International Journal of AgriScience Vol. 2(2): 143-148, February 2012 www.inacj.com
ISSN: 2228-6322© International Academic Journals

Performance of broiler starters fed varying levels of dietary methionine

Adeyemo G.O.
Animal Science Department, Faculty of Agriculture, University of Ibadan, Ibadan, Nigeria. Author for correspondence (gbemiadeyemo@yahoo.com)

Received October 2011; accepted in revised form January 2012

ABSTRACT
One hundred and fifty broiler chicks (Arbor acre breed) were used to determine responses of broiler starters to yarying levels of dietary methionine. The chicks were divided into 5 treatment groups consisting of 6 replicates of five chicks each. The chicks were kept in floor pens. The study lasted for 28 days and was conducted at the Teaching and Research Farm of the University of Ibadan, Nigeria. The performance variables under determination were Weight Gain and Feed Intake. No significant differences ($p>0.05$) were observed in the Weight Gain values from the different levels of methionine included in the diet. But significant differences ($p<0.05$) were observed, with Feed Intake values, which did not follow a particular trend.

Keywords: broiler starters, dietary methionine, performance

INTRODUCTION
Protein is a component from food that facilitates the synthesis of body tissue used for body repair and growth (Oluyemi and Robert, 1979). Proteins are also components of enzymes, hormones and blood, all of which are indispensable in the normal physiological function of any living organism. Proteins can be sourced from plant and animal origins (Zamora and Fields, 1979). Animal protein has a more balanced essential amino acids profile that is required for body growth and development, but it is very costly for commercially viable broiler production. However, plant proteins are usually deficient in one or more amino acids and require fortification with oil seed meal, animal protein concentrates or purified sources of amino acids such as methionine, lysine and threonine. Plant proteins are usually not as expensive as animal proteins but their use is limited due to some anti-nutritional factors such as tannins, saponins and trypsins. Anti-nutritional factors in plants are reduced by heat treatment and this increases the value and protein level of such plant proteins like cottonseed cake (Adeyemo and Longe 2007). Protein whose amino acids composition closely resembles that of the body is reported to have high biological value, as less energy is expended in its conversion to body tissue with minimal loss during the inter-conversion process, consequently animal protein is preferable to that of plant origin. It has been estimated that the national average supply of protein is 54g per caput per day, of which 8g is of animal origin. This falls significantly short of the F.A.O estimated protein recommendation of 70g per caput per day, of which 35g should be of animal protein origin FAO (1984).

Although broiler strains have been developed whose genetic potential promises a faster growth rate to attain market weight in the shortest possible time this genetic potential cannot be fully expressed without the right or optimal environmental

conditions of nutrition, climate and effective management. It is known that the genetic constitution of an animal sets a limit to its performance but an adequate environment ensures that this limit is reached. It therefore means that poultry should be adequately provided with the right kind of nutrients for the maximum expression of their genetic endowment.

However, a lot of factors militate against the nutrient requirements of poultry being met to ensure their maximum productivity, apart from the high cost of feed arising from the stiff competition between man and livestock for conventional feed ingredients, there is also a need to examine the level of utilization of those nutrients contained in the feed provided.

Soya bean, which has been judged as the best source of plant protein is used in many rations for broilers and swine (Church, 1991), it can serve as a good source of protein in broiler ration. Soya bean (*Glycine max)* is a legume, which occupies a premier position as a world crop because of its high and virtually unrivalled protein content and can be included in rations such as soybean meal. Soya bean contains about 15-21% oil, 38% crude protein (CP) while the meal (whose oil has been extracted) contains about 44-50% crude protein. Soybean protein contains all the essential amino acids; however, it has a minimal amount of the sulphur containing amino acids (methionine and cysteine). It can therefore satisfy the protein requirement of birds when adequately supplemented with sulphur containing amino acids, especially methionine.

The study was carried out to evaluate the methionine requirement for broiler starters when fed corn-soybean based diets, and to determine the correct balance of dietary protein and amino acids required for broiler starters.

