INCLUSION OF PHYTOBIOTICS IN DRINKING WATER AS NATURAL GROWTH PROMOTER ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS

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ABSTRACT
This study evaluated the effects of phytobiotics (Neem, Pawpaw, Moringa, and Thyme leaf meals) included in drinking water as natural growth promoters on carcass characteristics of broiler chickens. It was conducted at the Poultry Research Unit, Akperan Orshi Polytechnic, Yandev. A total of 150-day-old broiler chickens were randomly assigned to five dietary groups with 30 birds per group: a control group (T_1) and treatment groups with neem (T_2), pawpaw (T_3), moringa (T_4) and thyme leaf supplements (T_5). The results showed significant differences ($P < 0.05$) in final weight, total weight gain, daily weight gain, average daily feed intake, and feed conversion ratio (FCR) in the phytobiotic-supplemented groups with the best feed conversion on T_2, with Pawpaw leaf meal (T_3) exhibiting superior performance. Carcass characteristics, including live weight, dressing percentage, neck, wing, drumstick, thigh, and breast meat, were significantly improved in the phytobiotic-supplemented groups, particularly in T_3. The findings suggest that Pawpaw leaf meal can be used as a natural growth promoter to enhance carcass characteristics in broiler chickens, offering a sustainable alternative to conventional growth promoters.
Keywords: Phytobiotics, Broiler chicken, Carcass characteristics, Natural growth promoter, Pawpaw leaf meal.

INTRODUCTION

Poultry industry can harvest first class protein for human nutrition, as a source of revenue and play an important role in economic growth of any country (Tarhyel *et al.,* 2012). In the past, antibiotics were the regularly used as feed additives to improve the meat and egg production of chicken. However, the use of antibiotics is facing serious criticism (Iji *et al.,* 2001) and restricted due to drug residue in carcass and also due to modification of natural gut micro flora (Botsoglou *et al.,* 2002). The minimization to total prohibition on the use of antibiotics due to their side effect has been the trend practice particularly in broiler production which has given rise to the use of natural growth promoters like probiotics, prebiotics, phytogenics and other feeds additives to achieve improved performances (Borazjanizadeh *et al.,* 2011).

Recently, many countries banned the use of antibiotics because of their harmful side effects and due to increased awareness; the alternatives to antibiotics such as, herbs and medicinal plants are being widely used now (Manseh *et al.,* 2012). Nutritionists are shifting their attention from utilization of chemical to phytogenic growth promoters in recent years (Iji *et al., 2*001). Neem, pawpaw, moringa and thyme supplements can be used as good alternatives for common artificial growth promoters like antibiotics. Hence, this study was conducted with these four different phytobiotics as feed additives to study the effect of inclusion of phytobiotics in drinking water on growth and carcass characteristics in broiler chicken.

MATERIALS AND METHODS

Experimental Site

The study was conducted at the experimental site of the school of Agriculture, Akperan Orshi Polytechnic, Yandev, Benue State. Yandev is located within the Guinea Savannah zone of West Africa at latitude 723^0 North and longitude 910^0 East. The area is characterized by about 6-7 months of rainfall, the annual rainfall ranges from 1350-1400 mm. the ambient temperature is highest around March and ranges from 34-36^0c. The lowest mean monthly temperature range of 26-28^0c occur around January. The relative humidity is highest between August/September and lowest in January/February. Average radiation received is lowest in August and highest in April (GPS).

Experimental Design

A total of 150-day-old chicks were obtained from a reputable hatchery. The chicks were brooded together for 3 weeks, before the commencement of the proper experiment. This was done to maintain all the birds in the same

pre-experimental condition before the commencement of the trails. The chicks were weighed and randomly allotted to five different treatments which was replicated trice in a Completely Randomized Design (CRD). The birds were supplemented with Neam, Pawpaw, Moringa and Thyme in water, with birds in T_1 having no phytobiotics inclusion in drinking water, T_2 was served five (5) grams of Neem extract into 1 litre of water, T_3 with five grams of pawpaw extract into 1 litre of water, T_4 with five grams of moringa extract into 1 litre of water and T_5 was served five grams of thyme extract into 1 litre of water. The feed and water were provided *ad libitum* during the experimental periods. Standard management practices were adopted in all the experimental groups. At the end of the experiment, six birds for each treatment were picked up randomly and slaughtered by standard method.

