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GROWTH RESPONSE, CARCASS AND HAEMATOLOGICAL PARAMETERS OF BROILER BIRDS FED SELECTED MEDICINAL PLANTS LEAF MEAL.

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ABSTRACT

One hundred and twenty (120) apparently healthy day-old Ross 308 broiler chicks, were used in a study to evaluate the effects of substitution of antibiotics with selected medicinal plant leaf meal on their production indices. The study which was carried out from September to November 2022 consists of eight treatment groups designated as T_1 to T_8. Eight experimental diets were formulated such that T_1 served as the control, T_2 (5% *Moringa oleifera* leaf meal), T_3 (5% Neem leaf meal) T_4 (5% *Spondias mombin* leaf meal), T_5 (2.5% combination each of moringa and Neem leaf meal), T_6 (2.5% combination each of *Moringa* and *Spondias mombin* leaf meal) T_7 (2.5% combination each of Neem and *Spondias mombin* leaf meal), and T_8 (1.66% each of *Moringa*, Neem and *Spondias mombin* leaf meal) respectively. Parameters evaluated for the broiler chicken include weight gain, feed intake, feed conversion ratio, mortality, haematology and carcass characteristics of the broilers. The study lasted for 63 days. Data collected were subjected to a one-way analysis of variance using SPSS,22. Mean separation was done using the least significant difference. The weight gain, feed intake, feed conversion ratio as well percentage mortality for the broiler chicken all differed ($P<0.05$). The broiler chicken dressed weight, dressing percentage, breast cut, thigh, drumstick, shank and wing were significant ($P<0.05$) higher for T_4. The organs of the broiler chicken such as gizzard, crops, proventriculus, small intestine, large intestine and caecum were not significantly ($P>0.05$) affected by the feeding trial. The WBC, Hb and the platelet of the broiler chicken were significantly ($P<0.05$) affected by the study materials. The work therefore recommends that medicinal plant leaf meal can be used in place of antibiotics growth promoters as they positively affected the broiler growth performance.

Key words: Medicinal plant, broiler birds , growth rate, dressing percentage, Blood parameters

INTRODUCTION

Alternative ingredients are being researched to replace all or some conventional foods with alternative diets made from roots and tubers like cassava and new legumes such the jack bean and the sword bean (Iji, 1999). Due to nutrient inadequacies, such as those in amino acids, mineral imbalances in energy protein ratios, and anti-nutritive substances including non-starch polysaccharides (NSPs), polyphenols, and phytic acid, poultry productivity is frequently low (Dilger et al. 2008). These additives are chemicals that are added in minuscule amounts (Alaku, 2010). They also include certain amino acids (lysine and methionine), hormones, arsenic, tranquillizers, and antioxidants (Ugwu, 2006) .

Minerals and vitamins, in addition to additives and supplements, are now used in feeds (Sonaiya, 1993). However, the Food and Drug Administration (FDA) of the United States of America and the majority of European countries, and others, have discouraged the use of chemicals, particularly antibiotics, in livestock feeds (Customer Updates, 2013). This is due to the persistence of the effects in cattle products and the emergence of drug-resistant microorganism strains (Oyekunle and Owonikoko, 2002). Currently, the use of feed additives is prohibited in the majority of developed nations (Ugwu, 2006). As a result, additives with organic and eco-friendly qualities are sought for (Adedeji et al. 2008). Some of these compounds, primarily those with a botanical origin, have already been used. To cure ectoparasites in chicken, for instance, *Carica papaya* leaf can be burned to ashes and applied

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topically (Nwude and Ibrahim, 1980). According to Maigandi and Usman (1996), turkeys with coughing and diarrhoea can be treated with *Zingiber officinale* (ginger). According to Gefu et al. (2000), *Citrus aurantifolia* is utilised in chicken species to prevent worm infestation. Elaeis guinensis (oil) is a plant that is used to cure ectoparasites in all species of poultry, according to Adedeji et al. (2013).

