The analysis of pressure distribution of material in hopper and equations for determining the law outflow feed from the hopper.
Weigh, vertical axis, drum leakage, pressure distribution.

UDC 631,316

RESEARCH METHODOLOGY EXPERIMENTAL SETUP FOR PRODUCTION OF PROTEIN FRACTION Pellets MAKUHYNASINNYA OILSEED

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The method of experimental research installations for the production of pellets with protein fractions cake oilseeds.
Oilseeds meal, pellets, protein fraction, installation.

Formulation of the problem. Increased production and improved quality protein feed as one of the most important tasks in increased productivity of animals and birds can be achieved by improving the technology for processing oil cake, which is currently limited to grinding followed by introduction of the feed.

Today, the main method of processing cake is crushing with subsequent introduction of the feed. Advanced Institute oilseed cakes processing technology through the introduction of additional mechanical operations fractionation crushed cake and husk the protein fractions can provide more than

40% protein powder protein content of at least 38%. The content of protein powder in 8-12% oil promotes rapid oxidation, which leads to lower quality protein supplement. To increase the travel time of the oxidation process proposed to produce a protein fraction in the form of pellets [1-4].

Also avoid rapid oxidation due pelleting process, volumes will be reduced in the preservation of pellets warehouse and reduced the cost of their transportation. Therefore, issues of mechanical processing cake by improving the technology and equipment for the separation of the protein fraction in the form of pellets is very important.

The purpose of research. A method of experimental research installations for the production of pellets with protein fractions cake oilseeds.

Research results. To study the process of manufacturing pellets from pomace oil seeds developed constructive-technological scheme (Fig. 1) and established experimental setup (Fig. 2) for its implementation.

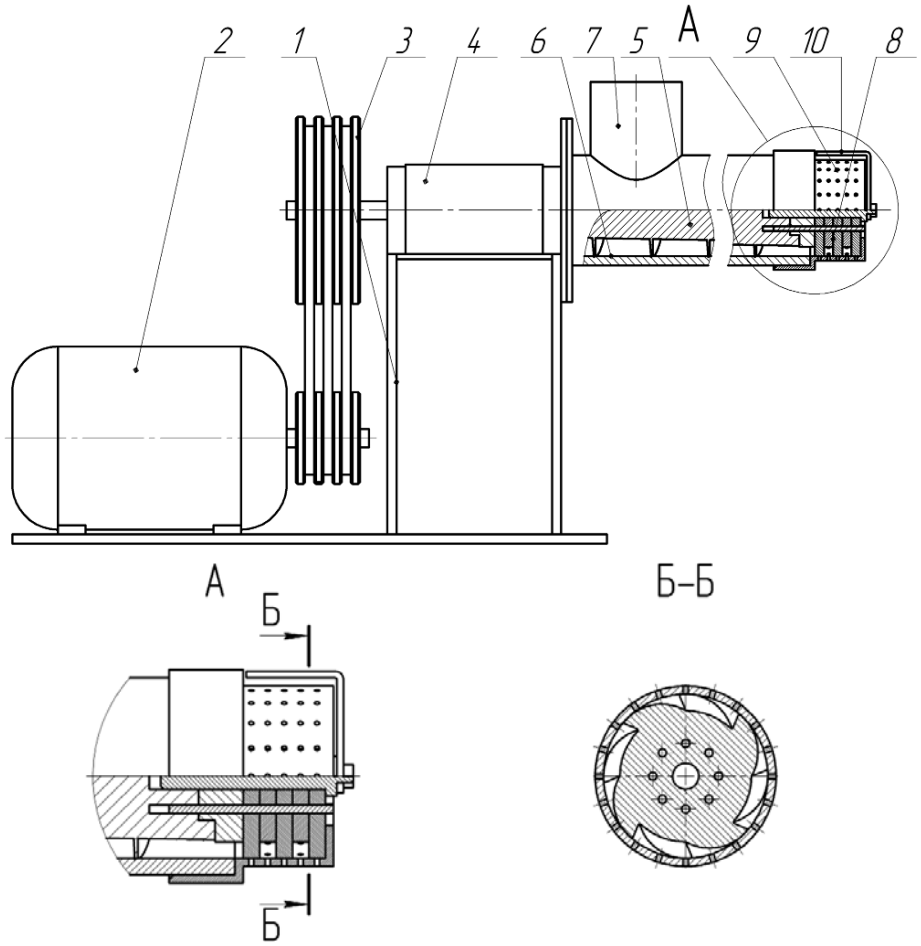
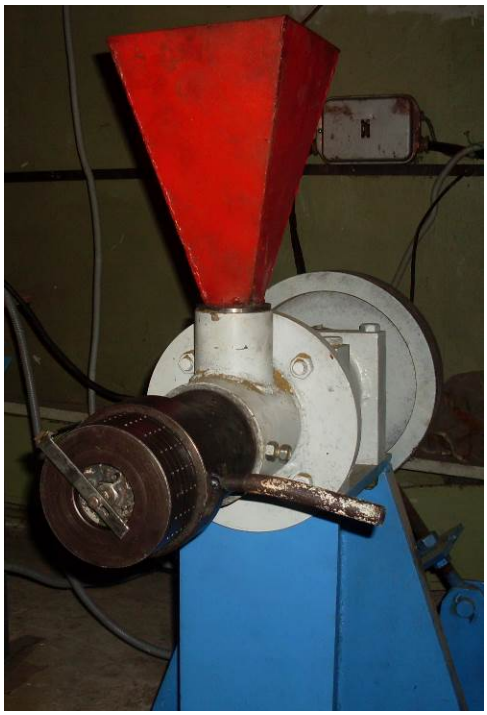


