REMOVING THE LYSINE SUPPLEMENT FROM A LOW-PROTEIN FINISHER DIET HAS NO ADVERSE EFFECT ON THE PRODUCTION RESPONSES OF HEAT-STRESSED BROILERS

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Recent studies have shown that the ideal dietary amino acid balance for broilers varies with ambient temperature. In particular, the optimum arginine:lysine (Arg:Lys) ratio increases at high temperatures (Brake et al., 1998). Arg:Lys ratios of approximately 1.35 appear optimal for 3-7 week old broilers at 30°-32°C compared to ratios of 1.10 and 1.18 calculated from National Research Council (1994) recommendations for broilers aged 3-6 and 6-8 weeks, respectively. The benefits of increasing the dietary Arg:Lys ratio are most evident at older ages (42-49 d of age) when broilers are most susceptible to heat stress (Balnave et al., 1999). The ratio can be increased by either increasing the dietary arginine concentration or by decreasing the dietary lysine concentration. The present studies were carried out to determine whether the body weight gain of heat-stressed finishing broilers, held at 30°C, could be maintained in the presence of a more ideal amino acid balance induced by the removal of the lysine supplement from a low-protein finisher diet containing an Arg:Lys ratio of 1.18.

Cobb 500 male broilers were used in all four studies. They were fed grower diets between 3 and 6 weeks of age that varied in Arg:Lys ratio from 0.88 to 1.35 in the four individual studies. The same finisher diet formulation used in each experiment contained 160 g crude protein/kg and included supplements of L-lysine (0.8 g/kg), DL-methionine (0.8 g/kg), L-threonine (1.0 g/kg) and L-arginine (0.5 g/kg). The amino acid composition of this diet met the NRC (1994) amino acid recommendations for 42-49 d old broilers, including lysine (8.5 g/kg), arginine (10.0 g/kg), methionine (3.2 g/kg) and total sulphur amino acids (6.0 g/kg). The removal of lysine from, or the addition of arginine to, this diet was balanced by alterations to the dietary concentration of solka-floc, an inert cellulose supplement. Mash feed and water were supplied ad libitum and continuous fluorescent lighting was provided.

Removing the lysine supplement from the low-protein finisher diet had no adverse effects on performance in any experiment. Removal of the lysine supplement gave production responses similar to those obtained from the complete diet when grower diets containing Arg:Lys ratios of 0.88 to 1.05 were fed prior to the introduction of the finisher diet or the lysine-depleted diet at 42 d. However, when grower diets containing Arg:Lys ratios of 1.15 to 1.35 were fed prior to 42 d, improvements in feed intake, body weight gain and feed conversion were obtained as a result of removing the lysine supplement from the finisher diet. Responses obtained by the removal of lysine from the finisher diet mirrored those observed from the addition of arginine in the two experiments where that treatment was employed. This suggested that the observed effects were due to the Arg:Lys ratio per se. This conclusion was supported by the observation that removal of the methionine supplement in addition to the lysine supplement resulted in poorer performance in some experiments.


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