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AMINO ACID SUPPLEMENTATION OF LOW PROTEIN DIETS FOR HEAVY HEN TURKEYS

Introduction

Protein is the most expensive nutrient in poultry diets, and turkeys require a higher level of crude protein compared to other classes of poultry. Efficient use of the protein and its constituent amino acids therefore can be economically beneficial. The requirement for protein is actually indicated by the amino acids in the protein. To support optimal growth of turkeys a specific amino acid profile is required, with no limiting amino acids or surpluses (1). Excesses of individual amino acids occur when whole protein is used for supplementation. Such excesses are costly and wasteful since birds cannot store excess dietary amino acids (2). Poultry can only utilize 40% of dietary protein. Amino acids are classified as being essential or non-essential. Essential amino acids must be provided for in the diet when carbon skeletons are not synthesized by animal cells or the bird is unable to attach the amino group to the carbon skeleton. Non-essential amino acids can be synthesized from other amino acids (2) providing there is a pool available for transamination. A certain amount of non-essential amino acids need to be provided in the diet to prevent the conversion of essential to non-essential amino acids (2). Various synthetic essential and nonessential amino acids are now commercially available, making it possible to lower the protein content of turkey diets by formulating based on meeting amino acid requirements.

Objective

Determine the effect of feeding reduced graded levels of crude protein combined with synthetic amino acid supplementation (lysine, methionine, tryptophan, threonine, arginine, valine, glycine, proline and isoleucine) on turkey growth performance and meat yield.

Photo Credit M. Gong

Trial

Day-old turkey poults were randomly placed in 32 floor pens. The experimental design was a one-way analysis of variance with crude protein level of the diet, for each of four phases of production (0-4, 4-6, 6-8 and 8-10 weeks of age), as the main effect. Four experimental diets were formulated to meet a percentage of the breeder crude protein nutrient requirement (Hybrid 2015): 100, 92, 84 and 76%. The diets were supplemented with synthetic amino acids as needed to meet the digestible amino acid requirements. Half of the diets were also supplemented with a commercial enzyme (Superzyme-CS) containing amylase, protease, xylanase, glucanase, cellulose and invertase activities. At 10 weeks of age, two birds per pen were weighed individually and commercially processed. Hot carcass and abdominal fat pad weights were recorded. Carcasses were air chilled, reweighed and both breasts (deboned *Pectoralis major* and *Pectoralis minor*) were removed and weighed to determine breast yield as a percentage of the chilled weight. Both legs with thighs attached were also removed and weighed to determine leg yield as a percentage of chilled weight.

Results

Up until 6 weeks of age, decreasing the crude protein content of the heavy hen turkey diets to 76% of the breeder recommended levels while supplementing the diets with synthetic amino acids did not affect body

weights. However, feeding 76% of breeder recommended protein level diets supplemented with amino acids during the 6-8 week and 8-10 week periods resulted in reduced body weights (Figure 1). Feed consumption (Figure 2) was not affected by diet crude protein level throughout the trial (Figure 2). Body weights and feed consumption were not affected by the enzyme supplementation. Breast yield (Figure 3) was significantly reduced and leg yield (Figure 3) was significantly increased as the crude protein requirement was reduced to 76% compared to the diets formulated for 100% and 92% of the breeder requirements. Percent carcass fat was affected by an interaction between crude protein level and enzyme supplementation. Fat content was significantly reduced on the turkeys fed the diets formulated for 76% of the breeder recommended crude protein levels when the enzyme was included in the diet (32.9% and 28.5%; no enzyme and enzyme supplementation, respectively).

Industry Impact

An improvement in the efficiency in feed formulation of turkey diets could be achieved by reducing the crude protein content of the diet and formulating for essential and non-essential amino acid requirements. Today an increasing array of synthetic amino acids are becoming commercially available, enabling more economical formulation of turkey diets. This work indicates that in terms of growth performance and yield, dietary crude protein can be reduced to 84% of the breeder recommendations when supplemented with synthetic essential and non-essential amino acids.

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References:

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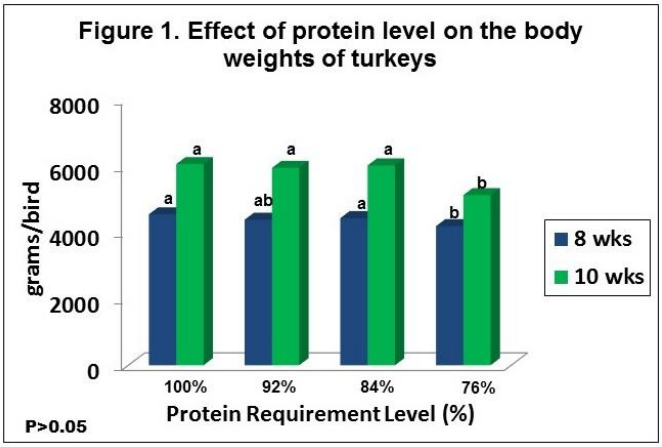

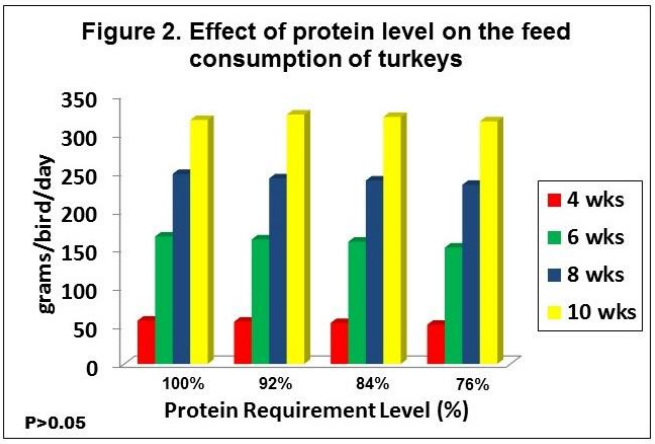

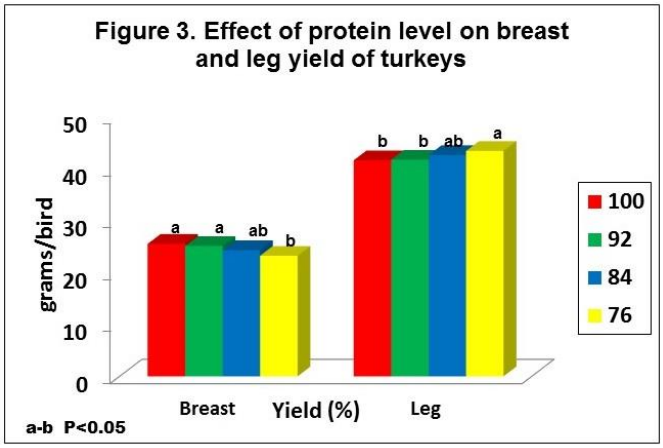

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