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Effects of Feeding Raw Jatropha Tanjorensis Leaf Meal to Broiler Starter Chickens

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Target audience: *Policy makers, feed millers, farmers and Agripreneurs*

Abstract

This study was conducted to evaluate the effects of inclusion of raw Jatropha tanjorensis leaf meal in diets of broiler starter chickens. One hundred and fifty day old unsexed arbor acre chicks were randomly assigned to 5 dietary treatments and each treatment had a total of 30 chicks replicated 3 times with 10 birds per replicate in a completely randomized Design (CRD). Fresh leaves of Jatropha tanjorensis were plucked, washed thoroughly to eliminate dirts and thereafter chopped into tiny fine pieces and dried under shade till it becomes cripsy to touch while still maintaining its green colour. The five (5) dietary treatments designated as T1 to T5 contained 0%, 2.5%, 5.0%, 7.5%. and 10% raw Jatropha tanjorensis leaf meal (JTLM) (Table 1). The birds were weighed at the commencement of the experiment using sensitive scale and later weekly. Weighed quantities of feed was offered to the birds and left over was weighed to determine their daily feed intake. Feed and water were provided ad libitum throughout the experiment which lasted for 28 days. At the end of the experiment, carcass quality was carried out according to procedures described by Assam et al., (2024). This involved selection of one bird from each replicate whose live weight was close to the mean weight. Those birds selected were fasted overnight with only water provided. The birds were weighed, slaughtered by severing the jugular vein and scalded in 600C hot water for 45 seconds, defeathered and weighed again. All cut parts were weighed and expressed as percentage of dressed weight. Also, visceral organs was weighed immediately using sensitive scale and expressed as percentage of dressed weight. Also, 3mls of blood from each of the birds used for carcass analysis was collected into a sterile bottle containing Ethylene diamine tetra-acetatic acid (EDTA) as anticoagulant and subsequently analysed for hematological parameters. Another 3mls of blood was collected into another sterile bottle without EDTA for serum analysis, which was carried out according to standard procedures. All data were analyzed using one-way Analysis of variance and significant means were separated using new Duncan multiple range test using SPSS Version 25.0. The results on the growth performance of broiler starter chickens fed diets containing Jatropha tanjorensis leaf meal (JTLM) showed significant variation in final weight and daily weight gains respectively, while other growth parameters remained statistical the same. The significant increase in final and daily weight gain in birds fed diets with JTLM, especially at 2.5%, demonstrated the potential of Jatropha

leaves as a growth promoter. The values for final weights obtained across treatment means were 896.33, 1007.33, 966.33, 988.33 and 931.67g/bird respectively. Higher daily weight gain (48.29g/bird) was observed in birds fed diet containing 2.50% JTLM (T2), while birds fed T1, T3, T4, and T5 recorded values of 42.77, 46.22, 47.36, and 44.50g/bird respectively. The results of the haematological indices of broiler starter chickens fed graded levels of Jatropha tanjorensis leaf meal showed significant difference (P<0.05) on packed cell volume, hemoglobin, total white blood cells and the differentials. The inclusion of Jatropha tanjorensis leaf meal in the broiler starter diets caused a significant elevation in packed cell volume (PCV) in the birds, especially at 10.00% JTLM. Despite the non-significant increase in red blood cells (RBC), haemoglobin was higher in Jatropha treated group. The total white blood cells (WBC) in the starter chickens were significantly increased at 10.00% JTLM supplementation, implying better immunity for the birds. Jatropha leaf meal did not have significant effect on lymphocytes in this study, there was however, a significant reduction in neutrophils in birds fed 5.00% JTLM and 7.50% JTLM respectively in their diets. There was significantly higher eosinophils and monocytes at 10.00% JTLM inclusion and basophils at 7.50% JTLM, conferring higher immunity on the birds, and also implying that the birds were not allergic to the test ingredient in their diets. Platelet, mean corpuscular cell haemoglobin (MCH), mean cell volume (MCV), mean cell hemoglobin concentration (MCHC) were all statistically non-significant, thus implies that the birds were not anemic in the starter phase. Jatropha tanjorensis leaf meal did not have significant effect (P>0.05) on blood urea level in broiler starter chickens in this study. However, there was significant elevation in creatinine level in the starter chickens at 2.50% JTLM inclusion level in their diets, while other treatment levels remain constant with the control group. Although, urea was not significant, the higher serum creatinine in the birds fed T2 (2.50% JTLM) diet, suggested the possibility of a slight damage to the kidney of the young birds. Broiler starter chickens fed T5 (10.00% JTLM) diet recorded the highest significant total protein in the study, while chickens fed 2.50, 5.00, and 7.50% JTLM respectively showed no significant variations in total protein, though values observed were significantly lower than those of starter chickens in the control group. Hence, the broiler chickens in the starter phase did not suffer liver damage, though values observed in birds fed T2 (2.50% JTLM) and T3 (5.00% JTLM) diets were numerically higher than those of T1 (0.00% JTLM) and T5 (10.00% JTLM) respectively. Although, there was no significant difference in high density lipoprotein (HDL) that is the good cholesterol, J. tanjoresis leaf meal had significant effect on low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL). In conclusion, raw Jatropha leaf meal can be included up to 10% in the diet of broiler starter chickens, to improve weight gain, and blood parameters without any deleterious effects.

