

**EFFECT OF SUN-DRIED CASSAVA PEEL MEAL (SCPM) ON GROWTH
PERFORMANCE, HAEMATOLOGICAL INDICES AND ECONOMICS OF
PRODUCTION OF FINISHER BROILERS**

**OMU, PB; AKPOLU, S. E
BEKETIN, T.O; OMU, J O
NWOSU, S.N.**

**1Department of Animal Science, Ignatius Ajuru University of Education, P
2.Department of Animal Science, Niger Delta University,
3.Department of Animal Science, Imo State University, Owerri,.**

Corresponding Author: Omu, Paul B
Email: paulomu100@gmail.com
GSM: 080376385892, 07058366893

ABSTRACT

A research was conducted to find out the "Effect of Sun-dried Cassava Peel Meal (SCPM) on Performance, Haematology and Economics of Production of Finisher Broilers. One hundred and five (105) unsexed Marshall breed of broiler chicks were procured from a reputable Agro-Dealer in Port-Harcourt, Rivers State. The chicks were randomly distributed to five treatment groups at an inclusion rate of 0%, 5%, 10%, 15% and 20% by weight for weight replacement of maize, representing T1 (Control), T2, T3, T4 and T5, in a completely randomized design (CRD). All the chicks were brooded for a four weeks period. After that, the broiler chicks were assigned to five treatment groups of 21 birds per treatment, with 7 birds per replicate. They were served clean water and fed ad libitum. Routine vaccination and rearing management practices were put in place and the research lasted for 28 days (4 weeks). Results indicate that the experimental diets depressed or reduced all the growth parameters except for the feed conversion ratio (FCR). Results on haematological indices did not show any adverse effects. SCPM exceeded 10% both on economics of production indicate that profit was maximized ($P < 0.05$) in the entire study. It is concluded that sun-dried cassava peel meal can replace maize in the diets of finisher broilers production as much as 10% inclusion level and above without eliciting any adverse effect on the performance parameters, haematological indices and economics of product cost of finisher broilers.

Keywords: Performance Parameters, Haematological Indices, Economics of Production, Sundried Cassava Peels, Finisher Broilers.

1. INTRODUCTION

Grains such as maize, wheat, millet, rice etc. are known to supply energy in the diets of man and farm animals. However, maize stands out tall as the most common and popular energy resource of plant origin in feed formulations in poultry farming (Sule et al., 2014). In recent times, maize (also known as Zeamays), has become very expensive, limited, scarce, costly and most highly competed for (Haladu and Sonaiya, 2017). It is against this backdrop that the need to source for other non-conventional energy materials to partially or completely replace maize has become imperative. This is to minimize overall cost and maximize poultry production.

To mitigate this challenge, alternative energy feed ingredients were sourced for (Olafedehan, 2011). In this regard, Cassava Peel was discovered because it qualified to fill the gap. Cassava (*Manihotesculenta*) is a multi-purpose or general duties plant, and performs well in the tropics, including Nigeria. It has a wide range of tolerance to poor soil, resistance to drought and adaptability. So far, cassava has been described as the Number 1 alternative feed material to maize because it is always available, cheap, and less competed for by man (Olafedehan, 2011).

It has been reported that the utilization of cassava covers the roots, leaf meal and root sieviate (Haladu and Sonaiya, 2017). Meanwhile, farmers and farm families are encouraged to take advantage of the high protein on the leaves, the bulk in tender stems, and the high energy of the tuberous roots (Aduku, 2004).

Today, Nigeria is ranked as the world's largest producer of cassava with a production capacity of 40 million metric tonnes per annum. Various cassava products have been used in feeding livestock. Cassava peel is a waste from cassava root. This serves as an alternative source of energy to poultry species, and ruminant feeding systems, serving either as the main basal diet or as a supplement. The peel accounts for between 10–13% of tuber by weight.

