Polish dose response data demonstrate superiority of DL-methionine over liquid methionine hydroxy analogue in broilers.


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Abstract

A dose response experiment with 550 male Cobb 500 broilers was performed in order to examine the relative effectiveness of liquid methionine hydroxy analog free acid (MHA-FA) and DL-methionine (DL-Met). Chickens were fed by basal diet with graded levels of DL-Met in first and MHA-FA in second comparison, from 1 to 42 days of age. During the experiment production parameters like: body weight gain (BWG) and feed conversion ratio (FCR) was measured. Increasing level of DL-Met and MHA-FA in the diet improved significantly BWG and FCR. Relative effectiveness of liquid MHA-FA in this trial was 64 and 59% for BWG and FCR, respectively.

Introduction

The absorption, metabolism and effectiveness of different commercial methionine sources have been investigated by physiologists and nutritionists for years (Lewis and Baker, 1995; Jansman et al., 2003). Accordingly, the relative effectiveness of liquid hydroxy-4-methylthiobutanoic acid (MHA-FA) compared to DL-methionine (DL-Met) is to be determined in a simultaneous dose response assay in which graded levels of either source are fed to animals. Multi-linear or multi-exponential regression analysis of the trial data allows for an estimation of how much DL-Met is needed to replace liquid MHA-FA in a diet without affecting animal performance. In broilers, the most commonly used parameters are body weight gain (BWG) and feed conversion ratio (FCR) for poultry (Lemme et al., 2002). The objective of this trial was to strengthen the findings of the mentioned surveys by determination of biological effectiveness of liquid MHA-FA compared to DL-Met by a simultaneous dose-response trial with male broilers. The present experiment was carried out by the Polish National Research Institute of Animal Production, Department of Animal Nutrition and Feed Science.

Material and Methods

One day old chickens were distributed to 11 dietary treatments. Five brooder cages with 10 birds each were assigned to each treatment. Eleven experimental starter and grower diets were produced comprising one basal diet being deficient in Met+Cys, five diets with graded DL-Met levels and five diets with graded levels of liquid MHA-FA. Methionine sources were supplemented on equimolar levels (0.03, 0.06, 0.10, 0.14 and 0.20 % of diet) assuming a content of active substance of 88 % and 99 % for liquid MHA-FA and DL-Met, respectively. With increasing inclusion levels steps increased in order to well describe particularly the sensitive part of the response curves with a sufficient number of data points as suggested by Pack and Beste (1992). Birds received the starter diets from day 1 to 21 and the grower diets from day 22 to 42. Mash feeds and water were offered ad libitum. Basal diets were mainly based on corn, wheat, soybean meal, and field beans and were formulated to be adequate for energy and all nutrients except for Met+Cys. The analysed Met+Cys content in the starter and grower diet was 0.8 ± 0.03 and 0.05 ± 0.00, respectively, confirming - like for all other amino acids as well - the expected contents. Body weights and feed intakes were recorded at days 1 (only weight), 21 and 42 and subsequently BWG and FCR were calculated. FCR data were
corrected for mortality. The results from above dose response experiment were analysed by multiple exponential regression as described by Lemme et al. (2002).

Results and Discussion
As displayed in Figure 1 the responses in both performance criteria followed a non-linear trend. Accordingly liquid MHA-FA was 64 % and 59 % as efficient as DL-Met regarding BWG and FCR, respectively.

![Graph showing the relative effectiveness of liquid MHA-FA compared to DL-Met in 1-42 days old male COBB 500 broilers with respect to weight gain (top) and feed conversion ratio (bottom)](image)

Figure 1: Relative effectiveness of liquid MHA-FA compared to DL-Met in 1-42 days old male COBB 500 broilers with respect to weight gain (top) and feed conversion ratio (bottom)
The responses of male 1 – 42 day old broilers indicated that the basal diet was clearly deficient in dietary methionine and cysteine as graded levels of both products resulted in substantial improvements in performance. Moreover, data points well described the sensitive part of the response curve for both products (Figure 1). Thus, requirements for a simultaneous regression analysis were met. Although supplemented on molar basis, regression analysis was performed on product basis to make the result directly applicable for practical feed formulation (on molar basis relative effectiveness 72 % and 66 % for BWG and FCR, respectively). The determined relative efficacy figures of the current experiment are in good agreement with the outcome of the studies by Lewis and Baker (1995) and Jansman et al. (2003).

Conclusion
The Polish dose-response experiment with broilers was performed in order to determine the relative effectiveness of liquid MHA-FA compared to DL-Met. The data of the study are in line with the outcome of recent literature surveys (Lewis and Baker, 1995; Jansman et al., 2003). This study also confirms the superiority of DL-Met over liquid MHA-FA. Over 42 days the effectiveness of liquid MHA-FA relative to DL-Met on product basis was 64 % and 59% for BWG and FCR, respectively.

References


Pack, M., Beste, R. (1992) How to evaluate different sources of the same nutrient? World Poultry 8 (7)