EFFECT OF METHIONINE TYPES ON THE CARCASS CHARACTERISTICS OF BROILER FINISHER

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***Target Audience**:* Animal Nutritionists, Poultry Farmers, Feed millers and Scientists

ABSTRACT
One hundred and ninety eight 7-day old broiler chicks were used to evaluate the effect of DL-Methionine and L-Methionine carcass characteristics of broiler chickens. The experiment was carried out at Hybrid Farms, Kaukau, Kaduna State. The DL-Methionine and L-Methionine were supplemented at 0.15, 0.20 and 0.25% levels of inclusion respectively. The birds were divided into six treatments and replicated three times with eleven birds per replicate in a 2 x 3 factorial arrangement in a completely randomized design (CRD). Feed and water were given *ad libitum.* At the end of the experiment two birds per replicate were used from each of the six treatments to evaluate carcass characteristics. Data generated during the study were analysed using GLM procedure of SAS (2002). Differences between means were compared for significance ($P<0.05$) using Duncan Multiple Range Test (Duncan, 1995). Methionine type had significant ($P<0.05$) effect on the carcass characteristics. Birds fed on L-Methionine had higher live weight, carcass weight than those on DL-Methionine. The prime cuts and organ parts in DL-Methionine were significantly ($P<0.05$) higher than that of L-Methionine. In conclusion, birds fed L-Methionine performed better in terms of live weight and carcass weight while the prime cuts and organ parts of those fed on DL-methionine were significantly($P<0.05$) better than those on L-Methionine.
Keywords: Effect, Methionine, Carcass, Broiler Chickens.

INTRODUCTION

Poultry production has gained prominence in Nigeria today, due to short generation interval, relatively quick turn over on investment and high quality protein from poultry products. Poultry production is generally accepted as the fastest way of increasing animal protein consumption in developing countries of the world (Ogundipe, 1999). To cope with market demand for protein (meat), modern broilers are reaching market age sooner than previously (Kleyn and Chrystal, 2008).

All animals need to be well fed and healthy if they are to grow to their potential. The nutrition of an animal is therefore of great importance if this is to be achieved in practice. In the modern day livestock farming, the nutritional requirements of farm animals are well understood and all the requirements can be met through direct dietary supplementation of the limiting nutrient in concentrated form (Adeniji *et al.*, 2014). Some amino acid cannot be synthesized by the animals themselves and must therefore be supplied in their diet; these are called essential amino acid. In avian specie methionine is one of the essential amino acids needed to improve performance and is considered to be the first-limiting amino acid in corn-soybean meal based poultry diets (Dilger and Baker, 2007). Adequate dietary level of this amino acid is needed to support optimum growth and carcass yield of fast-growing commercial broilers (Ojano-Dirain and Waldroup, 2002). Amino acids can exist as D- or L- isomer or mixture of the two products. The D- isomeris biologically inactive while L-form is commonly occurring in most of the tissues. However, birds possess the ability to utilize both D- and L-forms also called racemic mixture (Lesson and Summers, 2001).

Recently a fermentation approach was used to produce L-Methionine (Ikeda, 2003; Kumar and Gomes, 2005). During the fermentation process, L-Methionine precursor was obtained from microorganism strain, and mixed with converting enzyme and methyl mercaptan which converted the L-Methionine precursor to L-Methionine (Kim *et al.*, 2015).

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at Hybrid Farms, Farm A, along Kaduna–Abuja Express way, Kaukau, Kaduna, Kaduna State. Kaduna is located on latitude 1031'23.160"N and longitude 726'25.008"E on an altitude of 704m above sea level. The annual rainfall ranges between 617–1365mm with an average of 1041mm between July and September (Ovimap, 2015).

Source of Experimental Birds

The birds were purchased from Agriculture International Tyrade Limited (Agrited), Ibadan, Oyo State were used for the experiment.

Source of Methionine

DL-methionine and L-methionine were purchased from Hybrid Feeds Ltd, opposite Total Petroleum Filling Station along Kachia road, Kaduna, Kaduna State.

Experimental Diets

Six diets devoid of synthetic methionine were formulated to meet the requirements (for protein, energy, calcium, phosphorus and lysine) of broiler starter birds based on NRC (1994) nutrients requirement. The DL-Methionine and L-Methionine were supplemented at 0.15, 0.20 and 0.25% levels of inclusion respectively

Management of Experimental Birds

Birds were housed in a deep litter system with water and feed provided *ad libitum.* Vaccination and medication programmes were carried out when due. The drinkers were washed on a daily basis and water changed twice a day.
The pens were partitioned into replicates with wire mesh. Eleven birds were randomly allotted to each pen.

Carcass Analysis

At the end of the feeding trial (at 8 week), two birds per replicate were used for carcass analysis. Birds were starved for 12 hours, weighed, sacrificed, defeathered and dressed as described by Odunsi *et al.* (1999). Parameters that were measured include; live weight, carcass weight, dressing percentage, prime cuts and organ parts. Primal cuts and organ weight were expressed as percentage of live weight.