Body Weight and Weight Gain

The chicks were weighed at the beginning of the trail and were subsequently weighed weekly throughout the 3 weeks period of the experiment. The gain for each week was obtained by substituting the weight in the preceding week from the weight of the present week. The value obtained was then divided by the number of birds to get gain per chick per week and from this weight gain per day was calculated mathematically using:

Average daily weight gain = $\frac{Group\ Weight\ Different\ in\ a\ Week}{6 \times \text{Number of birds in the group}}$

Statistical analysis

Data, thus collected, was subjected to statistical analysis by analysis of variance (ANOVA) using Completely Randomized Design as described by Snedecor and Cochran (2002).

RESULTS AND DISCUSSION

The effect of the growth performance of broiler fed phytobiotic in water is presented in Table 1. The average final body weight, average daily feed intake, average daily weight gain and feed conversion ratio were significantly ($P<0.05$) different among the dietary treatments. The best total weight gain (1170.54 g) was obtained in birds served Neem Leaf Meal (NLM), with the least total weight (1063.24 g) obtained in birds served Thyme Leaf Meal (TLM). The Average daily feed intake was significantly ($P<0.05$) different among dietary treatments and the highest value (36.61 g) was obtained in PLM (T_3). The highest average weight gain was obtained in PLM (43.95 g) and the least in TLM (37.97 g). The feed conversion values were best in NLM (0.77). The significant ($P<0.05$) improvement in AFW, AFI and AWG in treatments, 2 and 3 and 4 which compared with the control may be due to improved health status and consequently increased digestion of essential nutrients for growth and development.

Table 1: Growth performance of Broiler Chickens fed phytobiotics

Parameters	T_1(Control)	T_2(NLM)	T_3(PLM)	T4(MLM)	T_5(TLM)
Initial weight (g)	209.00	206.96	209.50	208.25	206.76
Final weight (g)	1345.00^{c}	1377.50^{b}	1440.00^{a}	1332.50^{d}	1270.0^{e}
Total weight (g)	1136.00^{c}	1170.54^{b}	1230.50^{a}	1124.25^{d}	1063.24^{e}
Daily weight gain (g)	40.57^{b}	41.81^{b}	43.95^{a}	40.15^{b}	37.97^{c}
Average daily feed intake (g)	32.14^{b}	32.14^{b}	36.61^{a}	32.14^{b}	32.14^{b}
Feed conversion ratio	0.79^{b}	0.77^{a}	0.83b	0.80^{b}	0.85^{d}
Mortality (%)	0.00	0.00	0.00	0.00	0.00

ab Means in the same row with different superscripts differ significantly ($P<0.05$)
NLM = Neem Leaf Meal, PLM = Pawpaw Leaf Meal, MLM = Moringa Leaf Meal, TLM = Thyme Leaf Meal

Table 2 shows the result of broiler chicken served phytobiotics as natural growth promoter on carcass characteristics and organ weights of the broiler chickens. The result shows significant ($P<0.05$) effect of phytogenic inclusion on live weight, organ weight, wing, drumstick, thigh, breast weight and dressing percentage of broilers. There were no significant differences on intestine and back weight of broiler. Wing weight was higher ($P<0.05$) in birds served water containing Pawpaw. Breast weight was also higher ($P<0.05$) in birds served water containing Neem leaf.

Table 2: Effect of phytobiotics on carcass characteristics and organ weights of the broiler chickens.

