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## PROTEIN SUPPLEMENTS BASED ON SOY, FLAX SEEDS AND DRY MILK SERUM

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**Abstract:** The shortage of digestive protein – is an urgent problem not only in animal agriculture, but also in formula feed and grain-processing industry, which due to the protein shortage can't produce feeding-stuff that is well-balanced by the amino acid content.

In the article an actuality of flax seeds, soy and milk serum usage by the production of the protein supplement for different age groups of animals is observed. The technological scheme of protein supplement production is given.

**Key words:** protein supplements, flax seeds, dry milk serum

Nowadays the biotechnological direction for the agroindustrial complex especially for the feed stuff production is developing very intensive. Multicomponent protein supplements for the feed stuff enrichment have spread very much. In Ukraine the production of such products is almost out. The market is filled with imported and expensive premixes and additives.

The problem analysis has shown that the demand of such products is high enough and it will be increasing according to the increasing of the animal and bird livestock. The major problems of the breeding are: value increase of the feed stuff and embedded component for the animal management, a poor state support of the agrarian brunch. The only way out for the provision income in farm business – is an integrated production system that would help to reduce production costs and to enable a possibility of a quality improvement.

Ukraine has an actual problem – an animal industry developing, as the animal industry is not produced by the industrial way, and it loses an opportunity of successful using the scientific achievements and new feeding technologies. Under such conditions a marginal cost and a low quality of production are observed.

A modern fodder production is based on the outdated technologies or on the imported purchasing. In developed countries the fodder production is based on high technologies with the using different knowledge gathering of the whole world. Feed stuffs, which are produced on the base of high-level processing of various materials, have an especial actuality. These materials have vegetable, animal, microbiological origin, in other words they are technologically cultivated multicomponent mixtures, which are brought to necessary fineness depending on age and physiological status of animals.

The purpose of every husbandry is the maximum profit by optimal productivity. The part of outgoings for the food stuff and veterinary preparations in general structure of all financial placements in swine rearing works out 70-80%. The feed ration must be well-balanced to achieve animal culture productiveness, to improve their development, to optimize their reproductive functions. The well-balanced feed stuff must accord with all needs of age groups and meet requirements in feedstuffs and biologically active substances according to their physiological state.

ITTF NANU of Ukraine has an experience in technologies and equipment development for farming industry, which includes also fodder production.

We have proposed and explained the usage of soy, flax seeds and dry ilk serum for getting the therapeutic food products, which would be added to the feed stuff. The balanced formulation with fat, protein, carbohydrates and vitamin- mineral constituent content was developed. Such components compose the protein supplement: milk serum, soybeans, flax seeds. The usage of milk serum enables the providing of the product with all valuable components: serum proteins (90% from general protein quantity), carbohydrates, milk fat, vitamin- mineral constituents, and it also fulfils the function of dispersing environment for the solution of dry components in the paste-like additives production or in the production of calf milk replacer.

In the protein supplement production the dry milk serum is used. Serum proteins (milk albumin and lactoglobulin) stimulate the fermentative function of the stomach, help on vegetational protein fraction fixing and they are immune properties carriers.

The leading suppliers of fat, protein and vitamin- mineral constituents are soybeans and flax seeds, therewith all these products confer the feed stuffs medical and preventive properties, the chemical compound of which is given in the schedule 1.

**Table 1** Average Weighted, Chemical Compound of the Components

Markers	Soybeans	Flax seed
Proteins, %	36,5	23,0
Fats, %	20,0	35,0
Carbohydrates, %	30,2	35,0
Fibre, %	3,2	9,0
Water, %	8,5	8,0
Vegetable Food Fibers, %	-	28,0
Ash, %	1,7	3,0
Assimilation, %	90,5	91,6
Protein Efficiency Ratio, %	2,32	1,76
Protein Score, %	47,0	56,5

Flax seeds have been at all times used as a source of OFF (oil for food) for the purpose of medicated products. However, the last year examinations have found out the range of properties of the flax seeds, that largely determine its application area as a nutraceutical. The main components, which determine the biological reactivity of the flax seeds, are: fatty oil, proteic substances, vitamins, ferments, mucus, carbohydrates, carboxylic acids, microelements. The flax oil has the lowest content of the unwanted for the ration saturated fats. The unicity of the flax seeds consists in very high (up to 57%) contest of polyunsaturated alfa-linoleic acid (ALA), the indispensable fatty acid in the animal organism, that as a hormone-like preparation supports the carrying-out of the important biological functions in the organism. That is why the flax seed and an exuded from it flax oil have not only technical but also therapeutic value.

Flax seeds should be used in the feed production, as the defecation of the intestinal tract by the means of flax seed can be called not a defecation but an intestinal tract regeneration.

The flax seed consists of a plenty of necessary substances, which excrete, soften and coat the alimentary organs, relief and exert an antiphlogistic effect. Therewith the flax seed



digests very slowly and that supports the mechanical intestine distraction and so guaranties an intensive contraction and an excretion of a food mass.

The improvement of the secretory activity of the gastrointestinal tract is realized by means of alkaloid and linamarin, which are placed in the glume. The mucus, that appears by the grain handling, provides the defence from different excitors.

The feed supplements, which consist of flax seed have a special stuff – lignin, thanks to which the elimination urine system, the probability of nephritis decreases, the liver functioning is being supported. That is why the usage of the flax seeds in the protein supplements production not only enriches the feed stuff with the native protein, fat and microelements but also renders medical and preventive properties.

In ITTF NANU the technology and special equipment for getting the granulated multicomponent mixtures on the base of extruded handled soy were worked out, which can be widely used in the feed stuff production. The mixtures can be used as a self-consisted feed stuff for the young stock so also as a an additive to the feed stuffs for different kinds of animals and birds.

