HAEMATOLOGICAL PARAMETERS AND SERUM BIOCHEMISTRY OF BROILER CHICKEN FED DIETS CONTAINING VARIED LEVEL OF THORN APPLE (*DATURA STRAMONIUM)* POWDER

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ABSTRACT
Thorn apple is a plant is a strong source of antioxidants and natural medication that can shield animals from stress and possible illnesses. Six weeks feeding trail was conducted using a total of 180 Ross 308 broiler chick to evaluate the effect of thorn apple on haematology and serum biochemistry of broiler chicken. They were allotted into four (4) treatments of 45 birds per treatment and each treatment was further grouped into 3 replicates of 15 birds per replicate. T1-control, T2-diet containing 2g/kg of thorn apple, T3-diet containing 4g/kg of thorn apple and T4-diet containing 6g/kg of thorn apple, arranged in a complete randomized design. After six weeks, data were collected on haematology and serum parameters. Result revealed that the Highest (P<0.05) packed cell volume (30.00%) was recorded with broiler chicken fed diet containing 6g/kg of thorn apple while broiler chicken fed control diet had the least (24.25%). Highest (P<0.05) Haemoglobin concentration (13.88%) was recorded with broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet without the inclusion of thorn apple had the least (10.35%). Highest (P<0.05) white blood cell (137.50) was recorded from broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet with 0g/kg thorn apple had the least (97.00). Highest (P<0.05) cholesterol (4.18mmol/l) was recorded with broiler chicken fed control diet while broiler chicken fed diet containing 2g/kg of thorn apple had the least (2.15mmol/l). It can be concluded based on the result of this experiment that inclusion of thorn apple at 2g/kg in the diet may help maintain and improve health status of broiler chicken.

Keywords: Broiler Chicken, Haematology, Serum Biochemistry, Thorn Apple,

INTRODUCTION

Biochemical indicators and Haematology are useful instruments in animal husbandry. Their applications include assessing nutritional deficiencies, metabolic disorders, animal welfare, and health status (Menon *et al.,* 2013). According to the case under investigation, the normal reference values of certain serum biochemical indices and haematological indicators are used to diagnose the incidence of disease and malnutrition. Plant-derived natural bioactive compounds are recognized for their anti-inflammatory, immunomodulatory, antioxidant, anti-proliferative, anti-carcinogenic, detoxifying, digestion-stimulating, and flavor qualities. (Grashorn, 2010). Moreover, these bioactive compounds have been shown to improve animal performance, feed conversion ratio, carcass meat safety, immune enhancement and health protection (Alagawany *et al.,* 2015). Therefore, it is necessary to look for herbal feed additives that can improve animal health and liberate farmers from consequence of ban of antibiotics (European Union 2006) because of their harmful residual effect on both human and livestock. Samples of herbs commonly used in poultry production are garlic, clove ginger, black pepper, and turmeric except thorn apple which has not been used in poultry diet.

Thorn apple, also known as Jimsonweed (Datura stramonium), is a widespread annual herb found in tropical Africa that grows upright and forms bushes up to 1-1.5 meters tall. It is possible to grow thorn apples as a decorative plant. It is highly valued in West and Central Africa, where it is frequently used in traditional medicine. It has medicinal qualities and is used as a narcotic and growth promoter (Olusola and Nwokike,2018). Thorn apple has been scientifically proven to contain alkaloids, tannins, carbohydrate, and protein (Sreenivasa et al., 2012). The plant is thought to be a strong source of antioxidants and natural medication that can shield animals from stress and possible illnesses (Olusola and Nwokike, 2018). Nonetheless, there is a lack of data on the comprehensive impact of thorn apple on the serum biochemistry and haematology of broiler chickens, which necessitated this study.

MATERIALS AND METHODS

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

Preparation of test ingredient
Thorn apple was chopped to increase the surface area and was air dried until the weight remained constant and milled into fine powdery according to the method described by (Okanlawon *et al.,* 2020) and stored in air tight container until use.

