mg/dl) and T₁ (Control) (58.33mg/dl), respectively. The levels of blood glucose were higher in goats fed processed *Icacina manni* meals than the control diets. Table 2.1 indicates that processed *Icacina manni* meal diets have higher energy levels in the experimental diet than the control diet. This may explain increase in blood glucose level for T₃ and T₄. However, the values obtained for goats in this study were within the normal range (48-76mg/dl) as reported by Fraser and May (1986). This observation is in line with Saka *et al.* (2016). This further suggests that the animals were not starving which could have resulted in catabolism tissues or gluconeogenesis (Anyia *et al.*, 2018; Kalio and Anyanwu, 2016).

Goats fed soaked, toasted and control *Icacina manni* meal were significantly similar ($p < 0.05$) in their Serum urea concentration (20.80mg/dl, 20.40mg/dl and 20.27mg/dl respectively) when compared with the value obtained for goats fed boiled *Icacina manni* diet. However, the range values (19.03-20.80mg/dl) obtained in this study were within the normal range (13-26mg/dl) reported for WAD goats by Fraser and May (1986), but below lower than the range (0.8-9.7mmol/l) reported by Daramola *et al.* (2005). Researchers have reported that high levels of urea in the blood indicate inadequate utilization of protein, poor quality protein or excess protein catabolism, associated with protein deficiency (Anyia *et al.* 2018; Saka *et al.*, 2016). The low blood urea levels may provide information as regards to renal organ malfunction (Kalio and Anyanwu, 2016). In contrast, values obtained in the present study suggest that diets of the control and processed *Icacina manni* meals were better digested.

The ranged values of 36.33u/l- 41.33μ/l for ALT were significantly different ($p<0.05$) across the treatment groups and fell within the normal range (15-52u/l) reported by Fraser and May (1986). This is an indication that the animals were in good health condition without any dysfunction of the cells.

The concentrations of serum transaminase (AST) in the blood are reliable indicator for liver damage. The range values obtained for AST (24.67-30.33u/l) differed significantly ($p<0.05$) among the treatment groups and were below the normal ranged (66 – 230u/l) reported by Fraser and May (1986). This may suggest damage to the liver.

Table 3.4: Serum biochemistry parameters of WAD goats fed processed *Icacina manni* meals

Parameters	(T ₁)Control	(T ₂)BIMM	(T ₃)SIMM	(T ₄)TIMM	SEM
Total protein (g/dl)	4.34 ^d	5.42 ^b	4.92 ^c	5.75 ^a	0.06
Albumin (g/dl)	2.59 ^c	3.10 ^b	2.82 ^c	3.38 ^a	0.11
Globulin (g/dl)	1.75 ^c	2.33 ^{ab}	2.11 ^b	2.37 ^a	0.07
Bilirubin (g/dl)	0.25	0.20	0.26	0.22	0.02
Cholesterol (mg/dl)	79.67 ^d	86.83 ^c	95.00 ^a	90.97 ^b	0.83
Creatinine (mg/dl)	1.20 ^a	0.96 ^b	1.04 ^b	1.01 ^b	0.03
Glucose (mg/dl)	58.33 ^c	55.67 ^d	71.00 ^a	64.33 ^b	0.71
Urea (mg/dl)	20.27 ^a	19.03 ^b	20.80 ^a	20.40 ^a	0.26
ALP (U/l)	56.33	59.67	56.33	57.00	1.50
ALT (U/l)	41.00 ^{ab}	41.33 ^a	36.33 ^b	38.67 ^{ab}	1.38
AST (U/l)	27.33 ^b	24.67 ^b	26.00 ^b	30.33 ^a	0.87

a,b,c,d mean with different superscripts are significantly different ($p<0.05$), SEM = Standard error of mean, ALP = Alkaline phosphates, ALT = Alanine aminotransferase, AST = Aspartate aminotransferase, BIMM = Boiled *Icacina manni* meal, SIMM = Soaked *Icacina manni* meal, TIMM = Toasted *Icacina manni* meal

4.0 Conclusion

Icacina manni is an unconventional tuberous plant of which when processed could be used to improve the productivity of goats. Result of this study showed that toasted and boiled *Icacina manni* meal based diets enabled better output in terms of daily feed intake; daily weight gain, feed conversion ratio and cost/kg weight gain at 20% inclusion level but toasted *Icacina manni* diet could be recommended based on higher numerical value obtained in these parameters. However, there was no deleterious effect on the blood profile of West African Dwarf goat fed differently processed *Icacina manni* meal based diets.

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