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Haemogram of Broilers Fed *Cassia obtusifolia* Seed Meal as a Substitute to Protein

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ABSTRACT

Haemogram of eight weeks broiler birds was studied after being fed *Cassia obtusifolia* seed meal with different treatments (T1 to T4), T1 served as control. One hundred and twenty (120) day old broiler chicks purchased from a reputable source were divided in a Randomized Complete Block Design (RCBD) into four dietary treatments groups. Each treatment was replicated three times. Four experimental feeds were compounded with processed *Cassia obtusifolia* seed meal at concentrations of 0%, 2.5%, 5.0% and 7.5% representing T1, T2, T3 and T4, respectively. Generally, the results showed the Total Erythrocyte Count (TEC) was above the normal value but values decreased with an increase in the seed meal level of feed. Haemoglobin (Hb) concentration remained within the limit of normal range in all treatments. Packed Cell Volume (PCV) followed the pattern of haemoglobin where all treatments groups did not show any level of significance ($P > 0.05$) when compared to the control. Mean Corpuscular Volume (MCV), T2 to T4 showed strong levels of significance ($P < 0.0001$) but the values of T3 and T4 were below the normal lower range. Mean Corpuscular Haemoglobin (MCH), all except T4, their values are lower than the lowest normal range, but showed significant differences ($P < 0.05$) between each group. Mean Corpuscular Haemoglobin Concentration (MCHC), have surpassed all normal range of concentration in the different treatment groups, however, all treatments showed statistical significance ($P > 0.0001$). Total White Blood Cell Count (TWBC) was found to be lower than the normal range where T3 and T4 did not show any level of significance ($P > 0.05$). The study showed lots of fluctuations and was concluded that *C. obtusifolia* seed meal could have been responsible. The seed meal could be used at 2.5% in mature birds.

Keywords: Haemogram, *Cassia obtusifolia*, Seed Meal, Broiler Birds, Protein Replacement.

Introduction

The plant *Cassia obtusifolia* an aromatic plant (Cassia) and obtuse (because of the shape) (Sahelian, 1983) is leguminous and has been commonly known as 'sickle pod', Foetid Sassia, Sickle senna, Arsenic weed, Java bean, Jué míng zi ,

Ebisu-gusa, Fedegoso and Chirauta choked, in different languages. The plant mostly grows in the wild and can cover an extensive useful farm land area as weed, making farm lands either a waste or more costly to cultivate.

In Nigeria, *Cassia abtusifolia* is mostly found in the northern part of the country on fallow farm lands, the plants become nuisance in agriculturally productive areas and this has led to extra cost of land clearing. In Adamawa State, the plant abounds and is commonly called *'tasbd'* it however serve as both a nuisance and cash plant. In northern part of the state, the leaves are harvested, dried, sold and used for making soup, a delicacy. The indigenous people use the seeds to salvage eye problems. The seeds have been used in different forms by man, at times used as coffee (Ousman *et al.,* 2005; Damron and Jacob, 2009). Attempts have also been made to include the seed powder in birds' feed and different results were recorded, (Omer et al., 2000) reported significant decrease in the blood values of haemoglobin concentration (Hb), packed cell volume (PCV) and red blood corpuscle (RBC) in Lohmann broiler chickens when 2 and 5% of *C. senna* was fed. An aqueous extract of *C. obtusifolia* was administered to chickens at 2, 5 and 10% of their body weights; in a group of 2%, body weight only decreased slightly lower than the group given 10% (Sahelian, 1983). Also when 3% of the seed powder was added to the feed, there was depressed feed intake in broilers which occurred within 24 hours but this was attributed to the taste of the new feed (Damron and Jacob, 2009).

Ingweye *et al.,* (2010) reported the need to increase animal protein consumption in Nigeria and other developing countries through provision of cheap meat, milk and eggs. To achieve this, it is therefore obvious that cheap sources of feed are the answer as feed constitutes 55-80% cost of production in livestock industry. The competition between human beings and livestock for animal protein may necessitate the need for alternate cheaper protein source. It is therefore imperative that for animal protein consumption to be increased for the teeming population and to also lessen the competition, a cheaper and readily available good source of protein is therefore necessary. *Cassia obtusifolia* may be a better substitute. The seed is known to have the following composition; carbohydrate, 66-69%; protein, 14-19%; fats, 5-7% and anti-nutritional anthraquinones, 1-2%, (Li *et al.,* 2004; Harry-O'Kuru and Moh, 2009; Damron and Jacob, 2009; Smith, 2009).

