



INFLUENCE OF *TETRAPLEURA TETRAPTERA* AS ADDITIVE ON BLOOD PROFILE OF BROILER CHICKENS

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ABSTRACT

There is a growing interest in plant feed additives in livestock production. This study was designed to assess the influence of dietary inclusion of *Tetrapleura tetraptera* in drinking water on blood profiles of broiler chicken. A total of Two-hundred-day old broiler chicks were used. There were five (5) dietary treatments. T1 0.00g/litre (control) contained no *Tetrapleura tetraptera*, T2-T5 contained 0.25g/litres, 0.50g/litres, 0.75g/litres and 1.00g/litres of *Tetrapleura tetraptera* respectively. Each treatment was replicated four (4) times with each replicate having 10 birds in a complete randomized design (CRD). The experiment lasted for 7 weeks. Results revealed that Packed cell volume (PCV), Haemoglobin (Hb) and Red Blood Cell (RBC) values of birds fed diet 1-5 were similar ($P>0.05$), also, Serum biochemical indices showed no significant ($P>0.05$) difference except serum albumin that was significantly ($P<0.05$) difference among the treatment group. The overall result shows that birds on diet 3 (0.50g/litres of *Tetrapleura tetraptera*) had significantly superior body weight gain and final body weight than birds on diet 1 (0.00g/litre), diet 2 (0.25g/litres), diet 4 (0.75g/litres) and diet 5 (1.00g/litre) of *Tetrapleura tetraptera* respectively. The study could be concluded that 0.50g/litres of *Tetrapleura tetraptera* in drinking water could be used to improve the blood profile to produce antibiotics residues free chicken meat.

Key Words: Broilers chicken, Blood profile, additive and *Tetrapleura tetraptera*

INTRODUCTION

The importance of edible plants and their roles in improving human health cannot be over emphasized (Okpuzor *et al.*, 2008) According to (Akubugwo, and Ugbogu, 2007), trees and shrubs with nutritional and medicinal potentials abound in Nigeria. Many of these trees and shrubs are eaten and as well used as medicinal recipe against diseases (Akubugwo, and Ugbogu, 2007). For instance, herbal preparations and infusions made from trees and shrubs with medicinal potentials have been employed in the treatment of diseases such as sudden attack of convulsion, malaria, typhoid fever, dysentery, and ulceration of the stomach.

Prehistory records, reviewed that our forefathers depended wholly on these plants for survival (Sofowora, 1993). Different authors (Oliver, 1959, Sofowora, 1993) have reported that these trees and shrubs possess bioactive compounds that exhibit physiological activity against bacteria and other microorganisms. *Tetrapleura tetraptera* is among such trees and shrubs which possess bioactive compounds that exhibit physiological activity against bacteria and other microorganisms. The Survival of the poultry in most developing countries in the future will undoubtedly depend on the ability of poultry to compete with humans for the available food supply. Feed account for 60-80% of the total cost of production in the

livestock industry. Broiler is a type of chicken (*Gallus domesticus*) raised specifically for meat production, Broiler chicken provide most of the Worlds production and consumption of poultry meat. Broiler is a young meat-type chicken of either sex (usually up to 8 weeks of age) weighing about 2kg. Broiler are also referred to as fryers or young Chickens (Thomas and Robert 2006) Many broiler farm has lost money sometimes because of disease (Malden et al 2003). The use of blood examination as a way of assessing the health status of animals has been documented (Muhammed, *et al* 2000) this is because it plays a vital role in physiological nutritional and pathological status of organism (Muhammed, *et al* 2000) Haematology is the blood and blood – forming tissues and it currently considered an integral part of clinical laboratory diagnostic support in avian medicine. Medicinal plants have contributed immensely to health care. Over the past years, plants have become an indispensable source of food and medicine. To a larger extent, most people depend greatly on medicinal plants as an important source of remedy and treatment for most casual and life-threatening diseases. As a result, there is a demand all over the world for these medicinal plants. Aside from tackling diseases, people are resorting more to these medicinal plants as a means of reducing the use of chemical (orthodox) medicines that could potentially be detrimental to human health. Interestingly, most of these plants are used in our everyday cooking as herbs, spices, seasonings and preservatives. But the truth is that we often consume most of these essential medicinal plants in the form of spices without even acknowledging what our bodies gain from them. Furthermore, the use of these medicinal plants as food, preservatives, spices and as instrument for preventing and tackling the development of microorganisms in human bodies has become an area of extensive studies. One of such valuable medicinal plants is Aridan. This plant is botanically known as

