GROWTH PERFORMANCE AND ECONOMIC ANALYSIS OF BROILER CHICKENS FED DIETS CONTAINING DIFFERENT SOURCES OF HERBAL METHIONINE

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ABSTRACT
The study was carried out to evaluate the performance of broiler chicks fed diets containing different herbal methionine (Phytonin™ and Methiorep®). A total of 300-four-weeks old Ross 308 broiler chickens were allotted randomly to five dietary treatments each replicated thrice, with 20 chicks, in a completely randomized design. The herbal methionine sources were included at 200g per 100kg diet (0.2%). Diet 1 was formulated with DL-Methionine (DLM) (0.20%) as control while diets 2, 3, 4, and 5 were formulated with Phytonin™, Methiorep®, Phytonin™ (0.12%) + DLM (0.08%) and Methiorep® (0.12%) + DLM (0.08%). Data were collected on growth parameters for 28 days (5-8 weeks). The growth performance result showed that final body weight (2652.66 and 2493.17g/b), weight gain (1554.89 and 1375.24 g/b), feed conversion ratio (2.05 and 2.19) and feed cost per kg weight gain (289.75 and 305.81) were significantly higher ($p<0.05$) in birds fed diets containing DLM and Phytonin™. Higher return per naira invested was recorded in birds fed diets supplemented with DLM (₦1.87) and phytonin™ (₦1.61) as against methiorep® (₦1.40). In conclusion, phytonin can be used in broiler chicken's diet, as the use of DLM and phytonin™ resulted into higher growth performance, higher economic benefits of ₦1.62 and ₦1.43 respectively, over feed cost.
Keywords: DL-Methionine (DLM), Growth Performance, Methiorep®, Phytonin™

INTRODUCTION

Amino acids are important in poultry nutrition not only for protein deposition but also in other metabolic functions such as biosynthesis of tissues and animal products. Improving immune and gut functions are vital considerations in poultry production (Hewitt and Lewis, 2002). The levels and balance of amino acids in the diets are all important nutritional variables that affect the economic efficiency of both meat and egg laying enterprise (Opoola *et al*., 2016). The major amino acids that are usually limiting for meat and laying birds are methionine, lysine, threonine and tryptophan (Olomu, 1995). Among the essential amino acids required by poultry, methionine is indispensable, because it is the most limiting amino acid, based on corn-soybean meal diets (Fancher and Jensen, 1989) which means methionine must be supplied in poultry diets. Methionine plays an important role in energy production, protein synthesis; and also enhances overall growth performance, feed utilization and livability in broilers (Binder, 2003). Methionine deficiency is majorly caused by the fact that large amounts of vegetable protein supplements are used in combination with no or low levels of animal proteins (Makinde *et al*., 2017). Inclusion of herbal methionine in diets of chickens will be an environmental friendly and economic option (North and Bell, 1990).

MATERIALS AND METHODS

EXPERIMENTAL DIETS

Five isonitrogenous and isocaloric (CP= 20%, ME=3041 Kcal/Kg) diets were formulated to meet the nutrients requirement of the chickens. Diet 1 was formulated with DLM (0.20%) as Control while diets 2, 3, 4, and 5 were formulated with Phytonin™ supplementation at 0.20, Methiorep® at 0.20, Phytonin™ + DLM at 0.12 and 0.08, Methiorep® + DLM at 0.12 and 0.08 percent dietary levels.

EXPERIMENTAL DESIGN AND MANAGEMENT OF EXPERIMENTAL BIRDS

Three hundred (300) four weeks old Ross 308 broiler chickens were randomly allotted to five dietary treatments with three (3) replicates of twenty (20) birds each. The design was completely randomized design (CRD). The birds were housed in deep litter pens. Feed and water were provided *ad libitum* throughout the period of the experiment.

GROWTH STUDY

Initial and final body weights of birds were taken at the beginning and at the end of the study. Weight gain and feed intake were measured on weekly basis while feed conversion ratio and feed cost per kg weight gain were computed. Mortality was recorded as they occur.