Statistical Analysis

Data generated during the study were analysed using GLM procedure of SAS (2002). Differences between means were tested for significance using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Carcass Characteristics of Broiler Chicken Fed Dietary DL-Methionine and L-Methionine Supplements

Result on effect of methionine type on carcass characteristics of broiler finisher chicken (5-8 weeks) is shown in Table 1. Live weight, carcass weight, dressing percentage, prime cuts and organ parts except forthigh, gizzard and kidney were significantly ($P<0.05$) affected by methionine type. This result concord with the findings of Rahab (2014) who reported that methionine type had significant ($P<0.05$) effect on live weight of broiler chickens. This study agrees with findings of Chattopadhyay *et al.* (2006) who reported improved dressing percent, thigh and breast yield in broilers with DL-Methionine supplementation at the rate of 15g/kg. Better performance in DL-Methionine could be due to the fact that DL-Methionine in poultry diet has been associated with the tendency to have less total body fat, improve growth performance both for meat and egg laying birds and reduce odor-related compounds in excreta (Rostagno *et al.*, 1995; Chavex *et al.*, 2004)**.**

Conclusion and Recommendations

Birds fed L-Methionine performed better in terms of live weight and carcass weight while the prime cuts and organ parts of those fed on DL-methionine were significantly better than those on L-Methionine but more research need to be done with more number of broilers and other avian.

References

Adeniji, A., Ologhobo, A.D., Adebiyi, O.A. and Adejimo, I.O. (2014). Effect of methionine and organic acid on apparent nutrient utilization and gut morphology of broiler chicken. *Advances in Research*, 9(2):87-93.

Chattopadhyay, K., Mondal, M.K. and Roy, B. (2006). Comparative efficacy of DL-methionine source and herbal methionine on performance of broiler chicken. *International Journal of Poultry Science*, 5(11):1034-1039.

Chavex, C., Coufal, C.D., Lacey, R.E. and Carey, J.B. (2004). The impact of methionine source on fecal matter odor volatiles. *Poultry Science*, 83:359-364.

Dilger, R.N. and Baker, D.H. (2007). DL-Methionine is as efficacious as L-Methionine, but modest L-Cystine excesses are anorexigenic in sulphur amino acid-deficient purified and practical-type diets fed to chicks.*Poultry Science*, 86:2367-2374.

Duncan, D.B. (1955). Multiple ranges and multiple F-test. Biometrica, 11:1-42.

Ikeda, M. (2003). Amino acid production processes. In: Microbial production of L-amino Acids. Springer Berlin Heidelberg, Germany. Pp. 1-35.

Kim, S.Y., Cho, K.M., Shin, Y.U., Um, H.W., Choi, K.O., Chang, J.S., Cho, Y.W. and Park, Y.H. (2015). Microorganism producing L-methionine precursor and method of producing L-methionine and organic acid from the L-Methionine precursor. U.S. patent 9029105.

Kleyn, R. and Chrystal, P. (2008). Feeding the young broiler chicken in practice: a review. *23rd World Poultry Congress.* Brisbane, Australia.

Kumar, D. and Gomes, J. (2005). Methionine production by fermentation. *Biotechnology Advance*, 23:41-61.

Lesson, S. and Summers J.D. (2001). Scoot's Nutrition of the Chicken. University Books. Guelph, Canada.

NRC. 1994. Nutrient Requirements of Poultry. 9th revised edition. National Academic Press, Washington-DC.

Ogundipe, S. O. (1999). In: Poultry Care: *A complete guide to chicken production.* Gonab and Associates.

Ojano-Diran, C. P. and Waldroup, P.W. (2002). Evaluation of lysine, methionine and threonine needs of broilers three to six week of age under moderate temperature stress. *International Journal Poultry Science*, 1:16-21.

Rahab, M.S. (2014). Evaluation of two types of synthetic methionine supplement on the performance of Broiler Chickens. Thesis submitted to the Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria for the partial fulfillment of Award of Master of Science Degree. Pp. 36-65.

Rostagno, H. S., Pupa, J. M. R. and Pack, M. (1995). Diet formulation for broilers based on total versus Digestible amino acid. *Journal of Applied Poultry Research*, 4:293-299.

SAS (2002). Copyright © by SAS Institute Inc. Cary, NC, USA.

Table 1: Effect of methionine types on carcass characteristicsof broiler finisher chicken

	Types of Methionine			
Parameter	DLM	LM	SEM	LOS
Live weight (g)	2482[b]	2590[a]	37.36	*
Carcass weight (g)	1988.29[b]	2063.33[a]	35.10	*
Dressing %	80.12[a]	79.57[b]	0.48	*
Prime cuts expressed as percentage of live weight				
Back	11.15[a]	10.66[b]	0.27	*
Breast	25.50[a]	24.96[b]	0.14	*
Wings	8.05[a]	7.73[b]	0.11	*
Thigh	12.54	12.57	0.20	NS
Drumsticks	10.86[a]	10.50[b]	0.10	*
Organ parts expressed as percentage of live weight				
Liver	2.04[a]	1.72[b]	0.04	*
Heart	0.39[a]	0.34[b]	0.01	*
Gizzard	1.99	1.95	0.09	NS
Proventiculus	0.19[a]	0.17[b]	0.01	*
Spleen	0.09[a]	0.07[b]	0.01	*
Kidney	0.55	0.53	0.02	NS
Lungs	0.60[a]	0.56[b]	0.02	*
Abdominal fat	0.86[a]	0.96[b]	0.04	*

[abc]=Means in the same row having different superscripts are significantly different (P<0.05); NS=Not significant (P<0.05), DLM=DL-Methionine, LM=L-Methionine; *=Significant difference (P<0.05); SEM=Standard error of mean; LOS = Level of significant.