Herbs (medical plants) are often derived from plants, and plants create certain metabolites known as phytochemicals as part of their biological processes. According to DalleZotte et al. (2016), phytochemicals can be categorized depending on their therapeutic qualities, such as antibacterial, antifungal, anti-inflammatory, antiulcer, antioxidant, antiviral, anticancer, and immunological stimulants. Given that there are around 500,000 medicinal plants in the globe and that many of their therapeutic characteristics have not been researched, medicinal plants represent a potential source of medicine with a bright future. About 21,000 plant species, according to FAO (2008), have the potential to be utilized as medicines and are regarded as safe since they have either no adverse effects or only minor side effects.

The purpose of this study, therefore, is to investigate the effect of substituting antibiotics with three selected medicinal plant leaf meals (*Moringa oleifera, Azadirachta indica, Spondias mombin* and their combinations) on the growth performance, carcass characteristics and blood parameters of the broiler birds.

MATERIALS AND METHOD

A field experiments were conducted at the Poultry Unit, Department of Animal/Fisheries Science and Management, Teaching and Research Farm of the Faculty of Agriculture and Natural Resources Management, Enugu State University of Science and Technology, (ESUT) Agbani. The location is 67^0 4 North latitude, $8^0$3 East longitude, and 450 metres above sea level (Anikwe *et al.* 2017). The yearly rainfall in the area ranges from 1700 to 2010mm. The climate pattern is bimodal, with a rainy season from April to October and a dry season from November to March. The textural class of the soil is sandy loam with an isohyperature regime (Anikwe *et al*, 2017), and it has been classed as Typical paleudults of the Order ultisol (Anikwe *et al.*2016).

Experimental Materials and Preparation

The *Moringa oleifera* (drum stick) and *Azadirachta indica leaves(n*eem) were collected from ESUT commercial farm premises while *Spondias mombin* leaf was collected from Umueze in Nkanu West Local Government Area, Enugu State. The leaves were dried on a well-cleaned cemented floor. They were evenly spread and regularly turned to encourage fast and even drying. To make each leaf meal, the leaves were milled separately using a hammer mill when they were crispy while still retaining the greenish colouration. Various leaf samples were analysed to determine their proximate composition, mineral profile, and phytochemical composition. The analysis was conducted at the Animal Science Laboratory, University of Nigeria, Nsukka.

Experimental house.

This investigation was conducted in one of the chicken houses of Enugu State University of Science and Technology's Teaching and Research Farm, Poultry Unit. The poultry house has dwarf walls and is completely netted to allow for proper ventilation. A deep litter system was used to handle the birds. On both sides of the poultry house, 24 apartments measuring 1.8m x 1.5m and 0.7-0.9m2 floor area per bird were created. The pens were divided with half-inch wire mesh and wood. One treatment duplicate was kept in each pen. The litter materials were cleaned out every two weeks to maintain the sanitary state of the pens.

Experimental Birds and Management.

One hundred and twenty (120) apparently healthy day-old Ross 308 broilers were purchased from Avian Chicks, Uwani, Enugu. The deep litter system was adopted. The house was washed and disinfected before the chicks arrived. The brooding of the chicks lasted three (3) weeks. Two 100-watt electrical lights were kept at roughly 15cm above the ground during brooding to provide heat for each pen, then gradually raised to 1.75m height towards the conclusion of the brooding. Kerosene burners and charcoal heaters were utilised as backup heat sources during brooding if the electricity went out. The temperature during brooding was maintained at 39^0C from the first day to the second day and this

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will be gradually reduced by 2^0C every week to a final temperature of 33.5°C till the end of brooding on the 21st day. Routine management practices, including hygiene, vaccination, and medication, were observed.

Experimental Design.

In a randomised block design, day-old chicks were randomly assigned to one of eight feed treatments based on their weight. T_1, (the control); T_2, (5% MOLM), T_3, (5% AILM), T_4, (5% SMLM), T_5, (2.5% each of MOLM + AILM), T_6, (2.5% each of MOLM + SMLM), T_7, (2.5% each of AILM +SMLM) and T_8, (1.66% of MOLIM + AILM + SMLM). Each treatment contained eighteen (15) birds. Each treatment was repeated three times, with each replicate including five birds. The birds were rigorously cared for, with *ad libitum* feed and water. The study lasted for 63 days.

