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CARCASS CHARACTERISTICS, ORGAN PROPORTION, HAEMATOLOGY, SERUM CHEMISTRY AND DIGESTIBILITY OF BROILER CHICKENS FED UMUCASS 36 CASSAVA ROOT MEAL

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ABSTRACT

A week old 150 Arbor Acre strain of broilers fed UMUCASS 36 cassava root meal were used to evaluate the carcass characteristics, organ proportion, blood and serum chemistry and digestibility of the birds. The cassava was harvested, washed, peeled, chipped, oven dried and milled. The processed cassava root meal was used to formulate five diets, at 0, 25, 50, 75 and 100% levels designated D1, D2, D3, D4 and D5 respectively to replace maize. The birds were assigned in a Completely Randomized Design to five treatments with three replicates of ten birds per replicate. The carcass characteristics of broilers fed diet D2 was more superior and significantly (P>0.05) different from other broilers on the other diets. The superiority reflected in the bled weight, plucked weight, dressed weight and dressing percentage with the following values: 2136.67g, 2056.67g, 1723.33g and 77.71% respectively. The same trend was seen the values of the cut parts. Broilers on diet D5 had the highest percentage weight in heart (0.81%), liver (3.81%), gizzard (3.31%) and kidney (1.29%) while broilers on diet D2 had the least percentage of heart weight (0.38%), liver (1.33%), gizzard (1.11%) and kidney (0.57%). The experimental diets had no deleterious effects on the haematology and the blood serum of the broilers. Broilers placed on diet D2 had the best digestibility coefficients in all the digestibility parameters when compared with broiler chickens fed other diets. From the ongoing, it can be concluded that broilers on diet D2 performed best therefore, diet D2 is recommended.

Keywords: umucass 36, broiler chickens, blood, carcass, digestibility

INTRODUCTION

There is a wide gap between the recommended protein intake for an average adult Nigerian and the actual protein intake, this is because the cost of producing a kilogram of meat (especially chicken) is very outrageous today. This cost can be greatly reduced of feedstuff that is less competitive is used in the feed formulation (Akinmutimi & Ukpabi, 2008). Example of such is cassava as energy supplying feedstuff. The importance of energy cannot be overemphasized in poultry production because chicken eat to satisfy their energy requirement.

Nigeria is the largest producer of cassava. Average yields are 10 – 30 tons/ha, but in reality one hectare of cassava can produce 60-80 tons of roots and leaves (Oginni, 2013). The abundance of this tuber made it less competitive and can be used both by humans for food as well as feed for animals. Cassava is a potential energy source for poultry production in Nigeria. It is widely grown in Nigeria and can serve as an alternative feed stuff especially as energy and protein sources. Cassava is a perennial woody shrub with an edible root, which grows in tropical and subtropical regions of the world. Today, it is a dietary staple food in most African countries (Cassava production guideline, 2010). It is rich in carbohydrates, calcium, vitamins B and C, and essential minerals but nutrient composition differs according to variety, age of the harvested crop, soil conditions, climate, and other environmental factors during cultivation (Cassava production guideline, 2010). UMUCASS 36 is a pro- vitamin cassava with high β carotene content which makes it more preferable to other existing varieties of cassava. The potential of UMUCASS 36 is yet to be fully explored for animal feed stuff hence the purpose of this experiment.

MATERIALS AND METHODS

Experimental Site

The research was conducted at the Poultry unit of the Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State. Umudike lies on latitude $05^0 29'$ N and longitude $07^0 33'$ E with an elevation of 122 m above sea level and is located in the tropical rainforest zone of Nigeria. This zone is characterized by annual rainfall of about 2177 mm, monthly ambient temperature range of 22°C - 36°C and relative humidity of 50-95 % depending on the season and location (NRCRI, 2016)

Procurement And Processing of Experimental Material

Cassava root meal

The pro vitamin variety of cassava roots (UMUCASS 36) were collected from cassava farm of National Root Crops Research Institutes (NRCRI). These were washed and peeled. The roots were then cut into small chips and oven dried at 70^0 C for two days before milling. The milled flour was packed into polythene bags, ready for use.

Experimental birds and management

A total 150 one week old Arbor Acre strain broiler chicks were used for this experiment. The birds were housed in a deep litter brooding pens and reared to eight weeks of age by conforming to standard management procedures at the poultry unit of the Teaching and Research farm of Michael Okpara University of Agriculture, Umudike. The birds were fed and watered *ad libitum.* Proper sanitation and routine medication were maintained to forestall any outbreak of disease.

