# FEED UTILIZATION AND SERUM PARAMETERS OF BROILER CHICKENS FED *Chromolaena odorata* LEAF MEAL AS AN ALTERNATIVE TO ANTIBIOTIC GROWTH PROMOTER

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**Abstract**
The potentials of *Chromolaena odorata* (siam weed) leaf meal (COLM) as an alternative to oxytetracycline was investigated. COLM was incorporated into the formulated broiler diets at 0%, 0.5%, 1%, 1.5% respectively with a fifth treatment which contained the antibiotic growth promoter as positive control. Two hundred and twenty five unsexed arbor acre broiler chicks were used for the experiment; they were allotted into the five treatments with three replicates each in a completely randomized design and fed for 42 days. Results showed that COLM had 13.17% crude protein, 7.89 crude fibre and 12.23% ash. It contained 3.23mg/100g flavonoids,2.37mg/100galkaloids,4.63mg/100g saponins, 21.37mg/100g tannins, 11.37mg/100g glycosides, 8.53mg/100g phenolic acids, 1.37mg/100g coumarins, 10.47mg/100g terpenoids and 1.67mg/100g steroids. It also indicated that at 1.5% level of inclusion, feed utilization and growth performance of the birds were significantly ($P< 0.05$). The serum biochemical parameters were within normal limits and indicative of the beneficial effects of its inclusion in the diets. The use of this at 1.5% was recommended for profitable and sustainable broiler chicken production.

**Key words:** broiler chickens, Feed utilization, Siam weed

## Description of Problem

The vital role of chicken production in meeting the ever-increasing global demand for sustainable animal protein supply has become established. This brought initialization of intensive livestock production practices that can efficiently meet the higher demands for food and a resultant adoption of the use of sub-therapeutic doses of antibiotic growth promoters (AGPs) to ensure maximization of yields (1). Antibiotics increase animal growth efficiency by inhibiting the growth of microbes in the guts thereby enhancing immune response in the host (2). They have been shown to improve the health status of intensively raised animals and to reduce the microbial load in meat that can cause food borne diseases for humans (3). The use of synthetic antibiotics has however been associated with an increasing rise in antimicrobial resistance (AMR). The imposing risk presented by the possibility of cross resistance which may bring about the emergence of multi-dry resistance pathogens which will further limit treatment in both man and animals (4), necessitated the ban on their usage by the European Union since 2006. This has led to search for natural alternatives that can guarantee food safety while providing the same benefits as AGPs (1).

One of such natural alternatives are phytogenic feed additives such as *Chromolaena odorata*, which have had their uses in ethno-medicine for ages. Studies have been done using leaf meals of medicinal plants and there seems to be a growing documentation of their potentials as natural alternatives to AGPs (5). *Chromolaena odorata* is reported to have many properties of pharmacological importance, which is attributable to its strong antioxidant capacity and is said to have antifungal, antiprotozoal, antiadipogenic and antidiabetic activities (6). It contains some bioactive compounds which may affect performance and serum biochemical parameters as well as nutrient utilisation in animals 7, 8). It however contains some anti-nutritional compounds like tannins, cyanide, oxalates, phytate. There is therefore need to ascertain the safe level of administration of this plant as an alternative to synthetic antibiotics. According to (12), serum biochemical responses are used to assess the clinical and physiological responsiveness and well-being of

chickens. This study was aimed at assessing the effect of *Chromolaena odorata* leaf meal on performance and the serum lipid profile of broiler chickens.

## Materials and Method

### Experimental Site

The experiment was conducted at the poultry unit of the livestock farm, Kwara State College of Education, Ilorin, Kwara State, Nigeria. Ilorin is located with coordinates 8° 30′ North and 4° 33′ East; with an annual rainfall of 1185mm and temperature range of 33°C - 37°C. Fresh leaves of *Chromolaena odorata* were collected from the premises of the college air-dried at room temperature, ground into powder and sieved with a plastic sieve before storage. The day old chicks were purchased from Yamfy hatchery, Ilemona, Kwara State, Nigeria. A broiler diet was formulated for the research and used for all the treatments.

**Experimental Design** – two hundred and twenty five day old chicks were assigned to the five treatments of the experiment with three replicates having fifteen birds each on deep litter, in a completely randomised design (CRD).

**Growth Performance** – Parameters (live weight and feed intake) were measured using a digital scale. Feed consumed was calculated by finding the difference between the served and left over feed quantities each day. Body weight was measured weekly and the change determined by subtracting the new from that of the preceding weeks.

**Chemical Analysis** – The proximate composition of the feed and the *Chromolaena odorata* leaf was determined by the method of (9)

**Blood Collection**

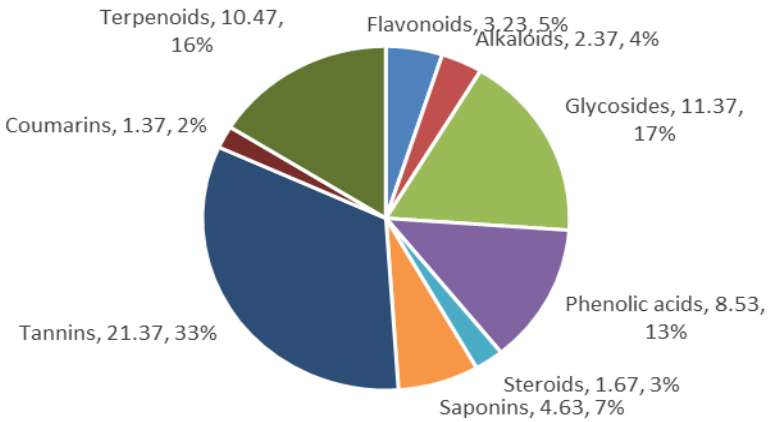
Two (2) birds were randomly selected and fasted twenty-four (24) hours before slaughtering, sample was collected into plain bottles for the serum profile parameters.

