Performance of Broilers fed graded levels of Basil leaf (*Ocimum gratissimum*) as supplement in finisher diet

Ogunleye A. J.

Department of Agricultural Education, Kwara State College Of Education, Oro, Kwara State

ABSTRACT

Poultry production in Nigeria depend largely on the use of synthetic drugs to prevent or control disease in flocks; these drugs often deposit some chemical residues in their carcasses which when consumed are subsequently deposited into man and pose health risks. These have led to a global campaign by many nations against their use to protect the health of their people, and promotion given to organically produced poultry products. Some of the herb used by man for curing different ailments is the *Ocimum gratissimum* (OCG) which could be adapted as an alternative to drugs in poultry management. One hundred and eighty, 3 weeks old broilers were randomly divided into five dietary treatments with three replicate each at twelve birds per replicate. Different levels of OCG leaf supplementation were investigated and compared with Coccidiostat addition and a control in finisher feeds for broilers. The performance parameters investigated were feed intake, body weight gain, feed conversion efficiency, and mortality. A completely randomized design was used for the experiment that lasted for 12 weeks. Results showed that the supplementation of OCG leaves at the levels used significantly reduced feed intake of broilers, they were however observed to utilize nutrients in their feed better than the other treatments ($p<0.05$). OCG supplemented feed significantly reduced mortality due to coccidiosis ($p<0.05$). This suggests an efficiency of OCG leaves in the suppression or control of some diseases in poultry such as Coccidiosis. Small-scale poultry farmers in rural or suburban areas are advised to pursue intensive cultivation of OCG for the purpose of using its leaves as an alternative to the use of synthetic drugs in organic poultry production in Nigeria.

KEY WORDS: *Ocium gratissimum,* (OCG), OCG leaves, broiler finishers, coccidiosis.

Corresponding author: ogunleyejulius60@gmail.com

INTRODUCTION:

Poultry production have played a significant role in the livestock sector of Nigerian economy (Nworgu, 2006), although the consumption of high quality animal protein foods in developing countries of the world is limited to 30-40% of the people (Nworgu, 2004). The high cost of production of poultry and products through feeds and drug administration have made them less affordable to most people. Efforts have been made in areas of reducing feed costs through using of unconventional feed stuff that are cheaply available so also is recent trends in organic livestock production that place emphasis on use of leaves, roots, and seed of plants to prevent or control disease in livestock instead of the use of synthetic drugs. However, this does not remove one of the potential challenges to the adoption of organic poultry farming in Nigeria that has to do with Disease prevention and control/Flock health management (Adedeji *et al*., 2013).

Performances of poultry are generally affected by the presence of microorganisms that naturally inhabit their digestive tract (Dendi *et al*, 2003; Ndelekwute, 2011). It is therefore important to formulate diets for its effect on gut health and function. Antibiotics have been used as feed additives for this purpose at sub-therapeutic doses in poultry diets (Enerberg *et al*, 2000). These antibiotics work against pathogens in the gut by creating a conducive environment for protein and energy digestion, absorption, and metabolism (Puyalto and Mesia, 2002). However, good performance of such birds produce negative effects such as host and cross drug resistance and almost all chemicals deliberately or not deliberately administered to animals in the conventional poultry production systems results in some trace residue remaining in the meat (Gracey and Collins, 1992; Al-Harthi, 2006). This phenomenon presents a real public health challenges globally and has led to the ban of these products by many countries of the world (Cardazo *et al*, 2004; Kehinde *et al*, 2011). This development has encouraged interests in the search for plant materials and their derivatives as alternatives to be incorporated into animal feeds (Odoemelam *et al*, 2013). Adedeji *et al*, (2012) asserted that poultry production in the rural and commercial settings stand chances of tremendous boost through the use of ethnoveterinary medicine, considering the vast biodiversity of Africa.

The traditional African way of rearing poultry originally uses less of synthetic drugs, although such birds raised are hardy in nature, there is therefore the need for the use of traditional veterinary knowledge of local African farmers as a basis for the development of organic alternatives of poultry production. ICS-UNIDO (2004) reported that about 80% of Africans relies on this ethnotheraphy for meeting health care needs of the people. This knowledge can therefore be of use in modern day organic poultry production.

Some of these useful herbs and spices naturally grow in Africa and have been reported to improve nutrient utilization and performance of broiler chickens (Dendi *et al*, 2003; Windisch *et al*, 2007; Carrijo *et al*, 2005, Odoemelam *et al*, 2012). Examples include Garlic *(Alium salivium),* Black pepper *(Piper nigrum),* basil or scent leaf *(Ocimum gratissimum),* mistletoe *(Viscum album),* water plantain *(Alismacan aliculatum),* chicory *(Chicorium intybus),* 'ugu' *(Telfararia occidentalis leaf meal),* bitter leaf *(Vernonia amygdalina),* and many others.