MOLM *Moringa oleifera* leaf meals.
AILM *Azadirachta indica* leaf meals.
SMLM *Spondias mombin* leaf meals

Experimental procedure

Eight experimental diets were formulated for the broiler birds. The eight experimental diets are T_1, (control), T_2, (5% MOLM) T_3, (5% AILM) T_4, 5% SMLM) T_5, (2.5% each of MOLM +AILM) T_6, (2.5% each of MOLM +SMLM) T_7 (2.5% each of AILM + SMLM) and T_8 (1.66% each of MOLM+ AILM + SMLM. Eight experimental diets were formulated; one for each treatment group. The starter diet was fed from 0 – 4 weeks, while the finisher's diet was fed from 5 –9 weeks. The composition of the experimental diets is shown in Tables 1 and 2;

Table 1; Composition of the broiler Starter experimental diet (100kg)

	TREATMENTS							
Ingredients	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**	**T_6**	**T_7**	**T_8**
Maize	53.00	53.00	53.00	53.00	53.00	53.00	53.00	53.00
Groundnut cake	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Soya bean	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Fish meals	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Wheat offal	4.97	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Oxytetracycline*	0.03	-	-	-	-	-	-	-
MOLM	-	5.00	-	-	2.5	2.5	-	1.66
AILM	-	-	5.00	-	2.5	-	2.5	1.66
SMLM	-	-	-	5.00	-	2.5	2.5	1.66
Limestone	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Bone meals	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100kg	100kg	100kg	100kg	100kg	100kg	100kg	100kg
Cal. Analysis								
Crude Protein (%)	24.75	23.89	23.55	22.62	23.86	22.35	23.88	22.65
Metab energy (kcal/kg)	2800	2868	2743	2754	2813	2853	2766	2688
Crude fibre (%)	3.44	3.54	3.64	3.88	3.23	3.65	3.32	3.93
Calcium (%)	1.48	1.52	1.35	1.65	1.73	1.87	1.39	1.68
Av Phos (%)	0.68	0.88	0.69	0.87	0.68	0.73	0.58	0.93

*30g/100kg of feed non-therapeutic use

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Table 2: Composition of broiler Finisher experimental diet (100kg)

Ingredients	Treatments T_1	T_2	T_3	T_4	T_5	T_6	T_7	$_8$
Maize	54	54	54	54	54	54	54	54
Groundnut cake	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20
Soya bean	17.70	17.70	17.70	17.70	17.70	17.70	17.70	17.70
Fish meals	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Wheat offal	9.97	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Oxytetracycline*	0.03		-	-	-	-	-	
MOLM	-	5.00	-	-	2.50	2.50		1.66
AILM	-		5.00	-	2.50	-	2.50	1.66
SMLM	-		-	5.00	-	2.50	2.50	1.66
Limestone	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bone meals	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100
Cal. Analysis								
Crude protein (%)	18.08	18.81	18.18	18.21	18.36	18.16	18.22	18.19
Metab energy(kcal/kg)	3023	3037	3107	3076	3093	3084	3062	3058
Crude fibre (%)	4.25	.60	4.36	4.30	4.48	4.63	4.59	4.63
Calcium (%)	1.46	1.50	1.48	1.48	1.46	1.48	1.47	1.48
Phos(%)	0.66	0.68	0.69	0.71	0.74	0.72	0.69	0.68

*30g/100kg of feed for non-therapeutic use.

Performance Evaluation of Broiler Chicken

Average weight gain (g)/bird

The birds were weighed at the start of the experiment and then every week after that.