Cassava peel meal (CPM) contains: Dry Matter: 90%, Crude Protein: 3–4.8%, Crude Fibre: 6.3–9.4%, Ether Extract: 1–1.4%, Ash: 4.7–5.7% and Nitrogen Free Extract: 70–79%. Different values have been reported from different geographical locations depending on the methods of processing and specific cassava varieties (FAO, 2012; NRC, 2010).

Poultry production helps in reducing the problems caused by food insecurity, poverty, and eco-ecological management of natural resources. Poultry, which is next to ruminants as a source of animal production in Nigeria, accounts for about 25% of the local meat production. The total poultry production has been estimated at between 133–165 million (IAR, 2017).

Broiler production is popular because of its peculiar characteristics of short duration cycle, high feed efficiency and high economic value (Oluyemi and Roberts, 2019). Broilers are fast growing, juicy and tasty white meat as they possess genetic potentials to attain live and dressed weights between 3.00 kg and 2.5 kg respectively in six to eight weeks of age, provided feed is adequate and balanced (Longe, 2006).

Accordingly, this study was conducted to evaluate the effect of feeding graded levels of sun-dried cassava peel meal (SCPM) as an alternative energy feed resource on growth performance, haematological indices and economics of production of finisher broilers.

2. MATERIALS AND METHODS

Experimental Site

This study was carried out at the Poultry Unit of the Teaching and Research Farm, Ignatius Ajuru University of Education, Rumuolumeni, Port-Harcourt, Rivers State. Rumuolumeni is situated between latitude 8° N and 10° E; and along longitude 14° N and 15° E of the equator. The annual rainfall is between 2626 – 3656 mm. Temperature varies from 25 – 29°C to 35°C, while the relative humidity ranges from 75–85% (RISADEP, 2024; Ourimaps, 2020; MRS, 2016).

Experimental Design

The experimental design used for this study was a Completely Randomized Design (CRD), with five treatments and three replications.

Experimental Birds

A total of one hundred and five (105) unsexed Marshall breeds of day-old-chicks were procured from a reputable Agro-Dealer in Port Harcourt, Rivers State, Nigeria.

Experimental Diets

The hybrid commercial broiler starter and finisher feeds were procured from an agro-based shop in Port Harcourt.

Housing and application

The experimental birds were brooded for 4 weeks. Adequate lighting and heat were supplied. The birds were later moved to their respective treatment pens and replications for another four weeks of the finisher phase; sufficient feeders and drinkers were made available.

Duration of the Research:

The research lasted for eight (8) weeks, or 56 days.

Collection of Cassava Peels:

Cassava peels were collected from different farm households in and around Rumuolumeni Communities in bags and transported to the animal science laboratory.

Preparation / Processing of the Test Ingredients:

Large quantities of cassava peels were collected in bags and brought to the Animal Science Laboratory. They were first soaked in large basins of water. Two days later, they were thoroughly washed to remove all the mud, insects, stones, dust particles, and sun-dried for about one week when they are crispy to touch. They are rebagged and taken to the mill for grinding to 0.2 mm guage.

Inclusion Rates:

The inclusion rates of the sundried cassava peel meal into the commercial finishing feed was: 0%, 5%, 10%, 15% and 20% representing T₁(Control), T₂, T₃, T₄, and T₅ respectively.

Feeding and Management:

The experimental birds were fed ad libitum. They were served clean water and adequate rations. All medication and vaccination schedules were strictly followed to forestall the outbreak of any disease.

Data Collection:

At the end of the field experimentation, data were collected on Growth Performance, Haematological Indices, and Economics of Production of the finisher broilers.

A) Growth Performance:

Initial Weight – This was determined by weighing all the birds at the beginning of the research on arrival to the Poultry Unit using electron weighing scale.

Final Body Weight – This was obtained by weighing all the birds by treatment groups at the end of experimental period using triple beam balance in kg. Meanwhile weekly weights were taken up to the last week.

