Prediction of Lysine Availability in DDGS from Optical Density and Front-Face Fluorescence

P. E. Urriola, A. A. Pahm, J. E. Pettigrew, G. C. Shurson, H. H. Stein

During the drying of distillers dried grains with solubles (DDGS), high temperatures can damage the Lys. There is evidence that heat damaged AA present fluorescent properties, and those properties are correlated with AA digestibility. The objective of this study was to measure the correlation of Lys availability (LysA) in DDGS with optical density (OD) and front-face fluorescence (FFF). Lysine availability in 7 sources of DDGS was measured using a chick growth assay. Optical density of the 7 sources was measured with a HunterLab spectrophotometer (ColorFlex) at D65/10 illuminant. Front-face fluorescence was measured using a spectrometer (Aminco Browman II) at an excitation wavelength of 360 nm with emission spectra of 380 to 600 nm and recording at each 5 nm within the emission spectra range. The correlation between OD and LysA was calculated using multiple linear regression and the correlation between FFF and LysA was calculated using a principal component analysis. Because of variability among individual readings for FFF on the same sample, the average of 5 readings was used in the analysis. Results of the experiment showed that the 7 samples of DDGS had LysA that ranged between 51.9 and 77.0% as determined by the chick growth assay. The correlation between OD and LysA showed that LysA can be predicted from OD using the following model, where H indicates the wavelength for OD: LysA = 150 – 108(H400) – 210(H420) + 134(H440) + 26(H500) + 12(H630). The adjusted R^2 for this model was 0.99 and the root mean square error (RMSE) was 0.24 ($P = 0.02$). The principal component analysis for FFF showed that LysA can be predicted from FFF using a model containing 3 principal components. The adjusted R^2 for this model was 0.92 and the RMSE was 0.02 ($P = 0.01$). In conclusion, OD and FFF are methods that are sensible to heat damage in DDGS. Both procedures may be used to predict available lysine in samples of DDGS.

Key words: Available Lysine, Fluorescence, Optical Density.