Experimental procedure

One hundred and fifty (150) birds were assigned in a Completely Randomized Design to five treatments with three replicates of ten birds per replicate. The formulated straight/single broiler diets were used for the period of seven weeks. Table 1 shows the composition of the experimental diets that were used.

Experimental diets

The processed cassava root meal was used to formulate five diets, at 0, 25, 50, 75 and 100% levels designated D1, D2, D3, D4 and D5 respectively to replace maize. The ingredients and composition of the experimental diets were as shown in Table 1 below:

Table 1: Percentage composition of experimental diets containing graded levels of processed UMUCASS 36 cassava root meal fed to broiler chickens

			Diets		
Ingredients (%)	**D1 (0%)**	**D2 (25%)**	**D3 (50%)**	**D4 (75%)**	**D5 (100%)**
Maize	42.00	31.50	21.00	10.50	-
CRM	-	10.50	21.00	31.5	42.00
Soybean Meal	34.00	34.00	34.00	34.00	34.00
Maize offal	11.8	11.8	11.8	11.8	11.8
Palm Kernel Cake	6.00	6.00	6.00	6.00	6.00
Palm oil	0.50	0.50	0.50	0.50	0.50
Fish meal	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25	0.25
*Premix	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated	**Composition**				
Metaboilzable energy (kcal/g)	2883.90	2859.33	2834.76	2810.19	2785.62
Crude protein	22.22	21.54	20.85	20.17	19.49
Energy : Protein ratio	130 : 1	133 : 1	136 : 1	139 : 1	143 : 1

*CRM- Cassava root meal; *To provide the following per Kg. of feed: Vitamin A 10,000iu; Vitamin D3, 2000iu; Vitamin B1 0.75mg; Nicotinic acid, 2.5mg; vitamin E, 2.5mg; cobalt, 0.40mg; Biotin, 0.50mg; Folic acid, 1.00mg; Cholin chloride, 2.5mg; Copper, 8.00mg; Manganes, 64mg; Iron, 32mg; Zinc, 40mg; Iodine, 0.8mg; Flavomycin, 100mg; Spiromycin, 5mg; DL – methionine, 56mg; L.Lysine, 120mg and Selenium, 0.16mg.*

Carcass characteristics and organ proportions

The carcass characteristics and organ proportions were determined by slaughtering three birds per treatment at the end of the feeding trial. The birds to be slaughtered were fasted for 24 hours to empty the digestive tract but water was supplied *ad-libitum*. Slaughtering was done by a clean cut across the jugular vein and the birds were allowed to bleed for at least three minutes. The birds were then dipped into hot water of between 60-70^{o}C for one and a half minutes and then their feathers were removed. The carcass was cut into parts and the organs separated according to the procedure described by Ojewola & Longe (1999). All parts (breast, drumstick, thigh, wings and back cut) were weighed and expressed as percentage dressed weight. Organs like liver, heart, gizzard, kidneys were also weighed and expressed as percentage of live weight.

Haematological parameters and serum chemistry

Blood samples were drawn from two birds per replicate through the jugular vein using a 12ml gauge (6cm) needle to draw 10ml of blood. The blood samples were divided into two; first lot (5ml) was emptied into heparinized packs containing about 40mg of anti-coagulant Ethyl diamine tetra acetic acid (EDTA) to determine the haematological components. The second lot (5ml) was collected over anti-coagutant free bottles, and was used to determine blood biochemical components. Packed cell volume (PCV), the ratio of volume of cells to the volume of plasma, was determined by the capillary haematocrit centrifuge as described by Coles (1986). White blood cell (WBC) was determined by Wintrobe method (Coles, 1986). Haemoglobin (Hb) by Cyanomethaemoglobin method (Coles, 1986) and red blood cells (RBC) also by Coles' (1986) method. These values were calculated: Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin concentration (MCHC).

Biochemical components, like total protein, urea, creatinine, alkaline phosphatase, and albumin were determined using the method of Coles (1986).

