

PHYTOGENIC FEED ADDITIVES INFLUENCE ON CARCASS AND INTERNAL ORGAN OF BROILER CHICKENS

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ABSTRACT

This study assessed the effect of phytogetic feed additives of cinnamon, ginger root and *Moringa* leaf meal on the carcass and internal organs of broiler chickens. A basal diet divided into 4 portions, designated : diet 1 (the control), diets 2, 3 and 4 supplemented with 0.2% cinnamon, 0.2% ginger root and 0.2% *Moringa* leaf meal, respectively. A total number of one hundred and twelve (112) day-old broiler chicks were randomly assigned to the four experimental diets (28birds/diet; 7birds per replicate) using a Completely Randomized Design. At the end of the 56th day. The selected slaughtered experimental birds were defeathered, dressed and weighed. Thereafter the carcass and the internal organs were expressed as a percentage of a live-weight. The live weight, slaughtered weight, and eviscerated weight of birds fed diet 4 (*Moringa* leaf meal) were significantly ($P<0.05$) higher compared to the control diet, cinnamon and ginger root.

The internal organs were not significantly ($P>0.05$) affected by the phytogetic supplements .

The 0.2% *Moringa* leaf meal dietary supplement improved the liveweight, slaughtered weight, dressed weight and eviscerated weight of the broiler chickens. In this study 0.2% *Moringa* leaf meal is hereby recommended.

Keywords: Broilers, carcass, internal organs, phytogetics, antibiotics

INTRODUCTION

Poultry production is the most widespread of all animal operations, it is a key pillar of improving food security as well as socio-cultural and economic development in the majority of countries (Alders, 2005; Dieye *et al.*, 2010). Poultry farming contributes considerably to the global economy by delivering food and wealth while also creating employment for the world's rising population (Alders *et al.*, 2019). Antibiotics have been used to stimulate growth and to prevent illness outbreaks (Phillips *et al.*, 2004). Antibiotic growth promoting factors (AGP) used at sub-therapeutic levels for long periods of time led in the development of antimicrobial resistance in bacteria. Antimicrobial growth promoters were banned in Europe due to the development of antimicrobial resistance and the transmission of resistance genes from animals to humans. Concerns over the spread of antibiotic-resistant germs from birds to people prompted the ban of antibiotics growth promoters (AGPs) and the following search for replacements. The unrestricted use of antibiotic growth promoters in feed endangers the development of antibiotic resistance in humans. It has become a serious issue in the broiler meat and egg industries. As a result, poultry nutritionist have shifted their focus to non-antibiotic growth promoters in feed, particularly plant-derived chemicals called phytogetics (Applegate *et al.*, 2010).

Phytogetic feed additives or plant extracts are gaining favor in the feed business as potential natural alternatives to antibiotic growth promoters since they are thought to be safer, healthier, and have less side effects. These phytogetic additions are a diverse set of feed additives derived from the leaves, roots, tubers, or fruits of herbs, spices, and other plants. They are available as solids, dried and powdered, extracts, or essential oils. This type of feed additive has lately acquired popularity, particularly for usage in poultry, with promising results in terms of growth performance and immunological response (Jamroz *et al.*, 2006). Broilers given phytogetic supplements singly or in combination have showed enhanced growth performance, feed intake, and feed conversion ratio (Ertas *et al.*, 2005). Phytogetic feed additives are usually accepted as natural feed additives that are safe for animals. However, the findings of investigations on the utilization of Phytogetic feed additives in broiler nutrition are inconclusive (Windisch *et al.*, 2008). Furthermore, the method of action of these compounds is not entirely understood, and in vivo research is restricted. Plant extracts have been demonstrated to alter digestion and digestive enzyme production (Williams and Losa, 2001), to boost micronutrient absorption (Usha *et al.*, 2010), and to have antibacterial, antiviral, and

antioxidant properties (Brenes and Roura, 2010). The aim of this study is to determine the effect of phytogetic supplements on carcass and internal organs of broiler chickens.

