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The Effect Of Graded Levels Of Palm Kernel Cake On Heamatological And Serum Indices Of Growing Rabbits

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Abstract - The effect of varying levels of palm kernel cake, PKC on haematological and serum biochemistry in the diets of growing rabbits were investigated, five-seven weeks old cross bred (New Zealand white x chinchilla) rabbits were randomly assigned into five dietary treatment groups in a completely randomized design of 10 rabbits per treatment and five replicate of two (2) for 56 days. The experimental diets contain (0%, 10%, 20%, 30%, & 40%) of PKC in the diet at graded levels. Blood samples were collected for haematological and serum indices, the results show ESR, PCV, RBC, Hb, WBC and its differential counts were not significantly different (P>0.05) in the rabbits fed PKC based diet. The values ranges from and 4.25 - 1.00mm/hr for ESR, PCV, 31.50 - 24.00%, RBC, (9.87-5.76x10^6/mm, Hb, 10.50 - 7.98g/dl, WBC, 3.73-2.46x10^3/mm and the differential counts Lymphocytes, Neutrophils, Monocytes, Eosinophils and Basophils ranges between 66.00 - 64.00, 26.00 - 24.00, 7.00 - 5.00, 3.67 - 2.50 and 1.50 - 1.00)% respectively and these figures falls within the normal range reported for rabbits. Serum biochemical indices shows significant difference across the treatment for total protein and globulin with the highest recorded in the control diet (14.99 and 0.85) respectively the rest does not follow any pattern. The Albumin and urea increases across the treatment while creatinine decrease across the treatment without any significant differences (p>0.05). This still falls within the normal range.

Keywords—Rabbits, Palm kernel cake, Maize, Feeding trial, Haematology and Serum

I. INTRODUCTION

The rapid growth rate in the population of developing countries like Nigeria, calls for increase in animal protein supply and availability to the populace. A survey by FAO (2004), reported that daily consumption of meat in Nigeria was as low as 20gm /day/person while in the developed countries, it was up to 304gm/day/person, occasioned by the advanced technology in animal production. The nutritional profile of meats and products such as egg from other small animals (poultry, pigs) has been under criticism due to large proportion of saturated fat and percentage of calories from fat and cholesterol (Rao *et al.,* 1979; USDA, 1989).

Rabbit's meat is considered a lean one that is cheap source of animal protein. Meat from rabbits of any age is highly appreciated for human consumption. It is a product that is fits any taste. It is tender and of high culinary yield, easy and quick to cook. Above all, rabbit's meat is a source of healthful food as it is low in cholesterol and good source of protein for coronary heart patients (Hernandez *et al*., 2006), but the major problem affecting rabbit industry is shortage of cheap quality feeds stuffs; feed accounts for more than 70% of the total cost of production.

The cost of conventional feed ingredients such as maize has been on the increase from year to year leading to increase in the price of animal protein sources (Adejinmi *et al*., 2007). The competition between man and his livestock for some of the feed ingredients coupled with the high cost call for search for alternative, non-conventional feed ingredients that would be used to replace the conventional ones in rabbits' diets. This competition between man and livestock for maize arose because of low production level of maize in Nigeria leading to inadequate supply and resulting in high cost of livestock feed which in turn reduces the expected profit of farmers (Durunna *et al.,* 2000). In view of this high price of maize, there has been an increase awareness of the search for agro- industrial by- product as replacement for maize in livestock rations (Ukachukwu *et al.,* 2003).Palm kernel cake is the main by-product of the palm kernel oil extraction process. It is a highly fibrous, rich in energy and medium grade protein feed, hence more suited to livestock feeding. Palm kernel cake is palatable and satisfactory in animal diets and is readily available. The economic advantages arising from the low cost of palm kernel cake relative to cereals together with its ever-increasing global production as well as its considerable potential as a good source of both dietary protein and energy ((Ataga, 1984; Olomu,1995) will justify the increasing use of palm kernel meal in feeding livestock. However, utilization of the agro industrial by-products that is locally available, cheap and less competitive feedstuff as palm kernel cake in feeding rabbits will minimize the incorporation of the highly costly conventional feed sources like maize while maximizing output at least cost of production.