Nutrient Digestibility

Digestibility trial was conducted at the end of the seventh week. Two birds per replicate were transferred to metabolic cages and allowed three days adjustment period. Faecal droppings were collected and weighed, oven dried and re-weighed for four days. The faecal collection per replicate was bulked, milled and analyzed for proximate constituents using standard methods of Association of Official Analytical Chemist (AOAC, 2000). Nutrients digestibility was calculated as follows:

$$ND = \frac{\text{(Nutrient in feed X FI) – Nutrient in faeces X FO}}{\text{Nutrient in feed X FI}} \text{ X } 100\%$$

Where: ND = Nutrient Digestibility; FI = Feed intake; FO = Faecal output

Statistical Analysis

All data collected were subjected to analysis of variance (Steel and Torrie, 1980), and significant differences between treatments means were separated using Duncan's multiple range test (Duncan, 1955). The model of the design was:

$Y_{ij} = \mu + T_i + e_{ij}$

Where Y_{ij} = single observation ie jth observation on the ith treatment.

μ =overall mean

T_i = the effect of the ith level of treatment

e_{ij} = experimental error.

RESULTS AND DISCUSSION

The carcass characteristics (expressed as percentage dressed weight) of broiler chicken fed processed UMUCASS 36 root meal is revealed in Table 2. There were significant differences (P<0.05) in all the parameters considered. Broilers on diet D2 showed superiority in all the parameters. The live weight of broilers fed diet D1 (2000.00g) was similar (P>0.05) to the ones on diets D2 (2216.67g) and D3 (1870.00g) but higher (P<0.05) than D4 (1666.67g) and D5 (1450.00g). Broilers on diet D2 had superior weight in bled weight, plucked weight, dressed weight and dressing percentage with the following values: 2136.67g, 2056.67g, 1723.33g and 77.71% respectively. For all the parameters measured in this study, weights and percentages of broilers on diets D1 and D3 were similar while broilers fed diets D4 and D5 had a decreasing trend in the parameters measured. The dressing percentage observed in this study, fell within or was higher than the normal range (65% - 70%) for broiler chickens as reported by Oluyemi & Roberts (2000). This showed that the live weight of birds fed the root meal diets contain more edible portion than inedible offals and feathers. Broilers on diet D2 led in the values of the prime cuts which are significantly different (P<0.05) across the entire diets. The percentage breast cut of broilers on diet D1 (31.97%) was similar to that of broilers on diet diets D3 (32.90%) and D4 (30.03%) while broilers on diet D4 (30.03%) was similar to those on diet D5 (28.17%).

Table 2: Carcass characteristics of broiler chicken fed processed UMUCASS 36 root meal

			DIETS			
Parameters	**D1 (0%)**	**D2 (25%)**	**D3 (50%)**	**D4 (75%)**	**D5 (100%)**	**SEM**
Live wt.(g/bird)	2000.00^{ab}	2216.67^{a}	1870.00^{b}	1666.67^{c}	1450.00^{d}	41.85
Bled wt. (g/bird)	1950.00^{b}	2136.67^{a}	1816.67^{b}	1616.67^{c}	1400.00^{d}	46.76
Plucked wt. (g/bird)	1850.00^{b}	2056.67^{a}	1726.67^{b}	1516.67^{c}	1283.33^{d}	41.97
Dressed wt. (g/bird)	1432.33^{b}	1723.33^{a}	1336.67^{b}	1150.00^{c}	950.00^{d}	47.89
Dressing percentage	71.13^{b}	77.71^{a}	71.41^{b}	69.00^{bc}	65.49^{c}	1.19
Cut parts or	Prime cuts	(%)				
Breast	31.97^{bc}	36.00^{a}	32.90^{b}	30.03^{cd}	28.17^{d}	0.74
Drumstick	16.92^{b}	18.60^{a}	16.53^{b}	15.57^{b}	13.43^{c}	0.43
Thigh	18.25^{a}	18.60^{a}	17.190^{a}	13.60^{b}	13.38^{b}	0.54
Wings	12.64^{ab}	13.80^{a}	12.97^{a}	12.13^{ab}	11.00^{b}	0.55
Back cut	16.29^{b}	18.00^{a}	16.53^{b}	13.98^{c}	12.90^{c}	0.38

Means within the same row with different superscript ($^{a-d}$) are significantly (P< 0.05) different. SEM-Standard Error of Mean

