Nig. J. Anim. Prod. 2020, 47(2):161 - 170
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Nigerian Journal of Animal Production

Performance, blood parameters and economic indices of broiler chickens fed graded levels of chestnut (*Castenea sativa)* phytobiotics as replacement for antibiotics growth promoters

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Abstract

A feeding trial was conducted to evaluate the performance, serum, lipid, haematology and economic indices of broiler chickens fed diets supplemented with different levels of Chestnut (Castenea sativa) phytobiotic as a replacement for antibiotic growth promoters (AGPs). A total of 300, oneday-old cobb 500 broiler chicks were allotted in a completely randomized design to five dietary treatments each replicated thrice, with 20 chicks per replicate. Chestnut phytobiotics was included at 0, 100, 125 and 150g/100 Kg diet while Oxytetracycline was included at 111g/100kg diet. Data was collected on growth performance, haematology, serum biochemical parameters, lipid profiles and economic indices. All data collected were subjected to analysis of variance and significant differences among treatment means were compared using the Duncan's Multiple Range Test of significance. At the end of the starter phase, result showed that chicks placed on 100g phytobiotics diet had significantly (P<0.05) high final weight and weight gain than other supplemented diets and control. There was significant (P<0.05) differences in the feed conversion ratio. Feed cost per kilogram gain was significantly lower in chicks fed control diet, followed by phytobiotics, however higher feed cost per kilogram gain was recorded for chicks fed diet containing Oxytetracycline. Weight gain was significantly (P < 0.05) higher on oxytetracycline based diet (1783.2g) for finisher phase however, there was an improved values for chicks placed on phytobiotics. Glucose (206.51mg/dL) was significantly higher in treatment diet that contained oxytetracycline. Haematological indices showed that values for white blood cell (91.90x103/µL) and Heterophils (20.63%) were significantly higher in diets containing oxytetracycline than other treatment groups. Values for red blood cell, monocytes, eosinophils and basophils were significantly (P<0.05) higher in broiler chickens fed diets containing 100g phytobiotics . Chestnut phytobiotics reduced the total cholesterol values from 151.13 - 96.55mg/dL when compared to other treatment groups. There were significant (P<0.05) differences in all the villi morphometry parameters measured except for crypt depth. The mean yield cost decreased as the level of phytobiotics increased. In conclusion, supplementation of Chestnut phytobiotics reduced total cholesterol and significantly improved the final weight, weight gain, feed cost per Kg gain and feed conversion ratio for both starter and finisher at 100g/100Kg. Chestnut phytobiotic is therefore a potential replacement for antibiotic growth promoters.

Keywords: Chestnut, phytobiotic, antibiotic, performance, broiler, blood parameters, economic indices

Introduction

The use of antibiotics in poultry feed at sub-therapeutic level as an antimicrobial growth promoters (AGP) has been beneficial to growth performance and reduction in the populations of potentially pathogenic organisms such as *Clostridium perfringens*, *Salmonella* and *Escherichia coli* and diseases associated with these pathogenic bacteria in the gastrointestinal tract (Hume, 2011). The use of antibiotics as growth promoters culminates in weight

increase, better feed conversion and low cost of therapy. Besides positive effects, it is possible for certain negative effects such as production of resistant strains of enterobacteria to occur. However, concerns of consumers over antibiotic-resistant bacteria and drug residues in poultry meat in recent years have generated controversial views concerning use of antibiotics. The European Union has banned the use of human antibiotics as growth promotants in animal feed since 2006 (Broz and Paulus, 2015). There are claims that alternative products, such as prebiotics, probiotics, essential oils, organic acids, enzymes, minerals (Zn and Cu compounds), herbs and spices among others affect the composition or activity of intestinal microbiota. The above-mentioned alternative substances are referred to as natural growth promoters (Panda*, et al.*, 2006) as most of them are of natural origin. Among the mentioned alternatives, phytobiotics have drawn a lot of attention because of being natural, nontoxic and residue free nature. Phytogenic feed additives (phytobiotics or botanicals) are commonly defined as plant-derived compounds incorporated in to diets to improve the livestock productivity through amelioration of feed properties, improvement of nutrient digestibility, absorption and elimination of pathogens in the gut (Abdel-Azeem, 2005; Abou-Bakr, 2011). However, the use of phytobiotics feed additives like plant extracts, hydrolysable tannin from Chestnut (*Castenea sativa*) have potentials which can be harnessed in a study like this for better performance in broiler chickens. In this scenario, raw plant extracts and derived tannins are showing promising results for food animal production (Huyghebaert*, et al.*, 2011). Miadiasan® feed additive is a blend of two products comprising phytobiotics (plant extract, hydrolysable tannin) from Chestnut (*Castenea sativa*) was used for this study. The specific objective was the evaluation of the optimum level of Chestnut (*Castenea sativa*) phytobiotics in broiler diets and the effect on growth performance, serum biochemical analysis, lipid profile, haematology and economic indices.

