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RAPESEED MEAL IN SWINE FEEDING

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Swine are probably less tolerant of rapeseed meal than are other classes of domestic animals. Historically, therefore, this meal gained a poor reputation as a protein supplement for pigs. However, the present solvent-processed or prepressed solvent-processed rapeseed meals as produced and presently available in Canada may be widely used in the diets of most classes of swine.

I will first make a few general comments on the recommended use of rapeseed meal in pig diets and then illustrate my comments with recent research. For young pigs during the starting period to 25 kg in weight, 4 to 5% of the total ration may be composed of solvent-extracted rapeseed meal of the types presently available. For market pigs from 25 to 90 kg liveweight the meal may make up to 10% of the total ration. Feed intake, rate of gain and efficiency of feed utilization may be reduced slightly at this level of feeding when comparison is made with diets containing equivalent levels of soybean meal. Higher levels up to 15% rapeseed meal or 100% of the protein supplement may be fed but a reduction of approximately 10% in performance must be expected. The major limitation on the use of rapeseed meal is in pregestation and gestation rations. Particularly for young females during this period, rapeseed meal may be unsuitable at a level above 3% of the total ration or 25% of the supplemented protein. High levels of rapeseed meal in gestation rations have been reported to cause difficulty in conception, smaller litter size with lighter pigs and lactational inadequacy. Longer gestation periods have been observed by Dr. J. M. Bell but not in our research. Breeding boars appear to be unaffected by a level of rapeseed meal as high as that recommended for market pigs, i.e. - 5 to 10% of the diet.

Table 1 illustrates performance of pigs when 25% of the soybean meal protein was replaced by rapeseed meal protein on an isonitrogenous basis (Manns and Bowland, 1963). No energy adjustment was made in this particular experiment. It illustrates typical performance that we get in starting, growing and finishing rations. In other words rapeseed meal can be used to replace a portion of the soybean meal with no significant influence on

performance. An apparent slight depression in efficiency of feed conversion can be compensated for by substitution of a low level of fat or some other adjustment in the diet to produce isocaloric diets. Replacement levels of up to 50% rapeseed meal in diets of market pigs give similar results. We have failed to obtain any response from supplemental lysine which would be expected to be the first limiting amino acid when rapeseed meal is used as a protein supplement.

TABLE I

PERFORMANCE OF PIGS WHEN 25% OF SOYBEAN MEAL PROTEIN REPLACED BY RAPESEED MEAL (NO ENERGY ADJUSTMENT).

	Starting		Growing		Finishing	
	Control	RSM	Control	RSM	Control	RSM
Daily gain .... kg	0.50	0.50	0.70	0.65	0.75	0.72
Feed/kg gain .. kg	2.4	2.4	3.2	3.4	4.1	4.5

Table 2 summarizes our recent data (Bowland and Saben, 1970) on determination of digestible energy, metabolizable energy, and nitrogen digestibility on a dry matter basis of rapeseed meals fed to pigs. These are the results of a study with ten different meals and although there is considerable variability in DE and ME values these are no greater than will be encountered with other protein supplements. The average values on an air-dry (10% moisture) basis are as given in the bottom two lines of Table 2. Meals from zero-erucic acid rapeseed and from Bronowski (low-glucosinolate) rapeseed were also evaluated in this study. Although not included in the Table, the results obtained were similar to the mean values shown. One important difference between feeding rapeseed meal to pigs and to poultry is that the energy values for use in swine diets are considerably higher than those that can be used in poultry diets. This is of particular importance to the feed manufacturer, particularly when he is using electronic computation of diets.

TABLE II

DE, ME, ME_n AND N DIGESTIBILITY (DRY MATTER BASIS) OF RAPESEED MEALS FED TO PIGS

	DE kcal/kg	ME kcal/kg	ME_n kcal/kg	N digest. %
Rapeseed meal				
Av	3,135	2,821	2,552	75.6
Low	2,880	2,550	2,186	70.8
High	3,463	3,255	2,953	79.3
Weight of pig kg				
15	3,347	2,970	2,714	71.7
35	3,027	2,773	2,515	73.2
65	2,983	2,728	2,420	73.1
Av (air dry 10% moisture)				
kcal/kg	2,820	2,540	2,300	
kcal/lb	1,280	1,150	1,050	

Table III illustrates the performance that we have obtained in our most recent sow reproduction experiments (Saben, 1970). In this study up to 8% of a commercial solvent-processed meal had no significant effects on performance. This is a controversial area and we must recommend caution because of the variability in results from the present rapeseed meals. We have no studies on low glucosinolate meals for sow reproduction but have fed this meal to rats and obtained satisfactory performance through gestation.