In Nigeria, there is paucity of information on *Cassia obtusifolia* seed meal on its utilization as protein source in formulation of poultry feed. Therefore, the study was done to find out the effect of *Cassia obtusifolia* seed meal as a

protein substitute on the haematology of broilers and its probable consequences.

Materials and Methods

The Study Area

The study was carried out at Adamawa State University Teaching and Research Farm, Poultry Unit. Mubi is located between Latitude 9°30′ and 11° North of the Equator and Longitude 13° and 13°45′ East of the Greenwich Meridian (Adebayo, 2004).

Identification of Cassia obtusifolia

The plant and seeds were identified by a Botanist in the Department of Biological Sciences, Adamawa State University, Mubi, Nigeria.

Collection and Processing of Cassia obtusifolia Seeds

Seeds collected from the field were toasted in oven at a temperature of 120°C for 30 minutes; the entire quantity was treated in same manner.

Experimental Diets and Treatments

Four experimental diets (T1-T4) were formulated as both starter (23% of crude protein) and finisher (19% crude protein). Processed seeds meal of *Cassia obtusifolia* were included at 0%, 2.5%, 5% and 7.5% representing treatments (T1, T2, T3 and T4), respectively. Treatment T1 served as control.

Proximate Composition of Cassia obtusifolia and analyses of treatments

Proximate composition of the processed *C. obtusifolia* seed and experimentally compounded diets were determined by AOAC, (2000) and are presented in Tables I and II, respectively.

Table I: Composition of Experimental Starter Feed

Ingredient (%)	T1 (0%) CSM	T2 (2.5%) CSM	T3 (5%) CSM	T4 (7.5%) CSM
Maize	40.0	40.0	40.0	40.0
Soybean	22.0	21.0	20.0	20.0
G/cake	20.35	19.0	18.0	15.0
C. S. M.	0.00	2.50	5.00	7.50
Maize offal	13.00	12.85	12.35	9.85
Salt	0.50	0.50	0.50	0.50
Bone meal	3.50	3.50	3.50	3.50
Methionine	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20
Premix	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**
Calculated Analysis				
ME (Kcal/kg)	2782.01	2725.84	2670.21	2615.85
CP (%)	23.35	22.85	22.89	23.16
CF (%)	4.48	4.59	4.69	4.70
Fat (%)	7.03	6.84	6.65	6.63
Calcium (%)	1.44	1.44	1.44	1.43
Phosphorus (%)	0.90	0.89	0.88	0.87

Note: CSM = *Cassia obtusifolia* Seed Meal

Table II: Composition of Finisher Feed

S/N	Ingredient (%)	T1 (0%) CSM	T2 (2.5%) CSM	T3 (5%0 CSM	T4 (7.5%) CSM
	Maize	39.00	38.00	37.00	38.00
	Soybean	17.00	14.00	15.00	12.00
	G/cake	15.00	13.00	13.00	12.00
	C. S. M.	0.00	2.50	5.00	7.50
	Maize offal	15.00	15.00	14.00	13.55
	Rice Offal	13.05	13.55	12.05	10.00
	Salt	0.40	0.40	0.40	0.40
	Bone meal	3.00	3.00	3.00	3.00
	Methionine	0.15	0.15	0.15	0.15
	Lysine	0.15	0.15	0.15	0.15
	Premix	0.25	0.25	0.25	0.25
	Total	**100**	**100**	**100**	**100**
Calculated Analysis					
	ME (Kcal/kg)	2905.33	2792.68	2696.83	2656.21
	CP (%)	19.31	19.07	18.95	19.06
	CF (%)	5.81	5.84	5.84	5.97
	Fat (%)	7.49	6.92	6.91	6.90
	Calcium (%)	1.23	1.22	1.22	1.22
	Phosphorus (%)	0.82	0.92	0.92	0.92

Note: CSM = *Cassia obtusifolia* Seed Meal

Experimental Design

Animals

One hundred and twenty (120) day old broiler chicks (Anak 2000 strain) purchased from a reputable source were randomly divided (Randomized Complete Block Design, RCBD) into four dietary treatments with three replicates of ten birds each.

