INFLUENCE OF AQUEOUS *CHROMOLAENA ODORATA* (SIAM WEED) LEAF EXTRACT ON THE PERFORMANCE, IMMUNOLOGICAL AND HISTOLOGICAL INDICES OF BROILER CHICKEN

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ABSTRACT
A 42-day trial was conducted to evaluate the effects of Aqueous Chromolaena odorata (Siam weed) leaf extract (ACOLE) on the growth performance, immunology and histological indices of broiler chickens. A total of 200 day old broiler chicks were randomly allotted into four (4) treatment groups consisting of five (5) replicates of 10 birds per replicate in a completely randomized design. Aqueous COLE was administered in their water served on daily basis at 0, 5, 10 and 15mL/L to represent four treatment groups; T1, T2, T3 and T4 respectively. At the end of the study, data were collected on growth performance, blood samples were collected at day 0, 12 and 42 to conduct immunological assessment of the birds and samples of the intestine and liver were collected for histological evaluation. All data collected were subjected to one-way analysis of variance. The Results obtained showed that there were no significant (P>0.05) differences on all growth parameters evaluated except in feed Conversion Ratio (FCR). Birds in T2 had the best FCR values (1.95). Administration of ACOLE had no significant influence (P>0.05) on immunological indices of broiler chickens for day 0 and day 42 but there was significant difference on day 12. The immunity (3.00 – 4.00) of the birds increased as ACOLE inclusion levels decreased. ACOLE had effect (P<0.05) on the histopathological indices observed in this study, ACOLE had some considerable level of protective effect on the liver with no negative influence on the intestine except for those on T4, (15mL/L ACOLE) where atrophy of villi, necrosis and cystic dilation of crypts was observed. Conclusively, the administration of 5mL/L ACOLE had the best FCR and posed a considerable level of protective effect on the liver sampled across the treatment groups.
Keywords: Siam weed, Aqueous extract, Immunology, Histological indices and Necrosis.

INTRODUCTION

The poultry industry is a fundamental component of global agriculture, serving as a primary source of high-quality protein, especially through broiler chicken meat production**.** As a result of the ever-increasing demand for poultry products, optimizing broiler chicken performance in terms of growth, health, and overall productivity is paramount (Smith, 2018). The National Agency for Food and Drug Administration and Control (NAFDAC) in 2018 banned the use of antibiotics as feed additives, except when prescribed by a Veterinarian. Therefore, research has been carried out to look for natural agents (PFAs) with similar beneficial effect as growth promoters, among the natural plants. The plant derived immune regulators are being considered as safer alternatives as most synthetic immune regulators pose serious toxicity or other side effects (Nair *et al*., 2019). One of such plants is *Chromoleana odorata* (Siam weed). *Chromoleana odorata* is a natural plant known for its rich array of bioactive compounds of which studies have shown its promising Results regarding the benefits of its extraction (Smith *et al*., 2021). It has been reported to have multipurpose medicinal properties (Akinmutimi, and Akufo, 2006). It has also been shown to possess anticancer, antidiabetic, anti-hepatotoxic, antiinflammatory, antimicrobial, and antioxidant properties. Hence, this necessitated the need to evaluate its effectiveness in promoting growth in broiler production in this study.

MATERIALS AND METHODS

Experimental site and duration: The experiment was carried out at the Teaching and Research Farm of the Federal College of Animal Health and Production Technology, Ibadan, Oyo State. The experiment lasted for six (6) weeks.

Experimental Animals and their management: A total of two hundred (200) one-day old broiler chicks were used for the experiment. They were randomly allotted into four treatments of fifty birds each with five replicates of ten birds each in a completely randomized design. The birds were fed commercial feed *ad libitum*; chicks were allotted into four treatment groups at the first day of age and aqueous *Chromolaena odorata* leaf extract (ACOLE) was administered to the birds via their cool clean drinking water according to the treatment specification.

