**A**

**RESEARCH PROPOSAL**

**ON THE TOPIC:**

**EFFECT OF GINGER (*Zingiber officinale*) LEAF ON THE HAEMATOLOGY, SERUM AND LIPID PROFILE OF BROILER CHICKEN**

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**CHAPTER ONE**

**INTRODUCTION**

* 1. **Background of the Study**

The need for poultry meat is on the increase both locally and internationally, and to meet the increasing demand, most commercial poultry enterprise operates using an intensive system of production (Oso *et al*., 2021). The intensive system which ensures and sustains high feed efficiency of poultry, however, is highly challenged with various infections and high feed cost which may be devastating, and huge losses may be incurred (Carrasco *et al*., 2019). Conventionally used condiments usually called antibiotic growth promoters (AGPs) are used for combating various infections experienced in poultry production. Doses of these growth promoters also improved feed utilization efficiency with resultant improved growth and increased economic returns (Suresh *et al*., 2018). However, consequent harmful residual effects on consumers involving transmission of antibiotic resistant bacteria and transfer of zoonotic infections are issues of concern discouraging its use in poultry production (Durairajan *et al*., 2021). To confront these threats, alternatives to antibiotics collectively called phytogenics are being explored which include medicinal plants and their products, plant extracts and essential oils of plants/parts of plants and plant extracts which are capable of positively influencing performance and immune status of birds without adverse effect on animal and final consumers (Karangiya *et al*., 2016; Alloui *et al*., 2014). Phytobiotics, also called phytogenic feed additives (PFA) are plant derived products added to feed in order to enhance the performance of livestock through the improvement of digestibility, nutrient absorption and elimination of pathogens residents in the animal gut (Borgohain *et al*., 2019). There is an increase in the use of phytogenics in recent times as feed supplements in poultry production and this has attracted much attention due to the inherent beneficial properties of the plants (Abou-Elkhair *et al*., 2014; Paraskeuas *et al*., 2017). Recent consumers' expectations in relation to food quality, have led to increasing use plant feed additives by poultry producers. Ginger belong to this class of phytogenic plants which are natural growth promoters that are suitable alternatives to feed antibiotics. In addition, these herbal plants are locally accessible and available in adequate quantity (Gbenga *et al*., 2009). Gingerols, gingerdiol and gingerdione as a constituent of ginger has the ability to exhibit digestive enzyme stimulation and antimicrobial activity (Dieumou *et al*., 2009). The positive effects of these feed supplements on broiler performance, carcass characteristics and meat quality have been demonstrated (Schleicher *et al*., 1998). Evidence also showed that gram positive and gram negative food-borne bacteria, yeast and mould could be inhibited by garlic, onion, cinnamon, cloves, thyme and other spices (Smith-Palmer *et al*., 1998). PFA, such as ginger (*Zingiber officinale Roscoe*) has been reported to prevent accumulation of lipids including neutral fats and cholesterol (Bamidele and Adejumo, 2012). The rhizome of *Zingiber officinale* is consumed as a delicacy, medicine, or spice (David, 2009). Ginger contains several bioactive components that has antioxidant, anti-inflammatory, anticarcinogenic and antibacterial properties (Sudrashan *et al*., 2010; Minghetti *et al*., 2007). Although Zhao *et al*. (2011) reported that feed intake and feed conversion ratio did not differ among laying hens fed dried ginger at 5, 10, 15 and 20g/kg inclusion levels, Onu (2010) found that 0.25% inclusion of ginger in broiler diets improved feed conversion ratio although feed intake did not change. Broilers fed diets containing ginger produced higher carcass weights, higher dressing percentages and improved carcass quality (Zhang *et al*., 2009). Total cholesterol, low density lipoprotein (LDL) cholesterol and very low density lipoprotein (VLDL) cholesterol decreased significantly (P<0.05) in broilers fed aqueous ginger extract, while, high density lipoprotein (HDL) cholesterol concentration increased (Saeid *et al.*, 2010). E-8 â, 17-epoxylabd-12-ene-15, 16-dial isolated from ginger, has been reported to inhibit cholesterol biosynthesis in homogenated rat liver (Tanabe *et al*., 1993). Reduction of total fat and cholesterol contents and alteration of the lipid profile to a more unsaturated kind were methods for improving the quality of meat health-wise (WHO and FAO, 2003). Achieving this through dietary inclusion of naturally occurring herbs would be a cheap and safe strategy, and amenable to adoption by poultry farmers, hence, the need to evaluate the efficacy of ginger leaf on broilers hematology, serum and lipid profile.

