

HAEMATOLOGICAL RESPONSE OF BROILER CHICKENS FED GRADED LEVELS OF SWEET POTATO (*Ipomoea batatas*) MEAL

A. I. Jibril, *N. B. Rano

¹Department of Animal Science, Bayero University Kano, Nigeria

*Corresponding author E-mail address: nbrano.asc@buk.edu.ng

[Mobile Phone Number: 08093524481](tel:08093524481)

Abstract

The experiment was conducted to evaluate the effect of feeding graded levels of sweet potato meal on performance and haematological indices of broiler chickens. A total of one hundred and eighty Anak strain day-old broiler chickens were fed varying levels of sweet potato meal at 0, 5, 10 and 15% dietary inclusion levels. The birds were randomly allotted to four dietary treatments which were replicated four times with fifteen birds per replicate in a completely randomized design. The compounded experimental diets (starter and finisher) were fed ad libitum. Fresh clean drinking water was given ad libitum throughout the days of the experiment. Routine medications and vaccinations were also observed. Results of haematological indices revealed no significant ($p>0.05$) differences in White Blood Cells (WBC), Haemoglobin (Hb), Mean Corpuscular Volume (MCV) Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC) and Lymphocyte (LYM) across the treatments. However, significant ($p<0.05$) difference was observed in the concentration of Red Blood Cells (RBC). It was concluded that dietary inclusion of sweet potato meal up to 15% in the diet of broiler chickens at both starter and finisher phases had no negative effects on performance and haematological indices of the birds.

Key words: Sweet Potato, Haematology, Broiler Chickens

Introduction

The scarcity and prohibitive cost of commercial energy sources like maize and sorghum for poultry rations, has been the main cause of the high cost of poultry products especially in developing countries. To arrest this situation, poultry farmers all over the world and particularly those of the developing countries are forced to think of those plants that can be easily grown and yield more *per* unit area as compared to maize for inclusion in poultry rations. This will subsequently lead to a reduction of the cost of production of poultry products (meat and egg) Nazmus (2013). Sweet potato (*Ipomea batatas*) is produced in considerable quantities in Nigeria and form important energy source for human and livestock feeding. The sweet potato meal is readily available at cheap cost in many parts of the country, because it has limited value to some human and for industrial uses. Sweet potato is one of the world's most important food crops; its main nutritional importance has been its starch content. However, sweet potato can also be a source of other nutritionally important dietary factors such as Vitamin A, Ascorbic acid, Thiamin, Riboflavin and Niacin (Dominguez, 1990). The few available reports agree that sweet potato can be incorporated into diets of chickens but should not be made the sole source of energy (Lee, 1979 and Tewe, 1991) as cited by Afolayan (2010). Sweet potato meal (SPM) can be used with an energy value of more than 2830 ME kcal *per* kg. According to composition values, potato meal(PM) contains more than 65% starch, 6.74% ash, 12.72% CP, 23.48% CF, and 0.99% EE on a DM basis. SPM have been reported to be cheaper than maize and wheat (PAN, 1995). Thus, they reduced feed cost and maintain production effici. This study therefore, was designed to evaluate the effect of feeding graded levels of sweet potato meal on performance and haematological indices of broiler chickens.

Materials and Methods

The experiment was conducted at the Poultry Unit of the Teaching and Research farm of the Abubakar Tafawa Balewa University Bauchi. Bauchi State is one of the states in the northern part of Nigeria that span two distinctive vegetation zones, namely; Sudan savannah, and the Sahel savannah. The state is located between latitude 9° 3' and 12° 3' North and longitudes 8° 50' of the equator with a total land area of 49,119 km² representing about 5.3% of Nigeria's total land mass. One hundred and eighty (180) day-old Anak strain broiler chicks were randomly allotted to four dietary treatments comprising forty-five (45) chicks *per* treatment which were replicated three times, with fifteen chicks *per* replicate in a completely randomized design. Four experimental diets were formulated and designated as A, B, C and D to contain sweet potato meal (SPM) at 0, 5, 10 and 15% levels of inclusion. Treatment one (A) did not contain the test ingredient, it served as control (Table 1). The

diets were formulated to meet the 23% and 20% crude protein requirements of broiler chickens for starter and finisher phases respectively. Fresh sweet potatoes were obtained from potato vendors in Ningi L.G.A of Bauchi State. The roots were washed, chopped using kitchen knife and sun dried for about three (3) days on concrete floor to reduce enzymatic and microbial reactions which may lead to spoilage. The dried sweet potato was milled and incorporated during feed mixing at different levels. Fresh clean drinking water with multivitamins (vitalyte) was given *ad libitum* throughout the days of the experiment. Routine medications and vaccinations were also observed. The experiment lasted for eight weeks.

