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Short Communication

Methionine deficient feeding with added choline and betaine by performance of broiler chicken

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The experiment was designed and conducted to evaluate the availability of betaine (betaine anhydrous 97%) as methionine sparing for broilers. Two hundred and fifty day-old chicks were randomly divided into five treatment groups which were divided into five replicates of ten chicks each. Primarily, a single starter ration deficient in methionine was formulated using NRC standards. The five treatment groups were; (A) Positive control supplemented with methionine, (B) Low Methionine (LM), (C) LM supplemented with choline at 0.17%, (D) LM supplemented with Betaine (0.14%) and (E) LM with Betaine at 0.07% in the starter ration. Choline was added at 700 mg/kg to Treatments A and B. Weight gain (WG), feed intake (FI) and feed conversion ratio (FCR) data was collected on a weekly basis from 0 to 28 days. Statistical analyses of data revealed significant differences among the treatment groups in FI, WG and FCR (P< 0.05). Supplementation of choline and betaine to Treatment Groups B, C, D and E respectively did not show results as per Treatment A supplemented with methionine. However, betaine supplementation showed better WG and FCR to Treatments B and C (P<0.05). Inclusion rate of betaine had no significant effect (P>0.05).

Key words: Betaine, broiler, choline, methionine, performance.

INTRODUCTION

Methionine (MET) is the second limiting amino acid after lysine. According to NRC (1994), the concentration of MET in the starter ration should not be less than 0.5%. It is required in a number of metabolic functions such as protein synthesis and as a methyl donor. As a methyl donor, MET is activated to S-Adenosyl Methionine (SAM), utilized in a number of body reactions such as the maintenance of DNA, formation of epinephrine and choline. The amount of MET needed by the body to provide SAM is far in excess than the dietary intake of MET. Thus the remethylation of homocysteine allows the conversion to methionine. Choline and folic acid are methyl donors; folic acid has to take a methyl group before liberating a methyl group while choline, first, has to be activated and then converted to betaine before methyl groups are liberated to fulfill its methylation function (McKeever et al., 1991). Dietary choline is preferentially used for biosynthesis of acetylcholine (that is neurotransmission) and phosphatidylcholine (that is cell membrane integrity) (Garrow, 2007).

The basic metabolic role of betaine as a methyl donor and osmoprotectant has been recognized (Barak et al., 1993). Recent research findings regarding the methylation function of betaine have demonstrated that when one of the two biochemical pathways (Vitamin B12 dependent and independent) in the conversion of homocysteine to MET is inhibited, betaine can be used to convert homocysteine to MET in the transmethylation pathway in the liver (Barak et al., 1996). Betaine needs no activation once in the cystol and regardless of its origin, it is used to methylate homocysteine to MET, through the action of the enzyme betaine homocysteine methyl transferase (BHMT) (McKeever et al., 1991; Dilger, 2007).

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