MATERIALS AND METHODS

Location and experimental site

The study was carried out at the Poultry Unit of Teaching and Research farm Department of Agricultural Technology, The Federal Polytechnic Ado, Ekiti state, Nigeria. The state is located in South Western part of the country, Ekiti State covers a land area of 6353km square (2453sqm) with a population estimated in 2005 to be 2737,186.

Site preparation

The poultry house was thoroughly washed, fumigated with disinfectant. The poultry house was allowed to stay and dried for two weeks before the arrival of the experimental birds, proper weeding of the surrounding was carried out to prevent predators and pests.

Experimental animals

A total number of one hundred and twelve (112) birds of commercial breed were used in this experiment. There were four treatments and four replicates per treatment. Seven (7) birds were allotted per replicates amounting (28) birds per treatment. Normal medications and vaccinations were given to the experimental birds.

Test ingredients

The test ingredients Cinnamon (*Cinnamomum Zeylanicum*) and Ginger root (*Zingiber officinale*) used were gotten from a local market in Ado Ekiti while Moringa leaf meal (*Moringa oleifera*) were harvested within the premises of The Federal Polytechnic Ado Ekiti, Ginger root was sliced, shade-dried for 10 days, while *Moringa* leaf meal was air-dried for a period of 7 days in order to reduce the moisture content. They were milled into fine particles and used to formulate the diets.

Management of experimental birds

A broiler chicken's basal diet each was prepared for the starter phase (0 to 28day) and finisher phase (29-56day) to meet the requirements of the birds (NRC, 1994). At each of the phases the basal diet was divided into four equal portions and designated to Diets 1 to 4. Diet 1 was the control while diets 2, 3 and 4 were supplemented with 0.2% of cinnamon powder, 0.2% ginger root and 0.2% *Moringa oleifera* leafmeal. One hundred and twelve (112) one-day old broiler chicks were randomly assigned to four experimental diets (28 birds per diet; 7 birds per replicate) using a Completely Randomized Design (CRD). The birds were raised on wire mesh.

Table 1 Composition of Experimental Diets (g/100kg) for Broiler Starter

Ingredients	T1	T2	T3	T4
Maize	53	53	53	53
Soybean meal (SBM)	22	22	22	22
Groundnut cake (GNS)	16	16	16	16
Fish meal	2	2	2	2
Bone meal	3	3	3	3
Limestone	2	2	2	2
Premix	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Oil	1	1	1	1
Total	100	100	100	100
Calculated composition				
Metabolizable				
Energy	2980	2980	2980	2980
Crude protein	23.4	23.4	23.4	23.4
Average calcium	1.99	1.99	1.99	1.99
Average				

Phosphorous	0.69	0.69	0.69	0.69
Lysine	1.33	1.33	1.33	1.33
Methionine	0.60	0.60	0.60	0.60

Table 2 Composition of Experimental Diets (g/100kg) for broiler finisher diets

Ingredients	T1	T2	T3	T4
Maize	58	58	58	58
Soybean meal (SBM)	22	22	22	22
Groundnut Cake (GNC)	11	11	11	11
Fish meal	2	2	2	2
Bone meal	3	3	3	3
Limestone	2	2	2	2
Premix	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Oil	1	1	1	1
Total	100	100	100	100
Calculated composition				
Crude protein	19.86	19.86	19.86	19.86
Metabolizable Energy	3019.7	3019.7	3019.7	3019.7
Calcium	1.98	1.98	1.98	1.98
Average				
phosphorous	0.68	0.68	0.68	0.68
Lysine	1.27	1.27	1.27	1.27
Methionine	0.58	0.58	0.58	0.58

DATA COLLECTION

The selected slaughtered experimental birds were defeathered, dressed and weighed. After that, the dressed percentage was expressed as a percentage of a slaughtered weight. The internal organs (liver, heart, lung, pancreas, gallbladder, gizzard, and proventriculus, and the spleen) were carefully excised, wiped clean with tissue paper and weighed with a sensitive scale. The relative internal organ weight was expressed as a percentage of the bird's live-weight. Following slaughtering, the carcasses were scalded at 50°C in a water bath.

