

Influence of acid hydrolysis on the nutritional value of canola  
meal for pigs 10-25 kg liveweight

P. NDIWENI and H.S. BAYLEY

University of Guelph, Guelph, Ontario Canada N1G 2W1

Plant breeders have developed cultivars of rapeseed which produce meals with low levels of glucosinolates and oils with low levels of erucic acid; such cultivars are referred to as 'canola'. However, attempts to formulate diets for young pigs using canola meal as the sole protein supplement result in lower growth rates than those observed for pigs receiving other sources of protein.

In the studies to be described, the effects of pre-hydrolysis of the canola meal on digestibility and growth were examined.

Autoclaving with sulphuric acid was used for the hydrolysis. The conditions which maximized solubilization of dry matter and nitrogen with minimum acid use were: 0.6N sulphuric acid at 126° for 3 hours using 5 l of dilute acid per kg of canola meal. The hydrolysate was neutralized with calcium hydroxide and filtered under pressure. The filtered suspension was stored at 4° for evaluation. The procedure recovered 66% of the dry matter and 69% of the nitrogen from the rapeseed meal in the filtrate.

Table 1. Composition of hydrolyzate of canola meal

Dry matter	Protein	Soluble carbohydrate	Ash
g/kg	g/kg dry matter		
16	340*	140	270

\*One third of the protein was 'true protein'

The high ash content of the product being due to the calcium sulphate formed by the neutralization of the sulphuric acid.

The effects of the processing in the nutritional value of the canola meal were examined by preparing diets in which 40% of the total nitrogen was provided by either the unprocessed or the processed canola. The diets contained

646 g/kg ground corn, 110 g/kg soybean meal and either 200 g/kg canola meal, or an equivalent amount of nitrogen from the hydrolyzate, with vitamins and minerals; analysis showed 187 g/kg crude protein, with the crude fiber level being lower (24 g/kg) in the hydrolyzate diet than in the unprocessed canola meal diet (46 g/kg). The unprocessed canola meal diet was mixed with water to provide the same dry matter level as in the hydrolyzate diet. The two diets were each fed to four pigs of approximately 11 kg liveweight for 21 days. There were no statistical significant differences in either food consumption (1.11 and 1.26 kg/d) or liveweight gains (0.54 and 0.52 kg/d) for the canola meal-, or its hydrolyzate-diets, respectively. All the pigs receiving the hydrolyzate diet had diarrhea. This was not due to the calcium sulphate present in the diet as a result of neutralizing the sulphuric acid with calcium hydroxide, because adding an equivalent amount of calcium sulphate to the canola meal diet did not induce diarrhea in a subsidiary experiment.

Digestibilities of the two diets were measured using chronic oxide as a digestion index and eight castrated male pigs of 15 kg liveweight. They were randomly allocated to the two diets and received 800 g/day divided between two equal meals for eight days. Feces were collected for the last four days. The apparent digestibilities of the dry matter and nitrogen were significantly lower ( $P < 0.01$ ) for the hydrolyzate diet than for the canola meal diet.

Apparent digestibilities of dry matter and nitrogen  
in diets containing 40% of nitrogen as either  
canola meal or its hydrolyzate

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	canola meal	hydrolyzate	Standard error
Dry matter digestibility	0.83	0.77	0.04
Nitrogen	0.81	0.72	0.12

At the end of the collection period for the digestibility determination the pigs were given a single meal 'marked' with  $^{51}\text{Cr Cl}_3$  and the feces monitored for gamma emissions: the times of first appearance of the marker were 26 h for the pigs receiving the canola meal diet and 12 h for the pigs receiving the canola hydrolyzate diet.

These data show that acid prehydrolysis of canola meal solubilizes two thirds of the dry matter and nitrogen but does not improve the nutritional value of the canola. The hydrolyzate passed through the digestive tract much more rapidly than the unprocessed meal resulting in a lower digestibility, and diarrhea. However, substitution of the hydrolysis product for the unprocessed canola meal did not reduce the growth rate of pigs between 10 and 20 kg liveweight.

(This work was supported by the Canola Council of Canada).