Tetrapleura tetraptera and it is a flowering plant that belongs to the mimosaceae family. African Porridge Fruit (*Tetrapleura tetraptera*) is from the family of Mimosaceae. It is locally known in all the parts of Nigeria. It is called by several names by various Nigeria ethnics group. *Tetrapleura tetraptera* is known as Aridan in Yoruba, Uhiokrihio in Igbo and dawo in Hausa The plant is a single stemmed and robust perennial tree of about 30m. It has a grey/brownish, smooth/rough bark with glabrous young branches and generally found in many African countries. The flower yellow/pink and racemes while the fruit is dark consist of a fleshy pulp with small, brownish black seeds. It possesses a fragrant and characteristically pungent aromatic odour which is attributed *Tetrapleura tetraptera* to its insect repellent property (Aladesanmi 2007). The fruit are green when tender and darker brown when fully ripe. The fruit has both nutritional and therapeutic attribute to man. Report has shown that the plant species has the potential of providing an alternative drug therapy because it has some antibiotic property Orthodox drugs such as antihelminth, coccidiostart and vitamins are some of the popular medicine for preventing and treating various pathogenic diseases which affect the health of farm animals. However, these drugs contribute significantly to the cost of inputs in the overall production process. The side effect of these drugs to farm animal especially in some areas where drug adulteration is prevalent has made many animal health experts begin to think of alternative cheap, less harmful and accessible drugs for livestock disease prevention and treatment. (Dipeolu and Idoiwu 2004). Spices have been reported to be naturally endowed with bioactive compounds such as essential oils which are antibacterial in action (Windish *et al* 2008). Therefore, the use of spices that is less toxic to farm animals becomes necessary Among these spices is, *Tetrapleura tetraptera* used extensively as spice in human diets in Nigeria and elsewhere.

This study is therefore to assess the influence of *Tetrapleura tetraptera* as additive on blood profile of broiler chickens.

MATERIALS AND METHODS

Experimental Site and management of birds

The experiment was conducted at the Poultry Unit, Teaching and Research Farm, University of Ibadan, Ibadan, Oyo State, Nigeria. A total of two-hundred-day old unsexed Arbor Acres broiler chicks were obtained from CHI Ajanla, Ibadan, Oyo State. They were divided into five groups comprising of 40 birds in a complete randomized design. Each group was further subdivided into 4 groups of 10 birds which serve as replicates. A week before the arrival of the chicks, one of the pens to be used for brooding was prepared. This was done by cleaning the dust and dirt on the sides and top of the pens. The floor was swept and washed with clean water, a disinfectant was mixed with water and used to disinfect the pen. The floor of the pen was later covered with wood shaving to serve as litter material up to 2cm in height. The side of the building pen was covered with nylon to conserve heat. The trial consisted of a 7-days acclimatization period. Water and feed were allowed *ad libitum*. The weight of animals were taken at the beginning and at the end of the 49-days, feed intake were also measured. The *Tetrapleura tetraptera* were added in drinking water as follows 0.00g/litres, 0.25g/litres, 0.50g/litres, 0.75g/litres, and 1.00g/litres for T1, T2, T3, T4 and T5 respectively. The *Tetrapleura tetraptera* were mixed thoroughly every day and were left inside water for 24 hours before giving the animal feed and water were given *ad libitum*. The dry fruit of *Tetrapleura tetraptera* were obtained from Oje market in Ibadan, Oyo state. The fruit collected over time were washed with clean water to remove any foreign matter and sun dried. The fruit of *Tetrapleura tetraptera* were broken

using knife and milled into fine powder and stored to be included in water.

Collection of blood samples

Haematological and Serum biochemical evaluation were carried out at the end of the experiment. Two birds per replicate were randomly selected and starved for 24 hours without water and weighed before slaughtering. The selected birds were bled using sterilized knife through the jugular vein to aspirate 5mls of blood from each bird for which 2mls were collected into EDTA bottle for haematological assay and 3mls of blood each were collected into a sterile sample bottle without coagulant to determine the serum biochemical components.

Statistical analysis

All data obtained were subjected to statistical analysis using one-way analysis of variance (ANOVA) as outlined in (SPSS 2012) and means were separated using Duncan Multiple Range Test at significance level of $P < 0.05$.