KEYWORDS: Broilers, Jatropha, performance, hematology, serum biochemistry

Description of Problem

According to Assam et al., (2024), inadequate consumption of animal protein by an average Nigerian is on the increase due to the increase in population, which has resulted in the demand for protein of animal origin to surpass it supply. An average Nigerian takes about 5.5g of animal protein per day, which is very low compared to the recommended 77g per day. Increased poultry productions has

been advocated as one of the fastest means of providing quality animal protein at minimum cost to meet the growing human population (2). Poultry feed is a very important component in determining the extent of the survival of the poultry industry, its sustainability and its profitability. However, in recent times, poultry feed is very costly. Assam et al., (2024) reported that poultry feed situations in Nigeria is a national issue and has become one of great concern, as the average price of a good 25kg bag of poultry feed cost about twenty thousand naira and above. Thus, it is of paramount importance to research on various ways to reduce the cost of poultry feed and to suggest alternative sources of low-cost feed to poultry farmers such as the use of leaf meals. Recently, the use of leaves of plants as feed ingredients and as alternatives to conventional feed resources is gaining interest in animal feed. Examples of leaf meals which have been widely used in feeding non-ruminant animals include Leucaena leucocephala, Sesban sesbania, Manihot esculenta (3). However, despite the great potentials of Jatropha tanjorensis as a medicinal leaf, with promising nutrients, vitamins and minerals content and the leaf extract having hypoglycaemic properties, it has no wide application in feed systems, hence the need for this study, to determine the nutritional potential of raw Jatropha tanjorensis leaf meal in broiler starter chickens diet. Jatropha tanjorensis is a perennial herb that belongs to the family Euphorbiaceae, native to Central America and has become naturalized in some tropical and subtropical countries like India, Nigeria and Canada (4). Its common names include Catholic vegetables, Jatropha, hospital too far, lapalapa, Iyana, ipaja (5). It is a common weed of field crops, bush re-growth, road side and disturbed places in higher rainfall forest zone of West Africa and is primarily used for fencing while its secondary uses are as sources of edible leafy vegetable and as a medicine (6). Jatropha tanjorensis possesses significant anticancer, hepatoprotective and pesticidal activity (4). The leaf extract is consumed as a blood tonic with the claim that it increases blood volume (7).

Materials and Methods

The research was conducted at the poultry unit of Teaching and Research farm, Departments of Animal Science and Biochemistry Laboratories, University of Uyo, Uyo, Akwa-Ibom State. Fresh leaves of Jatropha tanjorensis were plucked, washed thoroughly to eliminate dirts and thereafter chopped into tiny fine pieces and dried under shade till it becomes cripsy to touch while still maintaining its green colour. One hundred and fifty day old unsexed Arbor acre chicks were purchased from a reliable vendor in Uyo metropolis and raised under intensive deep litter system. The broilers were fed commercial starter diet for the first seven (7) days of the experiment to stabilize the birds before being fed the experimental diet formulated to meet the nutrient requirement of broiler starter chickens. The experimental birds were randomly allotted to five (0%, 2.5%, 5%, 7.5%, 10%) experimental diets (Table 1) in a Completely Randomized Design. Each treatment had a total of 30 chicks replicated 3 times with 10 birds per replicate. The initial weights of the birds will be taken at the commencement of the experiment using sensitive scale and later weekly. Weighed quantities of feed was offered to the birds and left over was weighed to determine their daily feed intake. Feed and water were provided ad libitum throughout