Ocimum gratissimum is commonly referred to as basil or scent leaf. In Nigeria, the plant is called 'efinrin' by the Yorubas, 'nchanwu' by the Igbos and 'daidoya' by the Hausas (Salami and Georgia, 2013). The plant belongs to the family Labiaceae, it is a well branched fragrant erect small herbaceous wood perennial with dicot features; leaves are lime green, it is pantropical and widely naturalized in many regions (Unabugwu, 2010). Its leaf and the whole herb are popularly used for colds and fever in man (Dalziel, 1956; Sofowora, 1993). The fresh leaves could be chopped or grinded and boiled or cooked as soup and eaten by man, this is considered to be of health benefit (Gabriel, 2017).

MATERIALS AND METHODS

Research site: The research was carried out at the poultry unit of the livestock farm, department of Agricultural Education, Kwara State College of Education, Oro, Irepodun LGA, Kwara State, Nigeria.

Collection and processing of OCG leaves: Fresh leaves of OCG were harvested from the wild within the Oro communities between August and September, washed in salt-water solution to remove dirt from dust, eggs, and nymphs of insects, acarides and of other terrestrial arthropods. The salt-water solution was allowed to drain properly before it is chopped into pieces with knife, wilted at room temperature for 24 hours to maintain its green colour before mixing with the base feeds. The treatment diets were kept in a cool and dry environment.

Feed ingredients and treatments: The feed ingredients for both the starter and finisher feeds were purchased from a reputable feeds mill in Ilorin and the formulated feeds were according to the Nutrient Requirement of poultry (NRC, 1994).

Collection of day old broilers and management: 3-weeks old (21 days) one hundred and eighty broilers of mixed sexes, from a group of broilers collected at day old from a reputable hatchery in Kwara State and collectively raised on a deep litter with the same broiler starter were used for this research. The birds have been challenged with poultry pathogens at 14 days through contaminated litter materials and drinking water and infection have been confirmed but not at virulent level. Several precautions were taken to prevent inadvertent transfer of materials such as litter between pens during the experimental periods. The birds were randomly assigned to a five treatment diets in a completely randomized design (CRD), each treatment was replicated three times with twelve birds per replicate, all the five treatments were fed similar broiler finisher diets but with or without OCG supplements at 3 levels of 2 kg, 1.5 kg and 1 kg, 120 g Coccidiostat each in 100 kg of finisher diet and the control diet without the OCG or Coccidiostat. One week of feed trial and adjustment was allowed for the birds in each treatment. The birds were fed ad-libitum and were sufficiently supplied with cool, clean, and fresh water throughout the period of the research. Data on feed intake, weight gain and feed conversion efficiency were taken for eight weeks. The test statistics was a one way analysis of variance (Steel and Torrie, 1980) and means separated using Duncan's multiple range test (Duncan, 1995). All post mortem examinations were carried out at the Veterinary Department of Kwara State Ministry of Agriculture and Natural Resources, Ilorin.

RESULTS

Table 1: The ingredients and composition of broiler starter mash.

Ingredients	**Kg/100 kg.**
Yellow maize	50
Wheat offal	8
Corn Bran	12
Soya bean Meal	12
Groundnut Cake	7.5
Blood meal	5
Fish meal	2
Bone meal	2
Oyster shell	0.5
Lysine	0.25
DL Methionine	0.25
Salt	0.25
Broiler premix	0.25
Total	**100**

Table 2: The ingredients and composition of broiler finisher and supplementation level of OCG or Coccidiostat in treatment

Ingredients	**Treatments**				
	I **Kg/100 kg**	**II** **Kg/100 kg**	**III** **Kg/100 kg**	**IV** **Kg/100 kg**	**V** **Kg/100 kg**
Yellow maize	54	54	54	54	54
Wheat offal	8	8	8	8	8
Corn Bran	10	10	10	10	10
Soya bean Meal	12	12	12	12	12
Groundnut Cake	5.5	5.5	5.5	5.5	5.5
Blood meal	5	5	5	5	5
Fish meal	2	2	2	2	2
Bone meal	2	2	2	2	2
Oyster shell	0.5	0.5	0.5	0.5	0.5
Lysine	0.25	0.25	0.25	0.25	0.25
DL Methionine	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Broiler premix	0.25	0.25	0.25	0.25	0.25
	100	**100**	**100**	**100**	**100**
OCG supplementation or Coccidiostat added	**2 kg**	**1.5 kg**	**1.0 kg**	**120 g** (manufacturers recommendation)	**-**

Table 3: Calculated proximate nutrient content of starter and finisher feeds minus the supplement or additive.