Data Collection and Statistical Analysis

At the end of the feeding trial (8th week), two birds were selected on the bases of average pen weight from each replicate for collection of blood samples for haematological analysis and carcass measurements. The birds were fasted overnight and blood samples were collected early in the morning through the wing veins into sample tubes containing anti-coagulant. The direct measurement of erythrocytes values; {Haemoglobin (Hb), Packed Cell Volume (PCV), Red Blood Cells (RBC), White Blood Cells (WBC) Mean Corpuscular Haemoglobin (MCH). Absolute erythrocyte indices; {Mean Corpuscular Haemoglobin Concentration (MCHC), and Mean Corpuscular Volume (MCV) were determined using the methods described by Bush (1991). Data on haematological indices were subjected to analysis of variance using Steel and Torrie (1980) and DMRT was used to separate the means.

Table 1 Composition of Experimental Diets at Finisher Phase (20%Cp) (5-8 Weeks) of Age

Ingredients	% Replacement of Sweet Potato with Maize (SPM)			
	A (0)	B (5)	C (10)	D (15)
Maize		52.4	46.62	40.86
Soybean		24.4	25.18	25.94
SPM		0	5	10
Wheat offal		15	15	15
Fish meal		4	4	4
Limestone		1.5	1.5	1.5
Bone meal		2	2	2
Premix*		0.25	0.25	0.25
Salt		0.25	0.25	0.25
Lysine		0.1	0.1	0.1
Methionine		0.1	0.1	0.1
Total		100	100	100
Calculated Analysis				
ME (Kcal/kg)		2857.57	2856.58	2857.72
CP (%)		20	20	20.01
CF (%)		3.75	3.71	3.63
EE (%)		7.19	7.13	7.06
Ca (%)		1.56	1.56	1.56
TP (%)		0.66	0.67	0.67

*Premix contained Vitamin A=12,500 IU; Vitamin D3=3,000 IU; Vitamin E=150mg; Vitamin K=3mg; Vitamin B2=8mg; Vitamin B6=5mg; Vitamin B1=2mg; Vitamin B12=30mmg; Nicotinamide 50mg; Pantothenate 10mg; Folic acid 2mg; Biotin 150mmg; Vitamin C 35mg; Choline 300mg; Copper 10mg; Manganese 80mg; Zinc 60mg; Iron 30mg; Iodine 2mg; Selenium 0.25mg; Molybdenum 0.2mg; Calcium (CaCO₃) limestone 70g/kg

Results and Discussion

The result of haematological characteristics is presented in Table 2. The values ranged from 1.85 to 2.53% RBC. Birds fed diets C and D presented significantly ($p < 0.05$) lower values compared to birds fed diet D (Fig.1). The values obtained for RBC of birds fed sweet potato meal based-diets were lower than the range of $3.07 - 7.05 \times 10^6/\text{mm}^3$ reported by Fudge (1999) and also lower than $5 - 8 \times 10^6/\text{mm}^3$ as reported by Anon (1980). Hackbath *et al.* (1983) reported that increased RBC values were associated with high quality dietary and disease free animals. RBC is responsible for the transportation of oxygen and carbon dioxide in the blood as well as manufacture of haemoglobin hence higher values

indicates a greater potential for this function and a better state of health (Olugbemi *et al.*, 2010). Moreover, the result of RBC in this experiment corresponds with the findings of Onu *et al.* (2011) in their experiment on performance and blood chemistry of starter broilers. However, PCV, WBC, HGB, MCV, MCH, MCHC and LYM were statistically similar ($p>0.05$) among the treatment groups. The comparable values for WBC of birds suggests that the birds were healthy. The PCV count of diet A recorded the highest value of 34.43% followed by diets B and D with the values of 32.17 and 30.83% respectively.

