Journal of Global Biosciences
ISSN 2320-1355
Volume 9, Number 6, 2020, pp. 7629-7637
Website: www.mutagens.co.in
URL: www.mutagens.co.in/jgb/vol.09/05/090618.pdf

Research Paper

EFFECT OF PROCESSED CASSAVA PEEL MEAL ON DIFFERENTIAL LEUCOCYTES COUNTS OF PULLETS

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Abstract

A 37 week feeding trial was conducted using 108 Dominant black strain of pullets to evaluate the effect of feeding diets containing sun-dried cassava peel meal (SDCPM) on their differential leucocytes counts. Three experimental diets were formulated using the SDCPM and was included at the rate of 0%, 10% and 20% respectively, to replace maize in the control diet. The birds were randomly allotted to three dietary treatment groups. Diet T_1 was the control, containing (0% SDCPM), while diets T_2 and T_3 had 10% and 20% SDCPM respectively. Increasing SDCPM inclusions resulted in increased monocytes values in the 24th week. The values recorded at the 20% inclusion level was significantly ($P<0.05$) higher than that of the control diet. Also, the values recorded in the 37th week at the 10% level of inclusion was significantly ($P<0.05$) higher than values recorded in the control and 20% inclusion diets respectively. Lymphocytes values in the 37th week at the 20% inclusion level was significantly ($P<0.05$) higher than values recorded at the 0% and 10% inclusion levels respectively. Compared to the control diet, SDCPM inclusion significantly ($P<0.05$) raised heterophils values in the 37th week of study. Increasing SDCPM inclusions resulted in higher basophilic values in the 12th and 37th weeks of study. It can be concluded that up to 20% SDCPM can be used in pullet diets to replace maize without adverse effect on their differential leucocytes counts.

Key words: cassava peels, poultry production, differential leukocyte count, nutrition, diets, pullets.

INTRODUCTION

Nigeria ranks high amongst the countries with the least consumer of protein in Africa in spite of the numerous human and natural resources [7]. [13] stated that a poultry enterprise can produce meat within seven weeks and has the first eggs produced within

eighteen weeks of first chick being hatched, which serve as a rich source of protein. In an attempt to combat the challenge of increasing feed cost however, researchers have stressed the need for utilization of cheaper, locally available and nutritionally viable alternative feedstuffs far removed from human and industrial interests, thereby limiting the dependence on maize for livestock production [6]. Feed crises in poultry production can be solved by use of unconventional feed resources like crop residues and agro-industrial by-products. Cassava peels is one example of these agro-industrial by-products that are readily available in countries of the world where cassava is cultivated and processed into feed for man. Aside the lower values of crude protein and energy of the peel relative to those of maize, the greatest limitation to the use of cassava peel as a substitute for maize is that of its hydrocyanic acid (HCN) content which is harmful to the monogastrics. Many processing methods that have been used to enhance the feeding value of cassava include sun drying [2], parboiling [10], soaking in water and retting [11]. The quantity and quality of feeds and also the level of anti-nutritional elements or factors present in the feeds to a great extent influence the haematological and biochemical blood components. Haematological components of blood are also valuable in monitoring feed toxicity especially with feed constituents that affect the formation of blood. Differential white blood cells counts are important indicators of health and disease in animals and have become indispensable in the diagnosis, treatment and prognosis of many diseases. The study was therefore designed to evaluate the effect of substituting maize in diets of pullets with different levels of SDCPM inclusions and assessing its effect on differential leucocytes parameters.

MATERIALS AND METHODS

The experiment was carried out from June, 2009 - May, 2010 at a private farm in Makurdi, Benue State, Nigeria. Makurdi lies approximately on Latitude 7^0 44'N, 8^0 3'E) in the southern Guinea Savannah zone of Nigeria, has a temperature range of 22.5-40^{0}C and annual rainfall of 1,290mm [16].

