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Abstract.*In the description of the article are yspытatelnoho equipment, kotoroe yspolzuetsya at the Department of Mechanics NUByP Ukraine for grain definitions mechanical properties of materials, kotoryya vlyyayut on эnerhetycheskye zatratы in the process pryhotovlenyya fodder.*

Keywords: grain, mehanycheskye trials, эnerhetycheskye zatratы, kormopryhotovlenyya

Annotation.*The paper contains description of test equipment in use at the Department of Mechanics NULES Ukraine for determine and mechanical properties of grain materials that affect energy consumption during feeding process.*

Key words: grain, mechanical testing, energy costs, feed preparation

UDC 631,363

EXPERIMENTAL STUDY OF grinding grain crusher VALTSEDEKOVOYU

SE Potapova, Ph.D.

Abstract. *The results of experimental studies of the process of grinding grain crusher feed valtsedekovoyu on which it reasonably rational parameters.*

Keywords: grain grinders, valtsedekova crusher, grinding module, coefficient of variation

Formulation of the problem. Complete feeding any and all types of livestock and poultry involves the introduction of the feed rations of feed grain, the fate of which is from 30% to 80% of the diet structure [1, 2].

To improve the nutritional value, rational use of grain feed use different methods of pre-treatment and preparation for feeding. However, one of the main and most common process is grinding operations [3, 4].

Flowing grain feed caused by the physiology of farm animals and increases their digestibility. Therefore, the right choice crushing tool is essential.

According to statistics from a large proportion of animal products produced in Ukraine provided by small farmers and households. For these households needed crusher low productivity, which would the relative simplicity of construction and maintenance can ensure quality performance grinding process.

Analysis of recent research. For the processing of concentrated feed in recent decades in agricultural production and feed industry gained widespread use hammer crusher. However, they have significant shortcomings that lead to overspending feed and inflated energy intensity process (12-20 kWh / t).

Rollers crushers provide the desired fineness of grinding grain feed with a uniform size distribution of the product and low output of dust fractions and characterized by low energy consumption grinding process. In practice kormopryhotuvannya dominated crusher with an even number of rollers, with a capacity of at least 1.5-3 t / h. However, for small livestock enterprises are rational standard size shredders feed grain productivity 100-250 kg / h [5].
In this regard, more appropriate for these farms are using valtsedekovyh (drum) crushers, which compared to dvovaltsevymy have a simpler design.

The materials of the scientific and technical information are enough studies of basic parameters and conditions for effective work dvovaltsevyh machines. Domestic and foreign scientists conducted fundamental research on the influence of kinematic and geometrical parameters dvovaltsevyh zernodrobarok the character of the crushing process. However, virtually no work that would allow to solve these complex issues regarding valtsedekovyh zernodrobarok. Drum crushers variant which compared to dvovaltsevym is different, insufficiently studied.

the purpose of research. Identify rational parameters shredder for small farm sizes based on experimental studies of the process of grinding grain crusher feed valtsedekovoyu.

Results. According to the program of experimental studies should investigate quality depending crushed product (grinding module M i fractional coefficient of variation of v), productivity and energy intensity Q q process of grinding of feed grain on the main parameters of the crusher (n - roller speed, rev / min; β - The angle of the guide; γ - Angle coverage of roller deck; δ - the value of the output gap, mm) and identify the lowest energy consumption process of rational design and kinematic parameters crusher.

For basic feedstock for studies taken cereals (barley, corn) feed, which is often used in the diets of farm animals.

To implement the program of experimental research was developed structural and functional scheme, under which the setting is made for grinding grain feed.

Experimental device includes (Fig. 1): storage tank with regulating valve, the working chamber of guides and rollers inside the deck and unloading neck. The surface of the roller, checkered, deck - smooth. To change the way grain processing variables used deck (Fig. 2) from different angles girth γ. The experimental setup made it possible to: adjust the rotational speed variator rollers using; change the angle of the guide; set one of three decks with a corresponding angle girth; change the size of the working gap between the rollers and deck.

During laboratory tests determined the following energy performance, power consumed by electric experimental installation at idle and under load; specific energy consumption. Fashion shot using tongs clamp Mastech MS 3302 (Fig. 3). For transformation and processing of the data used plug-in ADC / DAC E14-140M connected to a personal computer. Time processing of each portion of the feed material recorded stopwatch. Rotation speed roller measured tachometer.

