Feeding value of bean starch concentrates for growing pigs

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Implications The assessed standardized ileal digestible amino acid and digestible energy contents of bean starch concentrates suggests it has the potential to reduce reliance on soya bean meal and wheat in growing and finishing pig diets.

Introduction Air classification separates finely ground pulse flour in fractions of different densities using an air stream (Vose *et al*., 1976). Air classification of dehulled faba bean (*Vicia faba*) produces both protein and starch concentrates as co-products. Since bean starch concentrate (BSC) will still contain moderate levels of crude protein (CP), it may be used as an alternative energy and protein source for pigs. The current experiment was designed to determine the digestible energy (DE) and standardised ileal digestible (SID) amino acid (AA) contents of BSC for use in growing and finishing pig diets.

Material and methods Twenty-four 10-wk old male pigs, weighing 46.5±1.1 kg, were housed individually and fed commercial diets for three days, before experimental diets were gradually introduced at 3.3 × DE for maintenance. The two experimental diets were either a purified nitrogen-free diet or a semi-purified diet, containing 93.5% BSC as the only protein source. Pigs were fed the experimental diets for 8 days; faecal samples were collected on days 6, 7 and 8, and ileal digesta were collected on day 8. Faeces and ileal digesta were analysed for dry matter (DM), CP, starch, gross energy, titanium (digestibility marker) and amino acids (AA, ileal digesta only). BSC DE content was calculated from feed and faeces gross energy levels, corrected for DE arising from 2% soya oil included in the test diet. Coefficients of apparent ileal digestibility (AID) values for CP and AA were corrected for basal endogenous losses derived from the nitrogen-free diet to calculate SID.

Results The BSC tested contained 16.8% CP and 1.13% Lys on a DM basis (Table 1), with similar relative Met, M+C, Thr and Trp levels to the 0.11, 0.31, 0.52 and 0.13 respectively in BSC tested elsewhere (Gunawardena *et al*., 2010) and 0.11, 0.31, 0.56 and 0.14 in whole faba beans (Houdijk *et al*., 2013). As expected, SID coefficients were greater than AID, averaging at 0.79 vs. 0.75 for the AA reported, respectively. Averaged AA SID coefficients were in line with the 0.77 from whole faba beans in feeding tables (Hazzledine, 2008), which were both considerably lower than the 0.91 reported in BSC tested elsewhere (Gunawardena *et al*., 2010). The BSC contained 52.6% starch, and its ileal and total tract digestibility was 98.1 and 99.7%, respectively. Total tract diet energy digestibility averaged 84%; corrected for soya oil contribution, this indicated a DE content of 14.22 MJ/kg DM for the BSC tested, which is very similar to DE values of whole beans (Hazzledine, 2008) though around 14% lower than the 16.5 MJ/kg DM reported in BSC tested elsewhere (Gunawardena *et al*., 2010).

Table 1 Composition and digestibility of bean starch concentrate for growing pigs

Nutrient	Composition		Digestibility coefficients		Composition
	% (in DM)	AA to Lys ratio	AID	SID	SID %
CP	16.81	-	0.77	0.81	13.54
AA					
Lys	1.13	-	0.86	0.88	1.00
Met	0.12	0.11	0.79	0.84	0.10
M+C	0.35	0.31	0.68	0.72	0.25
Thr	0.58	0.52	0.71	0.75	0.44
Trp	0.11	0.10	0.74	0.78	0.09
Starch	52.60	-	0.98	-	-

Conclusion The composition and digestibility of amino acids in BSC in combination with its moderate DE content indicate that it is a promising ingredient in grower and finisher pig diets to replace at least a proportion of soya bean meal and wheat, provided that its imbalanced AA profile and moderate DE content is accounted for through appropriate raw material inclusion, including the use of synthetic AA. These expectations are currently being tested in a growth performance trial with grower and finisher pigs.

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