IAFMM Fish Meal Flyer

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ILEAL DIGESTIBILITY OF AMINO ACIDS FROM SOYABEAN MEAL RAPESEED MEAL AND FISH MEAL FED TO PIGS

SUMMARY

Rapeseed meal, an increasingly important protein crop grown in Europe, is generally considered to be inferior to soyabean meal as a source of protein in pig diets. In a trial at the National Institute for Research in Dairying, UK it was found that the digestibility of amino acids(ileal digestibility) from a mixture of rapeseed meal (a low toxin double zero variety) and fish meal were higher than those from soyabean meal.

Combining fish meal with rapeseed meal may provide a cheaper yet superior source of protein than soyabean meal in pig diets.

Background to the Trial

Production of rapeseed meal in Europe is increasing rapidly. Further production is being encouraged to reduce dependence on imported soyabeans and as an alternative crop to cereals, production of which are in surplus. Currently, most of the rapeseed produced in Europe contains toxins which make it unsuitable for pigs and poultry. New varieties have been developed which have a low content of these toxins (double zero) and these are likely to be used increasingly in pig and poultry diets.

The amino acids provided by rapeseed meal fed to pigs and poultry are believed to be inferior to those provided by soyabean meal (see IAFMM Technical Bulletin No.17). Work in Norway (see IAFMM Technical Bulletin No.18) has shown that by combining fish meal with rapeseed meal in pig diets, growth was equal to or better than that achieved with a soyabean

Furthermore, these proteins combined are likely to be cheaper than soyabean meal.

To investigate the nutritional effect of combining fish meal with rapeseed meal a trial was instigated at the National Institute for Research in Dairying (NIRD), Reading, UK to measure amino acid digestibility of the proteins from soyabean meal (S), rapeseed oil (R), fish meal (F) and combinations (Partridge et al 1985).

The treatments tested were:

Soyabean meal	S
Rapeseed meal	R
Fish meal	F
Soya/fish meals	SF
Soya/rapeseed meals	SR
Rapeseed/fish meals	RF
Soya/rapeseed/fish meals	SRF

Details of diets are given in Appendix Table 1.

The rapeseed used was the French double zero variety TANEAM kindly supplied by the French rapeseed growers association CETIOM. It is considered to be representative of European double zero varieties. The fish meal used was Chilean meal supplied by CORPESCA. A normal soyabean meal (44% protein) obtained by NIRD was used in the trial.

The digestibility of the amino acids was measured by taking samples of digested food from the small intestine (ileum) using pigs with ileal cannulas. This technique is considered to be better than the traditional digestibility method based on faecal collection in the assessment of amino acids subsequently available for protein synthesis.

Results

The average digestibility values for all the essential amino acids from the fish meal diet were higher (77%), than those from either soyabean meal (75%) or rapeseed meal diets (71%). Digestibility values for the limiting amino acids, lysine, threonine and methionine plus cystine were also higher for fish meal than for the other proteins (see table). By combining rapeseed meal with fish meal, digestibility of these amino acids, were higher than those from either soyabean meal (S) or soyabean meal/-rapeseed meal (SR) (see Table 1).

Table 1 Ileal Apparent Digestibilities of N and Amino Acids in Barley Diets containing as Protein Supplements, Soyabean Meal (S), Rapeseed Meal (R), Fish Meal (F) or Combinations (SR, SF, RF and SRF)(%)

	S	R	F	SR	SF	RF	SRF	#SED
Nitrogen	69.6	66.1	71.4	69.1	70.8	70.4	68.8	1.98
Lysine	74.6	68.2	79.7	72.2	76.9	75.6	75.3	1.80
Threonine	65.1	62.2	70.2	66.1	67.9	67.7	67.1	2.45
Methionine	80.6	83.8	84.1	83.7	83.1	85.1	83.4	1.27
Cystine	61.3	60.3	62.9	64.2	64.4	65.1	62.5	2.42

Standard error of difference

Conclusions

By combining fish meal with rapeseed meal, the resultant ileal apparent digestibility values for essential amino acids, and in particular lysine, threonine and methionine and cystine, were higher than those for either soyabean meal alone or in combination with rapeseed meal. These results indicate that the superior results obtained feeding diets containing fish meal and rapeseed meal (double zero) compared with soyabean meal in Norwegian Trials (IAFFM Technical Bulletin No.18) may in part be due to higher availability of amino acids. Furthermore, the results of the present trial confirm those carried out earlier in Scotland by Fuller et al and in Poland by Brundza et al (see Technical Bulletin No. 17).

Combining fish meal with rapeseed meal may provide a cheaper yet superior source of protein than soyabean meal in pig diets.

References:

Brundza L., Zebrowska, T., Savic S., Teodorovic M., and Latkouska M. 1981 'Zbornikradova' br 11/12. Institut zu Stocarstvo, Nov Sad.

Fuller M.F., Cadenhead A., Chink K.H., Milne T and Brown D 1983. VIth Int. Symp. Protein Metabolism and Nutrition III 285 INRA.

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Appendix Table 1 Composition of the diets (g/kg)

	S	R	F	SR	SF	RF	SRF
Barley	702.3	562.2	857.5	632.3	780.0	709.9	707.4
Soyabean meal	250.0	-	-	125.0	125.0	-	83.3
Fishmeal	-	-	125.0	-	62.5	62.5	41.7
Rapeseed meal	-	375.0	-	187.5	-	187.5	125.0
Soyabean oil	10.0	31.0	-	20.5	5.0	15.5	13.7
Salt	2.5	2.7	-	2.6	1.2	1.3	1.7
Limestone	3.7	6.0	-	4.8	1.8	3.0	3.2
Dicalcium phosphate	14.0	5.6	-	9.8	7.0	2.8	6.5
Min/Vit supplement	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Chromic oxide	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Composition based on ingredient analysis							
DE (MJ/kg)	13.1	13.1	13.1	13.1	13.1	13.1	13.1
Lysine	8.8	8.8	8.8	8.8	8.8	8.8	8.8
Threonine	6.3	7.3	6.0	6.8	6.2	6.6	6.5
Methionine + cystine	5.3	7.3	5.6	6.3	5.4	6.4	6.0
Crude protein	180	192	176	186	178	184	183
Crude fibre	51	71	44	61	48	58	55

All diets contained (g/kg) Ca 9.8; P6.6; NaCl 5.2