Research Animals

Dominant black pullet chicks for this research were purchased from Global Millenium Chicks Hatchery in Ibadan, Nigeria. One hundred and eight pullet chicks, averaging 32.17- 32.49g were used for this study and they were housed in an open-sided poultry

house, which was partitioned into homogenous pens. The birds were divided into 3 treatment groups with 2 replicates of 18 birds.

Experimental Diets and Design

The experimental diets consisted of a control diet without cassava peel meal; T_1 (0%) and others containing cassava peel meal at graded levels; T_2 (10%) and T_3 (20%) respectively. After soaking the cassava peels inside a closed metal drum for 5 days, the peels were removed from the sticky water and drained with a plastic basket and subsequently sun- dried for 3 - 5 days. Experimental diets were assayed for proximate composition by the method of [3]. Tables 1and 2 show the percentage composition of the grower and layer diets respectively. Feed and water were supplied *ad libitum a*nd the birds were adequately vaccinated.

Differential Leucocytes Counts

DLC (Differential leucocytes counts) determined included the basophils, eosinophils, monocytes, lymphocytes and heterophils. Blood samples (2ml) were collected from the jugular vein into clean dry glass tubes containing EDTA (ethylene diamine tetraacetic acid) for differential leucocytes counts. The basophils, eosinophils, monocytes, lymphocytes and heterophils were evaluated on the 12^{th}, 24^{th} and 37^{th} weeks of the study. Four samples were collected from each treatment group and the differential leucocytes counts were determined using the method of [12].

Statistical Analysis

Significant means among variables were separated using Duncan Multiple Range Test as outlined by [15]

Table 1: PERCENTAGE COMPOSITION OF GROWER DIETS

Feedstuff	Diets groups		
	T_1	T_2	T_3
SDCPM	0.00	10.00	20.00
Ground Cake	25.00	25.00	25.00
Maize	55.00	50.00	46.00
Rice Offal	16.23	11.15	5.01
Bone Meal	3.00	3.00	3.10
*Premix (Grower)	0.25	0.25	0.25
Lysine	0.10	0.15	0.16
Methionine	0.17	0.20	0.23
Salt	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated Analysis			
Crude Protein %	17.00	17.00	16.84
Energy Kcal/kg ME	2707	2674	2656
Calcium %	1.08	1.08	1.11
Phosphorus % (Total)	0.80	0.79	0.80
Methionine %	0.60	0.60	0.61
Lysine %	0.70	0.70	0.70

*Grower Bio-organics Premix at the rate of inclusion provides the following additional nutrients per kg of diet: Vitamin A 3.200i.u., Vitamin D3 640 i.u., Vitamin K 0.8 mg., Thiamine, B1 0.6 mg, Riboflavin, B2 1.6 mg., Pyridoxine, B6 0.6 mg, Niacine 6 mg, Vitamin B12 0.004 mg, Pantothenic Acid 2 mg., Folic Acid 0.2 mg., Biotin 0.008 mg., Choline Chloride 0.08 g, Antioxidant 0.05 mg., Manganese 0.032 g., Zinc 0.02 g, Iron 0.008 g, Copper 0.002g, Iodine 0.00048 g, Selenium 0.08 mg and Cobalt 0.08 mg.

Table 2: PERCENTAGE COMPOSITION OF LAYER DIETS

Feedstuff	Diets groups		
	T_1	T_2	T_3
SDCPM	0.00	10.00	20.00
Fish Meal	2.00	2.00	3.00
Soyabean Meal	30.00	30.00	25.00
Maize Bran	9.60	-	-
Maize	48.00	47.60	43.70
Bone Meal	3.50	3.50	3.50
Limestone	6.00	6.00	4.50
Methionine	0.30	0.30	0.30
*Premix (Layer)	0.30	0.30	0.25
Salt	0.30	0.30	0.25
Total	100.00	100.00	100.00
Calculated Analysis			
Crude Protein %	17.51	18.20	17.40
Energy Kcal/kg ME	2733	2705	2630
Calcium %	3.50	3.67	2.93
Phosphorus % (Total)	0.845	0.840	0.851
Methionine %	0.574	0.592	0.541
Lysine %	1.020	1.022	0.921

