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Proanalyzyrovanы suschestvuyuschye constructive and technological methods of calculation molotkovoy crushers and held usovershenstvovanye s about A yzmelchenyya byomassы for production lines hranulyrovannoho byotoplyva.

Molotkovaya drawbylka, Plotness materyala, CRITICALI lyneynaya velocity of the rotor, rotor diameter, length of the rotor.

The existent methods of structural-technological calculation of hammer crusher are analysed and their improvement is conducted in relation to growing of biomasses shallow for the lines of production of granular biopropellant.

Hammer crusher, closeness of material, stalling linear speed of rotor, diameter of rotor, length of rotor.

UDC 636: 631,223,018: 568,264

Solution composition manure runoff CATTLE AT anaerobic fermentation in bioreactors

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The technology of processing solutions cattle manure in biogas plants in. V.Krupil "Ukrainian dairy company". It is shown that the effective operation of bioreactors with regulations is a technological parameter and sustainable alkaline mode, which must be carefully maintained.

Organics, Fermentation, perebrodzhenyy solution bioreactor.

Resolutionska problem. Agricultural industryindustrial complex (APC) in Ukraine today - is one of the few sectors that in the current environment evolves. [1] Livestock, as one of the sectors of agriculture, is also steadily growing. So the question of disposal of organic waste. Recycling organic waste leads to significant savings in valuable energy resources, as well as products that

otrymuyuting as a result of this process, biogas and semi-liquid mass, are of great value as gaseous fuel and organic fertilizer. [3, 5] complex processing of manure and animal manure only do some farming. There are various technologies of processing organic waste AIC [4].

AnaLiz recent research. In Ukraine, for the first time on the current toiohazoviy stations were carried out constant research and analysis of the data.

Metand research - Continuous monitoring of the processing of organic solubers during anaerobic fermentation. Based on the data to optimize the processing.

Rezultaty dperssurvey findings. I havefor toandDOMO, Opganic toidhody agricultural production, especially with high humidity, such as animal waste, is a favorable environment for the life of various types of microorganisms.

Totraces on farm biogas plant "Papardes" was proved that manure runoff soon defikatsiyi is intense microbiological process, changing the composition and quality characteristics of manure effluents and their freshness affect production of biogas.

The Institute of Thermal Physics long as test subjects for the study of organic agricultural waste. Working with manure runoff cattle (hereinafter - KRS) (c. V. Krupil "Ukrainian Milk Company"), we were interested in how the composition and quality of wastewater and perebrodzhenoho solution under anaerobic microorganisms during fermentation.

Prand decomposition of organic matter and increased acidity fromminyuyetsya pH. We know that by changing the acidity of the solution depends on the value of production of biogas and methane content.

In biogas plants (p. V. Krupil) manure removed three times day, when the cows are doyitysya. From the pumping station manure runoff immediately transferred to tanks in detention, and from there to the fermenter for processing. For the analysis of selected samples of two pump, capacity in detention and discharge nozzles three fermenters.

In the process of anaerobic digestion produce acid and alkaline (methane) phases. During phase acidic pH is reduced due to the formation of volatile acids. This decrease is offset by splitting volatile acids metanoutvoryuyuchymy bacteria and associated production of bicarbonate.

In biorektorah during a normal process of all microorganisms are united. All intermediate decomposition products

aboutdniyeyi processed by bacteria under the second stage. Vital activity of different groups of bacteria both phases is vigorously and agreed. If any - or disorders of the process - sudden changes in temperature, overload bioreactor presence of inhibitors and other reasons, disrupted the activities of methane bacteria most sensitive to changes in the environment. In such cases, the bioreactor increased number of products of acid phase pH changes.

In studies conducted in 1960, showed that the optimum pH for metanoutvoryuyuchyh bacteria are within 6.4 - 7.5 and that these bacteria are very sensitive to changes
this indicator.

In the laboratory, "Ogre" processing of raw materials was carried out under anaerobic conditions. Using standard methods for the study analyzed the composition of primary and perebrodzhenoyi
raw biogas output. In the Table. 1 shows data from studies on cattle manure.