Fig. 1. Structural and technological scheme of installation for the production of pellets (peleteratora).



and

b

in g

Fig. 2. The pilot plant for production of pellets (peleteratora): and - a general view; b - the screw; in - forming cam; g - cylindrical matrix.

Installation (Fig. 1) for the production of pellets consists of a frame 1, 2 motor, pulley 3, bearing unit 4 screw 5, cylindrical body 6, the hopper 7, forming five cams 8, 9 cylindrical matrix, knife 10. Setting works as follows. The entire installation is installed on the frame 1. The protein fraction of pomace oil seeds evenly fed into the hopper 7, which falls on the screw 5. The screw 5 by performing rotating motion by means of an electric motor 2, 3 and pulley bearing unit 4 moves the protein fraction to forming cams 8. Thus there is a consolidation of the protein fractions by reducing the height of the turns in the screw 5. Once on forming cam 8, which performs a rotating movement, protein fraction is compacted and extruded through a fixed cylindrical matrix 9. More than 10 cutting hardened protein fraction. As a result, we obtain cylindrical pellets.

The apparatus for the production of pellets is possible to install the required configuration of forming cams 5. The installation includes a cylindrical array 6 with respective diameters of the holes - 3 mm. Installation for the production of pellets is joined by a drive shaft to one gear motor maximum power - 7.5 kW, which is connected to the frequency converter Danfoss VLT Micro Drive. Using a frequency converter is possible to change the frequency of the drive shaft in the range - 0-100 rev / min.

The required feed protein fraction in hopper 4 by means of regulating valve. The rate of protein fractions can be changed in range - 0-80 kg / h. Before the experimental research is necessary to determine the conditions for research (Annex A) and to prepare a protein fraction oilseeds (sunflower, mustard, red-haired) weight 10kg for each experiment.

Each portion of protein fractions oilseeds necessary to determine the moisture content by GOST 27548-97 "Stern vegetable. Methods for determining the moisture "Oil content per GOST 13496.15-97" Stern mixed, fodder, feed raw materials. Methods for determination of crude fat "protein content by ISO 7169: 2010" Stern mixed, fodder, feed raw materials. Methods for determining nitrogen content and crude protein. "

Volumetric mass of each portion of the protein fraction oilseeds determined by the method [5], which involves weighing the mass of the protein fraction, placed in a box the size of at least 10 cm × 10 cm × 10 cm without seal and flush with its edges, with a free fall from a height of protein fractions 10 cm on its top edge. The weight of the sample protein fractions is determined by the static weighing on electronic scales AA-200. Before each experiment the installation for the production of pellets is set on the location of the configuration forming cams.

