ENERGY AND AMINO ACID UTILIZATION OF WHEAT-BASED DIETS BY POULTRY: INFLUENCE OF GENOTYPE AND ENZYME SUPPLEMENTATION

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Several studies have demonstrated that the anti-nutritive effects of wheat can be overcome by supplementation with exogenous enzyme preparations, which lower the viscosity of intestinal contents and improve nutrient digestibility and absorption. Although the efficacy of enzyme supplementation in improving growth performance and apparent metabolizable energy (AME) has been well established, there is limited information on the influence of added enzymes on the amino acid utilization of wheat-based diets. In a previous study conducted in our laboratory, addition of two commercial enzyme preparations to diets containing 918 g/kg wheat was shown to improve the apparent amino acid digestibility (AAAD) by chickens (Hew et al. 1995). The present study was undertaken to investigate further the effect of enzyme supplementation (Avizyme 1300®) on the AME and AAAD of practical diets containing 408 g/kg wheat in broiler chickens. An additional objective of the experiment was to obtain information on the influence of genotype on energy and amino acid utilization.

Male broiler chicks from three commercial hatcheries, designated as strain A, B and C, were obtained at one day of age and reared under similar management conditions. On day 35, 40 birds from each strain were selected and groups of four were randomly assigned to each of 30 pens. Enzyme treatment (unsupplemented or supplemented) was then assigned within strain to five pens. The unsupplemented basal diet contained 408 g/kg wheat and celite (20 g/kg) was included as an analytical marker. The birds were fed the experimental diets (pelleted form) from days 35 to 42, and total collection of excreta was carried out during the last three days to determine the AME values. At the end of the trial, ileal contents were obtained and processed, and the apparent ileal digestibilities were calculated as described previously (Siriwan et al. 1993).

Strain x diet type interaction was not significant for any of the parameters evaluated. Enzyme supplementation resulted in 2.0% improvement ($P < 0.05$) in the AME of wheat-based diets. The AME contents of basal and supplemented diets were 13.34 and 13.61 MJ/kg, respectively. Although Strain A (13.50 MJ/kg) and Strain C (13.61 MJ/kg) had numerically higher energy utilization values than Strain B (13.25 MJ/kg), the differences were not statistically significant. The digestibility values of all amino acids were one to two percentage units higher in enzyme supplemented diets, but the differences were significant ($P < 0.05$ to 0.001) only for Asp, Ser, Gly, Val, Ile, His and Arg. Significant ($P < 0.001$) strain effects were observed for AAAD values, with Strain A recording the highest (80.2 - 94.5%) and Strain B the lowest (70.9 - 91.1%).

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