Average weight gain

$$= \frac{\text{weight of birds (g) - Initial weight (g)}}{\text{Total of birds}}$$

Feed intake (g)/bird

The birds were given a known amount of feed, and the leftover feed was weighted to establish average daily and weekly feed intake. The feed intake was determined using the following formula:

Average feed intake per bird

$$= \frac{\text{feed supplied (g)- leftover of feed (g)}}{\text{Number of birds}}$$

Feed Conversion Ratio (FCR)

The FCR of each group of birds was computed by dividing feed intake by body weight gain and was thus calculated as:

Feed conversion ratio (FCR)

$$= \frac{\text{Total feed intake (g)/bird}}{\text{Total body weight gain (g)/bird}}$$

Mortality percentage

$$= \frac{\text{Number of dead birds}}{\text{Number of birds}} \times 100$$

Determination of haematological parameters

At the end of the experiment, six birds from each group were selected for collection of blood samples from the win vein. For estimation of haematological parameters blood was collected as eptically with anticoagulant and estimated using an automatic haematolyzer. For estimation of total

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serumbiochemical profile blood was collected aseptically from the birds. The blood samples were brought tothe laboratory without disturbing the clots andcentrifuged at 3000 rpm for 15 minutes to collectserum and stored at -20°C till further analysis. Haematological parameters analyzed were haemoglobin concentration (Hb), white blood cell counts (WBC), red blood cell counts (RBC), platelets, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC). Red blood cell (RBC) and white blood cell (WBC) were determined with an improved Neubauer haemocytometer. Haemoglobin concentration (Hb) was determined using cyano-methaemoglobin method. The erythrocytic indices, mean cell volume (MCV), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration (MCHC) were calculated using Jain (1986) method.

Statistical analysis.

Using Special Package for Social Science (SPSS) statistical software, version 22.00 for Windows, all data were subjected to one-way analysis of variance (ANOVA) (SPSS, 2012). Where statistical differences were found between means, they were separated using the least significant differences (LSD) procedure at a significance level of 5% as contained in the same statistical package.

Results and discussion

Effects of substitution of antibiotics with graded levels of selected medicinal plant leaf meals on the growth performance of broiler chicken are presented in Table 3;

Table 3: Effects of substitution of antibiotics with selected medicinal plant leaf meals on broiler starter performance

Parameters	TREATMENTS								
	1	2	3	4	5	6	7	8	SEM ±
Av initial wgt(g)	41.2	40.7	42.06	39.76	40.73	41.73	42.13	40.02^{NS}	0.83
Av final wgt(g)	969^{b}	1003^{a}	965^{b}	1057^{a}	995^{ab}	999^{ab}	1038^{a}	1025^{a}	2.45
AV body wt gain(g)	927.8	962.7	922.4	1017.24	954.27	956.87	995.87	984.98	1.83
Avdaily feed intake(g)	36.64^{b}	36.61^{b}	33.63^{c}	42.94^{a}	34.84^{c}	34.95^{c}	35.78^{b}	37.13^{b}	0.13
Avdaily wgt gain(g)	33.13	34.3^{b}	26.37	36.33	34.08	34.19	35.57	35.18^{NS}	0.63
FCR	1.10^{b}	1.06^{a}	1.27^{b}	1.18^{b}	1.02^{a}	1.02^{a}	1.01^{a}	1.05^{a}	0.06
Mortality	5.55^{b}	-	11.11^{a}	-	-	-	-	-	0.13

Means within a row with different superscripts differ (P<0.05) significantly

The result of the feeding trial showed that at the end of the starter phase, the final body weight was highest for T_4 (1057) g, followed by T_7 (1038) g, T_8 (1025) g, T_2 (1003) g, T_6(999) g, T_5(995) g, T_1 (969) g and T_3 (965) g. The result showed that the body weight of birds in T_4, T_7, T_8 and T_2, which contain the selected medicinal plant leaf meals, was significantly (P<0.05) higher than those in other treatment groups. The superior significant (P<0.05) performance of T_4 over the other

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treatment groups may be due to the rich phytochemical content of T_4 which improved gut function and dietary palatability (Frankic *et al.* 2009). The final body weight of the broilers in T_4 (SMLM) has also been attributed to minerals, vitamins and phytochemical present in *Spondias mombin* leaf meals which has a higher biological function which acted as a growth promoter, absorption enhancers, antimicrobial agents, and metabolic modifiers (Gill, 2001; Abaza, 2001; Hassan, 2010).

