Extrusion enhances apparent metabolizable energy, ileal protein and amino acid digestibility of palm kernel cake in broilers

ABSTRACT

Objective: This study consisted of two stages; the first was to determine the effect of extrusion and sieving treatments on the chemical properties of palm kernel cake (PKC), and accordingly, a follow-up experiment (second stage) was conducted to determine and compare the apparent metabolizable energy (AME), and protein and amino acid digestibility of extruded and sieved PKC. Methods: Two physical treatments, namely extrusion (using temperature profiles of 90°C/100°C/100°C, 90°C/100°C/110°C, and 90°C/100°C/120°C) and sieving (to 8 particles sizes ranging from >8.00 to 0.15 mm) were carried out to determine their effects on chemical properties, primarily crude protein (CP) and fiber contents of PKC. Based on the results from the above study, PKC that extruded with temperature profile 90/100/110°C and of sieved size between 1.5 to 0.15 mm (which made up of near 60% of total samples) were used to determine treatments effect on AME and CP and amino acid digestibility. The second stage experiment was conducted using 64 male Cobb 500 chickens randomly assigned to 16 cages (4 cages [or replicates] per treatment) to the following four dietary groups: i) basal (control) diet, ii) basal diet containing 20% untreated PKC, iii) basal diet containing 20% extruded PKC (EPKC), and iv) basal diet containing 20% sieved PKC (SPKC). Results: Extrusion and sieving had no effect on CP and ash contents of PKC, however, both treatments reduced ($p<0.05$) crude fiber by 21% and 19%, respectively. Overall, extrusion and sieving reduced content of most of the amino acids except for aspartate, glutamate, alanine and lysine which increased, while serine, cysteine and tryptophan remained unchanged. Extrusion resulted in 6% increase ($p<0.05$) in AME and enhanced CP digestibility ($p<0.05$) by 32%, as compared to the untreated PKC while sieving had no effect on AME but improved CP digestibility by 39% which was not significantly different from that by extrusion. Conclusion: Extrusion is more effective than sieving and serves as a practical method to enhance AME and digestibility of CP and several amino acids in broiler chickens.

Keyword: Palm kernel cake; Physical treatment; Sieving; Extrusion; Hydration property; Feedstuff