The modernity of the technology lies on the fact that the effect of soy seeds plasticization, dispersed in high pressured extruder, direct in output of the drawing block. On the last stage of extrusion the soy seeds heat up immediately to high temperature (120-160°C), herewith the carbohydrates melting, fats outcome and inhibitor inactivation is performed.

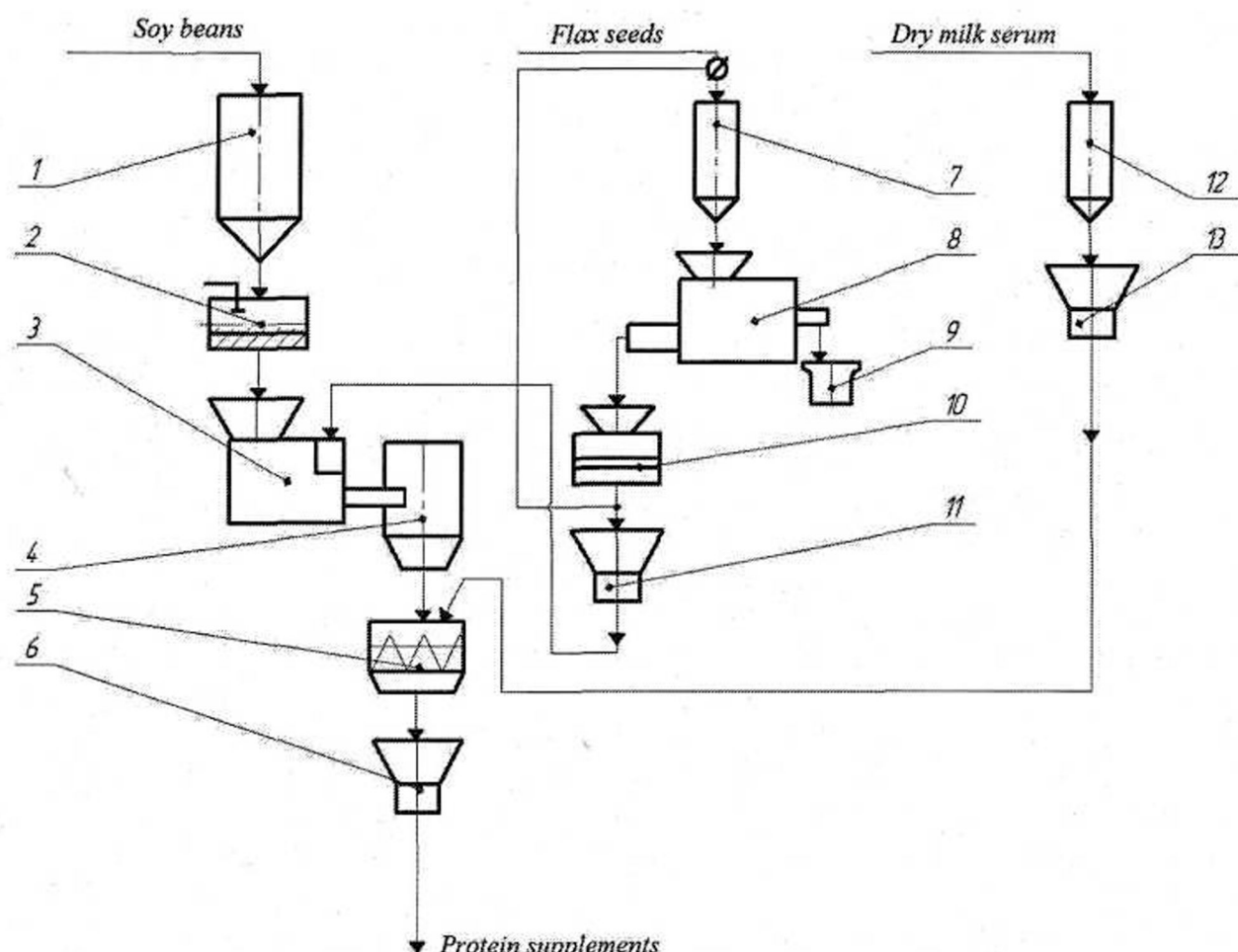
In such a condition “the melt” is placed in the flame source less than 0,1-0,5 sec., after that a carbohydrates recrystallization with the formation of loose product structure takes place. The effect of the molten state is used for the protein-vitamin components introduction into dispersed soy. It provides a deep interreacting of the components, their equal distribution and ordered structuring.

The introduction of protein components and oil cakes or dispersed flax seeds is being realized due to the special developed equipment, made in the Technical Thermophysics Institute HAH of Ukraine .

The production line for the production of granular mixtures enables the production in a high range of concentration and qualities of the cooperating components of the mixture with the enough protein, vitamins minerals and remedial agents.

Flax seeds are prepared as follows: the flax oil is being partially deleted and oil cakes are being produced, or flax seed are being dispersed in the rotor-impulse device with the fluid addition.

There is a technological scheme of a protein supplement production for different animals' age groups (fig.1).



**Fig. 1** Technological scheme of protein supplement production

1 – soy beans tanker; 2 – humidifier; 3 – extrusion device; 4 – mixer container; 5 – mixer; 6 – bagging turntable; 7 – flax seeds tanker; 8 – mill; 9 – flax oil container; 10 – oil cakes processing; 11 – bagging turntable; 12 – serum container; 13 – bagging turntable

Thus the developed technological scheme will enable the production of competitive multicomponent protein supplements for the mash enrichment in the base of extruded soy, flax seeds and dry milk serum, which will not bate by their chemical composition the imported high-priced supplements and premixes.