Experimental Layout

Treatment 1- 0mL, Control (prophylactic measures were taken)
Treatment 2- 5mL inclusion of *Chromolaena odorata* leaf extract per litre of water
Treatment 3 - 10mL inclusion of *Chromolaena odorata* leaf extract per litre of water
Treatment 4 - 15mL inclusion of *Chromolaena odorata* leaf extract per litre of water

Source and Preparation of the test ingredients

Fresh *Chromolaena odorata* (Siam weed) leaves were obtained from the farm premises of the College, leaves were properly rinsed and allowed to drain off water. Thereafter, the juice from the leaves were collected by hand method of extraction, weighed and mixed with the water as indicated in the experimental layout.

Experimental design: 200, one-day- old broiler chicks with initial average body weight of 41.6 g, sourced from a hatchery were randomly allotted into four treatment groups consisting of 5 replicates of 10 birds per replicates in a completely randomized design. The birds were raised from one-day old to 42 days of age.

Data collection

Water and feed intake were measured across all treatments and the remnants were also measured on daily basis to note the water intake as well as the feed intake, while the weight gain was taken on weekly basis. At the beginning (day O), at day twelve (12) and at the end of the experiment on day forty-two (42), blood samples were collected from the jugular vein and this was put into plain bottles for immunological analysis and assessment. Two (2) birds per treatment were randomly picked, sacrificed and organs were harvested and small portions of the liver was excised and placed into bottles containing 10% formalin. These were also taken to the laboratory for histological analysis and assessment using standard procedures.

Statistical Analysis: All data collected were subjected to one-way Analysis of Variance (ANOVA) using SAS (2005) and significant means were separated using Duncan's multiple range test (DMRT) of the same statistical package.

RESULTS AND DISCUSSION

Table 1 shows the influence of aqueous *Chromolena odorata* leaf extract on the performance characteristics of broiler chickens. ACOLE had no significant influence (P>0.05) on all the growth parameters evaluated except the feed conversion ratio (FCR). The FCR (1.95 – 2.21) values obtained

Table 1: Influence of aqueous *Chromolaena odorata* leaf extract on the performance characteristics of Broiler Chickens

Parameters	T_1 (0mLACOLE)	T_2 (5mLACOLE)	T_3 (10mLACOLE)	T_4 (15mLACOLE)	SEM
Initial Body Weight (g/b)	42.80	38.00	42.30	41.20	0.43
Final Body Weight (g/b)	2289.60	2375.00	2291.20	2210.40	31.02
Body Weight Gain (g/b)	2246.80	2337.00	2248.90	2169.20	31.14
ADWG (g/b/d)	53.50	55.64	53.55	51.65	0.74
Total Feed intake (g/b)	4605.10	4544.20	4588.60	4808.30	76.28
ADFI (g/b/d)	109.65	108.20	109.25	114.48	1.82
Total Water intake (L/d)	7.08	7.99	7.45	7.89	0.24
ADWI (L/b/d)	0.17	0.19	0.18	0.19	0.01
Feed Conversion Ratio	2.06^{ab}	1.95^{b}	2.05^{ab}	2.21^{a}	0.04

a,b,c Means having different superscripts along the same row are significantly different (P<0.05). SEM: Standard Error of Mean ; ADWG: Average Daily Weight Gain, ADFI: Average Daily Feed intake, ADWI: Average Daily Water intake

in this study varied significantly (P<0.05) across the treatment groups. The lower FCR value (1.95) observed in the birds administered 5mL ACOLE is an indication that the extract was well utilized by the birds. Fitra *et al.* (2017) reported that the lower the feed conversion ratio, the more the efficiency

of feed utilization by animals. This result was similar to the findings of Bernard *et al*. (2016) and Nalge *et al*. (2017) who reported improved broiler performance when administered Aloe vera gel extract in drinking water of broiler chickens without any deleterious effect on the overall health status of the birds.