Feed Intake / Day – Daily feed intake was completed as follows:

$$\frac{\text{Quantity of feed supplied} - \text{quantity left over}}{\text{number of birds}} \times \frac{100}{1}$$

$$\text{Daily weight gain} = \frac{\text{Final live weight} - \text{initial weight}}{\text{quantity left over} - \text{number of birds}} \times \frac{28}{1}$$

$$\text{Feed Conversion Ratio (FCR)} = \frac{\text{Quantity of feed consumed}}{\text{Weight gain}}$$

$$\text{Mortality Rate} = \frac{\text{Numbers of dead birds}}{\text{Number on Stock}} \times \frac{100}{1}$$

B) Haematological Indices:

At the termination of the feeding trials and just before slaughter, the birds were fasted overnight. There after, two birds were randomly selected from each replication. They were weighed the following morning before slaughtering. Thorough bleeding was ensured. Blood samples were collected in tubes containing a pinch of dry ethylene diamine tetra acetic acid (EDTA) for haematological examinations. The packed cell volume (PCV) was determined by haematocritmicrocentrifuge method outlined by Doyle (2016). The haemoglobin (Hb) concentration was estimated using the method of Howlett (2000). Total leucocyte counts was estimated using the method described by AOAC (2015).

C) Economics of Production:

The market price of the various feed ingredients as at the time of this investigation was used to compute the total cost of feed, the total cost of feed consumed, the quantity of feed consumed within the feeding period, and feed cost per kg weight gain. This was to determine the profitability and otherwise of whether sundried cassava peel meal (SCPM) can be used to raise finisher broilers and still maximize profit.

RESULTS AND DISCUSSION.

Performance Haematology Economics

Table 1: Proximate Composition of Cassava Peels and Maize

Nutrient Parameter	Cassava Peel Meal Value Range	Maize Core Value Range
Dry Matter (%)	85.00 – 91.00	88.00 – 96.00
Moisture (%)	10.00 – 14.00	6.00 – 15.00
Crude Protein (%)	3.66 – 4.89	9.28 – 15.87
Crude Fibre (%)	4.00 – 9.40	1.80 – 3.84
Ether Extract (%)	1.37 – 2.15	2.30 – 5.67
Ash/Minerals (%)	1.90 – 8.90	1.22 – 3.64
Nitrogen Free Extract (%)	66.56 – 78.50	74.00 – 87.00
Metabolizable Energy (kcal/kg)	2717	2962

Potassium 70.72–120.98 mg/100g: **Iron:** 53.00–57.00 mg/kg
Magnesium 7.86–14.21 mg/100g **Zinc:** 48.00–64.00 mg/kg

Source: Omu (2025).

ME = Metabolizable Energy, CP = Crude Protein, CF = Crude Fibre, EE = Ether Extract, NFE = Nitrogen Free Extract, DM = Dry Matter.

The results of the proximate composition of maize and cassava peel meal are displayed on the table as shown above. The table indicates that cassava peel meal (4 – 9.4%) was higher ($P > 0.05$) in crude fibre than maize (1.30 – 3.80%). Similarly maize has higher ($P < 0.05$) than cassava peel meal in Metabolizable Energy.

Table 2: Phytochemicals screening of sun-dried cassava peel meal

Phytochemical	Quantity
Cyanide	24.50
Terpenoids	14.20
Alkaloids	10.00
Flavonoids	7.76

Phytates	6.20
Phenols	4.65
Tannins	3.75
Saponins	2.84
Oxalates	0.13
Trypsin Inhibitors	0.04

Source: (Omu,2025).

Laboratory results of the phytochemicals present in the test ingredient (Sundried Cassava Peel Meal) is hereby presented in Table 2.