Nutrient	Starter mash	Finisher mash
Dry mater	90.1	89.9
Crude protein	21.10	20.3
Ether extract	3.84	3.78
Crude fibre	4.01	3.83
Ash	5.38	5.39
Nitrogen free extract	55.77	56.60
Calcium	1.06	1.06
Phosphorus	0.67	0.67
Lysine	1:01	1.01
DL Methionine	0.95	0.95
Metabolisable Energy (Kcal/Kg)	2887.30	2921.86

Table 4: Performance of Broilers on treatments

	TREATMENTS					
BODY WEIGHT	**I**	**II**	**III**	**IV**	**V (CONTROL)**	**SEM.**
AIBW (Kg)	0.84	0.87	0.90	0.78	1.08	0.03
AFBW (Kg)	4.63	4.71	4.58	4.69	4.80	0.35
ABW G(Kg)	3.79^{ab}	3.84^{ab}	3.68^{a}	3.91^{b}	3.72^{ab}	0.22
ATF I (Kg)	7.09^{a}	6.80^{a}	7.10^{a}	7.82^{b}	7.85^{b}	0.56
FCE (ratio)	1.87^{ab}	1.77^{a}	1.93^{b}	2.0^{b}	2.11^{b}	0.25
Mortality (%)	0.00^{a}	0.00^{a}	3.33^{a}	0.00^{a}	16.6^{b}	6.5

AIBW= Average Initial body Weight at 21 days.
AFBW= Average Final Body Weight at 84 days
ABWG= Average Body Weight Gain
ATFI= Average Total Feed Intake
FCE= Feed Conversion Efficiency

DISCUSSION

The broiler starter and finishers formulated shows on the Table 3 to be adequate for the class of bird as the calorie/protein ratio was 136.8:1 for the starter mash and 143.9:1 for the finisher, the higher calorie in the finisher feed is expected for its higher demand for a more rapid weight gain that is experienced at this period as a result of the high crude protein content. The calcium and phosphorus required for bones and cartilage formation were also balanced to prevent any deficiency of both minerals. This supports feed formulations for broilers based on body requirement for fast growth (Dariusz *et al*, 2011, Christopher *et al*, 2007).

The supplementation of OCG in the feeds reduced the feed intake significantly ($p<0.05$) as higher feed intakes were recorded for the control and treatment IV (with Coccidiostat additive). This could be that OCG intake enhanced better utilization of energy and protein in feed and this became evident as the treatment with supplemented OCG recorded the least FCE, this was significant ($p<0.05$) for treatment II. The highest average final body weight of broilers was obtained for the control treatment while the least was obtained for treatment III, the resultant average body weight gain for the five treatments were significantly ($p<0.05$) different with the highest obtained for treatment IV. The average total feed intake was highest for treatment IV and control and were observed to be significantly ($p<0.05$) different from treatments I, II, and III.

Treatment II however gave the best-feed conversion ratio followed by treatment I. The least FCE obtained for treatment II was significantly ($p<0.05$) better than other treatments. Similar observations were recorded on Total Feed intake, Total weight gain and feed conversion ratio when experimented diets were supplemented with *Amaranthus esculentus, Talinum triangularae and cellocia esculentus* leaves (Adedeji, 2013). The 16.6% mortality of birds on control treatment was significantly higher than the rest treatments, addition of OCG in the broiler finishers prevented or controlled disease infection of the birds effectively as the treatment with Coccidiostat. *Ocimum gratissimum* have been investigated and reported to have medicinal properties (Agomo, 1992). The presence of eugenol in OCG leaves shows some evidence of antibacterial activity (Celsso *et al,* 2002), the leaves have antihelmintic activity, relax muscles of the small intestine disorders, and prevents diarrhea (Pessoa *et al,* 2002; Socorro *et al,* 2002; Offiah and Chikwendu, 1999). Doses of extracts of the leaves are reported to have controlled coccidia infection in broiler chicks (Onwurah *et al.,* 2011). The symptoms of coccidian infection which causes coccidiosis in poultry as confirmed through post mortem are bloody diarrhea, watery diarrhea, ruffled feathers, huddling, lack of appetite and presence of oxysts or protozoan eggs in fecal sample, presence of lessions on intestinal tract, white patches (Linden 2015). The significantly ($p<0.05$) higher mortality recorded for the control could be due to the absence of OCG or Coccidiostat.

CONCLUSION

Supplementation of broiler feeds with OCG at the levels under study led to reduced feed intake of birds.OCG supplementation at 2 kg & 1.5 kg in 100 kg broiler finisher enhance body weight gain that is not significantly different from the ones with conventional Coccidiostat. The leaves at all the levels used may prevent or control Coccidiosis in poultry and hence reduce mortality due to pathogens that causes the disease. Birds fed OCG supplemented feeds have better FCE than those obtained for other treatments.

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