Table 2: Influence of aqueous *Chromolaena odorata* Leaf extract on Immunological indices of Broiler Chickens

Parameters	T_1 (0mLACOLE)	T_2 (5mLACOLE)	T_3 (10mLACOLE)	T_4 (15mLACOLE)	SEM
Day 0	6.00^{ab}	6.50^{a}	6.00^{ab}	5.00^{b}	0.23
Day 12	4.00^{a}	3.75^{a}	3.00^{b}	3.00^{b}	0.18
Day 36	4.50	3.00	2.00	2.00	0.52

a,b,c Means having different superscripts along the same row are significantly different (P<0.05). SEM: Standard Error of Mean

Table 2 reveals the influence of aqueous *Chromolaena odorata* leaf extracts on immunological indices of broiler chickens. ACOLE significantly influence (P<0.05) the immunological indices of broiler chicken obtained at day zero and 12 except at day 36. At day 12 when the maternal immunity of the broiler chickens is expected to have diminished, there were significant differences and values obtained for the birds administered 5ml/L had values comparable to those birds on control birds which were administered vaccines. This result corroborates with the reports of Olugbemi *et al.* (2010), who reported that aqueous extract of *Moringa oliefera* leaf showed beneficial effects on the immune response of broiler chickens.

As indicated in Figure 1a - 2d, there was no observable lesions in birds on T_1 - T_4 administered ACOLE across the treatment groups, but there was foci of lymphoid aggregate in birds on T_2 (5mL) which could be attributed to defense mechanism being displayed by the lymphocytes while birds on T_3 (10mL), showed multifocal hepacellular necrosis and inflammation. This indicated that administration of this extract at 10mL inclusion level was not favourable to the birds' health, and this was in line with the reports of Jude *et al*. (2014) who reported a reduction in liver cells when aqueous extract of *Chromolaena odorata* was administered to rat.

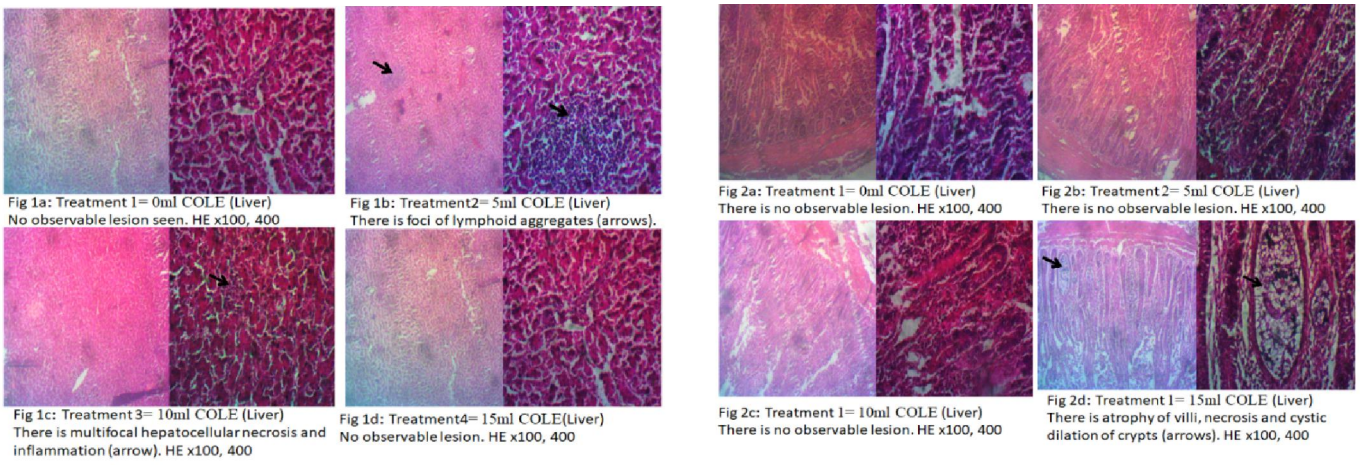

Figure 1: Influence of aqueous *Chromolaena odorata* leaf extract on the histopathology of the liver of Broiler Chickens

CONCLUSION:

It was therefore concluded that birds administered 5mL ACOLE had the best feed conversion ratio, enhanced immune system and posed a considerable level of protective effect on the liver sampled across the treatment groups

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