Experimental birds and management
The experiment was carried out using 180 Ross 308 day old chicks, they were weighed and equally distributed into four (4) treatments at 45 birds per treatment and each treatment was further grouped into 3 replicates making 15 birds per replicate in a completely randomize design. The four experimental treatments were prepared such that T1-control 0g/kg, T2-diet containing 2g/kg of thorn apple, T3-diet containing 4g/kg of thorn apple and T4-diet containing 6g/kg of thorn apple. Feed and water were supplied *ad libitum* daily. All other routine management practices were observed. The study lasted for 6 weeks. Data were collected on haematology parameter and serum biochemistry.

Haematology and serum biochemistry analysis
Four birds were randomly selected from each treatment. Blood samples were collected from their jugular vein. The blood samples meant for haematology were collected into Ethylene Diamine Tetra Acetic Acid (EDTA) bottles, while those meant serum analysis were collected into EDTA-free bottles. Haematology and serum parameters (red blood cell, white blood cell, packed cell volume, platelets, haemoglobin, neutrophils, lymphocytes, monocytes, eosinophil, basophils, albumin, globulin, total protein, cholesterol, urea, creatinine, alkaline phosphate, alanine transaminase and aspartate transaminase) were analysed according to procedure of (Kohn and Allen 1995 and Venkatesan *et al.,* 2006).

Statistical analysis
Data collected were analysed using ANOVA as contained in SAS (2002). Significant means were separated using Duncan Multiple Range Test.

RESULTS AND DISCUSSION
The effect of thorn apple on haematological parameters of broiler chicken is shown in Table 1. Significant ($P<0.05$) difference was recorded on packed cell volume, haemoglobin concentration, white blood cell, lymphocytes and basophils varied significantly ($P<0.05$). Highest ($P<0.05$) packed cell volume (30.00%) was recorded with broiler chicken fed diet containing 6g/kg of thorn apple while broiler chicken fed diet without the inclusion of thorn apple had the least (24.25%). Highest ($P<0.05$) Haemoglobin concentration (13.88%) was recorded from broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet without the inclusion of thorn apple had the least (10.35%). Highest ($P<0.05$) white blood cell (137.50ul) was recorded from broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet without the inclusion of thorn apple had the least (97.00ul). Highest ($P<0.05$) lymphocytes (78.75%) were recorded from broiler chicken fed diet containing 4g/kg of thorn apple while broiler chicken fed diet containing 4g/kg of thorn apple had the least (55.50%). Highest ($P<0.05$) basophils (24.00%) were recorded from broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet containing 4g/kg of thorn apple had the least (12.50%).

These results show that the chicken fed diet with the inclusion of thorn apple is more immune than the control group and this aligns with the findings of (Ademola *et al.,* 2009) who suggested that the inclusion of phytobiotic in the diet helps in boosting the immune system of poultry birds to prevent or fight against diseases in the body since they contain phytochemicals (phenol and alkaloid) as reported by (Sreenivasa *et al.,* 2012) which helps to improve the immune system in the body. Thorn apple inclusion in the diet was found to have mild impact on the recorded haematological parameters and it was within reported range by Merck Manual (2012) for healthy chicken.

Table 2 shows the effect of thorn apple on serum biochemistry of broiler chicken. Highest ($P<0.05$) globulin (27.00g/l) was recorded with broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed diet without the inclusion of thorn apple had the least (16.00g/l). Highest ($P<0.05$) cholesterol (4.18mmol/l) was recorded with broiler chicken fed control diet while broiler chicken fed diet containing 2g/kg of thorn apple had the least (2.15mmol/l). Highest ($P<0.05$) triglyceride (0.55mmol/l) was recorded with broiler chicken fed diet containing 4g/kg of thorn apple while broiler chicken fed control diet had the least (0.25mmol/l). Highest ($P<0.05$) glucose (11.90mmol/l) was recorded with broiler chicken fed diet containing 2g/kg of thorn apple while broiler chicken fed control diet had the least (10.40mmol/l). Globulin increased in the bird fed diet containing thorn apple in T_2 (2g/kg).

Table 1: The effect of Thorn Apple on the haematological parameter of broiler chicken.