Table 2: Haematological Characteristics of Broiler Birds Fed Different Inclusion Levels of Diets Containing Sweet Potato Meal (SPM %)

Parameters	A (0)	B (5)	C (10)	D (15)	SEM
RBC (%)	2.37 ^{bc}	1.88 ^{ab}	1.85 ^a	2.53 ^c	0.15*
WBC ($10^{12}/\text{ml}$)	121.43	105.87	90.07	132.93	12.99 ^{NS}
PVC ($10^9/\text{ml}$)	34.43	32.17	26.93	30.83	13.08 ^{NS}
HB (g/dl)	16.03	14.00	12.70	15.20	1.58 ^{NS}
MCV (fl)	145.03	143.17	145.53	144.43	1.86 ^{NS}
MCH (pg)	67.53	70.73	68.63	70.83	2.10 ^{NS}
MCHC (g/dl)	46.57	49.40	47.10	49.07	1.62 ^{NS}
LYM (%)	67.20	64.33	45.63	4.63	25.18 ^{NS}

a,b,c mean within the same row bearing different superscripts differ significantly ($p<0.05$), NS = Not Significant, * = Significant ($p<0.05$), SEM = Standard Error of Mean, RBC = Red blood cell, WBC = White blood cell, PCV = Pack Cell Volume, HB = Haemoglobin, MCV = Mean Corpuscular Volume, MCH = Mean Corpuscular Haemoglobin, MCHC = Mean Corpuscular Haemoglobin Concentration, LYM = Lymphocyte.

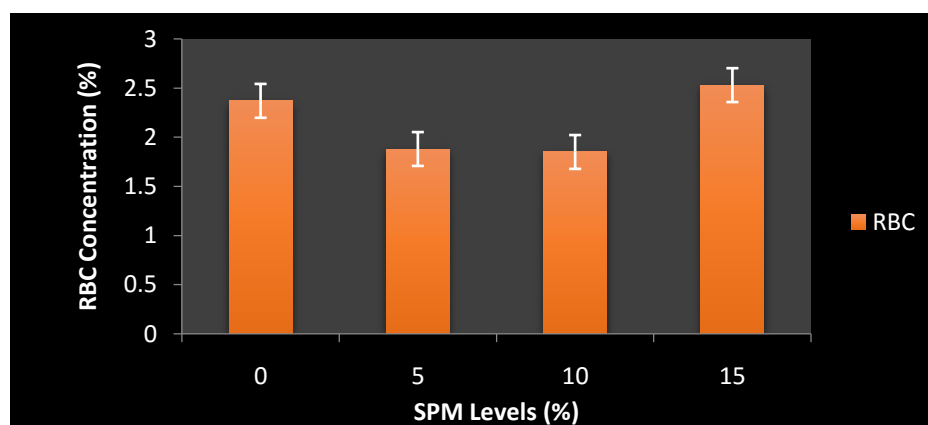


Figure 1: Effect of SPM level on concentration of RBC

Conclusion

The result of this study revealed that inclusion of sweet potato meal up to 15% dietary level of inclusion in broiler chickens diet at starter and finisher phases had no negative effects on performance and haematological indices of the birds.

References

- Afolayan, S.B. (2010). Evaluation of sweet potato meal as a source of energy in the diet of chickens. *Ph.D. Dissertation Department of Animal Science, Ahmadu Bello University, Zaria, Nigeria*
- Anon, (1980). “*Guide And Care Of Experimental Animal*”.*Canadian Council of Animal Care. Ottawa Canada* pp: 185-190.
- Dominguez, P. L. (1990). Feeding Sweet Potato to Monogastrics; In Root, Tubers, Plantains and Bananas in Animal Feeding. *Proceeding of FAO Expert Consultation* held in CIAT, Cali, Colombia 21th – 25th January, 1990. Edited: David Machin and SolverigNyvold.
- Fudge, C. S. (1999). Laboratory Medicine: Avian and Exotic Pets. WbSuaders, Philadelphia, USA
- Lee, P.K and Yang, Y.F. (1979). Comparative study of high protein sweet potato clips and common sweet potato clips as substitute for corn grain in diet on growth, feed efficiency and carcass quality on the growing fattening pigs. *Journal of the Taiwan livestock Research* 12 (1) 31-48
- Nazmus, S.M., (2013). “Effect of Potato (*Solanum tubarosum*) Meal on Broiler Production” *M.Sc Thesis. Department of Poultry Science, Bangladesh Agricultural University Mymensingh, 2202*
- Onu, P.N and Aneibo, A.O (2011). “Influence of Moringa oleifera leaf meal on the performance and blood chemistry of starter broilers” *International Journal of Food, Agriculture and Veterinary Science*. VOL. 1(1) pp. 38-44.
- Tewe, O. O. (1991). Sweet potato utilisation in poultry diets, Tropic Root Crops. A developing economy Editors: Ofori F. and Hahn S. K: *Proceedings of the Ninth Symposium of the International Society for Tropical Roots Crops*. Accra Ghana pp 426-435.