The average daily feed intake for the treatment groups during the starter phase indicated that T_4 birds consumed more feed (42.94) g followed by T_8 (37.13) g, T_1 (36.64) g, T_2 (36.61) g, T_7 (35.78) g, T_6 (34.95) g, T_5 (34.84) g and T_3 (33.63) gram respectively. Thus, the average daily feed intake during the starter phase was significantly ($P<0.05$) high for T_4 and low for T_3. The significant ($P>0.05$) reduction in feed intake shown by T_3 at this phase may be because of the bitter taste of neem leaf meals, high fibre content and high oxalate content of the leaf meals of neem which may have resulted in low feed intake and, thus the poor performance of the birds fed neem leaf meal (T_3).

The feed conversion ratio during the first four weeks (starter stage) was best for T_7 (1.01) followed by T_5 (1.02) and T_6 (1.02) T_8 (1.05), T_2 (1.06), T_1 (1.10), T_4 (1.18) and T_3 (1.27) in that order. Though numerical differences were observed during this phase, there was no significant ($P>0.05$) difference among the treatment groups. The best feed conversion ratio shown by T_4 birds that consumed *Spondias mombin* was due to the phytochemical content of *Spondias mombin* which lowered the pH of the digestive organ resulting in better utilization of nutrients (Seema and Johri, 1992; Bengmark, 1998; Dhama, 2011). The antimicrobial content of *Spondias mombin* changed the intestinal microflora, which helped to improve broiler performance, health status and reduced the microbial use of nutrients (Snyder and Wostmann, 1987). Lowering the intestinal pH by the phytochemical present in T_4 also optimized the activity of protease and beneficial bacterial (Overland *et al.* 2000; Nava *et al.* 2009) and thus enhanced better feed conversion by the birds.

The feeding trial showed that during the starter phase, the highest mortality was recorded in T_3 (11.11 percent) followed by T_1 (5.55 percent) mortality. The other treatment groups recorded no mortality. The bio-pesticidal agent in neem besides the disulphide is mainly azadirachtin and salannin, which are toxic. Thus, they may have been responsible for the death recorded in the first week of the life of the broiler chicken fed neem leaf meals. The death of 5.55 percent in the control group (T_1) may be most probably because of resistance to antibiotics.

Table 4:Effects of substitution of antibiotics with selected medicinal plant leaf meals on finisher broiler performance

	TREATMENTS								
Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**SEM±**
Av initial wgt (g)	969	1003	965	1057	995	999	1038	1025	0.83
Av final wgt (g)	2988^{b}	3055^{ab}	2729^{b}	3329^{a}	3011^{ab}	3023^{ab}	3128^{a}	3112^{a}	8.23
Av daily feed intake(g)	188.33^{a}	187.81^{ab}	177.9^{c}	182.57^{ab}	183.71^{ab}	184.90^{ab}	181.58^{ab}	191.51^{a}	8.64
Av daily wgt gain(g)	56.51	57.4b	49.20	63.78	56.44	6.64	58.51	58.45	4.03
FCR	3.33^{ab}	3.27^{ab}	3.61^{b}	2.86^{a}	3.25^{ab}	3.26^{ab}	3.10^{ab}	3.27^{ab}	0.52
Mortality (%)	-	-	-	-	-	-	-	-	-

Means within a row with different superscripts differ ($P<0.05$) significantly

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The finisher phase showed T_4 (SMLM) again had the highest weight of 3329g, closely followed by T_7 (3128) g, T_8 (3112) g, T_2 (3055) g, T_6 (3023) g, T_5 (3011) g, T_1 (2988) g and T_3 (2729) g, respectively. The average final weight for T_4, T_7 and T_8 was significantly ($P<0.05$) higher than for the other treatment groups. The superior significant ($P<0.05$) performance of T_4 over the other treatment groups may be due to the rich phytochemical content of T_4, which improved gut function and dietary palatability (Frankic *et al.* 2009). The final body weight by the broilers in T_4 has also been attributed to minerals, vitamins, and phytochemicals present in *Spondias mombin* leaf meals which have a higher biological function and acted as a growth promoter, absorption enhancers, antimicrobial agents and metabolic modifiers (Gill, 2001; Abaza, 2001; Hassan *et al.* 2010).