ECONOMIC ANALYSIS

Economic analyses of the different types of herbal methionine inclusion in the diets of broiler chickens was determined at the end of the study based on gross margin analysis.

DATA ANALYSIS

All data obtained from the feeding trials were statistically analysed using the General Linear Model Procedure of Statistical Analysis Systems software packages. Significant difference between treatments means were separated using Tukey Procedure (SAS, 2002).

RESULTS AND DISCUSSION

Growth performance of broiler finisher chickens fed diets containing different sources of herbal methionine

The growth performance of broiler finisher chickens fed diets supplemented with different herbal methionine is shown in Table 1. The result showed final bodyweight (2652.66g/b) and total weight gain (1554.89g/b) were significantly higher in birds fed diets supplemented with DLM followed by birds fed diets supplemented with phytonin™ with final bodyweight of 2493.17g/b and bodyweight gain of 1375.24g/b. Final bodyweight and bodyweight gain were lower in group fed diets supplemented with methiorep®, phytonin™ + DLM and methiorep® + DLM. The lower final weight gain reported in the group fed methiorep® supplemented diet could be as result of poor feed utilization resulting from unpleasant aroma which is similar to the report of Bunchasak and Keawarun (2006) that imbalance of amino acids especially methionine could result into poor growth rate.

Methionine has been reported to play important roles in protein synthesis, in low amounts of methionine, protein synthesis and cysteine biosynthesis from methionine will reduce. Thus, it cannot play its key role for synthesizing proteins (Hadinia *et al.*, 2014). This can be linked to earlier report by Salmon (1958) who reported that the consumption of a disproportionate amount of methionine impaired growth and caused tissue damage. Feed intake was significantly ($p<0.05$) higher in broiler finisher chickens fed diets supplemented with DLM (3176.05g), followed by those fed diets supplemented with phytonin™ (2996.63g) and least in those fed diet supplemented with methiorep® (2891.78g). Higher feed intake in birds fed DLM supplemented diet may be responsible for higher final weight and weight gain.

Table 1: Growth performance of broiler finisher chickens fed diets containing different sources of herbal methionine

Parameters	DLM	Phytonin	Methiorep	Phytonin+ DLM	Methiorep+ DLM	SEM	P Value
Initial weight (g/b)	1097.78	1117.92	1050.68	1011.33	994.52	67.83	0.11
Final weight (g/b)	2652.66^{a}	2493.17^{b}	2122.54^{c}	2145.11^{c}	2133.55^{c}	75.64	0.03
Total feed intake (g/b)	3176.05^{a}	2996.63^{b}	2891.78^{c}	2947.80^{bc}	2923.97^{bc}	35.74	0.02
ADFI (g/b/d)	113.43^{a}	107.02^{b}	103.28^{c}	105.28^{bc}	104.43^{bc}	1.28	0.02
Total weight gain (g/b)	1554.89^{a}	1375.24^{b}	1071.86^{c}	1133.78^{c}	1139.03^{c}	73.52	0.01
ADWG (g/b/d)	55.53^{a}	49.12^{b}	38.28^{c}	40.49^{c}	40.68^{c}	2.63	0.01
FCR	2.05^{a}	2.19^{a}	2.71^{b}	2.61^{b}	2.58^{b}	0.11	0.02
Feed cost per kg gain (₦/kg)	289.75^{a}	305.81^{a}	377.07^{b}	367.07^{b}	361.56^{b}	15.87	0.03
Mortality (%)	1.47	1.96	1.47	0.49	1.47	1.09	0.15

^{abc}Means with the same superscripts along the rows are not significantly different ($p>0.05$), SEM: standard error of means, ADWG: average daily weight gain, ADFI: average daily feed intake, FCR: feed conversion ratio.

Similarly, FCR and feed cost per kg weight gain were lower in birds fed DLM and phytonin™ supplemented diets and lower in groups fed diet containing methiorep® singly or in combination with DLM and those fed phytonin™ in combination with DLM. This indicates higher feed efficiency and effective feed utilization in birds fed diet containing DLM and phytonin™. The findings of this study contradicts earlier report by Kumari *et al*. (2012) who reported that methiorep® in combination with DLM at 1:1 (100 g each) improved feed efficiency in birds. However, it is in agreement with the study

of Manwar *et al*. (2016) who also reported improved feeding efficiency in birds fed DLM supplemented diet compared to herbal methionine.

