Evaluation of mandelup lupin (*Lupinus angustifolius L.*) at different inclusion levels and in response to enzyme supplementation for grower/finisher pigs

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Despite lupins (*Lupinus angustifolius*) being an economical plant protein ingredient to feed growing and finishing pigs in Australia, the presence of anti-nutritional factors such as oligosaccharides and non-starch polysaccharides has generally restricted high inclusion levels in diets. New cultivars of Australian sweet lupins (ASL) have been released in Western Australia, but these have been bred mainly for improved disease resistance, drought resistance and yield. While these breeding criteria may also have changed nutritional characteristics, no research has investigated the nutritional adequacy of recent cultivars of ASL when incorporated at high levels in diets for grower/finisher pigs. The aims of this experiment were to 1) evaluate the optimum inclusion level for grower/finisher pigs of the current major variety of ASL (cv. Mandelup) and 2) examine the effect of a multi-enzyme preparation on the performance of grower and finisher pigs fed the lupin-based diets. The enzyme treatment was included to assess any potential negative effects of feeding high levels of Mandelup to pigs.

Two hundred and twenty-four (Large White x Landrace, initial body weight 27.2 kg±0.22) male pigs were used in a completely randomized block design having eight experimental treatments, with 28 pigs (seven pigs/pen) allocated to each. The experiment was a 4x2 factorial design with the respective factors being lupin inclusion level (200, 250, 300 and 350 g/kg) and multi-enzyme supplementation (±200 g/tonne Allzyme® SSF, Alltech Biotechnology Pty Ltd). The enzyme contained minimum activities of 100 U 1,4-β-xylanase, 30 U α-amylase, 200 U β-glucanase, 700 U protease, 40 U cellulase, 4000 U pectinase, and 300 U phytase per g product. All diets were formulated to contain equal amounts of ileal digestible amino acids and the same ileal digestible lysine to DE ratio. Lupins were progressively substituted for soybean meal based on equivalent ileal digestible amino acid contents between test diets. Pigs were fed grower, finisher and pre-sale diets between 27-50 kg, 50-75 kg and 75-107 kg, respectively. The GLM procedure of SPSS (SPSS Inc) was used for statistical evaluation of the results with pen as the experimental unit.

Table 1. Effects of lupin inclusion level (L) and multi-enzyme supplementation (E) on the performance of grower/finish pigs and days to slaughter (DTS) between 27 to 107 kg

	Lupin inclusion (g/kg)				Enzyme		SEM	Main effects			Lupin effects	
	200	250	300	350	-	+		L	E	LxE	Linear	Quadratic
ADG (kg/day)	1.00	1.01	1.01	1.03	1.01	1.01	0.008	0.694	0.602	0.791	0.266	0.892
VFI (kg/day)	2.72	2.74	2.76	2.68	2.69	2.76	0.020	0.505	0.079	0.322	0.484	0.237
FCR (kg/kg)	2.73	2.71	2.74	2.62	2.68	2.72	0.027	0.459	0.447	0.751	0.221	0.379
DTS (days)	77.8	76.7	77.4	76.3	77.4	76.6	0.65	0.871	0.588	0.883	0.535	0.964

Including up to 350 g/kg lupin seed in the grower, finisher and pre-sale diets did not depress growth, feed intake or feed conversion ratio (FCR). Diets formulated to contain 350 g/kg lupins with adjustment of ileal digestible essential amino acids supported daily gains of over 1 kg with 2.7 kg/kg FCR between 27 kg to 107 kg live weight. Consequently, days to reach 107 kg were similar regardless of the lupin concentration in the experimental diets. Supplementation of the multi-enzyme preparation did not improve production, although supplementation of the enzyme tended to increase feed intake without increasing growth rate during the pre-sale period (3.44 vs. 3.28, P=0.054). The result suggests that the current variety (Mandelup) of lupin can be used in grower and finisher diets up to 350 g/kg without compromising growth of pigs.

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