



4B-108: Subtilisin protease increases digestible energy in sorghum and wheat based diets

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Aims and Objectives

The main objective was to investigate if the Subtilisin protease can significantly improve protein digestibility and energy availability in Australian grown or produced protein meals and cereals. Protein meals such as meat meal, canola (solvent and expeller), sunflower and cottonseed meal, the legumes field peas and lupins and protein in feed grains such as sorghum generally have inferior essential amino acid availability compared to soybean. If effective the protease would reduce the reliance on imported soybean, and address the outputs for sub-program 4B of Pork CRC.

The second objective was to compare the effectiveness and accuracy of two digestibility makers, Celite (acid insoluble ash) and Titanium Oxide.

Key Findings

The in-vitro protein digestibility studies showed a significant enzyme elicited improvement in all test protein sources, except for soybean meal and canola meal, which exhibited protein digestibility of 91% and higher. There was a significant relationship between digestibility of protein in the tested raw materials and response to the protease, where the lower the protein digestibility, the greater the increase in protein release.

The protease had no direct effect on increasing protein digestibility in the protein sources or the two cereals. However, there were trends towards the protease having a greater effect on the pea and meat meal based diets and the diets containing wheat.

The protease did, however significantly increase faecal DE across all treatments, with the largest effect in diets containing soybean and canola protein and sorghum, which is the opposite to the effects on protein digestibility.. The protease increased the ileal DE of the sorghum diets containing soybean and canola by 1.05 MJ/kg. The corresponding increase in faecal DE was 0.55 MJ/kg.

Both digestibility markers produced similar means and standard errors.

Application to Industry

The two digestibility markers, Celite and Titanium Oxide were found to produce similar standard errors, with the Titanium Oxide producing slightly lower standard errors in the ileal digestibility coefficients and the Celite produced numerically better standard errors in the faecal digestibility coefficients. The advantage of Titanium Oxide is it is cheaper to add, a lower cost to analyse for and a more rapid procedure.

The protease supplementation costs circa \$2.50 per tonne of feed. The average 0.35 MJ/kg increase in DE of the experimental diets (average of 0.44 MJ/kg DE for the sorghum and 0.20 MJ/kg for wheat diets), is worth approximately \$8.75 per tonne if the cost of 1 MJ/kg DE is \$25. Therefore the protease supplementation to improve DE only, is a 2:1 and 4:1 payback for wheat and sorghum diets, respectively, and there may be some small increases in protein digestibility as observed in the in-vitro study.