The aim of this study is to evaluate the effect of substituting graded levels of palm kernel cake (PKC) for maize on haematological and serum biochemical indices of growing rabbits

II. MATERIALS AND METHODS

The study was carried out at the Rabbit Unit of the Teaching and Research Farm, Rufus Giwa Polytechnic, Owo (latitude7^0 06^1 N; longitude 5^0 36^1 and altitude 317m) Ondo State, Nigeria. The test ingredient Palm Kernel Cake, (PKC) was purchased from Jof Ideal Farm Limited, Owo, Ondo State, Nigeria.

Fifty cross bred (New Zealand white x chinchilla) weaner rabbits aged between five-seven weeks, both sexes were divided into five (5) dietary treatments groups. Each treatment of ten (10) rabbits were sub divided into five (5) replicates of two (2) rabbits each on weight equalization basis before the commencement the feeding trial. The experimental design used is completely randomized design (CRD) and the experiment lasted for 56 days (eight weeks). The experimental animals were housed in individual cages made of galvanized iron and two animals in was placed in each cage cell/compartment feed and water was given the animals *ad libitum* and necessary routine management practices were strictly adhered to. Experimental diets (samples T_1-T_5 were analysed for proximate composition using the procedure of AOAC 1995. The composition of the experimental concentrate supplement is as shown in Table 1.

Experimental Design and Statistical Method

Data obtained was subjected to Analysis of variance (ANOVA) in a Completely Randomized Design using SAS (1999). Significant means was separated by Duncan's Multiple Range Test (Duncan, 1995). In all, a 5% confidence level was set to test statistical significance. Components of variance, mean values, and standard errors were estimated using the following experimental model:

$$\mathbf{Y_{ij} = \mu + Ti + \sum_{ij}}$$

Where:

Y = Output Yield

μ = Population mean

T_i = Effect of palm kernel cake source (Treatment: I, II, III, IV and V)

$\sum_{ij}$ = Residual error

At the end of the feeding trial, blood samples were collected from one rabbit per replicate through jugular veinipuncture for haematological indices such as ESR, PCV, HB, RBC, WBC, Neutrophil, Lymphosyte, Monocyte, Eosinophil and Basophil into a well labelled bottle containing ethylene diamine tetra-acetic acid (EDTA). Another set of 2ml of blood were collected into heparinised tube for serum biochemistry. Blood samples for serum biochemistry were placed in an ice bath and transported to the laboratory to determine the following parameters: Albumin, Total Protein, Creatinine, Urea and Globulin.

III. RESULTS AND DISCUSSION

The results of haematological and serum indices of growing rabbits fed graded levels of palm kernel cake in substitution for maize is as shown table 2 and 3 respectively. Some of the haemalogical parameters measured are PCV, RBC, Hb, WBC and its differential counts (Lymphocytes, Neutrophils, Monocytes, Eosinophils and Basophils), in all the parameters measured, there were no significant (P>0.05) difference across the treatments. The PCV (24.00-31.50)%, RBC (5.76-9.87) x 10^6/mm^3, Hb (7.98 - 10.50)g/dl, WBC (2.46 - 3.73) x 10^3/mm^3, Lymphocytes (64.00 - 66.00)%, Neutrophils (24.00 - 26.00)% Monocytes (5.00 - 7.00)%, Basophils (1.00 - 1.50)%, and Eosinophils (2.50 - 3.67)%; in all the differential counts, no significant difference were observed among the treatments. However, all the values fall within the normal values reported by Mitruka and Rawnsley (1977).

White blood cells and its differential counts are peripherial blood that provides valuable information on the status of blood cells and the presence of parasitic elements. Since the results shows no significant difference across the treatment and all the values obtained falls within the normal range reported for rabbits, this implies that the test ingredients (PKC) does not have adverse effect on the animal. (Ochei and Kolhatkar, 2007).