Experimental Animal Ethics

This research was carried out after the approval of Adamawa State University animal ethics committee.

Management

The birds were intensively managed on deep litter system and vaccinated against New Castle disease; Infectious bursal disease (Gumboro) and Fowl pox at appropriate times. At all times, experimental feed and clean water were provided *ad libitum*. Necessary precautionary measures (bio security) were also observed.

Blood Sampling and Analyses

Blood samples were collected through the wing web (venepuncture), 3mls each at eight weeks old when the experiment was terminated. Blood samples were analyzed for PCV, Hb, MCV, MCHC, RBC and WBC.

Statistical Analysis

The data generated was subjected to the analysis of variance (ANOVA) and Duncan Multiple Range Test (DMRT) was used to separate means where significant difference exist using the (SAS , 2011) package.

Results

Table III shows the blood picture of broiler birds fed at different concentrations of processed *Cassia obtusifolia* in feed for 8 weeks. The Total Erythrocyte Count (TEC) was found to be within normal range of $2\text{-}4x10^6 \mu L^{-1}$ in all treatments (T2 to T4) except for the control $4.1x10^6 \mu L^{-1}$. When the means were separated, all showed level of significance in the treatments (T1 -T4). The Hb, all groups had normal range (7-13g/dL). T1, T2 and T3 showed very strong level of significance ($P < 0.0001$) however, there was no significance between T3 and T4. Packed Cell Volume (PCV) been a faster parameter to determine the level of anaemic status of an animal, in this study, the levels are higher than the normal value (22-35%), whereas, the mean of the four treatments is 38%. The normal range for Mean Corpuscular Volume (MCV) is 90-140 μ^3.

The mean corpuscular haemoglobin (MCH) values were less than the normal (33-47 Pg), except for T4 which had 34.29Pg, values of other treatments are less than the normal range, including T1. Treatments 3 and 4 are lower than the control (96.96μ^3) but T2, though lower than the control (93.66 μ^3), it's still within the normal range. The means were separated and there was higher level of significance ($P < 0.0001$) between each. The mean corpuscular haemoglobin (MCH) was also lower than normal range except for T4 which fell within the range but significantly differ ($P < 0.05$) from the groups. Mean Corpuscular Haemoglobin Concentration (MCHC) was found throughout the treatments to be within normal range (26-30%) and values were found to be highly significantly different ($P < 0.0001$) between treatments. White blood cells result is presented as means. The normal range (20-30x$10^3\mu L^{-1}$) was not seen in all treatments but rather gave much lower values. T1, T2 and T3 and T4 had significant difference ($P < 0.0001$) whereas T3 and T4 showed no significance ($P > 0.05$) between the two treatments.

Table III: Mean Haemogram Values of Broiler Blood Fed *C. Obtusifolia* Seed Meal for Eight Weeks

	T1 (Control)	T2	T3	T4
RBC (x$10^6\mu L^{-1}$)	4.1[a]	4.00[b]	3.9[c]	3.5[d]
Hb (%)	13[a]	12.7[b]	12[c]	12[c]
PCV (%)	39[a]	38[b]	38[b]	37[c]
MCV (fl)	96.96[a]	93.66[b]	87.36[c]	87.13[d]
MCH (*Pg*)	31.7[b]	30.18[d]	30.77[c]	34.29[a]
MCHC (%)	34[a]	33.9[b]	33.1[c]	32[d]
WBC (x 10^3 μL^{-1})	10.06[a]	9.53[b]	8.96[c]	8.96[c]

Note: Means with the same letter are not significantly different

Discussion

The haemogram of eight weeks old broilers fed with *Cassia obtusifolia* seed meal as a substitute to protein is discussed. Tabeli *et al.,* (2005) and Mmereole, (2009), have earlier reported that the normal haemogram of broiler chicken can be influenced by age, sex and breed and type of management, environmental influence, handling of animals play magnificent roles (Furlan *et al.,* 1993; Coles, 1986; Memerele, 2009). This implies that the type of feed provided to the birds can also influence their haemogram. Haematological parameters, particularly haematocrit, are frequently used in assessing condition in birds (Sood, 2013). Mean Corpuscular Volume (MCV) overcomes some of the drawbacks associated

with measuring haematocrits and therefore should be a better condition index (Bearhop *et al.,* 2001).