Table 3: Gross Composition of Experimental Diets Fed To Finisher Broilers

Ingredients	T1	T2	T3	T4	T5	SEM
Maize	55	45	40	35	30	
SCPM	0	10	15	20	25	
SBM	24.00	23.82	22.33	21.15	20.96	
GNC	12.00	12	12	12	12	
Maize offal	19.80	19.80	19.80	19.80	19.80	
Fish meal	2.00	2.00	2.00	2.00	2.00	
Bone meal	3.00	3.00	3.00	3.00	3.00	
Palm Oil	0.50	0.25	0.25	0.25	0.25	
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	
	100.00	100.00	100.00	100.00	100.00	

Calculated Analysis

Crude Protein %	22.84	21.21	21.11	20.38	20.63
Crude Fibre %	4.45	4.64	4.68	4.73	4.82
Crude Fat %	3.65	3.77	3.85	3.81	3.80
Arginine %	0.88	0.86	0.84	0.82	0.82
Methionine %	0.70	0.68	0.66	0.60	0.60
ME (Kcal/Kg)	2877.52	2864.58	2851.44	2838.26	2825.32

Table 4: Growth Performance of Finisher Broilers Fed Graded Levels of Sundried Cassava Peel Meal

Parameter	0% (T1)	5% (T2)	10% (T3)	15% (T4)	20% (T5)	SEM
Initial Live Wt (g)	628.57	628.56	628.57	628.57	628.58	4.12
Final Live	2499	2390	2150	2057	2001	4.35

Wt (g)						
Total Feed Intake (g)	87,000	85,000	83,000	82,000	80,000	1.56
Total Wt Gain (g)	2370.43	2261.44	1871.43	1428.43	1372.42	6.27
FCR	3.6	3.9	4.3	4.8	5.3	0.01
Mortality	0.00	0.00	0.00	0.00	0.00	0.00

abcd: Means on the same row with different superscripts are significantly ($P < 0.05$) different.

The initial weights of all the broiler chicks in all the treatment groups were similar and statistically identical because there were no significant ($P > 0.05$) differences. Final live weight decreased linearly. The feed conversion ratio (FCR) gave the following progressive results: T1 (Control) 3.6, T2 4.1, T3 4.3, T4 5.7, and T5 6.0. Crucially, there was no case of mortality during the active course of the field study.

Table 5: Cost of Production of Finisher Broilers Fed Graded Levels of Sundried Cassava Peel Meal

Parameter	T1	T2	T3	T4	T5	SEM
Final Live Wt (kg)	628.57	628.56	628.57	628.57	628.58	4.12
Feed Intake (g)	2999	2890	2700	2557	2401	1.35
Feed Cost (Kg/₦)	870.00	850.00	830.00	820.00	800.00	1.56
Total Feed Cost (₦)	65,188	63,231	60,414	68,552	55,995	0.27
Labor / Drug (₦)	15,000	15,000	15,000	15,000	15,000	0.01
Total Cost of Production (₦)	80,188	78,231	75,444	73,552	70,995	0.53
Revenue (₦)	263,000	245,000	223,000	205,000	190,000	0.62
Profit (₦)	182,812	163,769	145,586	132,448	115,005	1.2

abcd: Means on the same row with different superscripts are significantly ($P < 0.05$) different.

Table 6: Haematological Indices of Finisher Broilers Fed Graded Levels of Sundried Cassava Peel Meal

Parameters	T1	T2	T3	T4	T5	SEM
PCV (%)						
Hb (g/dl)	6.30	6.80	5.70	5.95	6.20	
RBC ($10^6/\mu\text{l}$)	158	144	149	155	163	
WBC ($10^3/\mu\text{l}$)	130	129	132	138	141	

Neutrophils (%)	20.41	47.88	52.92	68.04	71.29
Lymphocytes (%)	113	91	94	101	40
Monocytes (%)	2.45	0.00	0.75	1.00	1.02
Eosinophils (%)	0.00	0.00	0.00	0.00	0.20
Basophils (%)	6.21	2.42	3.47	5.96	1.15
MCV (fl)	134.00	132.00	139.00	151.00	142.00
MCH (pg)	24	29	24	31	28
MCHC (g/dl)	19.40	22.00	18.67	17.52	17.06
Platelets (10³/μl)	12.00	13.00	10.00	15.00	17.00

abcd: Means with different superscripts on the same rows are significantly ($P < 0.05$) different.