*Layer Bio-organics Premix at the rate of inclusion provides the following additional nutrients per kg of diet:Vitamin A 8,500,000.00 i.u., Vit. D3 1,500,000.00 i.u., Vit. E 10,000 mg.,Vit. K3 1,000 mg., Vit. B1 1,500 mg., Vit. B2 4,500 mg., Niacine 15,000 mg., Pantothenic Acid, 4,500 mg., Vit. B6 3,000 mg., Vit. B12 15.00 mg., Folic Acid 600 mg., Biotin H2 500.00 mg., Choline Chloride 175,000.00 mg., Cobalt 200.00 mg., Copper 3,000.00 mg., iodine 1,000 mg., Iron 200,000.00 mg., Manganese 40,000.00 mg., Selenium 200.00 mg., Zinc 30,000.00 mg., Antioxidant 1,250.00 mgr.

RESULTS AND DISCUSSION

The Figure below shows the influence of SDCPM on mean periodic differential leucocytes counts of pullets at the 12th, 24th and 37th weeks. Basophilic levels in weeks 12 and 24 in all diets was 0.00 and in the 37th week, the level was 0.25% at the 10% and 20% inclusion levels, which were significantly ($P<0.05$) higher than that of the control diet. Also, monocytes values recorded in the 37th week, at the 10% level of inclusion was significantly ($P<0.05$) higher than values recorded in the control and 20% inclusions respectively. Lymphocytes values in the 37th week at the 20% inclusion level was significantly ($P<0.05$) higher than values recorded at the 0 and 10% inclusion levels respectively. Compared to the control diet, SDCPM inclusions significantly ($P<0.05$) increased heterophils values in the 37th week. Determination of the haematological profiles reflects physiological responsiveness of the animals to its internal and external environment [5]. Animals on a high plane of nutrition tend to show better haemotological indices than their counterparts on a low plane of nutrition [17], and white blood cells are good indicators of the physiological and pathological changes in the animal. White blood cell values of 5.39 – 5.95 x 10^3, 2.48-3.72 x 10^3 and 7.30-9.40 x10^3 mm^3, have been reported respectively by [14], [4] and [9] in exotic species while ranges of 1.00-9.00 [8] and 15.95-19.50 x 10^3 mm^3 [1], have been reported in local chicken. White blood cells were generally observed to be lower at the 12th week compared to the 27th and 34th weeks of the study. Grower diet, with comparatively lower nutrient value must have influenced white blood cell populations at this stage of the study. There was evidence from values recorded across the diets, and at various periods of the study that the test ingredient, SDCPM did not affect the white blood cells of the birds. This suggests that the hydrocyanic acid in the peels was sufficiently eliminated to influence the normal function of the pullets. Normal WBC values and low mortality rate obtained in the current study show that the bird were better equipped immunologically to fight infections arising from micro organisms