Broilers on diet D2 had the highest percentage of drumstick (18.60%) while broilers on diets D1 (16.92%) and D3 (16.53%) were similar. The percentage of drumstick declined as the level of inclusion of root meal increases. The percentage of thigh of broilers on diets D1 (18.25%), D2 (18.60%) and D3 (17.19%) were similar but significantly different (P<0.05) from broilers on diets D4 (13.60%) and D5 (13.38%) which were similar. The percentage of the wings were comparable for broilers on diets D1 to D4 but statistically different from diet D5. The percentage back cut of broilers on diet D2 (18.00%) were higher than broilers on all other diets, broilers on diet D1 (16.29%) and D3 (16.53%) were similar while broilers on diets D4 (13.98%) and D5 (12.90%) were comparable statistically. Broilers on Diet D2 appeared to be superior to all other diets in performance, this may be due to efficient utilization of nutrient, absorption and assimilation as opined by Bamgbose *et al.* (1998) and therefore recommended as a safe level of inclusion for broiler production. The submission on diet D2 (25%) inclusion level for maize replacement is in line with the recommendation of European Union which stated that cassava root meal's normal rate of inclusion is 25% in broiler diet (Mario & Dale, 1999)

The organ proportion (expressed as percentage of live weight) of broiler chicken fed graded levels of processed UMUCASS 36 root meal is shown in Table 3. There were significant differences (P<0.05) in all the parameters observed.

Table 3: Organ proportion (%) of broiler chicken fed graded levels of processed UMUCASS 36 root meal

			DIETS			
Parameters	**D1 (0%)**	**D2 (25%)**	**D3 (50%)**	**D4 (75%)**	**D5(100%)**	**SEM**
Spleen	0.09^{a}	0.12^{b}	0.49^{ab}	0.52^{a}	0.58^{a}	0.02
Heart	0.51^{c}	0.38^{d}	0.51^{c}	0.62^{b}	0.81^{a}	0.02
Liver	1.64^{d}	1.33^{e}	1.97^{c}	2.59^{b}	3.81^{a}	0.10
Empty Gizzard	1.86^{d}	1.11^{e}	2.23^{c}	2.84^{b}	3.31^{a}	0.08
Kidney	0.65^{d}	0.57^{d}	0.79^{c}	1.07^{b}	1.29^{a}	0.03
Lungs	0.61^{b}	0.71^{b}	0.77^{ab}	0.75^{ab}	0.91^{a}	0.05
Small intestine	2.21^{b}	1.64^{d}	2.59^{c}	3.42^{b}	4.53^{a}	0.13
Length of small intestine (cm)	200.67^{b}	186.33^{d}	214.00^{b}	227.33^{a}	227.67^{a}	2.04
Large intestine	0.56^{b}	0.43^{d}	0.56^{b}	0.70^{b}	0.95^{a}	0.02
Length of large intestine (cm)	43.33^{c}	41.33^{c}	52.67^{b}	57.33^{b}	62.33^{a}	1.54
Proventriculus	0.47^{cd}	0.41^{d}	0.52^{c}	0.63^{b}	0.79^{a}	0.02
Crop	0.47^{d}	0.39^{d}	0.61^{c}	0.76^{b}	0.96^{a}	0.03
Pancreas	0.26^{bc}	0.23^{c}	0.38^{a}	0.28^{bc}	0.32^{ab}	0.03
Abdominal fat	0.48^{d}	0.21^{e}	0.59^{c}	0.76^{b}	0.95^{a}	0.02

Means within the same row with different superscript ($^{a-e}$) are significantly (P< 0.05) different. SEM-Standard Error of Mean

The percentage spleen of broilers fed diets D1 (0.09%), D2 (0.12%) and D3 (0.49) were comparable but statistically different (P<0.05) from broilers on diets D4 (0.52%) and D5 (0.58%) which were similar. Broilers on Diet D5 which was a total replacement of maize had the highest percentage weight in heart (0.81%), liver (3.81%), gizzard (3.31%) and kidney (1.29%) followed by broilers on diet D4 and diet D3. Broilers on diet D2 had the least percentage of heart weight (0.38%), liver (1.33%), gizzard (1.11%) and kidney (0.57%). This observation is in line with the findings of Ukachukwu (2000) who said that the presence of anti-nutrients causes the enlargement leading to increase in weight of liver due to detoxifying activities. The increase in the size of gizzard could be attributed to increase in the quantity of less digestible fibrous materials in the diet (Akinmutimi *et al.,* 2006). Increase in the metabolic activities of the kidney and heart due to anti nutritional factors have resulted to their increase in weight (Akinmutimi, 2004). The percentage weight of small intestine, lungs, large intestine proventriculus, crop, pancrease, length of small intestine and large intestine followed the same trend as observed for other organs mentioned above. The increasing levels of anti-nutritional factors and fibre level could be said to be responsible for these.