Quality grinding feed was evaluated by screening their sample (weighing 100 g) On reshitnomu classifier. The samples were weighed on laboratory scales VLR-200 g, Which is error ±0.5 mg.

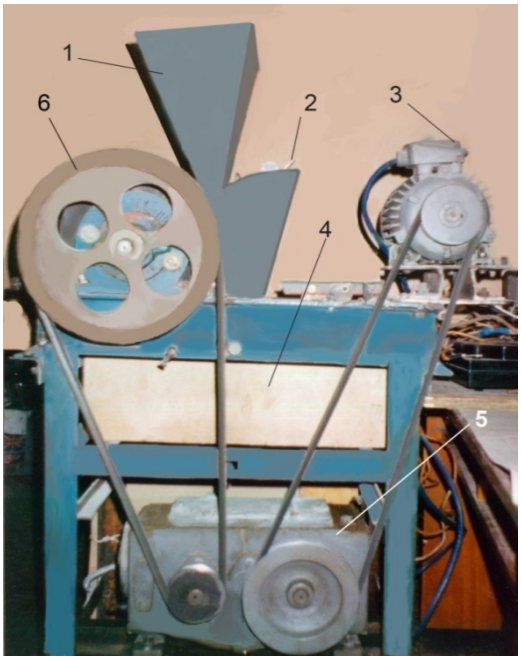

Fig. 1. General view of the experimental setup: 1 - Grain; 2 - guide; 3 - electric; 4 - a box for the finished product; 5 -

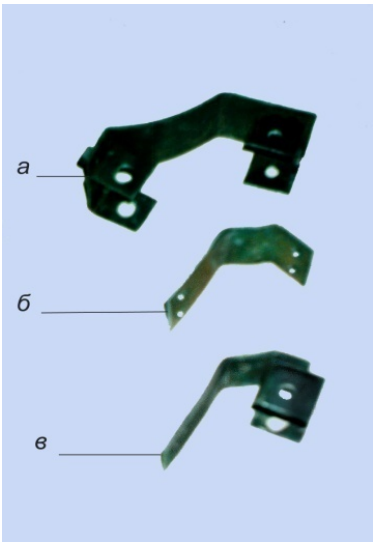

Fig. 2. Types Dec. studied: a - deck (γ = 45 °); b - deck (γ = 25 °); in -

CVT; 6 - the drive pulley. deck (γ = 10 °).

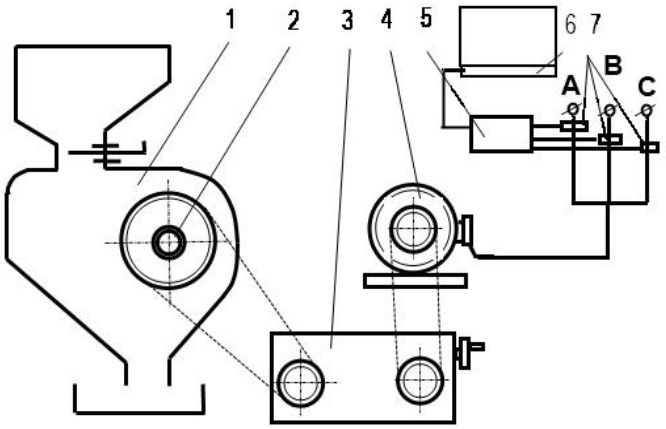

Fig. 3. Wiring measuring devices: 1 - Crusher; 2 - tachometer; 3 - CVT; 4 - the electric motor; 5 - ADC E14-140; 6 - current tongs Mastech MS 3302; 7 - the computer.

After processing experimental data on a PC using Statistica 6.1 application is received regression equation. Mathematical models after determining significant regression coefficients and decode conducted for ease of use when calculating equations become such a look.

- For barley:

$$MN = 0,5813 - 0,0021n - 0,0398\gamma + 0,1271\delta + 0,0002\beta\gamma - 0,0005\beta 2 + + 0,0004\gamma 2 + 0,1765\delta 2; \quad (1)$$

$$\nu_l = 14,2452 + 0,0427n - 0,2169\beta + 6,3465\delta + 0,0121\beta\delta - 0,0001n2 + + 0,0022\beta 2 - 3,3231\delta 2; \quad (2)$$

$$qya = - 4,0741 + 0,0222n + 0,1469\beta + 1,0058\delta - 0,0005n\beta - - 0,0029n\delta - 0,0611\gamma\delta - 0,0044\gamma 2; \quad (3)$$

$$Qya = 69,3408 - 0,0693n - 1,386\gamma - 0,3817\delta + 0,0024n\beta + + 0,016n\delta + 0,0087\beta\gamma + 0,1071\gamma\delta + 0,0113\gamma 2. \quad (4)$$

