

CHICKEN FED GRADED LEVELS OF SUN-DRIED CASSAVA ROOT MEAL BASED DIETS

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ABSTRACT

An experiment was conducted to determine the replacement value of sundried cassava (*Manihot exculenta* cazt) root meal for maize in broiler chicken diets. Five diet were formulated in which SDCRM was incorporated in the diet to replace maize at 0, 20, 30, 40 and 50% level designated as diet 1, 2, 3, 4, and 5 respectively. Feeds and water were supplied to the birds with all other routine measures and the experiment lasted for seven weeks after brooding the chicks for one week with a commercial feed (vital feeds). Two hundred and forty three (243) chicks were later randomly allotted to five dietary treatments after weighing with a lot of 9 – 10 chicks per replicate each in a Complete Randomize Design (CRD). The live weight (kg) was significantly different at 0.05** with the highest at feed 1 (0%) SDCRM and the lowest 40% SDCRM which were also significant for plucked weight (kg) eviscerated weight, carcass weight, spleen heart, gizzard large intestine, liver weight at various degrees of significance differences with no significant difference in dress weight, head and leg, lungs kidney, pancreas, abdominal fat and small intestine with basic tool as means separation

Key Word: SDCRM – Sundried Cassava root Meal.

BACKGROUND INFORMATION

This phenomenal high feed cost is accounted for by instability in supply of conventional energy and protein feeds resources (Guluwa, 2021). The existing practice of heavy dependence on commercial feed ingredients will continue to pose a constraint to the development of the livestock and poultry products leading to deficiencies of animal protein intake of average Nigerians. The objective of the study is to determine the carcass yield and gut dimension of broiler chickens.

MATERIALS AND METHOD

Experimental Diet, Animals and Design

The experiment was conducted at the Poultry Research Unit of the Department of Animal Production of the Abubakar Tafawa Balewa University, Yelwa, Bauchi. Sun dried cassava root meal purchased from Muda Lawa Market in Bauchi State was used to replaced maize at 0, 20, 30, 40 and 50% levels respectively at both starter (23% CP 2 – 5 weeks) and finisher (20% CP 6 – 8 weeks) phase as presented in Table 1 and 2. Two hundred and twenty five (225) day-old broiler chicks (Arbor Acres) obtained from “Tuns farms (Nig.) Limited, Osogbo were used for the study. The chicks were individually weighed and randomly assigned to five (5) dietary treatments consisting of five (5) replicates each containing nine (9) birds in a Completely Randomized Design (CRD). The birds were reared in an open sided well ventilated poultry house on deep litter system of production. Routine management practices like sweeping, cleaning and feeding was carried out. Routine administration of vaccines against Infectious Bursal Disease and New Castle Disease were undertaken and the birds were fed ad libitum and had access to clean drinking water.

Carcass and organs measurement

At the end of seven weeks of the feeding trial two birds from each replicate were randomly selected from the five treatment diets. The birds were deprived of food (fasted) over night and slaughtering was done by cutting the throat and jugular veins with a sharp knife for proper bleeding. Defeathering was done manually by immersing them in warm water.

The live weights of each treatment were taken using a sensitive scale before slaughtering, scalding, defeathering and evisceration for carcass assessments. The weight of the carcass was taken for each bird, and the dressing percentage was then determined as reported by Guluwa (2021).

Dressing Percentage = $\frac{\text{weight of carcass}}{\text{Fasted live weight}} \times 100$

Fasted live weight

The head, legs, small intestine, large intestines and ceca were weighed using an electronic scale and expressed as percentages of live weight of broiler chickens.

The following internal organs: liver, kidneys, spleen, heart, lungs, pancreas and the gizzard evaluated by means of an electronic scale.

Fats surrounding the gizzard, intestines and the bursa of Fabricius were removed and considered as abdominal fats pad. Presented in Table 1 and 2 below is ingredient and nutrient composition percentage of sun-dried cassava root meal for starter and finisher phases respectively.

Statistical Analysis

Data records collected were subjected to analysis of variance (ANOVA) in a completely randomized design (CRD) as packaged in SPSS 21.0 computer software programme. Significant differences between treatments were separated by means of the Duncan's Multiple Range Test option of the same software package (SPSS, 2012).