1. Fizychni performance studies in cattle manure anaerobic processing in the laboratory "Ogre".

pH		Stakekist dry organic substances (COP), d		Volatile fatty acids mg/ L		Production of methane CH4, l/ H CMO	The destruction schedule CMOs%	MAl ne-re rob-ki (bro mine din-ing)
do Boot.	after Boot.	do Boot.	after Boot.	do Boot.	after Boot.			
7.6	7.9	80.8	58.7	2095.9	339.2	27.3	27.3	16

YesHow we work with bioreactors where they yield to sustainable technological regime took place and goes support their work optimally and in an environment that is fermented, this association was formed close to the optimal quantity and ratio of different groups of bacteria that have adapted to these conditions processing (constant temperature of 38 ° C Loading fresh raw materials at 8th, 16y and 24 th issue o'clock to 30 m3 cycle work mixers, etc.) can expect biogas yield within 66.14 m3 / day and produce up to
~ 12 MW / day of electricity and the appropriate amount of heat.

We are interested in how the pH within a day after zahruzok fresh raw materials in fermenters and daily values.

In the Table. 2 shows the average pH of the pump and fermenters per day for three consecutive cleansing and transfer of fresh raw materials for fermentation.

2. Average pH per day.

Estse sampling	The transfer of fresh raw materials		
	1 cleaning	2 cleaning	3 cleaning
Pump. №1	6.79	6.69	6.56
Pump. Number 2	6.85	6,88	6.95
The enzyme. (Average)	786	763	765

Andnalizuyuchy survey data shows that the average pH in fermenters correspond to ~ 7.7 (alkaline phase metanoutvorennya) microflora in fermenters strong process of destruction goes focused on the production of biogas. For this day produced biogas - 67.8 m3 / day and electricity - 12.3 MW / day.

Minor differences in pH values of the first and second pump indicate that the pens that serves pump №1 cows are an older group, and in pens where the pump
Number2 - young cow herd.

At the biogas plant in the village. B. Krupil were conducted continuously monitor the work station. In the Table. 3 selectively present observation pH.

3. These pH values in primary and perebrodzhenyh solutions.

Estse sampling	Dates analysis							
	31.01 2009	10.06 2009	5.11 2009	30.10 2010	5.02 2011	26.04 2011	17.08 2011	9.11 2011
Nasos.1	6.56	-	648	-	6.82	6.93	7.02	7.07
Nasos.2	6.82	-	704	7.07	7.04	7.24	7.15	7.19
Capacity	-	661	686	672	695	656	701	715
Fermen.1	-	772	775	810	765	782	789	784
Fermen.2	697	783	775	790	765	785	780	802

PUSfor the biogas plant took place in early 2009. Analyzing the data table. 3 we see that over time the pH in fermenters change toward alkaline values, indicating that the bacterial community adaptation held and ripened relatively high and stable performance on biogas.

We, studies, or changing the pH
Sectionat the height of the solution in the fermenter. Height fermenters 6 m (without gas dome), a working solution ranges from 5.2 to 5.6 m. For this sampler samples were taken over the top layer of the solution and drain pipes perebrodzhenoho solution respectively after loading fresh product 40 minutes after mixing solution . Thus, the temperature of the solution in the tank

Draftdnoho retention was between 18 ° C (September) and 14 ° C (November) in fermenters within the regulations ~ 38 ° C. These studies are summarized in Table. 4.

4. From-identification pH layerin Robowhat tofermentatorah. Sectionabout heightsand Roserank

Date	Estse samplin g	Periodic dych - ness (time Cate	Curren t volume solutio n well,	pH	In theo- lo- gues t %	Abc. dry, %	Bioh. by RH. to abs.s, %	FromAul nay. by RH. to abs.s, %
	to Categories	1						
	to	2						
8.09	F 1		2100					
	C a t e g o r i e s t							
2010	o Categories		3					
	to Categories	4						
	F2							
	F3	Categories	12102					
	Yemn. pop. ut.		390					
	F1	Categories	1					
	2100 F2							
16.09 2010	to	1						
	Categories to	2						
	F3 Categories		2063					
	to	3						
	Categories Yemn.							
	pop. ut.	1	304					
4.11 2010								