Materials and methods

Experimental site

The experiment was conducted at the Livestock Section, Division of Agricultural Colleges, Ahmadu Bello University, Zaria, Kaduna state, Nigeria. Zaria is located in the Northern Guinea Savannah Ecological zone on longitude 11° 09ƸN 01.78ƸN and latitude 7°39Ɛ14.79ƐE, 671m above sea level. The climate is characterized by a well-defined dry and wet seasons with annual rainfall ranging from 700-1400mm.The maximum temperature varies from 26-320C depending on the season while the mean relative humidity during the dry and wet season are 21 and 72% respectively (IAR, 2016).

Experimental design and management of birds

Three hundred, one day-old broiler chicks was allocated to five dietary treatments with 3 replicates of 20 birds each in a completely randomized design (CRD). The birds were housed in deep litter pens and managed with all necessary routine management practices. Feed and water was provided *ad libitum* for the period of the experiment.

Experimental diets

Five treatment diets were formulated for starter and finisher chickens respectively. The phtobiotics additives was added as non-inclusive part of the diets as follows:

Diet 1: (Control diet) – without phytobiotics
Diet 2: 100g of phytobiotics/100 Kg diet
Diet 3: 125g of phytobiotics/100 Kg diet
Diet 4: 150g of phytobiotics/100 Kg diet
Diet 5: Oxytetracycline (Sub-therapeutic dose) at 111g/100Kg diet (as recommended by manufacturer).

Growth study

Initial and final weights of birds were taken at the start and the end of both starter and finisher phases. Weight gain and feed intake was measured weekly while feed/gain ratio and cost per Kg gain was computed for both phases. Mortality was recorded as they occur.

Blood Analyses

At end of the feeding trial, 2 mLs of blood samples was taken from three birds per treatment into sterilized sample bottles containing EDTA and taken to the clinical pathology laboratory of the Ahmadu Bello University Teaching Hospital for haematological study. The samples were analyzed for packed cell volume (PCV), Haemoglobin (Hb) count, RBC, MCV, MCH, WBC and differential counts for the various cell types incuding lymphocytes, monocytes, heterophils, eosinophils, basophils using an auto haemo-analyser (Lamb, 1991). From the same birds, 2 mLs of blood samples was taken into sterilized sample bottles without anticoagulant to allow for clotting and was used for the blood biochemical analysis. Sample was taken to the clinical pathology laboratory, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria for determination of parameters related to liver function, including total protein (TP), Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), Alkaline phosphatase (ALP), albumin and glucose using standard laboratory procedures (Lamb, 1991). Globulin values was obtained by subtracting albumin values from corresponding values of total protein (Coles, 1986). Also, parameters related to lipid profile (total cholesterol, triglyceride, high density lipoprotein, low density lipoprotein) were determined using standard laboratory procedures (Lamb, 1991).

Economic indices

Economic cost analysis of production was calculated based on some specific items such as chicks, feed, vaccine, test ingredients and other miscellaneous expenses. The prevailing market price was ascertained before the computation. This was used to determine whether the inclusions of Chestnut phytobiotics in the diets of broiler chicken have economic advantage. The following parameters were determined; feed cost/Kg, mean feed intake, mean feeding cost, cost of chicks, mean final weight, cost of chicken, mean yield cost and net profit.

Statistical analysis

All data obtained from the feeding trial was statistically analysed using the General Linear Model Procedure of Statistical Analysis Systems (SAS, 2002). Significant difference between treatments means was separated using Duncan's Multiple Range Test (SAS, 2002).