TABLE III

RAPESEED MEAL FOR SOWS - REPRODUCTIVE PERFORMANCE

Rapeseed meal in diet				
Gestation, %	0	4	8	8
Lactation, %	0	4	0	8
No. of sows	8	8	8	8
No. of litters (2 reproductions)	16	13	14	15
No. estrus cyclyes/conception	1.2	1.3	1.0	1.1
Gestation weight gain, kg	46	49	47	50
Lactation weight loss, kg	15	16	16	18
No. pigs born alive	9.8	8.1	8.5	8.4
Litter birth weight, kg	13.6	10.9	10.9	11.8
No. pigs weaned	8.4	7.5	7.5	7.7
Litter weaning weight*, kg	40	37	40	41

* 3 weeks

Table IV shows that there is no marked influence on milk composition when rapeseed meal is fed to swine (Schuld and Bowland, 1968). Colostrum had a higher fat content and milk a non-significantly higher fat content which suggests some reduction in total milk production in this particular study. There was no measurable erucic acid in any of the colostrum or milk. This is understandable as rapeseed meal contains a very low level of residual oil.

Table V illustrates the results obtained when rapeseed meal was fed in the diets of the progeny from sows fed either rapeseed meal or soybean meal (Bowland and Schuld, 1968). The objective was to see if there was a carryover effect from feeding rapeseed meal to sows. For first litters there was no significant effect on performance although litters fed rapeseed meal and from rapeseed meal-fed sows gained somewhat more slowly. Based on our overall results, any influence on reproduction is likely to be with gilts during pregestation and the first gestation.

TABLE IV

COMPOSITION OF COLOSTRUM AND MILK FROM SOWS RECEIVING 0 OR 8% DIETARY RAPESEED MEAL

		Colostrum		Milk	
Rapeseed meal		0%	8%	0%	8%
Total solids	%	20.7	23.3	18.5	20.8
Solids-not-fat	%	14.3	15.6	11.7	12.7
Fat	%	6.4	7.7	6.8	8.1
Protein	%	8.8	10.9	5.3	5.5
Lactose	%	4.8	4.1	5.7	6.4
Ash	%	0.66	0.63	0.71	0.79
Fatty acids (major)					
C16:0	%			25.0	25.5
C16:1	%			6.8	7.0
C18:0	%			4.7	4.6
C18:1	%			41.6	41.8
C18:2	%			16.8	16.4

TABLE V

RAPESEED MEAL IN DIETS OF PROGENY OF SOWS FED EITHER RAPESEED MEAL OR SOYBEAN MEAL

Diet for pigs	Diet for dams	Daily feed kg	Daily gain g	Feed/kg gain kg
1st litters				
SM	SM	2.1	600^{b}	3.10^{ab}
SM	RM	2.1	681^{a}	3.01^{a}
RM	RM	1.9	607^{b}	3.18^{ab}
RM	SM	2.1	647^{ab}	3.30^{b}
2nd litters				
SM	SM	2.1	672	3.12
RM	RM	2.0	600	3.33

In unpublished data (Devilat and Skoknic, 1970) supplied to me by the research workers from La Platina Experimental Station and the School of Veterinary Medicine, University of Chile, Santiago, a typical iodine deficiency syndrome accompanied by greatly enlarged thyroid glands was encountered in pigs from sows fed rapeseed meal. Twelve percent Chilean solvent-extracted meal was fed in substitution for an equivalent level of fishmeal. This substitution was made immediately following breeding when the sows were divided between control animals and rapeseed meal-fed animals. The probable explanation for the extreme results of this study is that substitution of rapeseed meal at this stage stresses the thyroid gland at a very critical time. The results emphasize, however, that caution must be used in feeding high levels of rapeseed meal to sows.

Table VI demonstrates the effects of feeding 5 or 10% rapeseed (not rapeseed meal) to growing pigs (Bowland, 1970). With the large production of rapeseed in Western Canada, cull rapeseed and rapeseed impurities in cereal grains are common. Myrosinase will not be inactivated in the unprocessed rapeseed as fed in this study. There is a definite sex effect demonstrating that gilts are influenced more than are barrows by rapeseed in the diet. Feeding rapeseed in a diet containing rapeseed meal seems more likely to be detrimental than feeding rapeseed in a diet without rapeseed meal.

TABLE VI

RAPESEED IN PIG RATIONS (17 WEEKS)

	5% rapeseed				10% rapeseed No adjust.
	Control	No. adjust.	Energy-prot. adjust.	4% RSM	
Gilts					
Daily feed kg	1.81	1.43	1.34	1.29	1.29
Daily gain kg	0.65	0.53	0.47	0.47	0.51
Feed/gain kg	2.79	2.72	2.84	2.74	2.52
Barrows					
Daily feed kg	2.04	1.93	1.97	1.80	1.48
Daily gain kg	0.64	0.65	0.65	0.57	0.54
Feed/gain kg	3.17	2.98	3.05	3.18	2.74

In summary, it is evident that there are few limitations on the judicious use of presently available rapeseed meal in swine diets. With the hoped for introduction of glucosinolate-low meals either by rapeseed breeding or by chemical procedures, it should be possible to remove existing restrictions in relation to recommendations on the use of rapeseed meal for swine.

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