The average daily feed intake for the broiler's finisher phase was highest for T_8 (191.51) g followed by T_1 (188.33) g, T_2 (187.81) g, T_6 (184.90) g, T_5 (183.71) g, T_4 (182.57) g, T_7 (181.58) g and T_3 (177.90) g respectively. Significant ($P<0.05$) differences were also observed among the treatment groups. Hence, the feed intake of T_3 was significantly ($P>0.05$) lower when compared to other treatment groups. The significant ($P<0.05$) increased feed intake shown by T_4 during the brooding phase may be because of the high biological function, mineral and vitamin and its low tannins content of *Spondia mombin* which helps to enhance appetite.

The significant ($P>0.05$) reduction in feed intake shown by T_3 at the finisher phase may be because of the bitter taste of neem leaf meals, high fibre content and high oxalate content of the leaf meals of neem which may have resulted in low feed intake and, thus the poor performance of the birds fed neem leaf meals (T_3). Low feed intake by the treatment group containing neem leaf could also result from the anti-feeding properties because of its efficacy in suppressing feed intake, even at a concentration of less than one part per million (Isman *et al.*1991).

During the finisher phase, however, the results showed that the feed conversion ratio was best for T_4 (2.86) followed by T_7 (3.10), T_5 (3.25), T_6 (3.26), T_2 and T_8 (3.27), T_1(3.33) and T_3 (3.61) respectively. Broiler birds in T_4 during the same period significantly ($P<0.05$) had the best FCR compared with broilers in other treatment groups. It was also observed from the feeding trial that broiler birds in T_3 significantly ($P>0.05$) converted the lowest feed to body tissues during the finisher phase.

The best feed conversion ratio shown by T_4 birds, that consumed *Spondias mombin* was because of the phytochemical content of *Spondias mombin* which lowered the pH of the digestive organ resulting in better utilization of nutrients (Seema and Johri, 1992; Bengmark, 1998; Dhama, 2011). The antimicrobial content of *Spondias mombin may also have* changed the intestinal microflora, which helped to improve broiler performance, health status and reduced the microbial use of nutrients (Snyder and Wostmann, 1987). Lowering the intestinal pH by the phytochemicals present in T_4 also optimised the activity of protease and beneficial bacterial (Pranen and Morz, 1999; Overland *et al.* 2000; Nava *et al.* 2009) and thus enhanced better feed conversion by the birds.

However, during the broiler finishing phase, no mortality was recorded. This may be because the birds at this phase no longer react to the bio-pesticidal agent in neem, mainly disulphide, azadirachtin and salannin which are insecticidal. These may have been responsible for the death recorded in the first week of the life of the broiler chicken fed neem leaf meals.

The effect of substitution of antibiotics with selected medicinal plant leaf meals on carcass characteristics of broiler chicken are presented in Table 5;

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Table 5: Effects of the selected medicinal plant leaf meals on carcass characteristics broiler

	TREATMENT								
Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**SEM ±**
Av final wgt (g)	2988^{b}	3055^{ab}	2729^{b}	3329^{a}	3011^{ab}	3023^{ab}	3128^{a}	3112^{a}	8.23
Dressing (%)	65.57^{b}	67.64^{ab}	64.432^{b}	72.17^{a}	65.67^{b}	67.37^{ab}	68.23^{ab}	67.77^{ab}	1.38
Breast cut(g)	389.38^{b}	398.46^{b}	331.71^{ab}	511^{a}	409.76a^{b}	405.76^{ab}	362.2^{b}	374.32^{b}	14.74
Thigh (g)	289.64^{ab}	304.21^{ab}	250.94^{c}	357.38^{a}	270.51^{c}	350.32^{a}	289.03^{b}	292.74^{ab}	11.13
Drumstick (g)	273.78^{c}	293.36^{b}	245.22^{c}	460.09^{a}	270.83^{c}	313.08^{b}	261.72^{c}	275.51^{c}	68.71
Shank (g)	107.42^{b}	104.03^{b}	87.97^{c}	221.^{3a}	95.97^{c}	128.34^{b}	114.30^{b}	105.31^{b}	6.13
Wing (g)	184.95^{b}	208.21^{a}	117.67^{b}	233.83^{b}	178.10^{b}	213.77^{a}	189.71^{b}	188.40^{b}	4.69
Head (g)	70.27	73.24	62.98	79.83	64.80	76.53	69.53	70.88^{NS}	2.03
Neck (g)	123.03	117.41	106.38	137.83	118.20	122.81	113.09	133.91^{NS}	2.46