- Corn:

$$MC = 1,3649 - 0,0041n - 0,0494\gamma + 0,1591\delta + 0,00001n\gamma + + 0,0004\beta\gamma + 0,0038\beta\delta + 0,0004\gamma 2 + 0,1031\delta 2; \quad (5)$$

$$\nu_k = 23,067 - 0,0193n + 0,019\gamma + 1,781\delta + 0,0003n\gamma + + 0,0015\beta\gamma - 0,0344\gamma\delta - 0,924\gamma 2; \quad (6)$$

$$qk = 2,7683 - 0,0715\beta + 0,1065\gamma - 0,5046\delta + 0,0001n\gamma - -0,0014\beta\gamma - 0,0098\beta\delta - 0,0265\gamma\delta + 0,0013\beta 2; \quad (7)$$

$$Qk = 56,5919 + 0,002n - 1,4829\gamma + 1,1066\delta + 0,0016n\beta + + 0,0079\beta\gamma + 0,116\gamma\delta + 0,0134\gamma 2. \quad (8)$$

Analysis of the surface shows that in general the impact on the value of variables grinding module M in the processing of different cultures is the same, but on barley obtained higher values of M.

This is a high strength barley grains. The highest rate of M depends on the working gap δ, which limits the ultimate size of the particles. With increasing δ naturally growing and grinding module M.

Slightly less impact on the value of M n is the frequency of rotation of the roller (Fig. 4 a). Increase frequency of rotation causes more intense grinding, which reduces the M. But at a fixed value of working gap δ, this effect is negligible. The angle β guide virtually no effect on the value of M (Fig. 4b).

In the study of influence of variable factors on the coefficient of variation of products for grinding barley v values were within 9-20%, 16-23% corn.

The difference is explained by the difference between the physical and mechanical properties of these crops. The simultaneous increase in girth angle γ deck roller and roller rotation frequency n leads to intensive growth coefficient of variation v (Fig. 4, B). Most significant effect on the coefficient of variation should change working gap δ. The higher the value of δ, the lower the coefficient of variation (Fig. 4, d).