Parameters	T_1(Control)	T_2(NLM)	T_3(PLM)	T4(MLM)	T_5(TLM)
Live weight	1100.00^{a}	1150.00^{b}	1250.00^{d}	1200.00^{c}	1250.00^{d}
Dressing %	63.63^{e}	73.65^{a}	66.56^{d}	68.58^{c}	69.60^{b}
Neck	13.57^{a}	11.45^{ab}	10.34^{b}	12.27^{ab}	12.07^{ab}
Wing	23.29^{c}	26.80^{bc}	30.77^{a}	28.55^{b}	27.24^{bc}
Drumstick	14.00^{a}	11.81^{b}	14.66^{a}	13.00^{ab}	13.56^{ab}
Thigh	18.00^{a}	16.17^{abc}	14.78^{c}	15.31^{bc}	16.78^{ab}
Intestine	8.00	6.49	6.25	7.78	7.01
Breast meat	15.14^{c}	20.31^{a}	18.15^{b}	17.98^{b}	17.01^{b}
Back	12.57	12.99	12.50	12.76	13.22
Heart	0.86	0.83	0.96	0.73	0.57
Liver	3.14	3.66	5.65	2.67	2.07
Gizzard	5.43	4.13	3.61	4.37	4.71
Kidney	0.29	0.12	0.60	0.12	0.11

ab Means in the same row with different superscripts differ significantly ($P<0.05$)

NLM = Neem Leaf Meal, PLM = Pawpaw Leaf Meal, MLM = Moringa Leaf Meal, TLM = Thyme Leaf Meal

The results of this study demonstrate the potential benefits of incorporating phytobiotics into broiler chicken water on growth performance. The significant improvements in final weight, total weight gain, daily weight gain, average daily feed intake, and feed conversion ratio (FCR) observed in the phytobiotic-supplemented groups (T_2 -T_5) compared to the control (T_1) suggest that these natural additives can enhance broiler growth. Neem leaf meal (T_2) exhibited the most pronounced growth-promoting effect, which is consistent with previous studies demonstrating the beneficial effects of Neem on broiler growth performance (Sena-Seldiver *et al.,* 2019; Sibanda *et al.,* 2015). Pawpaw leaf meal (T_3) also demonstrated significant growth-promoting effects, which may be attributed to its bioactive compounds, such as flavonoids and alkaloids (Oloyede *et al.,* 2012). Thyme (T_5) showed moderate growth-promoting effects, potentially due to its antimicrobial and antioxidant properties (Lee *et al.,* 2012). Moringa leaf meal (T_4) also showed growth promoting effect. The high nutrient content and antimicrobial properties of Moringa leaf meal may have contributed to its growth-promoting effects. (Kumar *et al.,* 2013).

The results of this study demonstrate the impact of phytobiotics on carcass and organ weights of broiler chickens. Significant increase ($P < 0.05$) were observed in the weights of various carcass parts, including neck, wing, drumstick, thigh, breast, live weight, and dressing percentage, among the different treatment groups. Neem leaf meal (T_2), Moringa leaf meal (T_4) and Pawpaw leaf meal (T_3) supplemented groups exhibited higher weights for most carcass parts, indicating improved muscle growth and development. These findings are consistent with previous studies demonstrating the positive effects of Neem, Moringa and Pawpaw leaf meals on broiler growth performance and carcass characteristics (Sena-Seldiver *et al.,* 2019; Sibanda *et al.,* 2015). Thyme (T_5) supplemented group also showed improved carcass weights, although to a lesser extent compared to Neem, Moringa and Pawpaw leaf meals. This may be attributed to the antimicrobial and antioxidant properties of thyme, which can enhance gut health and immune function (Lee *et al.,* 2012). The non-significant differences observed in the weights of back and intestine among the treatment groups suggest that these organs may have been affected adequately by the phytobiotics as compared to the conventional feed.

CONCLUSION

It could be concluded that the inclusion of phytobiotics in drinking water, particularly Neem, Moringa and Pawpaw leaf meals, in broiler chicken can improve carcass and organ weights, indicating enhanced muscle growth and development. These natural additives offer sustainable alternative to conventional growth promoters.

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