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

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Cereals are the main ingredients in broiler diet. They are generally rich in energy but due to their high incorporation rate they also contribute to the total protein in the diet. In broiler, digestibility of amino acids (AA) has been commonly reported as apparent ileal digestibility (AID). The objective of this study was to estimate apparent digestible AA (AAdig, g/kg diet) of the main cereals used in broiler diets based on their dietary CP (%) and total AA (AAt, g/kg diet), relationship in which the intercept represent total endogenous losses. A meta-analysis was performed using a database included 16 experiments totalizing 46 treatments published from 1999 to 2013 and reporting values of AID, CP and AA content in cereals in broilers. Models take into account experiment and cereal (corn, sorghum, wheat and barley) as fixed effect and CP or amino acids as independent variables. Results showed that for most AA, including the experiment in the model did not improve the accuracy of prediction. The prediction of AAdig based on CP is accurate with R^2 varying from 62% for Met to 97% for Ala. The slope is similar between cereals except for Lys, Glu and Ser; in Lys corn and sorghum did not respond to CP compared to wheat (0.022, $P < 0.05$) and barley (0.024, $P < 0.05$) while for Glu and Ser only wheat responded to CP (respectively, 0.33 and 0.061, $P < 0.05$). Models predicting AAdig based on dietary AA showed a similar slope between cereals for all AA. It also showed higher R^2 varying from 83% for Thr to 99% for Glu. Higher intercept values were systematically obtained for barley indicating higher endogenous losses. This is probably due to its high fiber content compared to the other cereals. Moreover, intercept are higher for Glu, Leu, Ser, Thr, and Asp which has been previously reported predominant AA found in the ileal digesta. In conclusion, CP can be used as predictor of AAdig in wheat and barley but, as expected, dietary AA is a better predictor and allows studying endogenous losses.

Key Words: amino acid, digestibility, broilers, Meta-analysis, cereals