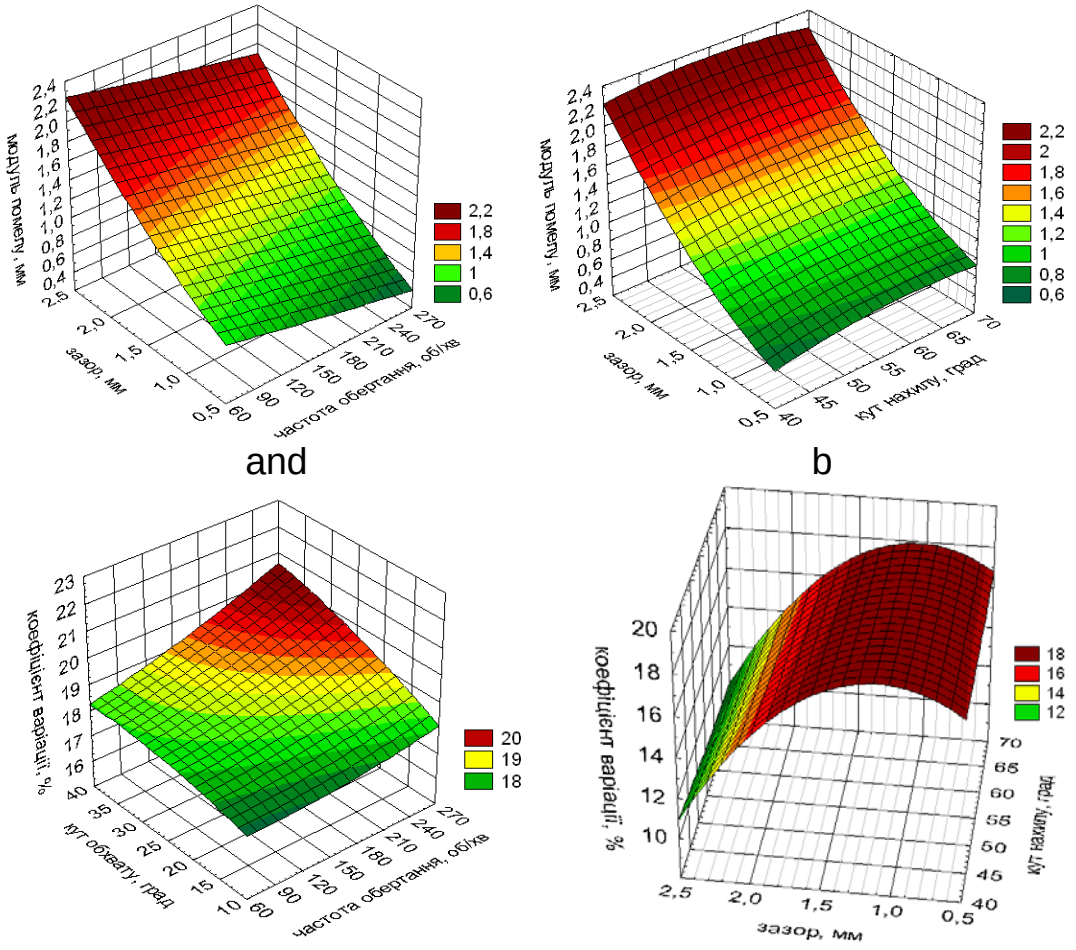

Fig. 4. Mark grinding module dependencies (a) and MN (b), the coefficient of variation vk (c) and vya (d) of variables.

Reducing the angle γ girth roller deck leads to increased productivity, but for large values of working gap δ γ offset by the impact. With increasing working gap δ q specific power consumption is reduced, and the smaller the angle of inclination β, the more intense impact δ. Energy intensity grinding process barley grain is stronger, higher than corn. With increasing frequency n roller rotation and a simultaneous increase in the slope angle β specific guide the process dramatically increases power consumption With significant (more than 210 rev / min) values of n with decreasing energy intensity angle β decreases, which can be explained by improved conditions tightening grain grinding zone. Examples dependency criteria optimization of the main factors are managed in Fig. 5 and Fig. 6.

Analysis of the dependencies makes it possible to make recommendations on rational parameters of the crusher. For example, in the case of grinding grain barley to medium size product M = =1,29 mm (clearance 1.5 mm) Are: speed roller n = = 160 r / min, the angle guide β = 70 °, angle of coverage of roller deck γ = 10 °. For these values above factors specific power consumption of 5.16 kWh / t with a coefficient of variation of fractional v = 17,94%.

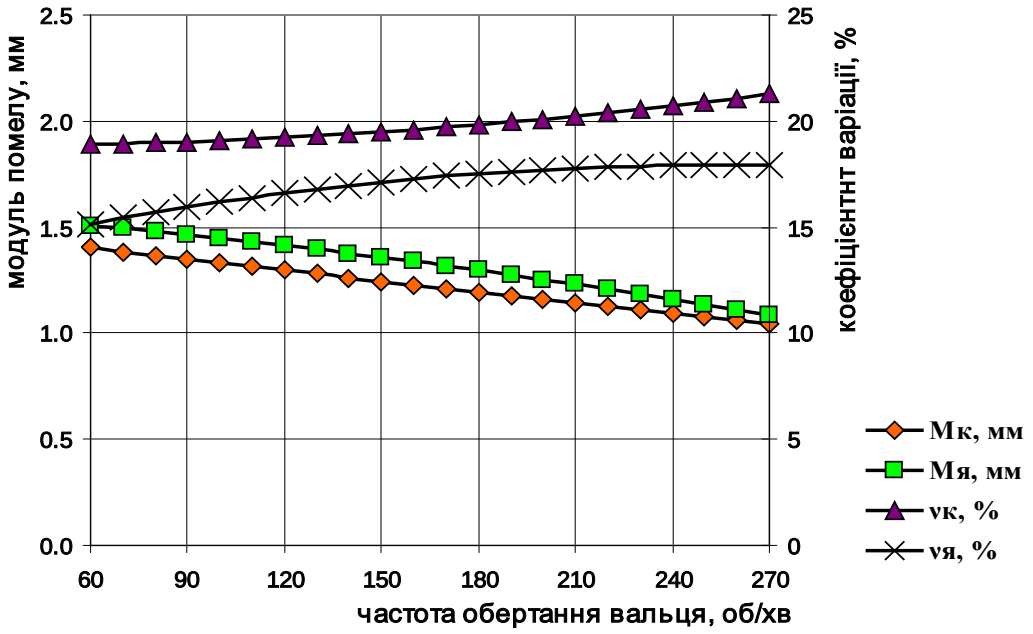

Fig. 5. Dependence module Mk grinding corn and barley Mint coefficient of variation according vk vya and the frequency of rotation n roller.