Table 4 reveals the haematological parameters at 8 weeks of broiler chicken fed graded levels processed UMUCASS 36 root meal. There were significant differences (P<0.05) in the parameters observed with the exception of white blood cell (WBC) and mean corpuscular haemoglobin concentration (MCHC). All haematological parameters with the exception of WBC and mean corpuscular haemoglobin (MCH) were within the normal range (RBC: 2-4 x 10mm^3; PCV: 25 – 45%; Hb : 7-13g/dl; MCH : 26 – 35pg/cell; MCV : 90 – 140fL; MCHC : 33 – 47g/dl) established by Mitruka & Rawnsley (1977). The WBC values were generally low compared to the value reported by Anon (1980). Wintrobe (1983) reported a range of 450 – 500 cells/mm^3 for exotic chicken. The lower values of WBC in this work could not be due to the effect of the diet and it does not suggest any microbial invasion; but could be due to the type of broiler strain used for this experiment.

Table 4: Haematological parameters of broiler chicken fed graded levels of processed UMUCASS 36 root meal

			DIETS			
Parameters	**D1 (0%)**	**D2(25%)**	**D3 (50%)**	**D4 (75%)**	**D5 (100%)**	**SEM**
WBC (x10^6/mm^3)	247.87	254.61	250.59	257.8	249.13	4.36
RBC (x10^6/mm^3)	3.20^b	3.58^a	2.75^c	2.55^d	2.50^d	0.04
PCV (%)	31.88^b	36.02^a	31.85^b	33.10^b	31.99^b	0.64
Hb (g/dl)	9.50^b	10.70^a	9.49^b	9.32^b	9.04^b	0.53
MCV (fL)	99.62^c	100.54^c	115.83^b	125.78^a	128.07^a	2.77
MCH (pg/cell)	29.69^b	29.88^b	34.52^a	36.18^a	36.49^a	0.62
MCHC (g/dl)	29.80	29.69	29.87	29.03	28.28	0.63

Means within the same row with different superscript ($^{a-d}$) are significantly (P< 0.05) different. SEM-Standard Error of Mean, WBC- white blood cells, RBC- red blood cells, PCV- packed cell volume, Hb- haemoglobin, MCV- mean corpuscular volume, MCH- mean corpuscular haemoblobin, MCHC- mean corpuscular haemoglobin concentration

Broilers on diet D2 had the highest value of red blood cells (RBC) 3.58x10^6/mm^3 followed by broilers on diet D1 (3.20 x10^6/mm^3) then D3 (2.75 x10^6/mm^3) and lastly D4 (2.55 x10^6/mm^3) and D5 (2.50 x10^6/mm^3) which were comparable. Broilers on diets D1 and D2 might not have experienced anaemia but there was a gradual departure from the average recommended value of what Mitruka & Rawnsley (1977) reported of RBC from broilers on diets D3 to D5. Broilers on diet D2 recorded the highest packed cell volume (PCV) 36.02% and haemoglobin (Hb) 10.70g/dl while other diets were comparable in the two parameters. The values of mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) increased as the level of cassava root inclusion increases. This suggests that the gradual increase in the anti -nutritional factors that affected the organ weights probably had influence on the MCV and MCH which made the birds prone to anaemia. Jackson (2007) said increment in the value of MCH implied regenerative anaemia. Considering the haematological parameters above, broilers on diet D2 was still superior to every other diet used in this experiment.

Table 5 shows the serum chemistry of broiler chicken fed graded levels of processed UMUCASS 36 root meal. There were no observed significant differences (P>0.05) in the values of urea, alkaline phosphatase, creatinine and globulin in all the diets but statistical differences were observed in the values of total protein and albumin.