Means within a row with different superscripts differ (P<0.05) significantly.

The result of the effect of substitution of antibiotics with selected medicinal plant leaf meals on the carcass characteristics indicated that the dressed weight was highest for T_4 (2052) g followed by T_6 (1772) g, T_8 (1763) g, T_7 (1709) g, T_2 (1666.67) g, T_5 (1631) g, T_1 (1627) g and T_3 (1557.33) g respectively. This result showed that medicinal plant leaf meals such as *Spondias mombin* or a combination of medicinal plant leaf meals can replace antibiotics in poultry production. The dressed weight of T_4 was significantly (P<0.05) higher than the other treatment groups.

The result also showed that the birds fed on diets containing *Spondias mombin* leaf meals performed better than other leaf meal combinations. Asuquo *et al*. (2013) reported a significant reduction (P<0.05) in the hormonal levels such as follicle-stimulating hormone (FSH), luteinizing hormone (LH), oestradiol and progesterone in female Wistar rats when administered with *Spondias mombin* leaf extract. These reductions must have led to the broilers developing masculinity, thus enhancing weight gain.

The dressing percentage was also significantly (P<0.05) higher for T_4 than other treatment groups. The breast muscle cut, thigh, drumstick, shank, and wing were significantly (P<0.05) higher for T_4 when compared to other treatment groups. The head and neck, however, did not differ (P>0.05) significantly. This agrees with the result of Windisch (2009) and Guo *et al.* (2004) that phytogenic feed additive improves carcass quality.

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Effects of substitution of antibiotics with selected medicinal plant leaf meals on the various organs of broiler chicken are presented below in Table 6:

Table 6: Effect of the selected medicinal plant leaf meals on organ characteristics of broiler chicken

	TREATMENT								
Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**SEM ±**
Empty gizzard (g)	49.30	52.53	51.32	53.35	45.03	46.00	45.53	51.16^{NS}	4.63
Crop (g)	22.02	20.70	22.50	21.48	18.39	2183	21.31	19.56^{NS}	168
Proventicles (g)	19.77	20.06	15.19	23.45	18.46	21.45	19.27	20.72^{NS}	1.92
Small intestine (g)	66.38	64.82	61.10	73.74	68.82	72.58	67.31	64.63^{NS}	0.83
Large Intestine (g)	42.87	42.73	38.53	47.59	40.46	44.38	41.67	41.88^{NS}	2.83
Caecum (g)	14.62	15.43	13.24	15.40	13.20	16.37	14.35	14.36^{NS}	1.37
Heart (g)	13.26^{b}	12.36^{b}	14.32^{b}	21.75^{a}	22.00^{a}	21.16^{a}	12.18^{b}	14.57^{b}	4.31
Abdominal fat	23.69^{b}	23.68^{b}	13.00^{a}	22.38^{b}	21.97^{b}	23.51^{b}	18.25^{a}	18.55^{a}	3.72

Means within a row with different superscripts differ (P<0.05) significantly

The organs of the broiler chicken such as gizzard, crops, proventriculus, small intestine, large intestine and caecum showed no significant (P>0.05) differences between the treatment groups.

