Carcass Composition of Broilers Fed Diets Based on Total and Digestible Amino Acid Formulation

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ABSTRACT

The objective of this research was to determine the difference in carcass composition between male and female birds and between birds of two different genotypes fed four diets differed in formulation, i.e: 1) based on total amino acids, 2) based on digestible amino acids (published book values), 3) based on digestible amino acids values determined, 4) based on digestible amino acids formulated commercially. This study demonstrated that sex and strain of broilers affect the requirement of amino acids. Male broilers had higher dietary amino acid requirements than females. With regard to genotype, the more rapid the growth of the birds, the higher requirement of amino acids. Birds given diets based on digestible amino acid formulation had a higher proportion of body protein and a low proportion of body fat ($P<0.05$) than birds fed diets based on total amino acid formulation.

Key words: amino acid, broiler, carcass, diet formulation, digestible

INTRODUCTION

The efficiency of protein utilization depends to a large extent on the amino acid composition of the diet. Within commercial poultry nutrition, there has been an increasing interest in the concept of using digestible amino acids to formulate cost-effective diets which more accurately meet the nutrient requirements of the bird. The concept of digestible amino acids is based on the realization that amino acids in most ingredients are not completely digested and diets based on total amino acid concentrations may not provide an appropriate balance of amino acids to meet the birds' requirements. However, many feed companies still use total amino acids to specify poultry diets and there is a need for a better-feed formulation system than one based on total amino acids.

For reliable application of digestibility in practice, it is necessary to quantify the effect of genotype and sex. Growth rates of male and female broilers were differ and it is suggested that they have different nutritional requirements (Ten Doeschate *et al.*, 1992). In regard to genotype, Leclerq (1983) stated that genetically lean chickens use dietary protein more efficiently than fat birds to make their own body protein. Pym *et al.* (2004), however found that the growth rate of genetically lean chickens was much more severely depressed at low dietary levels of protein than that of genetically fat birds. Strain and sex differences in digestibility of feed need further investigation and have implications for mixed sex versus single sex rearing.

MATERIALS AND METHODS

One hundred and sixty male and female chickens were obtained from two commercial hatcheries. The experiment used a factorial design with 2 genotypes, 2 sexes, and 4 diets. From day 21, the birds were given 4 experimental diets (iso-energetic and iso-nitrogenous). The diets were formulated based on: 1) total amino acids; 2) digestible amino acids refferring to publish book values (Ravindran *et al.*, 1998); 3) digestible amino acids values determined on the same ingredients as used in diet 1; and 4) digestible amino acids formulated commercially.

Birds were wing-banded for identification. Feed and water were given *ad libitum*. Birds were weighed at 21 days of age and again at 42 days of age. Feed intake was recorded weekly and feed conversion ratio was calculated. On day 42, 10 males and 10 females of both genotypes per dietary treatment were randomly selected for carcass analysis. Birds were killed by cervical dislocation to avoid loss of blood following a 12 h fast. They were then placed in individual plastic bags and frozen at -20^{o}C. The whole body of the chickens were minced and dried and then re-ground prior to determination of fat and protein. Carcass composition (fat and protein in the whole