Results and discussion

Table 1 shows the growth performance of broiler chicks fed diets containing different levels of chestnut (*Castenea sativa*) phytobiotics feed additives. There were significant ($P<0.05$) differences in final weight, weight gain, feed intake, feed conversion ratio and feed cost per kilogram gain. This study revealed that addition of chestnut phytobiotic to broiler diets at the levels of 125 and 150g reduced feed intake. This may be attributed to the presence of tannin in the chestnut. Tannins are known to have bitter or astringent taste which reduces palatability and hence will negatively affect voluntary feed intake. This agreed with the report of Maass*, et al.* (2005); Roth-Maier*, et al.* (2005); Jamroz*, et al.* (2009); Ebrahim*, et al.* (2015) that addition of phytobiotics to the diet of broiler chickens resulted in depression in feed intake. Feed intake was significantly higher for birds placed on oxytetracycline than the rest of other treatment groups. Feed cost per kilogram gain was best in the control,

followed by phytobiotics, however higher feed cost per kilogram gain was recorded for birds fed with AGP (Oxytetracycline). Broiler chicks fed diet supplemented with 100g phytobiotics were significantly higher and showed best performance in terms of final weight and weight gain. There was significant (P<0.05) difference in the feed conversion ratio. This observation disagreed with Jamroz*, et al.* (2009) who reported that chestnut tannin extracts have no effect on feed conversion ratio. Similarly, feed cost and mortality were not significantly affected (P>0.05).

Table 1: Growth performance of broiler chicks fed diets containing different levels of chestnut (*Castenea sativa)* phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet	SEM
	0g	100g	125g	150g		
Initial weight (g/b)	45.83	45.83	45.83	45.83	45.83	0.00
Final weight (g/b)	1129.67^{a}	1170.67^{a}	1086.67^{c}	1108.33^{bc}	1107.67^{b}	11.11
Weight gain (g/b)	1083.84^{b}	1124.84^{a}	1040.84^{c}	1062.50^{bc}	1061.84^{bc}	11.11
Feed intake (g/b)	1620.33^{c}	1709.00^{b}	1590.67^{c}	1562.67^{c}	1776.33^{a}	33.15
Feed conversion ratio	1.49^{b}	1.5^{b}	1.52^{b}	1.47^{b}	1.67^{a}	0.03
Feed cost (₦/Kg)	119.89	122.69	123.39	124.09	125.44	3.08
Feed cost/gain (₦/Kg gain)	179.32^{c}	186.34^{ab}	188.65^{ab}	182.52^{b}	209.84^{a}	3.78
Mortality (%)	0.00	0.67	0.33	0.33	0.67	0.47

a,b,c; Means with different superscripts on the same row are significantly different (P<0.05). SEM; standard error of means Oxytet; Oxytetracycline

Table 2 shows the growth performance of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa*) phytobiotics feed additives. The result shows non-significant (P>0.05) difference in feed intake and feed cost, whereas significant (P<0.05) differences were observed for final weight, weight gain, feed conversion ratio, feed cost per kilogram gain and mortality. Final weight was best in birds fed control diet (2884.3g) and diet containing oxytetracycline (2890.7g). Birds fed on diet containing oxytetracycline was best in terms of weight (1783.2g), however there was an improvement in the values for birds placed on phytobiotics. This work agrees with the report of Gessica*, et al.* (2019) that the use of tannin in the diet of broilers enhanced weight gain. Feed conversion ratio was significantly (P<0.05) different across the treatment groups which was best in treatment that had oxytetracycline followed by control diet and diets on phytobiotics. Francesco*, et al.* (2011) revealed that generally, chestnut tannin seems to play a more favourable role in the younger chicks than in older broiler chickens. There was significant (P<0.05) difference in terms of feed cost per Kg diet with the control having lower value which implies that addition of feed additives increased the feed cost per Kg. Mortality was significantly lower in diet containing 100g phytobiotics, control and oxytetracycline but statistically similar with diet placed on 125g phytobiotic, followed by diet containing 150g phytobiotics.