the experiment which lasted for 28 days. At the end of the experiment, carcass quality was carried out according to procedures outlined by (2). This involved selection of one bird from each replicate whose live weight was close to the mean weight. Those birds selected were fasted overnight with only water provided. The birds were weighed, slaughtered by severing the jugular vein and scalded in 600C hot water for 45 seconds, defeathered and weighed again. All cut parts were weighed and expressed as percentage of dressed weight. Also, visceral organs like heart, kidney, pancreas, gizzard and spleen were weighed immediately using sensitive scale and expressed as percentage of dressed weight. Also, 3mls of blood from each of the birds used for carcass analysis was collected into a sterile bottle containing Ethylene diamine tetra-acetatic acid (EDTA) as anticoagulant and subsequently analysed to determine hematological parameters such as red blood cells (RBC), white blood cells (WBC), packed cell volume (PVC), haemoglobin (Hb) and platelets. Another 3mls of blood was collected into another sterile bottle without EDTA for serum analysis, which was carried out according to standard procedures. All data were analyzed using one-way Analysis of variance and significant means were separated using new Duncan multiple range test using SPSS Version 25.0.

Results and Discussion

The results on the growth performance (Table 2) of broiler starter chickens fed diets containing Jatropha tanjorensis leaf meal (JTLM) showed significant variation in final weights and daily weight gains respectively, while other growth parameters remained statistical the same. This result varied from the findings of (8), who observed that the final body weight and total body weight gain were not significantly affected by dietary treatments. The significant increase in final and daily weight gain in birds fed diets with JTLM, especially at 2.5%, demonstrated the potential of Jatropha leaves as a growth promoter. The values for final weights obtained across treatment means were 896.33, 1007.33, 966.33, 988.33 and 931.67g/bird respectively. Higher daily weight gain (48.29g/bird) was observed in birds fed diet containing 2.50% JTLM (T2), while birds fed T1, T3, T4, and T5 recorded values of 42.77, 46.22, 47.36, and 44.50g/bird respectively. The total feed intakes recorded in the study were 721.12, 746.07, 756.95, 768.53, and 729.44g/bird for birds fed T1, T2, T3, T4, and T5 diets respectively. However, the inclusion of Jatropha leaves at higher levels could reduce the weight of broiler starter chickens. This might be due to the presence of phytochemicals which have anti-nutritional properties that can lead to reduction in bioavailability of nutrients especially, minerals as they could bind or form complex with them and make them non-bioavailable, if consumed in excess (9). The non-significant difference in total and daily feed intake of birds in this present study agreed with the report of (8), for broiler starter chickens. This indicated that inclusion of Jatropha leaves meal in the starter birds up to 10.00%, does not have effect on the feed intake and feed conversion ratio (FCR), at the starter phase, but could potentially reduce body weight due to the presence of anti-nutritional factors in the leaves. Ibironke and Owotomo (2019), opined that the protein in vegetables helps in the repair, improvement and maintenance of body tissue, hormones

Table 1: Experimental Broiler Starter Diets (%DM Basis)

FEED INGREDIENTS	INCLUSION LEVELS OF *J. TANJORENSIS* LEAF MEAL				
	T1(0%)	T2(2.5%)	T3(5.0%)	T4(7.5%)	T5(10%)
Maize (8.9%cp)	49.97	47:23	44.49	41.77	39.04
Soyabean meal (48%cp)	33.03	33.27	33.51	33.73	33.96
Jatropha (5.37%cp)	0.00	2.50	5.00	7.50	10.00
Palm Kernel meal(18%cp)	10.00	10.00	10.00	10.00	10.00
Fishmeal (63%cp)	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Methodine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Vit/Tm premix*	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated Nutrients					
	T1(0%)	T2(2.5%)	T3(5%)	T4(7.5%)	T5(10%)
% Crude protein	23.99	23.99	24.00	24.00	24.00
% Ether Extract	4.08	4.11	4.13	4.15	4.17
% Crude Fibre	4.64	4.65	4.66	4.67	4.68
Metabolizable Energy	2870.75	2890.77	2910.79	2931.02	2951.14

*1kg of premix contains: vitamins A (5,000,000Iu), Vitamin D $_3$ (1,000,000 1U), Vitamin E (16,000mg), vitamin K $_3$ (800mg), vitamin B $_1$ (1,200mg), Vitamin B $_2$ (22,000mg), Niacin (22,000mg), Calcium panthothenate (4,600mg), Vitamin B6 (2000mg), Vitamin B $_{12}$ (10mg), Folic acid (400mg), Biotin (32mg), Choline chloride (200,000mg), Manganese (48,000mg), Iron (40,000mg), Zinc (32,000mg), Copper (3, 400mg), iodine (600mg), Cobalt (120mg), Selenium (40mg), antioxidant (48,000mg).

balancing, and regulate the activities of body cells and organs.

