Protein

Beans | Peas | Lupines | Other Protein Crops

Protein
Proteins are produced as by-products from the vegetable oil and starch industries. The major part is used as animal feed. Europe has a deficit in feed protein, and the EU Commission is looking for ways to increase the domestic protein production.

The major domestic protein sources in the Baltic Sea area are rape-seed cakes and cereals.

Besides, a number of protein crops are grown in limited amounts. Those are: Beans, peas and lupines.

Table1. Protein content in protein crops

	(faba)Beans	Peas	Lupines
Protein content	25-35 %	18-30 %	35-43 %

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Beans
Faba beans have an excellent amino acid composition, high in lysin. The nutritive value is however limited by a relative high content of anti-nutritional factors such as tannins and glucopyranosides (vicin and convicin). Besides the yield can fluctuate considerably from year to year.

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Peas
Peas are good as supplement to cereal protein in feed mixtures as pea protein has high lysin content (cereal protein is low in the essential amino-acid lysin). It is however low in sulphur amino acids and tryptophan. Current breeding programmes have as objectives to improve the content of essential amino-acids.

Peas are also used for human consumption either directly or after processing. Peas have been used for production of starch, protein isolates and dietary fibres.

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Lupines
Lupines belong to the oldest crops in the World. It has been used as food and fodder since the stone age, and it is still grown in many countries in the World from the Middle East to Iceland. However the actual World production is modest and declining. The major producer in the World is Australia.
In Europe lupines are mainly grown in Poland, Spain and Germany. Polish plant breeders have developed new lupine varieties, for example Amulet that contains 46 % protein and only 4 % fat.

Lupine has approximately the same protein content as soybeans (up to 45 %). The oil content is however low (5-18 %). The content of high quality dietary fibres is as high as 30 %.

Traditional lupine varieties contain 0,8 – 0,9 % alkaloids that have to be removed by leaching or steaming, before the product can be used as food or feed. At least one European factory is producing lupine alkaloid extracts that for example are used to improve plant growth in vegetables.

Bioraf Denmark Foundation on Bornholm has together with other research institutes developed a process for production of protein concentrates and protein isolates from different varieties of lupines. The process is still at the pilot plant stage, however the products have been tested as binders in paper and paint productions. The prospect of using the products in the food industry e.g. as meat replacers ,

in bakery products and in baby food have so far only been tested in laboratory scale.

A business plan has been developed showing good competitive strength even in small scale production units. An optimal production size is 20.000 tons of lupine seeds pr year.

Apart from the protein products the plant will also produce prebiotics and fat replacers from the hemicellulose and cellulose fractions. As by-product are produced hulls that can be used for energy purposes.

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Other Protein Crops

A new protein crop with potentials for the Baltic Sea area may be amaranth

Amaranth is an old cultural crop grown extensively in Central and South America. It contains ca. 14% protein and 64 % starch. It should perhaps be characterised as a starch crop, however the protein quality is extremely high, and this is the main reason for the interest in amaranth in our part of the World. Amaranth protein has no gluten, and therefore amaranth flour may be used in bread for gluten allergics. The germ contains more than 40 % high quality protein.