Particle size of *Lupinus angustifolius* is associated with energy and protein digestibility in growing pigs

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Lupins contain high levels of non-starch polysaccharides (NSP) both in hulls and kernels, suggesting complex associations between digestible nutrients and these structural NSP in kernels. Therefore, the degree of mechanical grinding could influence digestibility of dietary components. Hammer-milling lupins through a finer screen (3 vs. 5 mm) increased total tract digestibility (TTD) of energy by 5% and digestible energy (DE) content by 1 MJ/kg (Wigan *et al.*, 1995). However, associations between TTD of nutrients and the lupin particle size have not been investigated in detail. The aim of this study was to establish relationships between particle size of lupins and TTAD of dietary components in growing pigs.

Sixty-three (Large White x Landrace), initial weight 63.5 kg ±0.95) individually-housed male pigs were randomly allocated to a 2x4 factorial experiment with the respective factors being lupin variety (Mandelup and Tanjil) and particle size of lupins (744, 888, 1099 and 1136 μm). A wheat control diet was used to determine the DE contents of the basal diet. All diets except the wheat control diet contained 574 g wheat, 350 g test lupins, titanium dioxide as a digestibility marker and other additives. Canola oil (930 g/kg) was used to prevent possible segregation. Wheat was ground using the same screen (6 mm) across treatments but lupins were hammer-milled through different sized screens (2, 4, 6 and 8 mm) to achieve the desired particle sizes. Pigs were fed their respective diets at three times maintenance [3x(0.458 MJ DE x body weight0.75)/diet DE] for 10 days and faecal samples were collected over the final three consecutive days to determine digestibility of dietary components. The GLM procedure of SPSS (SPSS Inc) was used for statistical evaluation. There were no variety effect on digestibility and hence data were pooled for particle size effects.

Increasing particle size of lupins from a mean particle size of 744 μm to 1136 μm linearly decreased total tract apparent digestibility of dry matter (DM), gross energy (GE) and crude protein (CP) of the test diets, and the DE content of lupins (Figure 1). However the extent of decline was greater for CP digestibility than other dietary components such as DM and GE. The results suggest that fine grinding of lupins is essential for adequate utilization of CP in pigs.

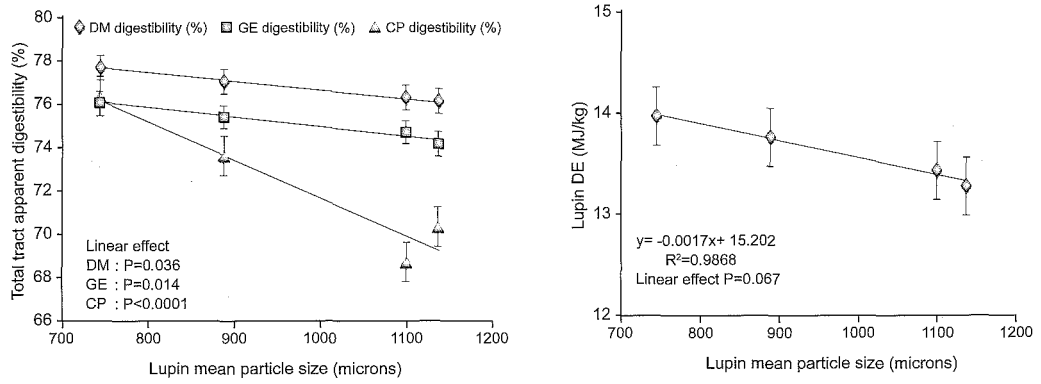

Figure 1. *Effects of lupin particle size on total tract apparent digestibilities of dietary components and digestible energy contents of lupins (Lupinus angustifolius)*

Study funded by the WA Agricultural Produce Commission: Pork Producers' Committee.

References

WIGAN, G.C., BATTERHAM, E.S. and FARRELL, D.J. (1995). In 'Manipulating Pig Production V' p 33, eds D.P. Hennessy and D.P. Cranwell. (Australasian Pig Science Association: Werribee).