The results on the haematological indices of broiler starter chickens fed graded levels of Jatropha tanjorensis leaf meal (Table 3) showed significant difference ($P<0.05$) on packed cell volume, hemoglobin, total white blood cells and the differentials. The inclusion of Jatropha tanjorensis leaf meal in the broiler starter diets caused a significant elevation in packed cell volume (PCV) in the birds, especially at 10.00% JTLM. Despite the non-significant increase in red blood cells (RBC), haemoglobin was higher in Jatropha supplemented group. This report aligned with (11), who reported that the significant improvement observed on the blood profile following the administration of Jatropha tanjorensis leaf meal in their study, could be attributed to the nutritional and beneficial phytochemical potential of Jatropha leaf, as the leaf have been shown to be rich in iron, protein, other nutrients, and many macro and micro mineral elements as supported by (12) and (13). Amaduruonye et al. (2023) further added that the appreciable amount of iron,

Table 2: Growth Performance of Broiler Starter Chicken s Fed Diets Containing Graded Levels of Raw *Jatropha tanjorensis* Leaf Meal

PARAMETERS	T1 (0.00% JTLM)	T2 (2.50% JTLM)	T3 (5.00% JTLM)	T4 (7.50% JTLM)	T5 (10.00% JTLM)	SEM
Initial weight (g/bird)	40.95	41.43	41.84	41.16	41.65	0.15
Final weight (g/bird)	896.33^{b}	1007.33^{a}	966.33^{ab}	988.33^{ab}	931.67^{ab}	9.66
Daily weight gain (g/bird)	42.77^{b}	48.29^{a}	46.22^{ab}	47.36^{ab}	44.50^{ab}	0.48
Total feed intake (g/bird)	721.12	746.07	756.95	768.53	729.44	7.18
Daily feed intake (g/bird)	14.42	14.92	15.14	15.37	14.59	0.14
FCR	1.19	1.29	1.22	1.24	1.22	0.02
Protein efficiency ratio	0.25	0.27	0.25	0.26	0.26	0.003

[a, b] Means with different superscripts are significantly different ($P<0.05$), FCR- feed conversion ratio.

protein and other mineral elements present in J. tanjorensis leaf may have increased the amount of iron and other nutrient availability for erythropoiesis, thereby enhancing the production of red blood cells, haemoglobin and the PCV of the broiler birds. It may also have been possible that some of the chemical constituents of Jatropha tanjorensis leaf have an erythropoietin-like effect on the bone marrow, leading to the increase in the rate of erythropoiesis and a resultant increase in packed cell volume, red blood cells, and hemoglobin concentration (11). The total white blood cells (WBC) in the starter chickens were significantly increased at 10.00% JTLM supplementation, implying better immunity for the birds. Jatropha leaf meal did not have significant effect on lymphocytes in this study, there was however, a significant reduction in neutrophils in birds fed 5.00% JTLM and 7.50% JTLM respectively in their diets. Chigozie et al. (2018), however noted that Jatropha leaf have high potency against some diseases. The observed reduction may have been stimulated by the presence of phytochemicals in the test material. There was significantly higher eosinophils and monocytes at 10.00% JTLM inclusion and basophils at 7.50% JTLM, conferring higher immunity on the birds, and also implying that the birds were not allergic to the test ingredient in their diets. Platelets, mean corpuscular cell haemoglobin (MCH), mean cell volume (MCV), mean cell hemoglobin concentration (MCHC) were all statistically non-significant, thus implies that the birds were not anemic in the starter phase. This confirmed earlier assertion by (7) that J. tanjorensis leaf extract when consumed as a blood tonic increases blood volume.