Growth Performance

The results from this study revealed that sun-dried cassava peel meal had no significant effect on the growth performance of broiler birds.

The result were in agreement with similar findings by Eshiett and Adenegun (2021), who reported that body weight growth performance and feed trend was not significantly influenced by sun-dried cassava peel meal.

Esser and Most (2009) opined that feed intake was influenced by any treatment effect.

Osei and Duodu (2005), stated that weight gain and feed conversion ratio were elements that are determined by feed intake. This study revealed that sun-dried cassava peel meal did not negatively influence the performance of the finisher broilers

Haematological Indices

Doyle (2016) stated that blood is the best sample that can be harvested from any animal to determine its health status. The haematological indices presented in this study revealed that all the criteria measured, ESR (mm/hr), HbC (g/100ml}, RBC (10⁶mm²}, WBC (x 10³ mm³), Lymphocytes (%), Neutrophils (%), Eosinophils (%), Monocytes (%) and Basophils (%) had values that fell within the normal haematological variables for chickens. This implies that the sun-dried cassava peel meal diets had no adverse effect on the blood parameters of broiler chickens (Howlett, 2000).

The PCV, RBC and Hbvalues obtained in this work fell within normal range and also indicates good health.

Among the differential blood count, lymphocytes constitute the greatest proportion. This agrees with the work of Maxwell, 2019. Only the eosinophils and basophils were within the normal range, while all the others were lower. It was revealed that low differential counts could precipitate haematological abnormalities which could affect the thriftiness of the birds.

Economics of Production

The current study proves that the work has shown some benefits and researchable.

Generally, the final live weight did not perform too poorly. The weights attained were within the recommended weight of between 2kg – 3kg per LW of finisher broilers. This agrees with the findings of Osei and Duodu (2008).

Using prevailing market prices, all the birds were sold at different selling prices. Revenue (income) were somehow different due to final live weight, market weights and sizes of the finisher broiler birds.

Ogbonna and Adebawale (2003), reported similar findings in their work and profit was determined for each treatment group as: Revenue minus total cost of production.

Mortality was not recorded.

Sogunle et al (2009), stated that feed cost and feeding cost reduced with the use of sun-dried cassava peel meal. It was significantly cheaper and more economical to produce 1kg of BW of broilers using sun dried cassava peel meal and yet make greater economic returns.

Conclusion and Recommendation

Conclusion:

The present research analyzed the proximate and phytochemical properties of SCPM. Also, the performance, haematology and economics of production were investigated.

From all the data generated in this study, it was revealed that sundried cassava peel meal has the potential to be used as an energy-based raw feed ingredient in broiler finisher diets, even at 10% inclusion rate.

The inclusion rate of the sun-dried cassava peel meal, even at 15% or 20% in the diets of finisher broilers did not constitute any adverse effect on performance, haematological indices, and yet improved economic returns of production.

Recommendations:

It is hereby recommended that since cassava peel meal is readily available, rich in carbohydrates and of low cost, it should be desired by Poultry (Broiler) farmers.

The inclusion level of 15% or 20% in the diets of finisher broilers should be sustained.

Further studies should be carried out with other animals and with different inclusion levels.