The serum biochemistry of growing rabbits fed the test ingredient is as shown in Table 3; the total protein and globulin showed marked difference across the treatment (P<0.05) but still falls within the normal range. According to Harper *et al.,* 1999; Awosanya *et al.,* 2000, total protein have been explored extensively in nutritional studies to distinguish normal state from abnormal condition in animals, dietary components had shown to have measurable effects on blood protein components which implies that the test ingredient does not impact negative effects on the experimental animals. Serum creatinine values were within the normal range of 0.19 - 0.69 mg/dl reported by Mitruka and Rawnsley (1977).

Bell *et al.,* (1987) reported that in the case of muscle wasting serum creatinine value is characteristically higher than the recommended range which is not in line with the current study and negate the possibility of muscle wasting. Serum urea and albumin value of rabbit were not significantly affected across the treatments (P>0.05), the recorded values for urea falls within the range 13-33-23.89 recommended for rabbit by Mitruka and Rawnsley (1977). The higher value of Albumin obtained in this study 55-63mg/dl may be attributed to the in ability of the free radicals to permit the albumin to function as an antioxidant (Hallwell and Chirico,1993). In contrast,

low albumin suggests poor clotting ability of the blood and hence retarded preventive processes of hemorrhage (Roberts *et al.,* 2000).

IV. CONCLUSION

The results of the experiment showed that the inclusion of palm kernel cake at all level in the diets of the growing rabbits does not have any adverse effects on the haematological and serum biochemical indices of the rabbits.

Table 1: Composition (%) of the Experimental Concentrate Supplements

Ingredients	T1	T2	T3	T4	T5
Maize	50.00	40.00	30.00	20.00	10.00
Wheat offal	30.00	30.00	30.00	30.00	30.00
Soya Bean Meal	15.00	15.00	15.00	15.00	15.00
Palm Kernel Meal	00.00	10.00	20.00	30.00	40.00
Salt	0.25	0.25	0.25	0.25	0.25
Bone Meal	3.00	3.00	3.00	3.00	3.00
Oyster Shell	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00

Calculated Analysis

Crude protein 16.4 17.2 18.00 18.8 19.6

Metabolisable Energy 2683 2557.1 2431.2 2305.3 2179.4

Table 2: Effect of Graded Level of Palm Kernel Cake (PKC) on Serum Biochemistry of Growing Rabbits

Parameter(g/dl)	T_1	T_2	T_3	T_4	T_5	SEM
Albumin	5.61	5.58	6.11	6.31	6.13	0.51
Total Protein	1.41^a	7.71^b	8.76^b	10.95^{ab}	10.55^{ab}	0.00
Creatinine (mg/dl)	0.69	0.41	0.56	0.19	0.54	0.66
Urea (mg/dl)	13.33	17.44	22.53	18.06	23.89	0.75
Globulin	0.85^a	0.21^b	0.26^b	0.46^b	0.44^b	0.00

a,b,c = means on the same row but with different superscripts are statistically significant (P<0.05)

Table 3: Effect of Graded Level of Palm Kernel Cake (PKC) on Haematology of Growing Rabbits

Parameter	T_1	T_2	T_3	T_4	T_5	SEM
ESR (mm/hr)	2.40	4.25	2.67	1.25	1.00	0.81
PCV (%)	27.20	24.00	28.33	31.50	30.00	0.66
RBC (x 10^6/mm)	6.47	5.76	7.44	9.87	8.44	0.62
Hb (g/dl)	9.06	7.98	9.47	10.50	10.00	0.65
WBC (x 10^3/mm)	2.72	2.46	2.85	3.73	3.52	0.67
Lymphocytes (%)	64.20	64.00	64.00	64.50	66.00	0.72
Neutrophils (%)	25.40	26.00	24.33	24.00	25.00	0.36
Monocytes (%)	6.20	6.00	7.00	6.50	5.00	0.46
Eosinophils (%)	3.00	2.50	3.67	3.50	3.00	0.53
Basophils (%)	1.20	1.50	1.00	1.50	1.00	0.62

ESR- Erythrocyte Sedimentation Rate, PCV- Packed Cell Volume, RBC- Red Blood Cell, Hb- Heamoglobin, WBC- White Blood Cell

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