Parameters	T1(0g/kg)	T2 (2g/kg)	T3 (4g/kg)	T4 (6g/kg)	SEM
Pack cell volume(%)	24.25^{b}	29.00^{ab}	26.75^{ab}	30.00^{a}	0.91
HB(gdl)	10.35^{b}	13.88^{a}	12.83^{ab}	12.88^{ab}	0.49
RBC (x10^{9} ul)	2.93	2.46	2.26	2.28	0.23
MCV(fl)	117.75	116.50	117.50	115.75	0.85
MCH(gl)	57.25	56.38	57.00	56.50	0.39
MCHC(gl)	485.00	483.75	483.50	485.50	2.17
WBC(x10^{9} ul)	97.00^{b}	137.50^{a}	135.50^{a}	136.00^{a}	6.19
Neutrophils (%)	16.75	14.75	9.50	11.75	2.18
Lymphocytes (%)	64.50^{ab}	55.50^{b}	78.75^{a}	74.00^{ab}	3.78
Eosinophils (%)	0.75	2.00	1.00	0.50	0.27
Monocytes (%)	4.75	3.75	2.25	3.75	0.61
Basophils (%)	15.25^{ab}	24.00^{a}	12.50^{b}	18.00^{ab}	2.50
Platelets (x10^{9})	37.00	39.00	40.50	42.00	2.62

^{abc} means the same row with different superscript were ($p<0.05$) significantly different.
RBC: Red Blood Cell, HB: Haemoglobin, MCV: Mean corpuscular volume. MCH: Mean corpuscular haemoglobin, MCHC: Mean corpuscular haemoglobin concentration.

Table 2: The effect of Thorn Apple on serum biochemistry of broiler chicken.

Parameters	T1(0g/kg)	T2 (2g/kg)	T3 (4g/kg)	T4 (6g/kg)	SEM
Total protein (g/l)	32.50	31.00	33.00	33.50	0.63
Albumin (g/l)	16.50	14.00	15.50	17.00	0.57
Globulin (g/l)	16.00^{b}	27.00^{a}	17.50^{b}	16.50^{b}	1.44
AST (U/L)	88.25	83.50	81.00	106.00	4.83
ALT (U/L)	11.25	11.50	12.00	11.50	0.45
Alkaline Phosphate (U/L)	162.50	158.00	162.00	147.50	4.10
Cholesterol (mmol/l)	4.18^{a}	2.15^{c}	3.00^{ab}	2.90^{bc}	0.23
Triglyceride (mmol/l)	0.50^{a}	0.20^{c}	0.25 ^{bc}	0.35^{ab}	0.04
Glucose (mmol/l)	10.40^{b}	11.90^{a}	10.80^{b}	10.43^{b}	0.19
Creatinine(mmol/l)	51.50	58.00	72.50	53.00	3.58
Urea (mmol/l)	3.53	3.80	3.65	3.40	0.06

^{abc} means the same row with different superscript were ($p<0.05$) significantly different.
AST- Aspartate Transaminase, ALT-Alanine Transaminase.

These elevated values could be attributed to improved host's immune system and enhanced hepatic function since the liver is the site of protein synthesis and this could indicate normal energy metabolism due to stimulation of endogenous enzymes by phytogenic feed additive to the release of adequate and stable substrate (glucose) needed for mechanical work and body maintenance. However, serum glucose value was within the reference range reported by Merck Manual (2012) for healthy chicken. The total blood cholesterol and triglyceride contents of the birds decreased with the inclusion of the test ingredient. Triglycerides are synthesized in the liver from fatty acids, protein and glucose when they are above the body's current need and are stored in adipose tissue (Esubonteng, 2011). Saponin is a phytochemical present in thorn apple as reported by (Sreenivasa *et al.,* 2012) which function is to reduce the cholesterol content both in the blood and animal product and this has been proven in this study. The result for total protein, albumin, aspartate transaminase, alanine transaminase. alkaline phosphate, creatinine, urea falls within the normal range reported by Merck Manual (2012) for healthy chicken which will help the liver and kidney to function well and ensure they are in good health state.

CONCLUSION AND RECOMMENDATION

It can be concluded that the inclusion of thorn apple as feed additive in the diet of broiler chicken had positive effect on haematological parameter and serum biochemistry. It is therefore recommended that 2g/kg of thorn apple can be included in the diet of broiler chicken to maintain and improve the bird's health status.

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