Table 3 shows the haematological indices of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa*) as phytobiotics feed additives. There were significant (P<0.05) differences for values of Hb, RBC, WBC, Heterophils, Lymphocytes, Monocytes, Eosinophils, Basophils, MCV, MCH except for the value of PCV which was non-significant but fell within the normal range of 24.00-44.00%. The heamoglobin count of 10.47-11.65g/dL in this study was within the normal range of

9.10-13.90g/dL as reported by Mitruka and Rawnsely (1977) for healthy chickens; indicating that the birds had sufficient blood pigment for proper transportation of oxygen. The values for RBC, Lymphocytes, Monocytes, MCV and MCH obtained in this study, though differed significantly among treatment groups but were within the normal range for RBC (2.00-3.00X10^6/µL), Lymphocytes (40-100%), Monocytes (1.00-7.00%), Basophils (0.00-2.00%), MCV (90-140fL) and MCH (33-47pg) for healthy broiler chickens as reported by Jain (1993); Nanbol*, et al.* (2016). This result revealed that the health of the birds was not compromised. However, the values for WBC (91.90x10^3/µL) and heterophils (20.63%) were significantly higher in diets containing oxytetracycline than the other treatment groups. RBC, Monocytes, Eosinophils and Basophils in chickens fed 100g phytobiotics were significantly ($P<0.05$) higher in values than other treatment groups. The result obtained for RBC is in agreement with the recent work done by Gessica*, et al.* (2019) that broiler chickens fed with an extract containing tannins had higher RBC counts.

Table 2: Growth performance of broiler finisher chickens fed diets containing different levels of chestnut (*Castenea sativa)* phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet	SEM
	0g	100g	125g	150g		
Initial weight (g/b)	1129.67^{a}	1170.57^{b}	1086.67^{c}	1108.33^{bc}	1107.53^{bc}	11.18
Final weight (g/b)	2884.27^{a}	2851.33^{ab}	2843.40^{ab}	2759.63^{b}	2890.73^{a}	50.18
Weight gain (g/b)	1754.60^{ab}	1680.77^{bc}	1756.73^{ab}	1651.30^{c}	1783.20^{a}	50.86
Feed intake (g/b)	3458.33	3461.67	3471.33	3454.33	3479.00	58.51
Feed conversion ratio	1.97^{bc}	2.06^{b}	1.98^{ab}	2.09^{a}	1.96^{c}	0.05
Feed cost (₦/Kg)	113.00	115.00	116.00	117.00	118.00	0.00
Feed cost/gain (₦/Kg gain)	222.61^{b}	236.90^{a}	229.68^{ab}	244.53^{a}	231.28^{ab}	6.00
Mortality (%)	0.33^{ab}	0.00^{b}	0.67^{a}	1.00^{a}	0.33^{ab}	0.25

a,b,c; Means with different superscripts on the same row are significantly different ($P<0.05$) SEM; Standard Error of Means Oxytet; Oxytetracycline

Table 3: Haematological indices of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa)* phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet	SEM	REF. V
	0g	100g	125g	150g			
PCV (%)	34.80	38.07	36.47	32.80	38.07	2.64	24.00-44.00*
Hb (g/dL)	11.25b	11.63ab	10.47c	11.05b	11.90a	0.31	9.10-13.90*
RBC (x10^6 /µL)	2.01c	2.93a	0.61d	2.27bc	2.53b	0.18	2.00-3.00**
WBC (x10^3 /µL)	84.75bc	82.07c	83.07c	90.00ab	91.90a	2.88	NA
Heterophils (%)	12.55^{b}	11.00^{b}	7.93^{c}	14.45^{b}	20.63^{a}	2.10	NA
Lymphocytes (%)	79.95^{b}	76.00^{bc}	87.27^{a}	77.50^{b}	72.67^{c}	2.32	40-100**
Monocytes (%)	4.00^{b}	7.07^{a}	3.07^{b}	4.15^{b}	4.27^{b}	1.05	1.00-7.00**
Eosinophils (%)	2.75^{b}	4.13^{a}	1.03^{c}	2.35^{b}	2.07^{b}	0.61	1.50-6.00****
Basophils (%)	0.80^{b}	1.80^{a}	0.70^{b}	0.55^{b}	0.33^{b}	0.47	0.00-2.00***
MCV (fL)	131.15^{a}	130.73^{a}	58.56^{b}	129.40^{a}	130.80^{a}	8.80	90-140**
MCH (pg)	42.90^{b}	41.83^{b}	90.90^{a}	42.65^{b}	43.50^{b}	16.26	33-47**

a,b,c,d; Means with different superscripts on the same row are significantly different ($P<0.05$) SEM; standard error of means Oxytet; oxytetracycline, PCV=packed cell volume, RBC=red blood cell, WBC= white blood cell, Hb=haemoglobin concentration, MCV=mean corpuscular volume, MCH=mean corpuscular haemoglobin, REF.V= reference value, *Mitruka and Rawnsely, 1997, **Jain 1993, ***Nanbol, *et al.,* 2016, ****Simrak, *et al.,* 2004, NA= not available.

