Effects of Sources of Protein and Enzyme Supplement on Protein Digestibility and Chyme Characteristics in Broilers

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The purpose of this study was to evaluate the effects of protein and enzyme supplements on protein digestibility and chyme characteristics in broilers. One hundred and twenty growing (20-day-old) and 60 finishing (40 day-old) Arbor Acre strain commercial male broilers were selected and placed into individual metabolism cages. They were randomly allocated into ten different dietary treatments. This experiment was a 5*2 factorial arrangement with five different sources of protein; casein, fish meal, soybean meal, soy protein concentrate (SPC), corn gluten meal, and two levels of protease (Bromelain) in 0 and 65 CDU/kg diets. The diets were formulated into an iso-nitrogenous semi-purified diet with Cr2O3 as the indicator for the determination of ileal digestibility and chyme characteristics.

The results showed that apparent ileal protein digestibility (AIPD), in both growing and finishing chickens, was significantly highest in the casein diet, followed by fishmeal, soybean meal and SPC and corn gluten meal, the last giving the worst result (P<0.05). Enzyme inclusion did not improve protein digestibility. The soybean meal group demonstrated a significantly lower pH in the gizzard contents compared to the casein group (P<0.05) because soybean meal contains large amounts of acidic pectin in NSP. The molecular weight distribution pattern of the soluble protein in the chyme of the GI segments showed a similar trend to that shown by the same source of protein, regardless of the enzyme inclusion or the stage of growth. Different sources of dietary protein displayed different molecular weight distribution patterns in soluble protein in the GI chyme. The concentration of large molecular (>10kD) protein decreased along the digestive tract from the gizzard to the ileum. Conversely, the concentration of smaller molecular proteins (<7kD) proportionally increased along the GI tract.

The rate of change in the concentration of large molecular soluble proteins in the casein group was greater compared to the other protein groups. This implicated a rapid breakdown of casein and fishmeal protein compared to a slower change with the less digestible corn gluten meal. The molecular weight distribution patterns were similar for both the soybean meal and SPC groups due to the same source of soy protein with similar solubility. The trend in the rate changes of the molecular weight distribution patterns in soluble protein agreed with the digestibility of the source of protein.

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