However, the heart of the broiler birds from T_4 was significantly (P<0.05) heavy than those of the treatment groups. The abdominal fats were significantly (P<0.05) lower in T_3, T_7 and T_8 than in other treatment groups. This may be due to the anti-adipogenic effect of various leaf meals, which inhibits the accumulation of lipid droplets in the fat cell (Asuquo *et al.* 2013)

Effects of substitution of antibiotics with selected medicinal plant leaf meals on haematological parameter of broiler chicken is presented in Table 7:

Table 7: Effects of substitution of antibiotics with selected medicinal plant leaf meals on the haematological parameter of broiler chicken

Parameters	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**	**T_6**	**T_7**	**T_8**	**SEM ±**
WBC ($x10^3$/ul)	6.63^{c}	7.34^{c}	17.73^{a}	11.43^{b}	6.98^{c}	11.34^{b}	7.36^{c}	7.54^{c}	4.21
Hb (g/dl)	109.00^{b}	119.34^{b}	102.67^{b}	112.00^{b}	110.00^{b}	112.67^{b}	130^{a}	121^{ab}	3.05
RBC ($x10^6$/ul)	2.38	2.57	2.29	2.56	2.44	2.48	2.79	2.67^{NS}	0.62
MCV (fl)	136.90	139.50	136.67	130.40	133.60	128.67	128.65	135.5^{NS}	1.27
Platelets ($x10^3$/ul)	21.33^{a}	13.67^{b}	6.33^{c}	10.00^{b}	10.0^{b}	7.33^{c}	6.67^{c}	7.67^{c}	1.21
MCH (pg)	45.50	44.40	44.76	45.80	44.37	45.40	42.93	45.10^{NS}	1.75
MCHC (g/dl)	326.67	332.67	334	335.67	337.33	328.64	332.34	333.34^{NS}	2.26

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The result of the effect of the substitution of antibiotics with selected medical plant leaf meals on the haematological particles indicated that the white blood cell count was highest for T_3 (17.73) followed by T_4 (11.43), T_6 (11.34) T_8 (7.54), T_7 (7.36), T_2 (7.34), T_5 (6.98) T_1 (6.63) respectively. This result shows that broilers fed neem leaf meals (T_3) had significantly ($P<0.05$) increased white blood cells when compared to broilers in the other treatment groups, while T_1, T_2, T_5, T_7 and T_8 did not differ significantly ($P>0.05$) from each other. The high white blood cell count in broilers that received neem is due to its secondary metabolic like a*zadirachtin*, *Nimbin*, *salain*, *meliacin* and their natural derivatives (NRC,1995). Neem has also been associated with an immune response by activating macrophages and lymphocytes in animals. Neem also processes a range of other pharmacological properties, such as being anti-inflammatory, anti-hyperglycaemic, anti-ulcers, immunomodulatory and various other properties showing no adverse effects (Gannu *et al.* 2003; Chakraberty, 2012).

The haemoglobin count of the broilers finisher in T_7 was significantly ($P<0.03$) higher than in the other treatment groups. Their red blood cell count and the mean cell volume (MCV) showed no significant ($P>0.05$) differences among the treatment group. The effects of the medicinal plant leaf meals on platelets indicated that T_1 was significantly ($P<0.05$) higher when compared to the other treatment groups, while T_3 ($6.33x10^3$), T_7 ($6.67\ x10^3$), T_6 ($7.33\ x10^3$) and T_8 ($7.67\ x10^3$) were significantly ($P>0.05$) lower. The MCH and MCHC values for the groups showed no significant ($P>0.05$) differences among the treatment groups. This can beattributed to the antioxidant capacities of the test ingredient. Red blood cell is formed in the longbones of the body, and sufficient production is dependent on the amount of iron absorbed from food digested.Furthermore,thekeyconstituentoferythrocytesishaemoglobin,asitformsabout one-third of red blood cell content.

However, the values achieved in all haematological analyses fall into the acceptable range for clinically healthy chicken (Mitruka and Rawnlay, 1981).

Conclusively, given the economic importance of poultry as a source of food, money, and employment most farmer is desirous of improved fed conversion ratio, dressed weight and dressed percentage. 5 percent inclusion of *Spondia mombin;* 2.5 percent combination each of neem and *Spondia* and 1.66 percent combination each of *Moringa oleifera*, neem, and *Spondia mombin* respectively is thus recommended

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