RESULTS AND DISCUSSION

The influence of *Tetrapleura tetraptera* inclusion in the diet of broiler chicken on haematological parameters and serum biochemical indices are presented in Table 2. The result of feeding *T. tetraptera* on haematological parameters of broilers. There were no significant ($P > 0.05$) difference in Packed cell volume (PCV), Haemoglobin (Hb), Red blood cell (RBC), Platelets (Plate), Monocytes (Mono), Eosinophils (Eo), Basophils (Ba). But there were significant ($P < 0.05$) difference in White blood cell (WBC), Lymphocyte and heterocyte (het). Birds fed 0.25g/litre of *Tetrapleura tetraptera* gave the highest blood total serum protein 6.08 g/dL. This suggests good quality protein of 0.25g/L dietary level of inclusion for the test feed stuff and since the higher the value of the protein the better the quality of the test

feeds stuff (Eggun 1970). The total serum protein value ranges from 4.90g/dL in birds fed 0.00g/L to 6.08g/dL in birds fed 0.25g/L there were no significant difference among the treatment groups, these result negate the findings of (Ologhobo *et al* 1993) who reported that the values obtained were comparably higher than the values of 3.90-3.10g/dL for Albumin, 0.25g/L gave the highest value (1.23g/dL) that was significantly different from other treatments, this result agreed with the findings of (Roberts *et al* 2003) who reported that serum Albumin act as clotting factors and hence prevent haemorrhage. Globulin results showed no significant difference. This implies that all the diets have the ability to fight against diseases which was confirmed by the report of (Eggun 1970) Aspartate transaminase (AST) values ranged from 205.50iu/l in birds fed 1.00g/L to 217.50iu/l in birds fed 0.50g/L, there were no significant different across the treatment groups as inclusion level of *T. tetraptera* increased in the diet. Values in this study were higher compared to the values (18-53.33iu/l) reported by (Obikaomu *et al* 2012). Higher values of AST in birds fed 0.50g/L indicates an increase in liver activity in order to reduce the toxic effect of the test ingredients. Alkaline phosphatase (ALP) values ranged from 331.25iu/l in birds fed 0.50g/L to 403.00iu/l in birds fed 1.00g/L There were no significant difference among the treatment groups. Higher value of Alkaline phosphatase in the blood suggests increased activity of the liver due to the presence of toxic factors (Ologhobo *et al* 1993) The values for serum creatinine ranged from 0.55mg/dl to 0.65mg/dl. There was no significant difference among the treatment groups, the values obtained were below the normal range of 1-2mg/dl for healthy bird's Similar report was observed in broiler starter fed neem leaf meal as reported by (Obikaomu *et al* 2012). Low values of creatinine obtained in this study indicated that there was no muscle wastage. The glucose values across the

treatments showed no significant difference with the values ranges from 351.75mg/dL in birds fed 0.75g/litre of *T. tetraptera* to 408.50mg/dL in birds fed 0.00g/litre of *T. tetraptera* The diet 4 had the lowest value which negate the normal range of 152-180mg/dL reported by (Mitruka and Rawsley 1977)

Table 4 showed the result of feeding *Tetrapleura tetraptera* on serum biochemical indices of broilers There were no significant ($P>0.05$) difference on serum biochemical indices of broiler fed *T. tetraptera* except the serum albumin which shows significant ($P<0.05$) difference across the dietary treatment. However, there is no significant difference in the value of Packed Cell Volume (PCV) across the dietary treatments. The value obtained in this study were below the value of (33-43%) reported by (Tolu 2008). The poor value in PCV obtained in this study especially in birds fed 0.75g/litres of *T. tetraptera* which consequently had values below the recommended range of 30-40% (Okigbo and Igwe 2007, Justine 2010) may be attributed to the anti-nutrient of *Tetrapleura* such as Saponin, Alkaloid, Tannins among others that inhibit proper utilization of nutrient especially protein and iron necessary for red blood formation (Ayyuk and Essien 2009) The Haemoglobin value in this study were higher than the value (7.67g/dL) reported by (Kwari *et al* 2011) when broiler chicken were fed raw sorrel seed meal. the values obtained in this study were higher than the values of (1.20-2.6($\times 10^6$ /mm) reported by (Ugwene 2011) Also higher than the value (2.15-2.75($\times 10^6$) reported by (Odetola *et al* 2015). The value obtained for white blood cell showed significant difference across the dietary treatments. The result of the study was in line with (Ukpabiet *et al* 2015) who reported a significant difference in the value recorded for white blood cell among the treatment groups The highest value (14.19 $\times 10^3$ /mm³) of white blood cell was noticed in broiler fed 0.75g/litres of *T.*

tetraptera. This result confirmed the finding of (Adeyemo and Sani 2013) who reported the highest white blood cell in birds fed treatment two. The elevated white cell as raw Alligator pepper seed meal (APSM) inclusion increase could be a physiological adjustment against negative antigenic effect associated with the diet. In the same vein, the result of this study

also confirmed the finding of (Mitruka and Rawnsley 1977) who reported a significant difference in the value obtained in white blood cell among the values treatment groups. The white blood cell values obtained ranges from (87.99-110.30(x10³/mm²)) and were above the normal range of (9.76-31.0 (x10³/mm)) as reported by (Mitruka and Rawnsley 1977).