For the experiment included electric motor-reducer and by frequency converter Danfoss VLT Micro Drive set required speed shaft drive installations for the production of pellets.

Protein mass fraction 10kg filled in the tank and using calibrated regulating valve installed set speed feed material to the plant for the production of pellets.

The study is fixed vytrachayemoyi electric power to the frequency converter Danfoss VLT Micro Drive and the passage10kg material through the installation for the production of pellets.

The duration of the production cycle zamiryayutsya stopwatch. The beginning of the production cycle was considered the process of loading the source material. The end of the production cycle - the completion of the process of accumulation of pellets.

At the end of the experiment setup turns off and prepares for the next. The resulting pellets to be measured geometric dimensions, weight

and apparent bulk density.

Research carried out for each of oil crops - sunflower, mustard, red-haired.

The study will be conducted for two configuration options for the location of forming cams (Figure 3). Option I - forming cams are consistently offset by an angle of 45 ° relative to the axis. Option II - forming cams are successively without bias.

Factors research is the revolutions of the drive shaft, the feed rate of the protein fraction and humidity. Intervals and varying levels of factors in the table.

1. Intervals and levels of varying factors in experimental research installations for the production of pellets.

Designation factors		Name factors and unit of measure	Levels of variation			The interval of variation
The code	Natural		-1	0	+1	
x1	q	The rate of supply of material, kg / h	25	50	75	25
x2	n	Speed working body, rev / min	30	60	90	30
x3	W	Humidity protein fraction,%	10	20	30	10

Research carried out according to plan tryfaktornoho experiment 33, by varying factors used matrix planning experiments Box-Banking. Experiments conducted in the triple repetition.

For criteria selected research productivity of the manufacturing process creating pellets Q, bulk density ρ and pellets motor power P, spent on the process.

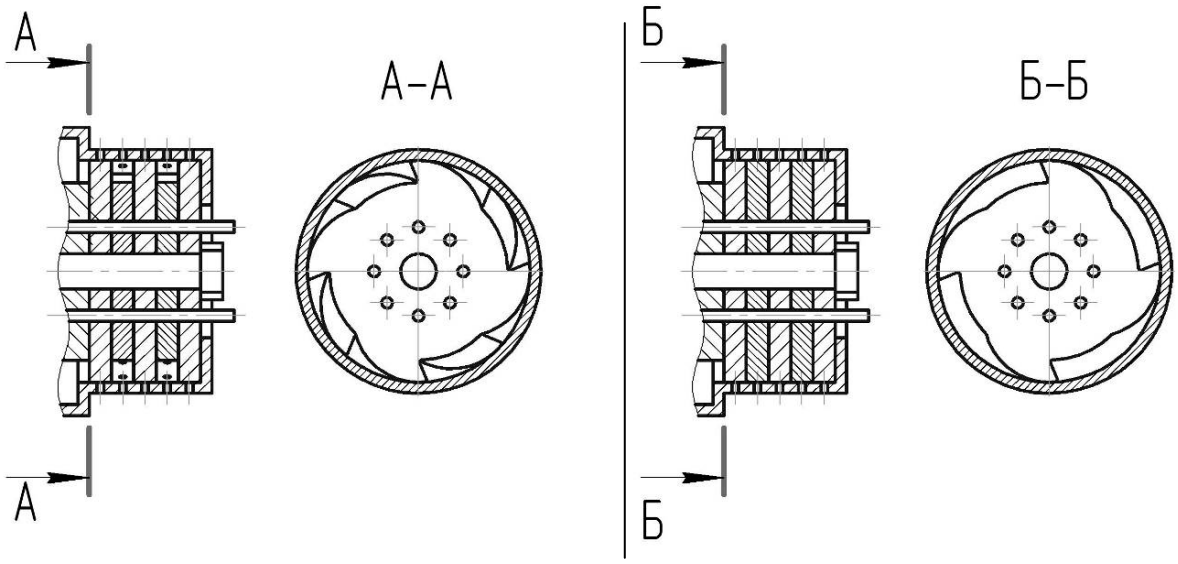
The performance of the manufacturing process is determined by calculating the formula

$$Q = m / t, \quad (1)$$

where: m - mass protein fractions, m =10kg; t - duration of the production cycle, h.