* 1. **Problem Statement**

Poultry production is highly challenged with various infections and high feed cost which may be devastating, and huge losses may be incurred (Carrasco *et al*., 2019). Conventionally, the use of antibiotic growth promoters (AGPs) are used for combating various infections experienced in poultry production (Murugesan *et al*., 2015). Doses of these growth promoters also improved feed utilization efficiency with resultant improved growth and increased economic returns (Suresh *et al*., 2018). However, consequent harmful residual effects on consumers involving transmission of antibiotic resistant bacteria and transfer of zoonotic infections are issues of concern discouraging its use in poultry production (Durairajan *et al*., 2021). Consequently, feed cost is still disadvantageous, hence the need to reconcile the challenge of high feed cost as it constitutes more than 60% of poultry production which will facilitate increased poultry production and safe meat consumption.

* 1. **Justification of the Study**

In general, the need to meet chicken demand for the increasing populace, it is paramount to lower cost of animal feed taking into considerations of consumers’ safety. The use of plant extracts has been examined for this reason. Several studies suggest that plants rich in antioxidants, for example, play a protective role in health and against diseases, and their consumption lowers health risks, hence enhance feed efficiency. The potential of these medicinal plants may be related to the concentration of phenolic substances (flavonoids, hydrolyzable tannins, proanthocyanidins, phenolic acids, phenolic terpenes) and some vitamins (E, C, and A). The advent of phytogenic feed additives such as herbs and spices particularly in poultry production improved flavor and palatability, thereby enhancing productive performance. Today herbs and spices are extensively studied because of their potent properties and used as alternative non-antibiotic growth promoters. Ginger (*Zingiber officinale*), a widely used herb and food spice is a major constituent of most Nigerian cuisine. Ginger are natural growth promoters and a suitable alternative to feed antibiotics. In addition, these herbal plants are locally accessible and available in adequate quantity (Gbenga *et al*., 2009). The medicinal value of ginger has been linked to its antioxidant potential that arises from the oleoresins which are present in it. The oleoresins in ginger have also been credited for various pharmacological effects such as antimicrobial, anti-inflammatory, antioxidant, anti-hypercholesterolemic, anti-hyperglycemic, and antispasmodic. The positive effects of these feed supplements on broiler performance, carcass characteristics and meat quality have been demonstrated (Schleicher *et al*., 1998; Abou-Elkhair *et al*., 2014; Paraskeuas *et al*., 2017). Hence, there is need to evaluate the efficacy of ginger leaf on the haematology, serum and lipid profile of broilers for increased production and safe consumption. The results of haematology and serum analysis are usually used to assess the health status of an animal. Haematological and serum biochemistry parameters are good indicators of the physiological status of animals and their changes are important in assessing the response of such animals to various physiological situations. Furthermore, changes in haematological parameters are often used to assess stress in animals due to environmental, nutritional and/or pathological factors. One of the health-promoting effects of phytochemicals from plants is thought to arise from their protective effects of counteracting reactive oxygen species, as well as their antimicrobial action, hence the need for this study.