MATERIAL AND METHOD

EXPERIMENTAL BIRDS AND THEIR MANAGEMENT

One hundred and fifty broiler chicks (Arbor acre breed) were used for the 0 to 4 weeks of the feeding trials. The chicks were divided into 5 treatments; each treatment consisted of 6 replications of five chicks each. They were kept, maintained and treated in compliance with the accepted standards for the humane treatment of animals. The chicks were kept in floor pens. The lighting management and vaccinations were provided according to commercial practice. Prior to introducing the chicks to the pen their initial or day old weights were taken.

EXPERIMENTAL TREATMENTS

The experimental treatments are shown in table 1 below; the experimental treatments were formulated to attain the nutrient requirement for table birds as stated by Poultry Nutrients Requirement (N.R.C 1994). The chicks were fed diets containing 22.6% crude protein (CP) and an energy level of 2925 ME kcal/kg. Treatments 2, 3, 4, and 5 contained 0.19, 0.31, 0.53, 0.64, additional methionine amounts, respectively in addition to the common CP and energy for all the treatments. Treatment 1 had no supplemental synthetic methionine and served as the control. Amino acid patterns were adjusted according to the recommendations of NRC (1994). Feed samples were collected and milled for proximate analysis. Treatments were analyzed for protein, fat, fiber, moisture and ash according to the methods of AOAC (1990).

The following performance variables were determined Weight Gain, Feed Intake, and Mortality Rate for each period. The chicks were weighed at the end of each week and feed intake was also measured weekly. All pens were checked daily for mortality.

STATISTICAL ANALYSIS

The data obtained were subjected to statistical analysis using simple Analysis of variance (ANOVA) and where significant differences were observed the means were separated using the Duncan's Multiple Range Test (Duncan, 1955)

RESULTS

WEIGHT GAIN

The live weight of birds, though different and increasing weekly as expected did not show any significant differences ($p>0.05$) between the different treatments. Birds in treatment 4 had the highest value while the control (treatment 1) had the lowest value at the end of the 4th week.

FEED INTAKE

No significant differences were observed at weeks 1, 2 and 4 respectively. But significant differences ($p<0.05$) were observed between the treatments at the 3rd week, treatment 4 had the highest mean value of 0.773g, while treatment 5 had the lowest mean value of 0.662g, of feed consumed in the 3rd week. However, no significant differences ($p>0.05$) were observed between treatments 2 and 4 in the 3rd week.

DISCUSSION

Birds in treatments 4 and 5 had higher crude protein percentages in their diets than birds in treatment 2 and they also had lower live weights than the birds in treatment 2. This may have been due to the toxicity of methionine which can cause a depression in growth and development when there is a high content in the diet as postulated by Baker et al. (1980), or it may be as a result of amino acids imbalance caused by excess methionine as reported by Buttery and D'Mello (1994) who further stated that small excesses of methionine in the feed can be deleterious to birds, they also stated that an oversupply of amino acids cannot be converted to body protein and may depress performance leading to inefficient and uneconomical meat production.

Treatment 2 had a crude protein percentage of 18.58% at the starter phase, this diet ranked best overall among the treatments. This may be attributed to the possibility that it is possible for broilers to produce efficiently with a lower level of protein provided that the amino acid level of the diet is balanced Fetuga (1984). This assertion is also supported in a similar study, where the researcher stated that the need for protein is essentially the need for amino acids and that amino acids requirements in tropical livestock do not differ remarkably from those of a temperate climate. This implies that efficient production is feasible at lower protein levels provided that balanced amino acids levels are maintained.

This is assertion is supported in the report of Moran et al. (1990) demonstrating that diets with reduced protein below the recommended levels supplemented with essential amino acids mainly methionine and lysine, will support adequate weight gain while increasing fat deposition which does not affect meat yield. Conversely, Ferguson et al. (1998) reported decreased growth of broilers when fed diets low in protein content, below their recommended requirement.

