AMINO ACID COMPOSITION OF PROTEIN FRACTIONS IN RAPESEED

B. Uppström, M. Johansson

Svalöf AB, S-268 00 Svalöv, Sweden

INTRODUCTION

The interest in rapeseed meal as a feeding-stuff has increased due to the development of low glucosinolate varieties. Rapeseed meal has a high protein content and a well balanced amino acid composition especially regarding the essential amino acids lysine, methionine and cystine/cysteine (Bengtsson 1985).

An investigation was performed to explore the possibility to improve the content of these amino acids by plant breeding (Uppström and Johansson 1987). There is a considerable variation in the amino acid composition. Plant breeding for increased protein content does not cause any detectable deterioration of the content of lysine, methionine and cystine/cysteine.

As a consequence of this we determined to investigate how different protein groups vary with the protein content and the distribution of the essential amino acids in these protein groups.

MATERIALS AND METHODS

18 varieties and lines of Brassica napus, summer form, were used. 7 of these were from the 1983 harvest, 5 from 1984 and 6 from 1989. The seeds were defatted (Troëng 1955) and the protein fractionation performed according to Osborne (1986). The protein fractions were hydrolysed with hydro chloric acid in the traditional way. For analysis of the sulphur containing amino acids the samples were oxidized prior to hydrolysis. The amino acids were analysed as 9-fluorenylmethyl chloroformate derivatives by reversed phase HPLC with fluorescence detection (Einarsson et al. 1983).

RESULTS

The variation in protein content of the investigated material is considerable ranging from 27.5 to 38.0. With increasing protein content the salt soluble proteins will increase. The other protein fractions, soluble in water, alcohol and alkali, will remain relatively constant with increasing protein content. The salt soluble proteins represent the main fraction while the alcohol soluble ones are negligible (Table 1 and Figure 1).
The range of variation of some essential amino acids of the different protein fractions is presented in table 2.

DISCUSSION AND CONCLUSION

Rapeseed protein consits to 75 - 80 % of water and salt soluble proteins. There is no considerable difference between water and salt soluble proteins regarding the

selected essential amino acids. Consequently there should be no depression of the content of those essential amino acids with increasing protein content.

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Table 1. Protein content of rapeseed meal and protein fractions, a selection.

Line	Rapeseed meal. Sum amino acids % of meal	Water soluble proteins % of protein	Salt soluble proteins % of protein	Alcohol soluble proteins % of protein	Alkali soluble proteins % of protein
89-20009	28.9	32.4	45.2	2.1	20.3
84-20005	30.1	37.0	43.5	2.2	17.3
83-21544	33.3	27.6	53.5	1.8	17.1
89-20242	34.5	35.3	43.5	2.1	19.1
84-26603	35.9	28.7	54.0	2.1	15.3
83-21543	38.0	24.6	59.4	1.5	14.5

Note. The protein content is expressed as the sum of amino acids and not as the Kjeldahl nitrogen.

Table 2. Range of variation of some essential amino acids. % amino acid of protein fractions and of meal.

Amino acid	Water soluble	Salt soluble	Alcohol soluble	Alkali soluble	Total of meal
Cys	2.8-4.4	2.4-3.6	1.0-3.3	0.6-0.8	2.4-2.9
Ile	3.6-4.1	4.1-4.9	4.2-5.7	5.0-6.0	4.4-4.7
Leu	6.7-7.2	7.4-8.0	8.9-12.0	9.4-10.1	6.3-8.0
Lys	6.2-7.7	4.9-7.1	5.7-7.2	5.3-6.5	5.7-6.8
Met	1.8-3.6	1.6-2.0	0.7-2.4	1.9-2.7	1.8-2.4
Phe	4.0-4.3	4.0-4.4	3.7-4.7	5.1-5.6	4.3-4.5
Thr	3.9-4.5	3.6-4.2	4.7-7.1	6.2-7.3	4.2-4.9
Val	5.0-5.4	5.3-5.6	6.2-8.0	6.3-6.9	4.7-5.7

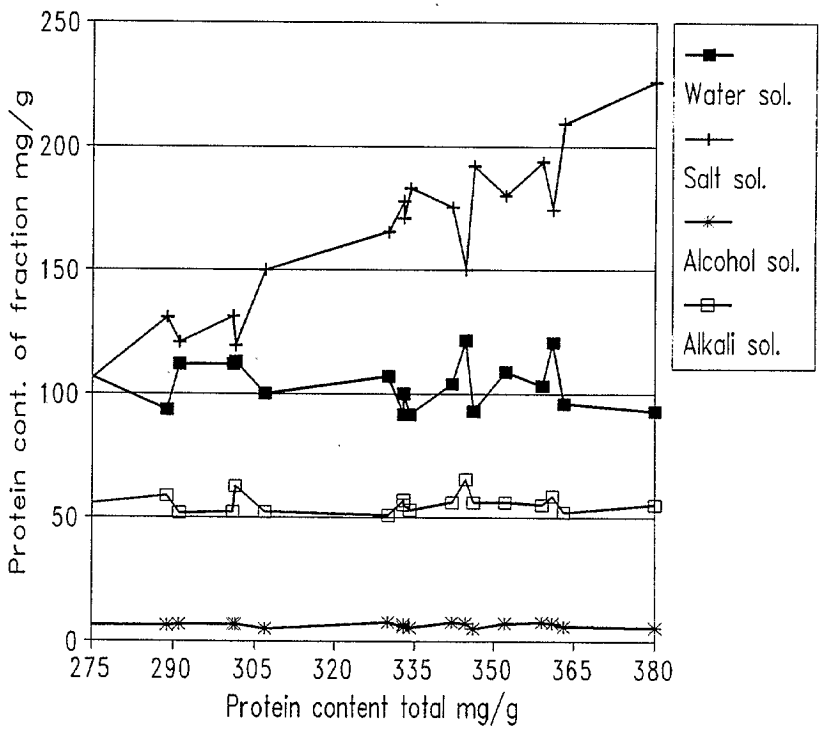

Figure 1. Protein fractionation of Brassica napus summer form. Protein content mg/g meal.