**1.4 Objectives of the Study**

The objective of this study will be to;

* evaluate the hematological parameters of broilers fed diets containing varying levels of ginger (*Zingiber officinale*) leaf extracts.
* evaluate the serum and lipid profile of broilers fed diets containing varying levels of ginger (*Zingiber officinale*) leaf extracts.

**CHAPTER THREE**

**MATERIALS AND METHODS**

**3.1 Experimental Site**

The experiment will be conducted at the poultry Research unit of the Department of Animal Science, Akwa Ibom State University, Obio Akpa Campus, Oruk Anam Local Government Area, Akwa Ibom State. The area lies between latitude 4030’N and 50 00’N and longitudes 700 30’E and 800 00’E. The climate of the experimental site is a tropical rain forest characterized with high temperature (average of 300C), high rainfall (about 1500mm) and relative humidity of 70% on average (SLUS-AK, 1989).

**3.2 Experimental materials sourcing and processing**

Leaves of ginger (*Zingiber officinale*) will be sourced around the university campus. The leaves will be air dried for 24 hours before being chopped into smaller sizes and mixed as supplement in the diet at varied levels.

**3.3 Purchase and Management of Experimental Birds**

A total of one hundred (100) day-old broiler chicks will be used for the experiment. The chicks will be purchased from a hatchery agent; Brilliance Livestock Enterprise in Abak Local Government Area, Akwa Ibom State. The brooding of the birds at the first two weeks will be done at a temperature of 32-35oC to enable feather development by providing adequate heat source. The birds will be managed intensively using deep litter system. Wood shavings will be used as litter material. Feed and water will be provided ad-libitum. The chicks will be vaccinated against the most common diseases such as; Newcastle Disease and Infectious Bursal Disease (Gomboro). They will be acclimatized for one (1) week before the commencement of the experiment.

**3.4 Experimental Design**

On day fourteen (14), the birds will be weighed to obtain their initial weights and divided into four (4) treatment groups. Each treatment group will further be replicated thrice and each replicate having about eight (8) birds each. Completely randomized design (CRD) will be employed for this experiment. Each group will be supplied one of the five experimental starter diets for twenty-one (21) days and experimental broiler finisher diet will be supplied from day 22 to day 42. The treatments will be as follows:

Group one: Basal diet only (control)

Group two: Basal diet + GLE (Ginger leaf extract) at 2% inclusion level in-feed

Group three: Basal diet + GLE (Ginger leaf extract) at 4% inclusion level in-feed

Group four: Basal diet + GLE (Ginger leaf extract) at 6% inclusion level in-feed

The birds will be administered these treatments for six (6) weeks and data will be collected during the course of the feeding trial.

**3.5 Proximate analysis of test materials**

Sample of the leaf meals will be taken to the laboratory for proximate analysis according to methods described by AOAC (2003).

**3.6 Data Collection**

At the end of the feeding trial, 3 birds will be selected at random from each treatment, tagged and kept in separate slaughter pens. They will be starved (of feed) for 12 hours (overnight) with unlimited access to water. Thereafter, they will be weighed and sacrificed by severing the carotid arteries. Blood samples will be collected individually into ethylene diamine-tetra acetic acid (EDTA) treated bottles for the estimation of haematological parameters and another set of blood samples will be collected into bottles without anticoagulant for determination of serum lipid profile.

Haematological parameters will include; packed cell volume (PCV), red blood cell count (RBC), white blood cell (WBC), haemoglobin, mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC) and platelets while serum and lipid profile parameters will include; Albumin (g/dl), Total protein (g/dl), Glucose (g/dl), AST (g/dl), ALT (g/dl), Triglyceride (g/dl), cholesterol (g/dl), HDL (g/dl), LDL (g/dl), Globulin (g/dl).

**3.7 Data analysis**

All data collected will be subjected to Analysis of Variance (ANOVA) procedure of Statistical Package for Social Sciences (SPSS 2007). Significant differences will be separated using Duncan’s Multiple Range test at 5% probability level (Duncan 1955).

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