Table 1: Ingredient and nutrient composition (%) of sun dried cassava root meal at the starter phase (2 – 5 weeks)

Ingredients	Diets				
	1 (0%)	2 (20%)	3 (30%)	4 (40%)	5 (50%)
Maize	43.73	36.58	32.01	27.44	22.86
Sun-dried cassava	0.00	9.15	13.72	18.29	22.87
Full fat soya beans	37.07	37.07	37.07	37.07	37.07
Fish meal	4.00	4.00	4.50	5.50	7.00
Wheat offal	12.00	10.00	9.50	8.50	7.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated Analysis					
Crude Protein (%)	23.60	22.90	22.90	23.14	23.63
Metabolizable energy (Kcal/kg)	3063	3016	3013	3018	3031
Crude Fibre (%)	4.38	4.90	5.21	5.48	5.71
Ether Extract (%)	9.10	8.71	8.55	8.41	8.26
Ash (%)	3.86	4.12	4.29	3.68	4.56
Calcium (%)	1.29	1.31	1.35	1.42	1.52
Phosphorus (%)	0.80	0.79	0.80	0.82	0.86

Diet 1= 0% Sun dried cassava root meal Diet 2 = 20% Sun dried cassava root meal, Diet 3 30% = sun dried cassava root meal, Diet 4 = 40% sun dried cassava root meal, Diet 5 = 50% sun dried cassava root meal, % = percentage

Biomix Vitamins and trace minerals premix each containing the following per 2.5kg: Vitamin A 10,000,000.00 i.u., Vitamin D₃ 2,000,000.00 i.u, Vitamin E 23,000,000 mg, Vitamin K 2,000.00mg, Vitamin B₁, 1,800.00mg, Vitamin B₂ 5,000.00 mg, Niacin 27,500.00mg, Pantothenic Acid 7,500.00mg Vitamin B₆ 3,000.00mg, Vitamin B₁₂ 15.00mg, Folic Acid 750.00mg, Biotin H₂ 60,000mg, Chlorine Chloride 300,000.00mg, Cobalt 200.00mg, Copper 3,000.00mg, Iodine 1,000.00mg, Iron 20,000.00 mg, Manganese 40,000.00mg, Selenium 200.00 mg, Zinc 30,000.00mg, Antioxidant 1,250.00mg.

Table 2: Ingredients and nutrients composition (%) of sun-Dried cassava root meal at the finisher phase(6-8 weeks)

Ingredients	Diets				
	1 (0%)	2 (20%)	3 (30%)	4 (40%)	5 (50%)

Maize	51.4	41.12	35.98	30.84	25.7
Sun-dried cassava	0.00	10.28	15.42	20.56	25.70
Full fat soya beans	27.90	27.90	27.90	27.90	27.90
Fish meal	2.00	3.00	4.50	6.50	8.00
Wheat offal	15.00	14.00	12.50	10.50	9.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Total	100	100	100	100	100
Calculated Analysis					
Crude Protein (%)	19.55	19.51	19.98	20.68	21.15
Metabolizable Energy (Kcal/kg)	2936.95	2928.70	2940.17	2959.45	2970.92
Crude Fibre (%)	4.14	4.83	5.10	5.33	5.61
Ether Extract (%)	7.70	7.34	7.18	7.01	6.86
Ash (%)	3.79	5.50	5.31	4.43	4.57
Calcium (%)	1.33	1.41	1.51	1.64	1.74
Phosphorus (%)	0.78	0.89	0.83	0.89	0.92

Diet 1= 0% Sun dried cassava root meal Diet 2 = 20% Sun dried cassava root meal, Diet 3 30% = sun dried cassava root meal, Diet 4 = 40% sun dried cassava root meal, Diet 5 = 50% sun dried cassava root meal, % = percentage

Biomix vitamins and trace minerals premix containing the following per 2.5kg; vitamin A 8,500.00iu D₃ 1500,000,00iu vitamin E 10,000, Vitamin K₃ 1,500.00 mg, Vitamin B₁ 1,600.00 mg, Vitamin B₂ 4,000.00 mg, Niacin 20,000.00 mg, Pantothenic Acid 5,000.00 mg, Vitamin B₆ 1,500.00 mg, Vitamin B₁₂ 10.00mg, Folic Acid 500.00mg, Biotin H₂ 750.00 mg, Choline Chloride 176,000.00 mg, Cobalt 200.00 mg, Copper 3,000.00 mg, Iodine 1,000.00 mg, Iron 20,000.00 mg, Manganese 40,000.00 mg, Selenium 200.00 mg, Zinc 30,000.00 mg, Antioxidant 1,250.00 mg.

