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"Solidarity in a competing world — fair use of resources"

Pig's Diets Containing Fibre-Rich Feedstuff Characterised through *in vitro* Simulation of Small Intestine Digestion and Colon Fermentation

Hai Quan Nguyen[1], Duc Ngoan Le[2], Phung Dinh Le[2], Veerle Fievez[1]

[1] *Ghent University, Dept. of Animal Production (Lanupro), Belgium*
[2] *Hue University of Agriculture and Forestry, Fac. of Animal Sciences, Vietnam*

Abstract

Including dietary fibre in pig's diets has been suggested to potentially reduce urinary urea losses, and hence ammonia emissions, through stimulation of the hindgut fermentation. However, protein digestibility in the small intestine might be reduced, resulting in impaired animal productivity. Accordingly, the objective of this *in vitro* study was to screen diets containing one out of nine Vietnamese feed ingredients, rich in fermentable fibre, in terms of apparent ileal crude protein digestibility as well as fermentation capacity and ammonia accumulation in the hindgut. Following nine feed ingredients, rich in fermentable fibre were studied: Banana stem (*Musa acuminata*), Brewery by-product, Cassava (*Manihot esculenta*) leaf and root by-product, Cabbage waste (*Brassica oleracea*), Sweet potato vines (*Ipomoea batatas*), Taro leaves and petioles (*Colocasia esculenta*), Tofu by-product and *Trichanthera gigantean*. All dietary ingredients were analysed for proximate composition, neutral detergent fibre (NDF), lignin, non-starch polysaccharides (NSP), soluble and insoluble fibre and were submitted to a two-steps *in vitro* simulation of the enzymatic hydrolysis in stomach and small intestine followed by microbial fermentation in the colon, using faecal inoculum. The *in vitro* simulation was conducted either for all ingredients separately as well as for complete diets. The latter ten complete diets included a control diet with 15 % NSP and nine experimental diets with 20 % NSP containing one of the fibre-rich feedstuffs which contributed 15 % of the total dietary NSP. Diets were formulated to contain similar amounts of crude protein (160-170 g kg^{-1} DM), metabolisable energy (12.1-12.3 MJ kg^{-1} DM) and ileal digestible protein (120-125 g kg^{-1} DM) based on the chemical analysis and *in vitro* results of the individual feedstuffs. The observed ileal digestible protein of the diet containing *Trichanthera gigantean* was 25 % lower than its corresponding calculated value ($p < 0.05$ based on 95% confidence intervals of both observed and calculated ileal digestibilities), whereas for other diets differences - if any - were smaller. Diets containing Banana stem ($p = 0.01$), and Cassava leaf ($p = 0.021$) stimulated hindgut fermentation, as suggested from increased productions of volatile fatty acids as compared with the control diet (T-tests). However, this stimulation did not result in a reduced accumulation of ammonia in the hindgut simulation system.

Keywords: Ammonia, fermentation, ileal digestibility, *in vitro*, large intestine

Contact Address: Hai Quan Nguyen, Ghent University, Dept. of Animal Production (Lanupro), Proefhoevestraat 10, 9000 Gent, Belgium, e-mail: nguyenhaiquan@huaf.edu.vn