Table 4 shows the Serum biochemical analysis of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa*) phytobiotics feed additives at finisher phase. There were significant (P<0.05) differences for all the parameters measured. The values for ALP show that birds placed on phytobiotics, oxytetracycline and control diet were within the normal range of 10-106µ/L for healthy birds as reported by Bounous and Stedman (2000) except for AST which were below reference value of 100-400 µ/L (LAVC, 2009). ALT was significantly higher in treatment diet (100g, 125g, 150g) which may signify liver injury as reported by WebMed (2016). However, this did not reflect on the haematology parameters as injurious to the birds. Albumin was significant across the treatment group and the values are statistically similar. Serum albumin is a strong predictor of health, a lower albumin concentration is a sign of poor health and predictor of poor outcome (Kastow, 2009). The higher the values of albumin the higher the clothing ability of blood, hence preventing hemorrhage. However, the values obtained for total protein, albumin and globulin falls within the normal range as reported by (Ross*, et al.*, 1997; LAVC, 2009). Glucose (206.51mg/dL) was significantly higher in treatment diet that contained oxytetracycline. The birds from this treatment were hyperactive. This could be attributed to higher available energy (glucose) present in the blood. Total protein was significantly higher in treatment that contained phytobiotics (150g) which indicate good health.

Table 4: Serum biochemical analysis of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa)* phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet	SEM	REF. V
	0g	100g	125g	150g			
Glucose (mg/dL)	97.04^{c}	127.41^{b}	127.97^{b}	111.87^{b}	206.51^{a}	10.39	NA
Total protein (g/dL)	4.00^{bc}	3.60^{c}	3.79^{c}	5.83^{a}	5.37^{ab}	0.73	3.60-5.50*
Albumin (g/dL)	1.66^{a}	1.58^{a}	1.46^{ab}	1.62^{a}	1.60^{a}	0.08	1.10-2.20*
Globulin (g/dL)	2.35^{b}	2.03^{b}	2.33^{b}	4.21^{a}	3.77^{a}	0.70	1.20-3.20**
AST (µ/L)	63.45^{a}	65.73^{a}	54.47^{b}	67.75^{a}	58.30^{a}	5.05	100-400**
ALT (µ/L)	12.70^{b}	14.07^{a}	14.80^{a}	14.65^{a}	11.77^{b}	0.64	NA
ALP (µ/L)	78.50^{a}	79.67^{a}	80.77^{a}	71.65^{b}	79.63^{a}	1.92	10-106***

a,b, c; means with different superscripts on the same row are significantly different (P<0.05)aspartate amino transferase (AST): alanine amino transferase (ALT): alkaline phosphatase (ALP): albumin(ALB): globulin (GLB): oxytet; 0xytetracycline; SEM: standard error of mean, *Ross, *et al.* (1976), **LAVC (2009), ***Bounous and Stedman (2000), NA= not available.

Table 5 shows the lipid profile of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa*) phytobiotics feed additives at finisher phase. There were significant (P<0.05) differences for all the parameters measured. This study reveals that inclusion of chestnut phytobiotics reduced the total cholesterol values from 151.13 - 96.55mg/dL. This work is in agreement with the report of Gessica*, et al.* (2019) who reported similar trend. Sturkie (2000) reported that the concentration of cholesterol is influenced by physical and nutritional status of the bird. Low cholesterol reduces the occurrence of cardiovascular disease. However, the values obtained from this study is within the normal range (75.30-

196.00mg/dl) for a healthy chicken as reported by (Gessica*, et al.*, 2019). Triglycerides was significantly (P<0.05) different across the treatment groups with phytobiotics at 150g having the least value (36.87g/dL), followed by oxytetracycline (60.2g/dL) and phytobiotics at (125g) while phytobiotics at 100g (83.70g/dL) and control (78.74) were higher and similar. There was a significant (P<0.05) decrease in the level of triglyceride in the birds fed diets containing phytobiotics (100g, 125g, 150g). This result shows that addition of chestnut phytobiotics reduces the levels of triglyceride in the blood. Triglycerides are the major form of energy stored in the body. High density lipoprotein and low density lipoprotein were statistically different; they are the major transporter of triglyceride in the system.