Table 3: Carcass yield and gut characteristics (% body weight) of broiler chickens fed graded levels of sun-dried cassava root meal based diets

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	
PARAMETERS	0%	20%	30%	40%	50%	SEM
Live weight (kg)	2.48 ^a	2.17 ^{abc}	2.20 ^{ab}	1.81 ^c	1.95 ^{bc}	0.05**
Plucked weight (kg)	2.11 ^a	1.90 ^{ab}	2.01 ^a	1.64 ^c	1.77 ^{ab}	0.05**
Eviscerated weight(kg)	1.90 ^a	1.66 ^{ab}	1.76 ^{ab}	1.36 ^c	1.50 ^{bc}	0.13**
Carcass weight (kg)	1.76 ^a	1.53 ^{ab}	1.57 ^{ab}	1.26 ^c	1.35 ^{bc}	0.04**
Dressed (%)	70.93	70.60	71.41	69.23	69.61	0.58 ^{NS}
Head and leg (%)	5.33	5.45	5.85	6.34	6.09	0.12 ^{NS}
Lung (%)	0.43	0.48	0.43	0.55	0.45	0.02 ^{NS}
Kidney (%)	0.19	0.29	0.23	0.29	0.28	0.01 ^{NS}
Spleen (%)	0.10 ^{ab}	0.11 ^{ab}	0.08 ^{bc}	0.16 ^a	0.07 ^c	0.01**
Heart (%)	0.32 ^{ab}	0.40 ^a	0.30 ^b	0.46 ^{ab}	0.41 ^{ab}	0.01**
Gizzard (%)	1.76 ^a	1.66 ^b	1.75 ^{ab}	2.10 ^{ab}	1.71 ^b	0.04**
Pancreas (%)	0.28	0.28	0.23	0.32	0.26	0.01 ^{NS}
Small intestine (%)	4.18	4.20	4.22	4.09	4.31	0.12 ^{NS}
Large intestine (%)	0.21 ^a	0.25 ^a	0.15 ^b	0.23 ^{ab}	0.14 ^b	0.01*
Abdominal fat (%)	2.11	2.54	2.38	2.12	2.55	0.01 ^{NS}
Caecal weight (%)	0.58	0.65	0.52	0.69	0.63	0.03 ^{NS}
Liver weight (%)	1.86 ^a	2.19 ^a	2.12 ^a	2.28 ^{ab}	1.82 ^b	0.04**

^{abc} - means denoted by different alphabets in the same row are significantly different,

** - p<0.01 level, * - p<0.05 level, NS—no significant difference

SEM- standard error of means, % = percentage, KG = kilogram

Diet 1= 0% Sun dried cassava root meal Diet 2 = 20% Sun dried cassava root meal, Diet 3 30% = sun dried cassava root meal, Diet 4 = 40% sun dried cassava root meal, Diet 5 = 50% sun dried cassava root meal, % = percentage

RESULTS AND DISCUSSION

Carcass yield and internal organs of broiler chickens fed graded levels of sun-dried cassava root meal based diets

The carcass yield, internal organ weights and gut characteristics of the birds fed sun-dried cassava root meal were presented in Table 3.

The highest live weight value of 2.48 kg was obtained in birds fed diet 1 (0% SDCRM) which was significantly ($P < 0.01$) higher than the values on the other diets. This was closely followed by the live weight on diets 2 and 3 respectively and the lowest values were found on diets 4 and 5 (1.81 vs 1.95kg).

Broiler birds fed diets 1 (0% SDCRM) have the highest plucked weight of 2.11 kg which was significantly ($P < 0.05$) higher than the values on the other diets and birds fed diet 4 had the lowest plucked weight (1.64 kg). The eviscerated and carcass weight had the same trend of significant differences across dietary treatments. Significant variation in live, plucked, eviscerated and carcass weights agrees with the finding of Agunbiade *et al.* (2004) in broilers fed fermented and unfermented cassava tuber meals.

The dressing percentage, head, leg, lungs, kidney, pancreas, small intestines, abdominal fat pads and caecal weight percentages showed no significant ($P > 0.05$) difference in their treatment means. This suggested that inclusion of sun-dried cassava root meal based diets did not interfere with the function of these organs

The spleen highest value of 0.16% was obtained in broilers fed diets 4 (40% SDCRM) which was significantly ($P < 0.05$) higher than the values of other diets. The lowest values were found on diets 5 and 3 (0.07 vs 0.08%). The emphatic statement in this study disagree with Aeyemi *et al.* (2018) that reported no significant difference in spleen of broiler chicken fed cassava root meal fermented with rumen filtrate. Sun-dried cassava root meal based diets inclusion levels were also significant ($P < 0.05$) for heart, gizzard, large intestine and liver weights across dietary treatment groups.

Conclusion

The dressing percentage, heads and legs, lung, kidney, pancreas, small intestine, abdominal fat and caecal weight were not having any significance difference from each other. Also, growth impairment were not observed in these organs.

Recommendations

That sun-dried cassava root meal can successfully be used as a substitute for the conventional energy food stuffs like maize in broiler rations at up to 50% level, provided that the high cassava based rations are duly balanced for all nutrients, properly supplemented fish meal to correct nutritional problems associated with the meal.

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