Estimation of feedstuffs apparent ileal digestibility of amino acids and endogenous losses in broilers: a meta-analysis

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Optimizing nitrogen (N) use by birds needs a precise estimation of the amino acid (AA) value of ingredients. Given the within variation in AA digestibility in literature, the possibility of predicting AA digestibility based on proximal analysis of ingredient (e.g. crude protein, fiber, anti-nutritional factors) has been tested through meta-analysis tool. Two models has been performed: 1) Y = apparent digestible AA (AAdig, g/kg) and X = dietary CP (%) and 2) Y = AAdig and X = total analyzed AA (AAt, g/kg) in which the intercept is the endogenous losses (EL). A database of 49 publications has been used and was divided in 4 sub-databases: 1) cereals (barley, sorghum, wheat and corn) (n=47), 2) soybean meal (SBM) (n=38), 3) meat and bone meal (MBM) (n=34), and 4) database 1 plus faba beans and peas (n=65) to study EL. Study effect was random and ingredient effect in database 1 and 4 was fixed. In cereals database, prediction of AAdig by CP was accurate (R^2 from 0.62 for Met to 0.97 for Ala). The slope was similar between cereals except for Lys, Glu and Ser; in Lys corn and sorghum did not respond to CP compared to wheat ($P < 0.001$) and barley ($P < 0.001$) while for Glu and Ser only wheat responded to CP ($P < 0.001$). In SBM and MBM, the study improved R^2 (respectively 0.09 to 0.91 and 0.31 to 0.68). More negative intercepts values and significantly different from 0 ($P<0.002$), except for Met ($P=0.237$) were systematically obtained for barley in cereal database indicating higher EL probably due to its high fiber content. When adding faba beans and peas, that contain more crude fiber, they systematically presented higher EL than cereals. Among the AA, intercepts were the highest for Glu, Leu, Ser and Thr, which are predominant in the ileal digesta. In conclusion, CP can be a predictor of digestible AA of most AA for cereals, but not for SBM and MBM. Also, total EL seems to be influenced by crude fiber given the high intercepts for barley, faba beans and peas.