REFERENCES

- AOAC. (2015). Association of Official Analytical Chemists: Official Methods of Analysis (18th ed.). Washington, DC.
- Aduku, A.O. (2004). Tropical Feedstuff Analysis. Ahmadu Bello University Press, Samaru, Zaria, Nigeria.
- Doyle, D.C. (2016). Father of Haematology. British Journal of Haematology, 333, 375–381.
- Eshiett, N.O., & Ademosun, A.A. (2001). Effect of feeding cassava peel meal to growing pullets on their subsequent laying performance. Bulletin of Animal Health and Production for Africa, 29, 237–242.
- Esser, J.A., & Moute, M.J.R. (2009). The safety of dark moulded cassava flour compared with white: A comparison of traditionally processed dried cassava peels in North-East Mozambique. Tropical Science, 29, 261–262.
- FAO. (2012). Food and Agriculture Organization Corporate Database records. Rome, Italy.
- Haladu, S., & Sonaiya, E.B. (2017). Effect of replacing maize with sorghum, millet or 'acha' on the growth and carcass characteristics of broilers. Nigerian Journal of Animal Production, 44(5), 135–140.
- Howlett, J.C. (2000). Clinical Diagnostic Procedures. In J.H. Samour (Ed.), Avian Medicine. London: Port Harcourt Publishers Ltd.
- IAR. (2017). Technical Meteorological Data Archives. Institute of Agricultural Research, Ahmadu Bello University, Samaru, Zaria, Nigeria.
- IITA. (2009). International Institute for Tropical Agriculture Bulletins (No. 144, P.M.B 5320). Ibadan, Oyo State, Nigeria.
- Iyayi, E.A., & Tewe, O.O. (2008). Serum protein, urea and creatinine levels as indices of quality cassava diets for pigs. Tropical Veterinarian, 16, 59–67.
- Longe, O.G. (2006). Poultry nutrition research trends in alternative energy options. Technical Paper, University of Ibadan, Nigeria.
- MRS. (2016). Map of Rivers State Guidelines. Ministry of Land and Housing, Port-Harcourt, Rivers State, Nigeria.
- Maxwell, L.N. (2019). Textbook of Hematological Diagnostics and Avian Cellular Pathology. Academic Press.
- Morgan, N.K., & Choct, M. (2016). Cassava: Its nutrient composition and utilization in poultry diets. Animal Nutrition, 2(1), 1–8.
- NRC. (2010). Nutrient Requirements for Poultry (Revised ed.). Washington, DC: National Academies Press.
- Ogbonna, J.U., & Adebawale, E.A. (2003). Effects of sundried cassava peel meal as a replacement for maize and wheat offals on performance and nutrient utilization of cockerels. Nigerian Journal of Animal Production, 30(1 & 2), 61–70.
- Olafedehan, O.A. (2011). Carcass quality and cost benefit of rabbits fed cassava peel meal. Archivos de Zootecnia, 60(231), 757–765.
- Oluyemi, J.A., & Roberts, F.A. (2019). Poultry Production in Warm Wet Climates (3th ed.). Nigeria: MacMillan Publishers Ltd.

- Omu, P.B. (2016). Effect of graded levels of enzymes fortified *Costus lucanusianus* and *Blighia sapida* on the performance and blood indices of finisher broiler diets (M.Sc. thesis). Imo State University, Owerri, Nigeria.
- Omu, P.B. (2025). Effect of Sun-Dried Cassava Peel Meal (SCPM) on growth performance, haematological indices and economics of production of finisher broilers. *Bagbami Journals*, 12(2), 45–58.
- Ourimaps.(2020). Geographic Longitude and Latitude Mapping Software Coordinates for West African Ecological Zones.
- RISADEP.(2024). Meteorological Unit Reports.Rivers State Agricultural Development Programme, Rumuodamaya, Obio-Akpor L.G.A., Port-Harcourt, Nigeria.
- SPSS. (2015). Statistical Package for Social Sciences: Procedures and Facilities for Release (Version 22.0). New York, NY: McGraw-Hill Book Company.
- Sogunle, O.M., Fanimu, A.O., Abiola, S.S., & Bangbose, A.M. (2009). Performance of growing pullets fed cassava peel meal diet supplemented with cashew nut reject meal. *Archivos de Zootecnia*, 58(221), 23–31.
- Sule, E.I., Umoh, V.J., Ihenhong, C.M.Z., Abdulahi, T.O., & Okoli, I.C. (2008). Chemical and nutritional value of maize products obtained from selected markets in Kaduna State. *African Journal of Food Science & Technology*, 5(4), 100–104.