Statistical analysis

All data collected in this study were subjected to Analysis of Variance using SPSS. Duncan's Multiple Range test of one-way ANOVA was used to analyze the mean differences of the same parameter. Significant differences were considered where necessary at a level of ($P > 0.05$).

Results and Discussion

Results

The Live weight, slaughtered weight, and eviscerated weight of birds fed diet 4 (Moringa leaf meal) were significantly ($P < 0.05$) higher compared to the control diet, cinnamon and ginger root.

The inter organs spleen, pancreas, lungs were significantly affected ($P < 0.05$) by the phytogetic supplements.

Table 3: The effect of phytogetic supplements on carcass analysis and internal organs

Parameters	Control diet	Diet 2	Diet 3	Diet 4	±SE M	P-Value
Live weight (g)	1572.50 ^{ab}	1701.00 ^{ab}	1481.50 ^{ab}	1950.51 ^a	77.48	0.15
Slaughtered weight (g)	96.72 ^b	96.44 ^b	96.69 ^a	98.34 ^a	0.29	0.04
Dressed weight (%)	93.63	92.28	92.11	94.02	0.41	0.27

Eviscerated weight (%)	73.73 ^{ab}	71.84 ^{bc}	70.05 ^c	75.63 ^a	0.72	0.01
Liver (%)	2.77	2.34	2.34	2.39	0.09	0.28
Kidney (%)	0.81	0.79	0.79	0.78	0.08	0.12
Heart (%)	0.42	0.40	0.40	0.42	0.02	0.62
Spleen (%)	0.18 ^b	0.16 ^a	0.14 ^c	0.15 ^{bc}	0.01	0.11
Pancreas (%)	0.27 ^a	0.26 ^{ab}	0.27 ^a	0.2 ^b	0.01	0.06
Lungs (%)	0.61 ^a	0.62 ^{ab}	0.61 ^b	0.62 ^a	0.01	0.12
Proventriculus (%)	0.42	0.43	0.44	0.43	0.01	0.67
Abdominal fat (%)	1.11	1.13	1.15	1.13	0.01	0.06
Gallbladder (%)	0.14	0.15	0.13	0.13	0.02	0.11
Bursal Fabricus (%)	0.06	0.07	0.06	0.06	0.01	0.01
Gizzard (%)	2.25	2.21	2.39	1.49	0.19	0.37

^{a,b} means in the same row with different superscripts are significantly ($p < 0.05$) different; SEM: standard error of the mean. Expressed in percentage liveweight.

DISCUSSION

The improved live weight, slaughtered weight, eviscerated weight recorded for the birds fed *Moringa* leaf meal supplements diet in this study agreed with the earlier report that supplementation of broiler chickens diet with phytochemical such as lemon balm, cinnamon, spices improve the carcass weight and dressed weight percentage (Valenzuela - Gryalva *et al.*, 2017). This suggests that the phytochemical supplements used in this study have phyto constituent or bioactive compound that played a positive role on carcass. (Valenzuela -Grijalva *et al.*, 2017). These plant based compound have a similar structure with the natural animal hormones. They could interact with BETA- adrenergic receptor against to modulate animal metabolism by increasing lipolysis and protein synthesis and by decreasing lipogenesis (Dominguez - viral *et al.*, 2009) There was decrease in the values of spleen, pancreas and lungs of birds on diets 2,3 and 4 when compared with the values recorded for birds on control diet. This has been reported as a possible response of their internal organ to toxin in the diet. (Ayodele *et al.*, 2016). The higher values of spleen, pancreas and lungs recorded for birds on control diet may be as a result of absence of toxin in the diets. The similarity in the growth response of these animal internal organ to the phytochemical supplementation in this study suggest the support of the supplements to the normal functioning of birds' internal organ

Conclusion and recommendations

The 0.2% *Moringa* leaf meal dietary supplement improved the liveweight, slaughtered weight, dressed weight and Eviscerated weight of the broiler chicken. In this study 0.2% *Moringa* leaf is hereby recommended

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