# EFFECT OF DIFFERENT LEVELS OF *COSTUS AFER* LEAF AND STEM EXTRACTS ON THE HAEMATOLOGICAL INDICES OF FINISHER BROILER CHICKENS.

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**ABSTRACT**

*A total number of one hundred and twenty (120) 7-day old 'Abor acre' broiler chicks were divided into four groups of 30 birds each. Each group was replicated three times with 10 birds per replicate. The birds were randomly assigned to 0, 5, 10 and 15mL of homogenous Costus afer leaf and stem extracts per litre of drinking water in a completely randomized design (CRD) experiment. The groups were labelled $T_1$ (control), $T_2$, $T_3$ and $T_4$ respectively. Commercial feed and Costus afer leaf and stem extracts were offered ad libitum and the birds were managed under the same experimental conditions for 56days. At the end of the feeding trial, 4mL of blood samples from two birds per replicate were collected for hematological analysis. The result obtained showed that hemoglobin and parked cell volume value for $T_1$ and $T_2$ were similar ($P>0.05$) while $T_1$, $T_3$ and $T_4$ are similar ($P>0.05$). This study concluded that Costus afer extracts in drinking water of finisher broiler chickens recorded an increase in the red blood cell and PCV amongs chicken offered 15mL of the homogenous Costus afer leaf and stem extracts and up to 15mL of the extracts could be added. Also, the ratio of leaf to stem could be altered in the preparation of the extract, while using the same species of birds or using other poultry birds like layers, turkey etc.*

**Keywords: Hematological indices, level of administration, *Costus afer* leaves, *Costus afer* stem, finisher broiler chicken**

## INTRODUCTION

Haematoligical indices are good indicators of the physiological state of animals and changes in them are used in examining the response of such animals to various physiological situations. (Khan and Zafar, 2005). However, changes in hematological indices are usually used to assess stress in animals due to environmental, nutritional or pathological factors (Afolabi *et al*., 2010). It has been reported that recently, local plant materials have been tried as additives in poultry feed to overcome major problems in poultry industry, like environmental effects on digestibility and feed utilization (Adeniji, *et al*., 2021). Recently also, the use of phytogenic feed additive has been adopted either as leaf meal or aqueous extract aimed at improved broiler production. Phytogenic feed additives have attracted increasing interest as an alternative feeding strategy to replace antibiotic and or inorganic growth promoters. This has occurred especially in the European Union, where antibiotic has been banned completely from use as additive in livestock feeds since 2006, because of suspected risk of generating microbiota with increased resistance to the antibiotic used for therapy in human and animals (Windisch *et al*., 2008). Leaf extracts are potent, cheaper and constitute no health issue, in fact, they are often used to nurture the gap between production and food safety (Alagbe *et al*, 2020). Some phytogenic products have been used for many decades as spices, herbs, ethno-veterinary and products derived thereof. *Costus afer* which happens to be the product of interest in this study is one of the known phytogenic materials in Nigeria (Dioka *et al*., 2002).

## MATERIALS AND METHODS

This study was carried out at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Chukwuemeka Odumegwu Ojukwu University (COOU), Igbariam, Anambra State of Nigeria. The bush cane leaves and stem were washed to remove debris, spread out on a mat for 4 hours in order to drain properly under room temperature. The leaves and stem were air-dried in a well-ventilated and clean room, this was to avoid the loss of some important components when

exposed to sunlight especially vitamin C. Thereafter, they were ground into few fine particles using a simple hammer mill. An extract was thereafter made from the ground leaves and stem by hand squeezing with cloth. The extract was sieved and stored in a plastic container and refrigerated until needed for use. A total number of one hundred and twenty (120) 7-day old abor acre broiler chicks were divided into four groups of 30 birds each. Each group was replicated three times with 10 birds per replicate. The birds were randomly assigned to 0, 5, 10 and 15mls of homogenous CALSE per litre of drinking water in a completely randomized design (CRD) experiment. The groups were labelled $T_1$ (control), $T_2$, $T_3$ and $T_4$ respectively. Commercial feed and *Costus afer* leaf and stem extracts were offered ad libitum and the birds were managed under the same experimental conditions for 56days. At the end of the feeding trial, blood samples (4 mL) were collected from two birds per replicate on the last day of the study through marginal wing web vein using sterilized syringe. The assessment of haematological parameters and serum biochemical indices, followed the methods described by Jiwuba *et al.* (2017). 2mL was collected from marginal wing web vein of the birds into labelled sterile universal bottle containing 1.0 mg/mL ethyldiamine tetracetic acid (EDTA) for haematological analysis. Another 2ml was collected into anti-coagulant free bottle. The blood sample was allowed to clot at room temperature and serum separated by centrifuging within three hours of collection. Serum biochemical and haematological parameters were measured using methods outlined by Campbell (1994) and Higgins *et al.* (2008), respectively. Mean cells haemoglobin (MCH), mean cell volume (MCV) and mean cell haemoglobin concentrations (MCHC) were thereafter calculated.