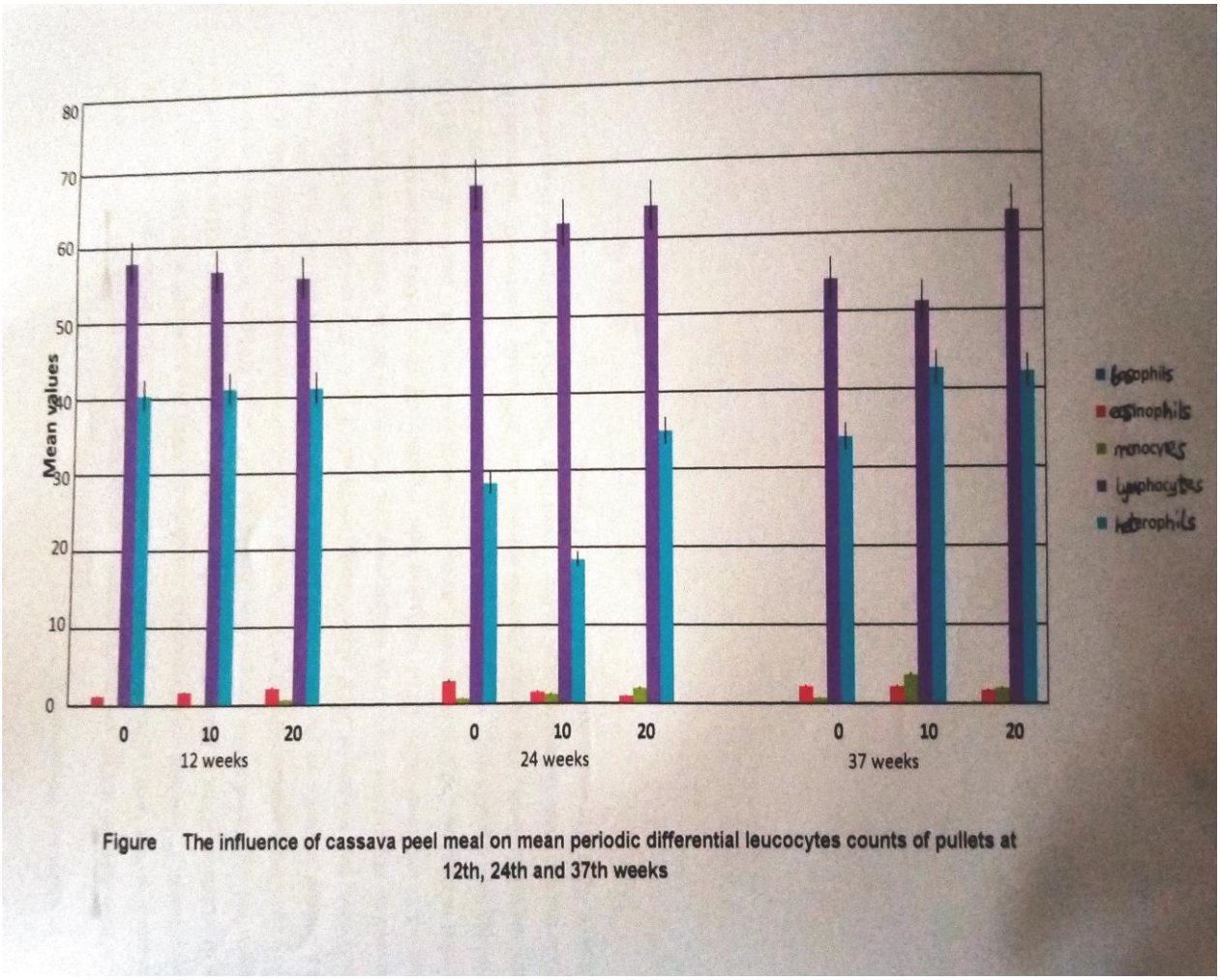

Figure The influence of cassava peel meal on mean periodic differential leucocytes counts of pullets at 12th, 24th and 37th weeks

CONCLUSION

SDCPM at a maximum level of 20% inclusion in all pullet diets support exchange of substances in the blood as well as work of internal organs. Generally, the basophilic, eosinophilic, monocytic, lymphocytic and heterophilic values obtained in this study indicate that the birds were healthy and could withstand respiratory stress. This suggests that the different diets were balanced in their formulation to support optimum performance and haemotological profiles of the birds.

ACKNOWLEDGEMENTS

We appreciate Dr. (Mrs.) Jacqueline Chinweokwu Adaku Ezihe and Dr. Motunrayo Triumph Onadeji for their assistance in preparing the manuscript of this work.

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