Erythrocyte indices (MCV, MCH and MCHC) values obtained are used in the determination of morphological type of anaemia in an animal. The values for MCV were found to decrease from T1 to T4. Higher value in T2 indicates the small quantity of the seed meal added. As the quantity increases, the value of MCV also decreased. However, the values of MCH are contra to that of MCV, except for T4; values of other treatments which are less than the normal, including T1. This is in consonance with the report of (Banerjee, 2006) and (Mmereole, 2009) where they showed that the erythrocyte indices decreases as birds get older. But in this case, it seems the quantity of seed meal provided (7.5%) might have played a greater role in increasing the volume (MCV) of the red blood cells.

The mean corpuscular haemoglobin concentration (MCHC) values were all found to be higher than the normal range (26-30%). MCHC is a ratio of Hb and PCV, wherewith, these two parameters denote type of anaemia. Unless either is decreased, value of MCHC usually remains fairly within normal range compared to MCV and MCH. In a similar work by (Duwa *et al.,* 2013), they observed that MCHC did not fluctuate in values when broilers birds were fed processed seed of sorrel (*Hibiscus sabdariffa*).

Generally, in most anaemic conditions, alterations in average size of red blood cells (MCV) are paralleled by similar changes in MCH and often the MCHC. The decrease in the values of MCV and MCH in T2, T3, and T1; T2 and T3, respectively, has shown that there was microcytic hypochromic anaemia (Coles, 1986), but (Ocheja *et al.,* 2012) pointed out that not all feed substitutes change blood indices of birds.

PCV and Hb values have fluctuated along with the control (T1) which had the highest, but these values remained within the normal range. However, the values continue to decrease numerically with the increase in the quantity of seed meal. The erythrocyte indices which pointed to microcytic hypochromic anaemia were supposedly due to the *C. obtusifolia* seed meal in feed fed but these parameters did not suggest anaemia.

Red Blood Cells count (TEC) is influenced by factors like handling of birds, feed provided and method employed for the count. Higher mean value of TEC found was attributable to the age and breed (Anak 2000) of the birds and importantly the *C. obtusifolia* seed meal fed to the birds. (Mmereole, 2009) had earlier

reported that the values of haemogram increase with age and stabilizes at maturity. He further demonstrated that clean broiler at seven and eight weeks of age should have 4.50 and 5.4 x $10^{6}\mu l^{-1}$, respectively.

Generally speaking, TWBC was found to increase in cases of infection, which also was dependent on the type and severity, duration and prognosis of condition (Coles, 1986). Leucocytes can be found to have decreased which majorly due to stress. (Karthiajini and Philomina, 2008); (Pardurang *et al.,* 2011); (Aade *et al.,* 2012), all reported that stress was the major cause of lowered WBC in broiler birds.

We therefore conclude that feeding of *Cassia obtusifolia* seed meal does not change the picture of haemogram of broilers at 2.5% level of inclusion except that it is better given to mature birds.

REFERENCES

Aade, U.P., Wankhede, H.J. and Kaldate, K.D. (2012). Haematological Parameters Change in *Gallus gallus domesticus* Infected with Cestode Parasite. *International Multidisciplinary Research Journal 2 (4):13-15.*

Adebayo, A.A. (2004). *Mubi Region: A Geographical Synthesis*. First Edition. Paraclete Publishers, Yola, Nigeria. Pp. 17.

Association of Official Analytical Chemist. Official Methods of Analysis (AOAC) (2000). 19th Edition, Washington DC.

Banerjee, G.C. (2006). *A Textbook of Animal Husbandry,* 8th, Edition. Oxford and IBH Publishing Co. J. Pvt, Ltd. New Delhi.

Bearhop, Griffiths, Orr and Furnes (2001). Mean Corpuscular Volume (MCV) as a Measure of Condition in Birds. *Ecology Letters 2: 352-356.* http://onlinelibrary.wiley.com/doi/10.1046/j1461-0248.1999.00088.x

Coles, E.H. (1986). *Veterinary Clinical Pathology.* WB Saunders Company, Philadelphia, London, Toronto. Second Edition

Damron, B.L. and Jacob, V.P. (2009). *Toxicity to Poultry of Common Weed Seeds*: Institute of Food and Agricultural Sciences, University of Florida, Gainsville 32611. First Edition. Pp 3-4.