Economic analysis of broiler chickens fed diets containing different sources of herbal methionine

The economic analysis of broiler chickens fed diets containing different herbal methionine is presented in Table 2. The results showed that the best economic gain in terms of gross margin were obtained in broiler chickens fed diets containing DLM (₦809.01), phytonin™ (₦597.32) followed by phytonin™ + DLM (₦359.38), methiorep® + DLM (₦348.45) while those fed diet supplemented with methiorep® had lower gross margin (₦336.35).

The economic gain reported in broiler chickens fed diets supplemented with DLM and Phytonin™ is ₦472.66 and ₦260.97 respectively above what was obtained in the group fed diet supplemented with methiorep® which was least in terms of economic gain. This accounts for 58.42% and 43.66% additional gain by using DLM and Phytonin™ in broiler chickens diet compared to methiorep®. Return per naira invested was also higher in broiler chickens fed diets containing DLM(1.62) and Phytonin™ (1.43) and least in the group fed methiorep® (1.25). Hence, feeding broiler chickens diets supplemented with DLM or Phytonin™ increases economic gain. Lower economic gain (gross margin and return per naira invested) reported in treatment group fed diet containing methiorep® or its combination with DLM could be as a result of poor utilization of feed resulting in poor growth performance. Higher economic gain reported in groups containing DLM or phytonin™ agreed with earlier report by Akbarian *et al.* (2012) who stated that the use of herbal feed additives accounted for higher economic gain in poultry enterprise.

Table 2: Economic analysis of broiler chickens fed diets containing different sources of herbal methionine

Parameters	DLM	Phytonin	Methiorep	Phytonin+ DLM	Methiorep+ DLM
Expenditure (Variable cost)					
Day-old chicks (₦)	275.00	275.00	275.00	275.00	275.00
Starter feed/kg (₦/kg)	145.31	143.61	143.11	144.41	143.91
Starter feed intake (kg)	2.07	2.19	2.11	2.08	2.09
Feeding cost starter (₦)	300.50	314.08	301.96	300.95	301.20
Finisher feed/kg (₦/kg)	141.34	139.64	139.14	140.64	140.14
Feed intake (kg/b)	3.28	3.82	3.67	3.65	3.62
Finisher feeding cost (₦)	463.45	533.56	510.64	512.63	507.31
Total feeding cost (₦/kg)	763.95	847.64	812.61	813.58	808.51
Water (₦)	15.57	15.57	15.57	15.57	15.57
Wood shaving (₦)	6.50	6.50	6.50	6.50	6.50
Labour (₦)	93.33	93.33	93.33	93.33	93.33
Brooding (₦)	53.13	53.13	53.13	53.13	53.13
Vaccination (₦)	10.11	10.11	10.11	10.11	10.11
Repair (₦)	50.40	50.40	50.40	50.40	50.40
Transportation (₦)	43.00	43.00	43.00	43.00	43.00
Total variable cost (TVC)	1310.99	1394.68	1359.65	1360.62	1355.55
Income					
Average weight (kg/b)	2.65	2.49	2.12	2.15	2.13
Cost of live chicken (₦/kg)	800.00	800.00	800.00	800.00	800.00
Revenue per chicken (₦)	2120.00	1992.00	1696.00	1720.00	1704.00
Gross margin (₦)	809.01	597.32	336.35	359.38	348.45
Return/naira invested	1.62	1.43	1.25	1.26	1.26

kg: kilogram, kg/b: kilogram/ bird, TVC: total variable cost, Gross margin: Revenue-TVC, Return/naira invested: Revenue/TVC

CONCLUSION

It was concluded that the use of DLM or phytonin™ in broiler chickens diets resulted into higher growth performance at the finisher phase, better economic benefits with higher return per naira invested over methiorep.

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