

Determination of Chicken Body Composition Measured by Dual Energy X-Ray Absorptiometry

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Abstract :

Traditionally, body composition data for poultry is determined by grinding /homogenizing the whole bird and obtaining a sample for wet chemistry analysis. The overall process is slow, requires a large amount of freezer space and the time-lag required for determining body composition reduces the opportunity to use data in real- time situations. Two studies were conducted to evaluate Dual-energy X-ray Absorptiometry (DEXA) as a means of measuring body composition in broilers and broiler breeders. In Trial 1, two hundred and forty Cobb 500 broilers were reared from day-old to 60 days of age. Broilers were extracted from the flock every 3 days during the 60 day grow-out in order to obtain a variety of body weights and body composition for developing the body composition equations. The birds were weighed and scanned using the small animal software mode of the DEXA scanner (LunarProdigy, GE®). DEXA provides measurements in grams of Bone Mineral Content (BMC), Fat Mass (FM) and Lean Mass (LM). It was assumed that the sum of BMC+FM+LM represented the total body mass. After the scan was performed, the carcasses were frozen for further chemical analysis. Prior to chemical analysis, the carcasses were thawed, autoclaved at 110°C with 1 atm pressure for 1-5 h depending upon Body Weight (BW) and homogenized in a heavy duty blender (Waring Laboratory, Blender LBC15, Model CB15). Samples of the homogenized carcasses were freeze dried, weighed, ground and analyzed for total ash, ether extract and crude protein. The measurements obtained from the DEXA scans were compared with the whole body chemical analysis for each broiler. Regression analysis of DEXA values (BMC, FM, LM) and chemical analysis (ash, ether extract and protein) were utilized to determine possible correlations. Prediction equations were then developed to adjust the original DEXA results to more accurately predict BMC, fat tissue and lean mass. The R² values for the prediction equations using DEXA values were 0.999, 0.99, 0.96 and 0.99 for total mass, BMC, fat and lean mass (P<0.0001). In Trial 2, 156 Cobb 500 broiler breeder hens were scanned to validate the equations developed in Trial 1. The results indicate that the prediction equations were adequate and a reliable alternative for measuring body composition in broilers and broiler breeders. The high degree of correlation for all the variables indicates that with proper calibration the DEXA values can be used to predict body composition for these birds (R² = 0.99, 0.99, 0.84 and 0.94 for total mass, BMC, FM and LM, respectively, p<0.001).

Key Word :

Body composition, meat yield, DEXA scanners

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