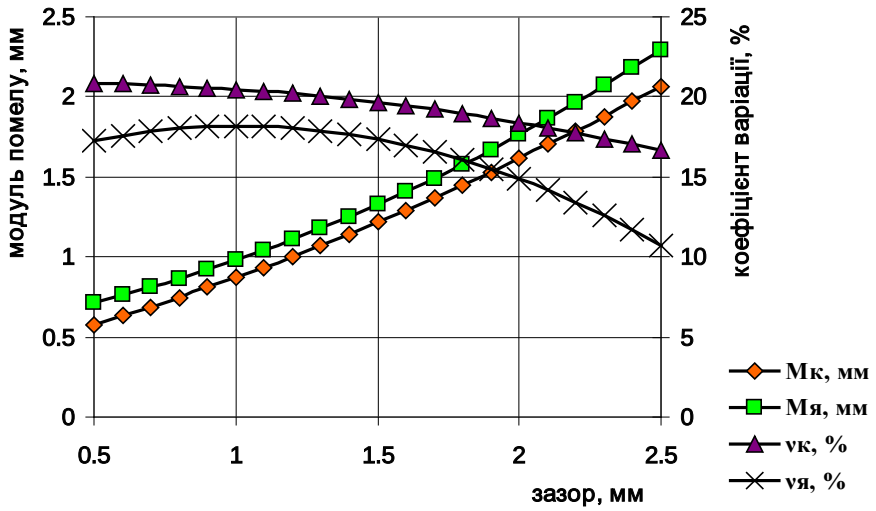

Fig. 6. Dependencies module Mk grinding corn and barley, and coefficient of variation QM according vk vya and the magnitude of δ working gap between the rollers and deck.

In the case of grinding corn to medium size product M = 1.44 mm (clearance 1.5 mm) Is rational, roller speed n = 165 r / min, the angle guide β = 40 °, angle of coverage of roller deck γ = 10 °. For these values above factors specific value enrhomistkosti be 2.78 kWh / t, and the coefficient of variation v = 18,39%.

Conclusion. Based on the studies established the feasibility of using drum (valtsedekovyh) zernodrobarok proposed design for the crushing of concentrated feed on farms smaller sizes. This rational recommended following parameters: speed roller - 160-165 / min, the angle deck roller circumference - 10 °, the angle of the guide is adjusted depending on the type of the processed grains (for barley β = 70 °, corn β = 40 °), which will ensure the reduction of energy consumption and improve product quality shredding.

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Abstract.*Pryvedeny results эksperymentalnыh of research process yzmelchenyya grain sternward valtsedekovoy zernodrobylkoy, based kotorыh obosnovany ee ratsyonalnыe Options.*
Keywords: Grinders grain valtsedekovaya crusher, grinding module, Factor varyatsyy

Annotation.*The results of experimental studies of the process of grinding grain in roll-and-deck crusher are presented; on which crusher's rational parameters were justified.*
Key words: grain grinders, roll-and-deck crusher, module of grinding, coefficient of variation

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COMPARISON OF OPERATION OF VEHICLES FOR CARRIAGE sugar beet

***SG Fryshev, Dr. sci*k**

Abstract.*The methodology of comparative evaluation of vehicles for transportation of sugar beet harvesters.*
Keywords:*sugar beet, harvesting,Transport-tionVehicles, overloading, efficiency*

Formulation of the problem. The use of different methods of transportation of roots of beet harvesters (BC) provides a different composition Harvesters transport systems (ZTK). Evolution of BC took place recently in the area of equipment originally bunkers, compensators capacity of 1.5-3.5 tons, and then with increasing engine power up to 250-300 kW capacity hopper gradually increased - up to 10-12, 15-18, 20-25 tons. According greatly increased carrying capacity for the transport fleet, which is enriched with specialized equipment. Great choice of machines on the market for technical and operating parameters causes considerable diversity makes BC and transport systems used in farms recently. Cost economic evaluation of harvesting and transport technologies (ZTT) is complicated by the lack of stable prices for equipment due to frequent changes in exchange rates. It is therefore advisable to develop methods of comparative assessment that is based on an assessment of specific labor manufacturing operations ZTT.