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## PRODUCTION AND UTILIZATION OF SUNFLOWER PROTEIN FLOUR IN CONFECTIONERY

Processing of sunflower seed has until recently yielded only one toolstuff - vegetable oil.

The main technological aim was the maximum oil yield with minimum losses.

The goal set at present is to use sunflower seeds more fully so that both high-quality edible oil and high quality protein and by-products could be obtained. Yet this problem cannot be solved by the current processing methods. Though oil extraction is rather complete, some other valuable foodstuffs are not extracted. This especially concerns seed drying by the products of combustion, raw material cleaning and threshing and the separation of the threshed product (windrowing, fractionation).

The pressing method of obtaining oil has some defects; high temperatures and pressures lead to inconvertible changes of proteins, vitamins and phosphatides. The extraction method has some disadvantages too: along with fats some other soluble substances hampering oil refining are also extracted. In all existing methods the moistening operation is unsatisfactory as well as vapour treatment and vaporization. They all lead to changes in proteins and other physiologically active substances.

The Melovoye Oil Refinery jointly with the Voroshilovgrad Confectionery Factory has for two years been working to improve processing methods of obtaining sunflower kernels with 0.2-0.5% of husk in order to proceed to a more complete utilization of sunflower seeds. Besides, the Oil Refinery has developed a method of

flour preparation from the above-mentioned kernels. Thus an additional product has been obtained along with edible oil and cake. It contains proteins, carbohydrates and lipids. The product has the form of powder and is technologically denominated as "Milled Semi-defatted Sunflower Kernel".

According to the Technological Regulations 18 of the Ukrainian SSR (418-75) the major physical and chemical properties of the above-mentioned product are as follows: humidity - not over 5%; fat content - not over 20%; crude protein in dry matter - at least 30%; complete passage through the sieve with the mesh diameter of 2 mm.

According to biochemical analysis carried out in the biochemical departments of VNIIMK, Ukrainian Research Institute, etc. this product has the following chemical composition (% of flour weight): protein 47-50, fat 14-16, soluble carbohydrates 7-10, other carbohydrates and cellulose 10-20, humidity 4.5-5, ash 2.0-6.0.

Fluctuations on the content of some components in different lots of flour is due to some varietal differences of processed sunflower and to certain differences in the technological process. The vitamin content is so far known only for carotin (provitamin A) where it amounts to 1.66 mg %.

It is of interest to note high concentration of proteins and soluble carbohydrates in flour. This is very important for confectionery.

According to VNIIMK estimates sunflower flour contains almost all amino acids and their quantity, especially of essential amino acids which are so important for metabolism, is much higher than in native sunflower kernel. Flour composition and properties allowed the Voroshilovgrad Confectionery factory to utilize sunflower albuminous flour and dehulled kernels to produce a wide range of sweets, pastries, dragees, etc., over 30 different items in all. Products containing sunflower flour were approved by degusta-

tion councils of the Food Industry Ministries of the Ukraine and of the Soviet Union and were recommended to all confectionery factories in the country.

Partial reconstruction was carried out at the Melovoye Oil Refinery allowing industrial production of milled semidefatted sunflower kernel with a daily output of about 5-7 tons along with the common oil production and partly cake production. Price of one ton of albuminous sunflower flour is 240 roubles. The Voroshilovgrad confectionery produced 380 tons of confectionery in 1975 using this sunflower raw material. In 1976 the planned production of this flour at the Melovoye Refinery was to be 2000 tons. Using this flour the Voroshilovgrad factory alone is planning to increase total production up to 2000 tons.

Experience in producing sunflower albuminous flour allows to conclude that the scheme for its manufacture at the Melovoye Refinery may be used for sunflower processing in other countries to obtain additional quantities of edible protein. The major features of this scheme are as follows:

- utilization of good quality raw material;
- thorough elimination of foreign objects;
- improved separation of hull;
- introduction of additional fine cleaning of kernels;
- defatting of kernels under soft regimes;
- thorough crushing.

The best suitable for albuminous flour production are sunflower varieties characterized by easy separation of husk from the kernel, along with other economically useful properties; such as high oil content, high quality protein, and the necessary content of other physiologically active substances. It is such varieties that have to be produced by breeders.