Jatropha tanjorensis leaf meal did not have significant effect ($P>0.05$) on blood urea level in broiler starter chickens in this study

Table 3: Hematology of Broiler Starter Chickens fed Graded Dietary Levels of Raw *Jatropha tanjorensis* Leaf Meal

PARAMETERS	T1 (0.00% JTLM)	T2 (2.50% JTLM)	T3 (5.00% JTLM)	T4 (7.50% JTLM)	T5 (10.00% JTLM)	SEM
PCV	27.67^{b}	30.67^{ab}	31.00^{ab}	30.00^{ab}	31.33^{a}	0.55
Haemoglobin	11.33^{b}	12.80^{a}	12.67^{a}	12.13^{a}	12.63^{a}	0.24
RBC	2.43	2.61	2.68	2.58	2.71	0.04
TWBC	66.53^{ab}	60.07^{b}	59.27^{b}	59.47^{b}	74.33^{a}	2.14
Neutrophils	6.00^{a}	6.00	2.67^{b}	2.00^{b}	5.00^{a}	0.83
Lymphocytes	87.33	87.00	90.33	91.33	83.67	1.43
Eosinophils	1.67^{b}	2.33^{ab}	2.00^{ab}	1.67^{b}	3.00^{a}	0.27
Monocytes	3.67^{b}	3.33^{b}	3.67^{b}	4.33^{ab}	6.33^{a}	0.45
Basophils	1.33^{ab}	1.33^{ab}	1.00^{b}	2.00^{a}	1.40^{ab}	0.23
MCH	46.33	47.00	47.00	46.67	46.67	0.45
MCV	113.67	117.33	116.00	115.67	114.00	0.58
MCHC	41.00	41.67	40.67	40.67	41.00	0.25
Platelets	52.33	54.33	40.67	50.33	56.00	2.71

[a, b] Means on the same row with the same superscripts are significantly different ($P < 0.05$), PCV = packed cell volume, RBC - red blood cells, TWBC - total white blood cells, MCH - mean corpuscular haemoglobin, MCV - mean corpuscular volume, MCHC -mean corpuscular haemoglobin concentration.

(Table 4). However, there was significant elevation in creatinine level in the starter chickens at 2.50% JTLM inclusion level in their diets, while other treatment levels remained constant with the control group. Ojediran et al. (2019), opined that the higher the value of serum creatinine, the lower the protein quality of the test ingredient, implying the nutritional inferiority of the protein quality of the diets. Ojo et al. (2013), stated that a significant elevation of creatinine and urea is a pointer to renal dysfunction in chickens. Although, urea was not significant, the higher serum creatinine in the birds fed T2 (2.50% JTLM) diet, suggested the possibility of a slight damage

Table 4 : Serum Biochemistry of Broiler Starter Chickens fed Graded Levels of Raw *Jatropha tanjorensis* Leaf Meal

PARAMETERS	T1 (0.00% JTLM)	T2 (2.50% JTLM)	T3 (5.00% JTLM)	T4 (7.50% JTLM)	T5 (10.00% JTLM)	SEM
Urea	2.50	2.63	2.47	2.70	2.63	0.05
Creatinine	22.33^{b}	28.00^{a}	25.67^{b}	27.67^{b}	24.67^{b}	0.85
Total Protein	36.67^{b}	34.33^{bc}	33.67^{c}	33.33^{c}	39.00^{a}	0.85
Albumin	25.00^{b}	24.67^{b}	26.33^{ab}	27.33^{ab}	29.67^{a}	0.63
AST	54.00	66.67	61.33	48.00	57.67	3.42
ALT	14.67	17.33	15.67	13.33	13.67	0.69
TC	3.67^{b}	3.83^{b}	3.83^{b}	4.43^{a}	4.03^{ab}	0.09
HDL	0.93	0.90	1.00	1.10	1.00	0.03
VLDL	0.37^{b}	0.40^{b}	0.43^{ab}	0.53^{a}	0.47^{ab}	0.02
LDL	2.37^{b}	2.53^{ab}	2.40^{ab}	2.47^{ab}	2.57^{a}	0.02