**Table 1: Nutrient Composition of Experimental Diet**

| Parameters | Starter | Finisher |
|---|---|---|
| Metabolizable Energy (Kcal/kg) | 3161.00 | 3202.00 |
| Crude protein (%) | 16.15 | 18.02 |
| Ash/ Mineral (%) | 4.79 | 6.63 |
| Moisture (%) | 6.93 | 7.08 |
| Dry matter (%) | 93.07 | 92.93 |

**RESULTS AND DISCUSSION**

**Table 2: Effect of *Costus afer* leaf and stem extracts on haematological indices of broiler finisher chickens**

| | Level of *Costus afer* leaf and stem extracts (mL) | | | | |
|---|---|---|---|---|---|
| **Parameters** | **$T_1$** **0** | **$T_2$** **5** | **$T_3$** **10** | **$T_4$** **15** | **SEM** |
| Parked Cell Volume (%) | $28.47^{ab}$ | $26.17^{b}$ | $29.93^{a}$ | $29.83^{a}$ | 0.62 |
| Hemoglobin (g/dL) | $10.42^{ab}$ | $9.82^{b}$ | $11.83^{a}$ | $11.53^{a}$ | 0.23 |
| Red Blood Cell ($10^6$/µL) | 2.66 | 2.66 | 2.81 | 2.83 | 0.04 |
| White Blood cell ($10^3$/µL) | 47.50 | 43.17 | 41.83 | 38.17 | 1.95 |
| Lymphocytes ($10^3$/µL) | $24.56^{a}$ | $20.73^{ab}$ | $16.96^{b}$ | $23.72^{ab}$ | 1.27 |
| Mean cell volume (fl) | $106.92^{a}$ | $98.17^{b}$ | $104.64^{ab}$ | $105.24^{ab}$ | 1.49 |
| Mean cell haemoglobin (Pg) | 36.20 | 38.31 | 39.61 | 35.51 | 0.79 |
| MCHC(Pg) | 34.54 | 39.21 | 37.20 | 33.71 | 1.01 |
| Hetrophils ($10^6$/µL) | $14.44^{ab}$ | $14.36^{ab}$ | $19.11^{a}$ | $7.27^{b}$ | 1.74 |
| Eosinophils ($10^3$/µL) | $5.22^{a}$ | $4.01^{ab}$ | $3.22^{b}$ | $3.94^{ab}$ | 0.28 |

abc means with different superscripts within a row are significantly different ($p<0.05$)
SEM = Standard Errors of Mean.

The result showed that parked cell volume values for T3 (29.93%) was superior, closely followed by those in T4 (29.83%) and T1 (28.47%). While the value of packed cell volume was least in T2 (26.17%) respectively. PCV values in this study ranged between 26.17 – 29.93% which falls within the normal range for healthy chicken (Purves *et al*., 2003). Haemoglobin value had the highest value

of 11.83g/dL in T3, which was similar to those in T4 with 11.53g/dL. The lowest value of 9.82g/dL was observed in T2, which differed from those of 10.42g/dl in treatment 1. The findings in White Blood Cell is in agreement with Nwokocha *et al* (2013), who stated that there was steady increase in White Blood Cell count in samples treated with *Costus afer*, which is a sign of better immune system and development. While, the improved PCV from this study aligned with Nwokocha *et al.* (2013), who indicated that there was tremendous improvement in PCV in a mixture of *Costus afer* and *Boerhavia diffusa* in the same period of time, when administered to broiler birds. Packed cell volume (PCV), haemoglobin and mean cell haemoglobin (MCH) are major indices for evaluating circulatory erythrocytes and are significant in the diagnosis of anaemia (Peters *et al*., 2011). While MCV shows that $T_1$, $T_3$ and $T_4$ are similar ($P>0.05$), while results obtained in treatment group $T_2$, $T_3$ and $T_4$ are similar ($P>0.05$). Results obtained from lymphocytes and easimophils showed that $T_1$ which serves as the control recorded significantly ($P<0.05$) higher lymphocytes and easimophils as compared to other treatment groups but similar ($P>0.05$) to $T_2$ and $T_4$. Results obtained in MCH, Monocytes, MCHC, RBC and WBC showed that there was no significant ($P>0.05$) difference in all the treatment groups.

## CONCLUSION

Administration of *Costus afer* leaves and stem extracts up to 15mls in the drinking water of finisher broiler chickens did not cause any deleterious effect rather it improved red blood cells counts and Packed cell volume of the chickens.

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