

Net Energy Content of Canola Meal and Full-Fat Canola Seeds in Swine

Carlos A. Montoya, Kathryn Neufeld, Pam Kish & Pascal Leterme



Pascal Leterme

SUMMARY

The project aimed to estimate the net energy (NE) content of canola meal (CM) and full-fat canola seeds (FFCS) in swine and to validate these values, through growth studies using diets containing graded levels of CM or FFCS. No difference in average daily gain and feed conversion ratio was observed between the treatments. This confirms that the estimation of the NE content (CM 2.41 and FFCS 3.53 Mcal/kg DM) was correct and that it is possible to formulate balanced diets for growing pigs that contain up to 15% FFCS and 22.5% CM.

INTRODUCTION

Canola meal (CM) is used in animal nutrition but has to compete with other protein sources such as soybean meal and peas. Currently, CM is not used to its full potential in swine nutrition, due in part to a lack of confidence in its nutritional quality. It is perceived as a poor energy source, due to its low starch and oil content and high protein and fibre content.

Thanks to their high oil content, full-fat canola seeds (FFCS) could partly contribute to correct the low energy content of CM. However, the seeds must be crushed to liberate the drops of oil entrapped within the cell walls and little information is available on the efficiency of the process.

“No difference was observed in average daily gain and feed conversion ratio when canola meal or full fat canola seeds were included at different levels in the swine diets”

The NE system is the best estimator to predict pig growth and its ability to convert feed into lean meat. However, it is often estimated by means of prediction equations because the direct determination is time-consuming and expensive. It is possible to confirm the validity of the NE content of CM or FFCS by measuring the



Canola Meal

feed conversion ratio of pigs fed with canola-based-diets. If the growth rate does not correspond to the predicted value, it means that the current values of NE over- or underestimate the real energy potential of these canola products.

The present project aimed to estimate the NE content of CM and FFCS and validate them through a growth trial using different graded levels of both ingredients in growing pigs.

MATERIAL AND METHODS

A total of 18 growing pigs (36 kg on average) were used for the digestibility study. Three experimental diets were prepared: a control diet (composed of barley, soybean meal and a mineral/vitamin premix) and two diets composed of 2/3 of the control diet and 1/3 of CM or FFCS. Each diet was tested on 6 growing pigs. After an adaptation period to the diet of 10 days, the faeces were quantitatively collected for 10 days. The samples were then pooled per animal, freeze-dried and analysed at the University of Saskatchewan. The digestible and net energy (DE and NE) content of the diets were calculated. The same parameters were calculated for the CM or FFCS alone (Table 1).

Based on the results of NE content of both CM and FFCS, two separate growth studies were conducted with graded levels of CM or FFCS. In each study, 72 growing pigs were used and four diets containing graded levels of FFCS (0, 5, 10 and 15%) or CM (0, 7.5, 15 and 22.5%) were formulated in order to meet the pig's nutritional requirements. Each diet was tested on 18 growing pigs (9 females and 9 males) for 35 d.

RESULTS

The DE content was 3.51 and 4.99 Mcal/kg DM and the NE 2.41 and 3.53 Mcal/kg DM for CM and FFCS, respectively. The DM and nitrogen digestibility for CM was 74 and 79% and for FFCS 75 and 74%, respectively (Table 1). The results of growth performance are detailed in Table 2 and Figure 1. No difference in average daily gain (ADG) and feed conversion ratio (FCR) was observed when CM (ADG, 1.07 ± 0.29 kg/d and FCR, 1.99 ± 0.56) or FFCS (0.97 ± 0.24 kg/d and 2.27 ± 0.56) were included at different levels in the diets (P>0.05).

CONCLUSIONS

The validity of the values of NE obtained for CM (2.41 Mcal/kg DM) and FFCS (3.53 Mcal/kg DM) was confirmed through growth experiments. The latter also showed that inclusion rates up to 22% canola meal and 15% full-fat canola seeds in rations have no detrimental effect on the performance of growing pigs.

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Table 1. Digestibility values and energy content of canola meal (CM) and full-fat canola seeds (FFCS) in growing pigs.

	CM	FFCS
Digestibility (%)		
Dry Matter	74	75
Nitrogen	79	74
Energy	74	73
Digestible Energy (Mcal/kg DM)		
	3.51	4.99
Net Energy (Mcal/kg)		
	2.41	3.53

Table 2. Feed intake and growth in growing pigs fed with different levels of canola meals (CM) or full-fat canola seeds (FFCS) in the diets.

Diet	Inclusion level (%)				RSD ¹	P			
	0	7.5	15	22.5		Diet	Time	D*T	Gender
CM	0	7.5	15	22.5					
FFCS	0	5	10	15					
<i>Average daily feed intake (kg)</i>									
CM	2.09	2.02	2.01	2.09	0.55	0.664	0.001	0.122	0.023
FFCS	1.97 ^a	1.99 ^a	1.84 ^{ab}	1.75 ^b	0.45	0.001	0.001	0.651	0.002
<i>Average Daily Gain (kg)</i>									
CM	1.08	1.09	1.03	1.08	0.25	0.483	0.001	0.925	0.360
FFCS	0.98	1.00	0.94	0.95	0.24	0.070	0.001	0.437	0.018
<i>Feed conversion</i>									
CM	1.94	1.95	2.06	2.00	0.63	0.190	0.001	0.694	0.814
FFCS	2.07	2.05	2.03	1.92	0.56	0.068	0.002	0.056	0.245

¹ RSD: residual standard deviation.

^{ab} Values with different letters in the same row differ significantly at P < 0.05.

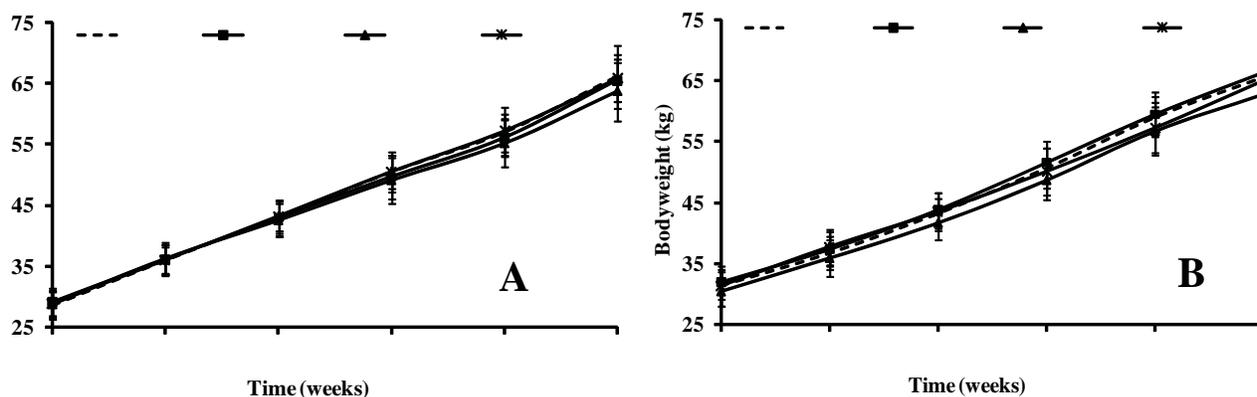


Figure 1. Growth curve of growing pigs fed with diets containing graded levels of canola meal (A) or full-fat canola seeds (B). Values are means and SD for 18 pigs (9 females and 9 males).