$^{a, b, c}$ Means on the same row with the same superscripts are significantly different (P<0.05) AST – aspartate aminotransferase, ALT - alanine aminotransferase, TC – total cholesterol, HDL -high density lipoprotein, VLDL-very low density lipoprotein, LDL-low density lipoprotein

to the kidney of the young birds. As described by (16), creatinine is a breakdown product of creatine and is usually produced at a fairly constant rate by the body and filtered out of the blood by the kidneys. Nwanjo et al. (2005), noted that if the filtering capacity of the kidney is deficient, the blood creatinine level rises. Reports by (15) and (18), have also shown that residual anti-nutrients in Jatropha curcas can cause damage to the kidney thereby, distorting renal function. Broiler starter chickens fed T5 (10.00% JTLM) diet recorded the highest significant total protein in the study, while chickens fed 2.50, 5.00, and 7.50% JTLM respectively showed no significant variations in total protein, though values observed were significantly lower than those of starter chickens in the control group. Emeka et al. (2023), reported that the serum total protein in their study increased, implying that J. tanjorensis leaves increased the production of serum protein which in turn increased the formation of blood, by enhancing the mechanism of action of the protein-erythropoietin biochemical pathway in the starter chickens. The study observed a significant increase in albumin in the starter birds fed T5 (10.00% JTLM), and T1 (0.00% JTLM), these values were however, not different from birds fed T3 (5.00% JTLM), and T4 (7.50% JTLM) diets respectively, in the starter phase. The main functions of albumin as stated by (20), are the transport of several molecules and the maintenance of blood osmotic pressure thus, implying a healthier condition for the broiler chickens. Jatropha tanjorensis leaf meal did not have significant effect on liver enzymes in this study in the starter phase. Emeka et al. (2023), in their work stated that methanolic extract of J. tanjorensis species exerted hepato-protective role in diabetic complications by maintaining the normal serum levels of AST and ALT which increased in the diabetic control rats as a sign of hepatic injury due to leakage of these enzymes from liver cytosol to the blood

stream. Hence, the broiler chickens in the starter phase did not suffer liver damage, though values in observed birds fed T2 (2.50% JTLM) and T3 (5.00% JTLM) diets were numerically higher than those of T1 (0.00% JTLM) and T5 (10.00% JTLM) respectively. Ojediran et al. (2015), reported that an increased AST, ALT and ALP values might be attributed to liver damage. There was significant increase in total cholesterol in T4 (7.50% JTLM) and T5 (10.00% JTLM) in the broiler starter chickens fed dietary levels of Jatropha leaf meal. This result was not consistent with the findings of (19), who reported a significant reduction in total cholesterol in diabetic rats fed diet containing Jatropha tanjoresis leaf. Although, there was no significant difference in high density lipoprotein (HDL) in the starter phase, J. tanjoresis leaf meal had significant effect on low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL). These results contradicted the report of (21), who claimed that leaf extract of Jatropha tanjorensis caused a significant reduction in total lipids and cholesterol parameters in rats.

Contribution to Knowledge and Recommendation

The results on the growth performance of broiler starter chickens fed diets containing Jatropha tanjorensis leaf meal (JTLM) showed significant increase in final and daily weight gain in birds fed diets with JTLM, which demonstrated the potential of Jatropha leaves as a growth promoter.

The inclusion of Jatropha tanjorensis leaf meal in the broiler starter diets caused a significant elevation in packed cell volume (PCV) in the birds, especially at 10.00% JTLM. Despite the non-significant increase in red blood cells (RBC), haemoglobin was higher in Jatropha supplemented group. Platelets, mean corpuscular haemoglobin (MCH), mean cell volume (MCV), mean cell hemoglobin concentration (MCHC) were all statistically non-significant, thus implies that the birds were not anemic in the starter phase. Jatropha tanjorensis leaf meal did not have significant effect ($P>0.05$) on blood urea level in broiler starter chickens in this study. However, there was significant elevation in creatinine level in the starter chickens at 2.50% JTLM inclusion level in their diets, while other treatment levels remain constant with the control group. Although, urea was not significant, the higher serum creatinine in the birds fed T2 (2.50% JTLM) diet, suggested the possibility of a slight damage to the kidney of the young birds. Also, the broiler chickens in the starter phase did not suffer liver damage, though values observed in birds fed T2 (2.50% JTLM) and T3 (5.00% JTLM) diets were numerically higher than those of T1 (0.00% JTLM) and T5 (10.00% JTLM) respectively.

In conclusion, raw Jatropha leaf meal can be included up to 10% in the diet of broiler starter chickens, to improve weight gain, and blood parameters without any deleterious effects.

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