Table 5: Lipid profile of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa)* phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet	SEM
	0g	100g	125g	150g		
TCHOL (mg/dL)	97.99^{b}	151.13^{a}	126.40^{a}	96.55^{b}	112.27^{b}	14.76
Triglyceride (g/dL)	78.74^{ab}	83.70^{a}	60.81^{b}	36.87^{c}	60.20^{b}	9.70
HDL (mg/dL)	54.85^{b}	79.58^{a}	80.64^{a}	71.42^{ab}	71.25^{ab}	7.70
LDL (mg/dL)	33.88^{a}	51.51^{a}	49.47^{a}	11.36^{b}	43.52^{a}	11.20

a,b, c; means with different superscripts on the same row are significantly different (P<0.05): total cholesterol (TCHOL): high density lipoprotein (HDL): low density lipoprotein (LDL): oxytet; oxytetracycline; SEM: standard error of mean.

Table 6 shows the economic indices of broiler chickens fed diets containing different levels of chestnut (*Castenea sativa*) phytobiotics feed additives. The feed cost/Kg, mean feed intake, total expenses and mean yield cost were higher in birds placed on phytobiotics and oxytetracycline except the control group with the least value. This may be attributed to the cost of added levels of chestnut phytobiotics and oxytetracycline. The mean yield cost decreased as the level of phytobiotics increased. Birds placed on oxytetracycline (₦2023.00) and control (₦2016.00) diets were higher in revenue/bird. This underlines the importance of using cost of feed consumed to obtain a unit of product as a basis for recommending feeds to farmers (Ukachukwu and Anugwa, 1995). However, slight difference exists between those birds placed on phytobiotics and other treatment groups although gut welfare was the key focus.

Table 6: Economic indices of broiler chickens feddiets containing different levels ofchestnut (*Castenea sativa*) phytobiotics feed additives

Parameter	Levels of phytobiotics				Oxytet
	0g	100g	125g	150g	
Feed cost/kg (₦/Kg)	116.45	118.85	119.70	120.55	121.72
Mean feed intake (Kg/b)	5.08	5.17	5.06	5.02	5.26
Mean feeding cost (₦)	591.57	614.45	605.68	605.16	640.25
Cost of chicks (₦)	220.00	220.00	220.00	220.00	220.00
Other expenses (₦)	200.00	200.00	200.00	200.00	200.00
Total expenses (₦)	1011.57	1034.45	1025.68	1025.16	1060.25
Mean final wt. (Kg)	2.88	2.85	2.84	2.76	2.89
Cost of Chicken/Kg (₦)	700	700	700	700	700
Mean yield cost (₦)	2016.00	1995.00	1988.00	1932.00	2023.00
Net profit (₦)	1004.43	960.55	962.32	906.84	962.75

Oxytet; oxytetracycline, other expenses = cost of multi-vitamins, repairs etc; mean yield cost = cost of chicken/Kg x Mean final weight (Kg); Net pofit = Mean yield cost – Total expenses.

Conclusion and recommendation

It can be concluded that, chestnut (*Castenea sativa*) phytobiotic used as natural growth promoter:

Did not significantly improve feed intake above the AGPs for starters but improved the weight gain, feed conversion ratio and feed cost/Kg gain for both starter and finisher. Reduced the total cholesterol values from 151.13 - 96.55mg/dL. Decreased the mean yield cost as the level of phytobiotics increased. Birds placed on oxytetracycline (₦2023.00) and control (₦2016.00) diets were higher in mean yield cost while control diets was best in net profit (₦1004.43) than other treatment groups. It is recommended that poultry farmers can therefore use chestnut (*Castenea sativa*) phytobiotic at 100g/100 Kg feed as replacement for antibiotics in broiler production.

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Received: 20th September, 2019
Accepted: 19th February, 2020