Table 1: Composition of experimental diets for broiler chickens

INGREDIENTS g/kg	Starter	Finisher
Maize	55.40	56.40
Soya bean meal	38.00	36.78
Fish Meal	2.50	2.44
Wheat offal	0.80	1.08
Dicalcium phosphate	1.50	1.50
Premixes	0.25	0.25
Limestone	0.80	0.80
D-L Methionine	0.25	0.25
L-Lysine	0.25	0.25
Table salt	0.25	0.25
Total	100.00	100.00
Calculated analysis		
Crude protein g/kg	23.14	20.00
Energy ME, Kcal/kg	3014.90	3000.00
Crude Fibre g/kg	0.40	0.51
Calcium/kg	0.87	0.95
Total phosphorus/kg	0.73	0.85

Table 2: Haematological parameters of broiler fed *Tetrapleura tetraptera*

Parameters	T1	T2	T3	T4	T5	SEM
Packed cell volume (%)	27.25	28.25	27.75	26.50	26.75	0.49
Haemoglobin (g/dL)	8.98	9.58	9.00	8.68	9.00	0.20
Red blood cells(x10 ⁶ /mm ³)	2.87	3.01	3.09	2.83	2.45	0.16
White blood cells (x10 ³ /mm ³)	11.73 ^{ab}	14.06 ^a	10.05 ^b	14.19 ^a	12.39 ^{ab}	0.69
Platelets (x10 ³ /mm ³)	150.75	156.00	155.75	168.00	182.00	8098.57
Lymphocytes(%)	59.00 ^{bc}	67.50 ^a	63.75 ^{ab}	55.00 ^c	59.75 ^{bc}	1.36
Heterophils(%)	34.75 ^{ab}	27.25 ^b	29.25 ^{ab}	37.25 ^a	32.00 ^{ba}	1.31
Monocytes(%)	3.50	2.50	2.00	3.25	4.25	0.35
Eosinophils(%)	3.75	2.75	4.75	4.25	3.50	0.45
Basophils(%)	0.25	0.00	0.25	0.25	0.50	0.10

^{ab}: Mean along the row with the same superscript are not significantly (P>0.05) different from each other

Table 3: Serum biochemical indices of broiler fed *Tetrapleura tetraptera*

Parameters	T1	T2	T3	T4	T5	SEM
Total protein(g/dL)	4.90 ^b	6.08 ^a	5.25 ^{ab}	5.35 ^{ab}	5.60 ^{ab}	0.17
Albumin(g/dL)	0.80	1.23	1.03	1.10	1.18	0.06
Globulin(g/dL)	4.10	4.78	4.23	4.25	4.23	0.14
Albumin Globulin ratio	0.18	0.23	0.20	0.25	0.20	0.01
Aspartate transaminase (iu/L)	207.00	206.50	217.50	215.00	205.50	3.20
Alanine amino transferase (iu/L)	26.25	30.75	32.25	29.50	32.25	1.82
Alkaline phosphate(iu/L)	379.25	341.50	331.25	376.75	403.00	16.37
Total bilirubin (mg/dL)	11.00	11.88	11.63	11.13	11.30	0.17
Creatinine (mg/dL)	0.55	0.65	0.58	0.60	0.58	0.02
Glucose (mg/dL)	408.50	402.75	363.25	351.75	394.00	11.68
Cholesterol (mg/dL)	200.75	209.50	224.00	219.50	210.00	3.86
Triglyceride(mg/dL)	128.00	118.00	147.00	126.00	125.50	4.71
HDL(mg/dL)	89.50	110.50	133.25	133,25	126.50	7.82

^{ab}: Mean along the row with the same superscript are not significantly ($P>0.05$) different from each other

CONCLUSION

From the results obtained in this study, It could be concluded that 0.50g/litres of *Tetrapleura tetraptera* in drinking water could be used to improve the blood profile to produce antibiotics residue free chicken meat.

RECOMMENDATION

It could be recommended that, the extension officer and animal scientist are therefore expected to encourage the farmers to adopt the use of *Tetrapleura tetraptera* in place of antibiotic as this will reduce the cost of

production and hence increase the profitability of the farmer and also prevent the damage done to human body by the residue of antibiotics in chicken meat.

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