**Statistical Analysis** – Data obtained were analysed by one way analysis of variance (ANOVA) Duncan's multiple range test was used to separate the treatments means where differences occurred at $P < 0.05$.

## Results and Discussion

Results of the phytochemical analysis (Figure 1) also showed that the COLM contained antinutritional factors (10), but the better feed conversion ratios obtained with the birds on COLM suggest that the levels of it utilized were within the range below its toxicity level. The results indicate that the levels of COLM given did not adversely affect the livability of the birds, but rather enhanced it. Table 1 shows the mean values for average daily weight gain, average daily feed intake, and feed conversion ratio. There were significant differences across the treatments, the mean values for feed conversion ratio for other treatments were however lower than that of the controls, this may be due to improved digestibility, activation of the immune system (6). *Chromolaena odorata* is said to contain essential oils, and therefore is capable of increasing digestibility of nutrients by stimulating enzyme secretion, and stabilizing the gut microflora (10)

Figure 1: Quantitative Phytochemical Screening of *Chromolaena odorata* leaf




The lower values of tryglycerides in COLM when compared with $T_1$, and $T_2$ must have been of dietary origin or due to other factors as the birds on the treatments had lower indices for serum lipids and therefore lower risks of cardiovascular and other types of diseases associated with hyperlipidemia when compared with those on the controls (10).The values for the controls were higher than those of COLM, LDL and HDL were of similar pattern, thus confirming the antiadipogenic property of COLM as reported by (6). The mean values for serum cholesterol, and LDL were within the normal range recommended by (10) 17, 23.77±5.83–32.47±8.84 mg/dl (≤1.30mg/dl) and 125–200 mg/dl for the LDL and triglycerides, respectively. The AST and ALT levels were significantly decreased in the COLM groups than those of the controls which suggested that the birds were able to tolerate the potency of its phytochemical contents, however the ALT value for $T_5$ was higher than the AST, implying that there would be hepatotoxity leading to liver damage beyond this level of its inclusion. This is in agreement with the findings of (8).

**Table1: Performance Characteristics of Broilers Fed with Graded Levels of *Chromolaena odorata* Leaf Meal**

| | Levels of COLM | | | | | |
|---|---|---|---|---|---|---|
| **Parameters** | T1 (0%) | T2 (OXYYET) | T3 (0.5%) | T3 (1%) | T4 (1.5%) | SEM* |
| Initial body weight (g/bird) | 44.62 | 45.20 | 44.71 | 46.30 | 46.12 | 2.10 |
| Final body weight (g/bird) | 2230$^{d}$ | 2504$^{b}$ | 2625$^{a}$ | 2680$^{a}$ | 2426$^{c}$ | 9.80* |
| Average daily weight gain (g/bird) | 52.03$^{d}$ | 58.54$^{c}$ | 61.44$^{b}$ | 62.70$^{a}$ | 52.52$^{d}$ | 1.24* |
| Average feed intake (g/bird) | 104.06 | 111.23 | 115.51 | 115.99 | 109.90 | 2.20 |
| Feed conversion ratio | 2.00 | 1.90 | 1.88 | 1.85 | 1.91 | 0.09 |

Means with different superscripts on the same row differ significantly (P<0.05), * Significant at P< 0.05

**Table 2: Serum Lipid Parameters of Broilers Fed with *Chromolaena odorata* Leaf Meal (COLM)**

| | Levels of COLM | | | | | |
|---|---|---|---|---|---|---|
| **Parameters** | T1 (0%) | T2 (OXYYET) | T3 (0.5%) | T3 (1%) | T4 (1.5%) | SEM* |
| Triglycerides (mg/dl) | 52.06$^{a}$ | 48.47$^{b}$ | 44.15$^{d}$ | 46.00$^{c}$ | 46.10$^{c}$ | 2.30* |
| Cholesterol (mg/dl) | 117.00$^{a}$ | 100.00$^{b}$ | 79.80$^{c}$ | 81.00$^{c}$ | 81.00$^{c}$ | 3.25* |
| HDL (mg/dl) | 40.18$^{d}$ | 44.10$^{c}$ | 78.37$^{a}$ | 59.00$^{b}$ | 43.78$^{c}$ | 2.32* |

| | | | | | | |
|---|---|---|---|---|---|---|
| LDL (mg/dl) | 29.36 | 28.08 | 29.20 | 29.20 | 28.08 | 0.90 |
| AST (I U/L) | $43.53^{a}$ | $38.64^{b}$ | $21.20^{c}$ | $29.40^{c}$ | $20.98^{c}$ | 0.90* |
| ALT (I U/L) | $36.75^{a}$ | $35.54^{a}$ | $24.64^{c}$ | $24.72^{c}$ | $30.41^{b}$ | 1.75* |

Means with different superscripts on the same row differ significantly (P<0.05), * Significant at P< 0.05, HDL–High density lipoprotein, LDL–Low density lipoprotein, ALT- Alaninine aminotransferase, AST- Aspartate aminotransferase.

**Conclusion and Application**

It can be concluded that the 1.5% COLM as antibiotic growth promoter has potentials for improving feed conversion efficiency of broiler chickens, in terms of improved feed utilisation, and it has hypolipidemic effect. Hence, can be adopted by poultry farmers.

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