The criterion optimization studies selected factors specific energy consumption, which are defined as follows:

$$E = P / Q, \quad (2)$$



Option I Option II

Fig. 3. The location of the configuration options of forming cams installations for the production of pellets.

Conclusion. The method of experimental research installations for the production of pellets with protein fractions cake oilseeds. The results of experimental studies will be mathematical model depending on the performance of the production process of pellets production, capacity required for the manufacture of pellets and their bulk density of the feed rate of the material, its humidity and rpm drive shaft for the two configuration options for the location of each forming cams and oilseeds - sunflower, mustard, red-haired.

References

1. *Gritsenko VT* Methods of obtaining protein powder IZ semyan sunflower / VT Gritsenko // Scientific and Technical Bulletin of the Institute of Agrarian Sciences oilseeds. - Zaporozhye, 2003. - Vol. 8. - P. 279-283.

2. *Gritsenko VT* Development of technology for processing oilseeds and their cakes / VT Gritsenko, Y. Durin // Modern questions Creating and Using hybrydov maslychnыh varieties and crop coll. tezysov Internat. Conf. - Zaporozhye, 2002. - S. 25.

3. *Patent* 87579, Ukraine, IPC C10L 5/40. A method for producing fuel briquettes from oilseeds / VT Gritsenko, A. Chekhov; patent owner Zaporizhia Institute of Agrarian Sciences oilseeds. - №200712549; appl. 12.11.2007; publ. 27.07.2009, Bull. №14. - 2 seconds.

4. *Patent* 74880, Ukraine, MKI 23 A j 1/14 / A method for producing protein flour with oil seed cake / VT Gritsenko, A. Chekhov. - №2003109430; Appl. 20.10.2003; Publish 15.11.2005, Bull. №11. - 2 seconds.

5. *Methodologies* of research in animal husbandry / [FF Эysner (responsible. Ed.) *AI Vynohradskyy, VK Gavrish, IA Zozulya, V. Maksakov, AJ Panov, NA Staroverov*]. - K .: Harvest, 1965. - P. 102-132.

Эksperymentalnыh of research methodology is designed for

installation belkovoy IZ Production pellet fraction zhmыha semyan maslychnыh cultures.

***Maslychnыe culture, zhmыh, pellety, belkovaya, fraction, installation**.*

The technique of experimental research installations for production of pellets from the protein fraction oilseed cake.

Oilseeds, cake, pellets, protein fraction, installation.

UDC 631,363

RELATIONSHIP fill factor and angular velocities drum mixer

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Determined mutual influence fill factor and angular speed cameras drum mixer for circulating motion mode mixing during mixing.

Mixing, drum mixer, circulating motion, fill factor, the angular velocity.

Formulation of the problem. Production of feed quality in terms of economy requires resolve the issue of technical support mixing feed additives. Components of feed additives such as vitamin and mineral blends, enzymes, amino acids and others. contained in the composition of feed in very small quantities, and therefore their uniform mixing requires advanced technological and structural solutions. A given level of uniformity mixing in such cases provide a mixing drum. Of the total range of the best indicators of the quality sumishky are drum mixers with cylindrical chamber whose axis of symmetry

shifted relative to the horizontal axis of rotation at the specified angle camera [5].

Analysis of recent research. The process of mixing in the drum mixer consists of a number of basic processes occurring simultaneously [1, 2, 3, 4]. This displacement of adjacent particles from one place to another implementation and sliding layer material (Convective mixing) gradual redistribution of particles of different components through formed the line of partition (diffusive mixing) and the concentration of particles that have the same weight in the appropriate places mixer under the influence of gravity and inertial forces (segregation).