Table 5: Serum chemistry of broiler chicken fed graded levels of processed UMUCASS 36 root meal

			DIETS			
Parameters	**D1 (0%)**	**D2(25%)**	**D3 (50%)**	**D4 (75%)**	**D5 (100%)**	**SEM**
Total Protein (g/l)	2.98^b	4.28^a	2.52^b	2.60^b	2.45^b	0.23
Urea (mg/dl)	9.67	8.67	9.83	12.00	12.30	2.12
Alkaline phosphatase (µ/l)	724.75	667.33	958.33	863.67	847.12	118.66
Albumin (g/l)	1.27^b	2.66^a	1.21^b	1.24^b	1.18^b	0.09
Creatinine (mg/dl)	0.41	0.40	0.42	0.45	0.50	0.05
Globulin (g/dl)	1.71	1.62	1.31	1.36	1.27	0.25

Means within the same row with different superscript ($^{a-b}$) are significantly (P< 0.05) different. SEM-Standard Error of Mean

Broilers on diet D2 had total protein value of 4.28g/l and albumin value of 2.66g/l which were significantly higher (P<0.05) than total protein and albumin of other diets. The total protein and albumin of broilers on diets D1, D3, D4 and D5 were comparable. The normal range of the total protein level in most birds is from 3-5g/dl (Kaneko *et al.,* 1997), 3.32 – 4.57g/dl (Adeyemo & Longe, 2008) and 5.87- 6.55g/dl (Akande *et al.,* 2012). Serum total protein was depressed with increasing level of cassava caged layer waste (CCLW) but not affected by the form of feed presentation (pellet or mash)

(Adeyemi *et al.*, 2008). The low values of albumin recorded the broiler chickens fed diets D1, D3, D4 and D5 suggest that the birds may have hepatic disease (Jackson, 2007).

There were no significant differences (P>0.05) in the values of urea, alkaline phosphatase, creatinine and globulin in the broilers fed the different diets. They also did not follow a particular pattern or trend; this result may not be attributed to diet effect on the broiler. There were no observable difference in total protein of starter and finisher broilers fed cassava root meal by Hassan *et al.* (2012). In conclusion, diet D2 having the best total protein and albumin suggest that the diet was better than others.

Table 6 reveals the digestibility coefficients of broiler chicken fed graded levels of processed UMUCASS 36 root meal. There were significant differences (P<0.05) in all the parameters measured with exception of crude fibre.

Table 6: Digestibility of broiler chicken fed graded levels of processed UMUCASS 36 root meal

			DIETS			
Parameters (%)	**D1 (0%)**	**D2 (25%)**	**D3 (50%)**	**D4 (75%)**	**D5 (100%)**	**SEM**
Dry Matter	56.33^{b}	68.25^{a}	56.22^{b}	51.30^{b}	47.42^{b}	2.78
Crude Protein	77.26^{b}	83.29^{a}	75.90^{bc}	72.34^{c}	71.11^{d}	11.46
Ether Extract	81.05^{b}	86.23^{a}	81.54^{b}	79.15^{b}	78.51^{b}	1.11
Crude fibre	38.64	38.84	40.97	44.05	38.27	3.29
Ash	63.68^{b}	72.31^{a}	60.30^{b}	60.28^{b}	55.98^{b}	2.49
NFE	55.09^{b}	67.66^{a}	56.18^{b}	51.28^{b}	46.55^{b}	2.86

Means within the same row with different superscript ($^{a-d}$) are significantly (P< 0.05) different. SEM-Standard Error of Mean

Broilers on diet D2 had the best crude protein digestibility (83.29%) followed by diet broilers on D1 (77.26%) which was comparable to those on D3 (75.90%). Broilers on diet D5 had the least crude protein digestibility. This observation was a reflection of the result obtained in the performance, carcass characteristics and organ proportion in this experiment. Ether extract, ash, NFE and dry matter followed the same trend with broilers on diet D2 having the highest digestibilities, while others were comparable. Though the nutrient digestibility of broiler chickens on diets D1, D3, D4 and D5 were comparable, the numerical values decrease as the level of inclusion increases. This was consistent with the report of Balagopalam *et al.* (1988) who pointed out that fibre content of a diet is a contributory factor to the reduced digestibility and utilization of nutrients by monogastric animals. High level of dietary fibre decreases feed conversion ratio, digestibility and nutrient utilization (Isikwenu *et al*., 2000).

CONCLUSION AND RECOMMENDATION

Considering the outcome of the carcass characteristics, organ proportions, haematological and serum chemistry and the digestibility coefficient of the broiler fed graded levels of processed UMUCASS 36 root meal, it could be concluded that 25% of the cassava can replace maize in broiler production. Hence D2 which was 25% inclusion of cassava root meal was recommended.

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