Duwa, H., Raji, AY. and Muhammad, H.A. (2013). Influence of Sorrel Seed (*Hibiscus sabdariffa*) Meal on Haematological and Biochemical Indices of

Broiler Chickens in Semi-Arid Region of Nigeria. *IOSR Journal of Agriculture and Veterinary Sciences* 2 (6): 45-50.

Furlan, R.L., Tucci, F.M., Nakaghi, L.O., Secato, E.R., Guerreiro, J.R. and M. Macari (1993). Effect of Age and Strain on Haematological and Gasometric Parameters in Selected and Non-Selected Broiler Chickens. *Brazil Journal of Veterinary Resources and Animal Sciences 30 (2): 141-144.*

Harry-O'Kuru, R. E. and Mohamed, A. (2009). Processing Scale-Up of Sickle Pod (*Senna obtusifolia* L.) Seed. *Journal of Agricultural and Food Chemistry 57 (7): 2726-31.*

Ingweye, J.N., G.A. Kalio, J.A. Ubua and E.P. Umoren (2010). Nutritional Evaluation of Wild Sickle Pod (*Senna obtusifolia*) Seeds from Obanliku, South-Eastern Nigeria. *American Journal of Food Technology, 5: 1-12.*

Karthiayini, K. and Philomina, P.T. (2008). Effect of Overcrowding Stress in Haematological Parameters of Broiler Chicken. *Indian Journal of Poultry Science 43 (3): 313-316.*

Li, C.H., X.Y. Wei, X. E. Li, P. Wu, B.J. Guo (2004). A New Anthranquinone Glycoside from the Seeds of *Cassia obtusifolia. Chinese Chemical Letters 15 (12): 1448-1450.*

Mmereole, F.U.C. (2009). Effects of Age and Breeds on Haematological Parameters of Broilers. *Natural and Applied Sciences Journal 10 (1): 90-95*

Ocheja, J.O., Lalabe, B.C., Okpanachi, U., Atabor, J.O. and Anaja, A. (2012). Performance and Haematological Parameters of Pullets Fed Varying Levels of Bambara Nut Waste. *The International Journal of Agriculture and Rural Development 15 (2): 1099-1103.*

Omer, S.A.; Al-olayan, E.M.; El-Amin, M.H.; Hassan, Z.K.; Daghestani, M.H. and Mohammed, O.B. (2012). Experimental *Cassia senna* Intoxication in Lohmann Broiler Chicks. *Journal of Medicinal Plants Research 6 (17): 3306-3310.*

Ousman, A., M. Ngassoum and C. Kamga (2005). Chemical Composition of *Cassia obtusifolia* L. leaves. *Journal of Food Technology 3 (3): 453-455.*

Pandurang, L.T., Kulkarni, G.B., Gangane, G.R., More, P.R., Ravikanth, K., Maini, S., Deshmukh, V.V. and Yeotikar, P.V. (2011). Overcrowding Stress Management in Broiler Chicken with Herbal Ant Stressor. *Iranian Journal of Applied Animal Science 1 (1): 49-55.*

Sahelian, R. (1983). Toxicological and Haematological Effects of Sickle Pod (*Cassia obtusifolia*) Seeds in Spraque-Dawley Rats: A Sub Chronic Feeding Study. *Toxicon 29 (11): 1329-1336.* http://raysahelian.com/cassiaseed/html Retrieved on 09/12/2010.

Smith, Y.R.A. (2009). Determination of Chemical Composition of *Senna-siamea* (Cassia Leaves). *Pakistan Journal of Nutrition 8 (2): 119-121.*

Sood, R. (2003). *Medical Laboratory Technology: Methods and Interpretations.* Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, Fifth Edition.

Statistical Analysis Systems Institute, (2011). Version 9.1, SAS Institute, Inc. Cary, NC 27513, USA.

Talebi, A., Asri-Rezael, S., Rozeh-Chai, R. and R. Sahrael (2005). Comparative Studies on Haematological Values of Broiler Strains (Ross, Cobb, Arbor-Acres and Arian). *International Journal of Poultry Science 4 (8): 573-579.*

References to this paper should be made as follows: Neils, J.S. *et al.* (2014), Haemogram of Broilers Fed *Cassia obtusifolia* Seed Meal as a Substitute to Protein. *J. of Agriculture and Veterinary Sciences,* Vol. 6, No. 2, Pp. 21 – 31.