Also superior performance (weight gain and feed efficiency) of broilers fed supplementary dietary methionine (diets 2, 3, 4, and 5) over the control diet can be supported by reports of various researchers like Schutte and Pack (1995) who questioned the sulphur amino acid levels recommended by the National Research Council (NRC 1994) for broilers, also Café and Waldroup (2006) reported that methionine needs may be higher than suggested by NRC (1994) especially in support of improved feed conversion and

increased breast meat yield. Schutte and Pack, (1995) recommended in their studies that the methionine level in broiler feed should be above the NRC (1994) recommendation. Ojano-Dirain and Waldroup, (2002) also reported that the methionine level suggested by NRC (1994) may be inadequate for maximum live performance or breast meat yield.

From the results herewith presented no significant interactions ($p>0.05$) were found between the different levels of methionine inclusion in diets for weight gain between the first and the fourth weeks. Weight gain improved as the level of methionine increased ($p<0.05$). Some authors have questioned whether Sulphur Amino Acids (SAA) levels recommended by NRC (1994) would be sufficient to maximize broiler performance (Hickling *et al.*, 1990; Shutte & Pack, 1995). Café and Waldroup (2006) reported that increasing the level of methionine above the NRC (1994) recommendation produced a significant increase in weight gain of broilers. This work shows clearly that with a shortening of the maturity period for broilers, the requirement for essential amino acids particularly methionine increases.

Table 1. Gross composition of experimental starter diets fed to broiler chicks from 0-4 weeks of age.

	TREATMENTS				
Ingredients	1	2	3	4	5
Maize	52	52	52	52	52
Soya bean meal	35	35	35	35	35
Wheat offal	6.5	6.5	6.5	6.5	6.5
Fish meal(FM)	2.5	2.5	2.5	2.5	2.5
Bone meal (BM)	2.0	2.0	2.0	2.0	2.0
Oyster shell (OYS)	1.5	1.5	1.5	1.5	1.5
Broiler premix	0.25	0.25	0.25	0.25	0.25
% level of Methionine	0	0.19	0.31	0.53	0.64
Salt	0.25	0.25	0.25	0.25	0.25
Crude protein(CP)%	22.6	22.6	22.6	22.6	22.6
Metabolizeable energyME(Kcal/Kg)	2925	2925	2925	2925	2925
Total	100.0	100.0	100.0	100.0	100.0

Table 2. Proximate composition in (g/100kg dm) of experimental starter diet fed to broilers on graded levels of dietary methionine

	TREATMENTS				
Parameters	1	2	3	4	5
Dry Matter (%)	90.72	96.34	91.21	89.92	89.12
Crude protein (%)	18.44	18.58	18.23	19.22	20.89
Crude fibre	13.64	13.98	14.08	14.07	14.18
Ether extract	3.88	3.77	3.66	4.08	4.12
Ash	11.88	11.75	12.05	10.77	12.33
Nitrogen free extract	52.16	51.35	51.95	51.86	48.48

Table 3. Average weekly live weight of broiler starters fed varying levels of methionine in g/bird/week

	TREATMENTS				
WEEKS	1	2	3	4	5
1	76.42	77.33	78.08	77.25	82.00
2	149.92	155.67	158.33	170.00	168.33
3	246.08	298.58	306.33	287.67	290.00
4	386.67	441.33	411.25	453.00	400.00

abc means with differing superscript in the same row are significantly different (P<0.05)

Table 4. Average weekly feed intake of broiler finishers fed varying levels of dietary methionine in g/bird/week

	TREATMENTS				
WEEKS	1	2	3	4	5
1	31.08	21.67	18.33	28.00	25.33
2	232.42	300.00	551.00	341.25	226.00
3	640.33^{b}	696.00^{ab}	626.67^{b}	773.25^{a}	622.00^{b}
4	1210.17	1273.42	1182.83	1142.58	1143.3

ab means with differing superscript in the same row are significantly different (P<0.05)

REFERENCES

Adeyemo, GO and Longe OG (2007) Effects of graded levels of cottonseed-cake on performance, haematological and carcass characteristics of broilers fed from day old to 8 weeks of age. African Journal of Biotechnology 6(8):1064-1071