				6.86	94.78	5.22	84.46	15.54
F1	to C	1	2100	7.75 7.92	96,15 96.3	3.85 3.7	76.51 74.87	23.49 25.13
F2	to C	2	2101	7.77 7.91	96.3 95.93	3.7 4.07	77.31 75.93	22.69 24.07
F3	to Categories	3	2106	7.75 7,87	96.12 96.1	3.88 3.9	78.93 77,17	21.07 2283

Andnalizuyuchy data in the first fermenter (from 08.09.10 g) were taken during the day after each of the four zahruzok 20 m3 after mixing procedural solution for 40 min see that the pH value close to its height correspond alkaline solution and (metanoutvoryuyuchomu) processing. In the second fermenter (from 16/09/10 p) Downloads carried only three per day to 20 m3. The pH similar

Draftdnim. Interestingly, during the operation of the biogas plant, even at considerable showers solution of fermenters, lowering the temperature of the solution during the winter months of work, the pH in bioreactors not lowered to 7 or less, and remained at alkaline values. This again shows that in bioreactors formed a strong community of microorganisms that continually supports metanoutvoryuyuchyy process in fermenters.

Conclusions

Yesor obtained at the biogas plant in the village. B. Krupil "Ukrainian dairy company" and their analysis showed that the initial fermentation solution loaded high humidity (Regulation
– 93%), which affects the routine performance of the biogas plant. During his time in bioreactors formed a strong community of microorganisms that continually supports metanoutvoryuyuchyy process in fermenters, which corresponds to an alkaline pH.

Effectsness recycling process that should take place in a stable technological modes, estimated at 85 - 95%.

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Technology of solutions described Converting large horned livestock manure on byohazovoy station in the village. B. Krupyl «Ukrainskaia breast company. " Shown something эffektyvnaya Business byoreaktorov happening at rehlamente tehnolohycheskohO parameter of sustainable and alkaline regime kotorыCarefully podderzhyvat and mercy.

Orhanyka, Fermentatsyya, perebrozhennыy Solution, byoreaktor.

The technology of processing solutions cattle manure in biogas plant in village. V. Krupil "Ukrainian Dairy Company." It is shown that effective operation of bioreactors happens when regulations and constant technological parameter alkaline mode, which must be carefully maintained.

Organics, Fermentation, roam solution, bioreactor.

UDC
631,363

EVALUATION OF USE Grinders Feed Grains

SE Potapov, engineer

The variant improve methods of comparative evaluation of machine for grinding grain feed.

Ondribnyuvachi grain grinding feed quality, performance, power consumption, the degree of grinding.

Resolutionska problem. DFor the existence and development of the livestock industry important to the rational use of fodder. In this connection special significance takes to develop criteria and methods for evaluating the effectiveness of technological methods of processing feed raw materials, and the choice of means for their implementation

One of the most important and mandatory training of feed manufacturing operations, particularly grain for feeding is crushing [1]. In practice kormopryhotuvannya crushing process
Roseviewed as the destruction of feed grain to produce a product with optimum particle size of particles needed for effective use.

The optimum particle size of feed particles is determined scientifically based recommendations and livestock depends
by species and age of animals and birds, the type of grain and character yogio Use (feeding alone or as part of the mixed feed or feed) [1,2].

Youjuice quality grinding feed provided by a set of measures related to improvement of machine-chopper,
Sectionidvyschennyam requirements for process control and monitoring products shredding.

AnaLease rezultativ Finalnnih dperssurvey findings. The main coupleduring the grinding process meters are known [3], the performance $Q$and specific energy q(energy consumption per unit of production) equipment

$$q=\frac{N_{Section}}{Q}, \quad (1)$$

as well as the quality of the product. However, the overall performance can be outstanding criteria, as determined by a number of structural and technological parameters

-Size first working chamber and working bodies, kinematic modes shredders, physical, mechanical and technological properties of the feedstock.

A more objective criterion can be considered performance per unit surface area of the working chamber. Specific
indicatorand reflect the full value of the load space usage grinding chamber, operating machinery and largely determine the metal and energy process. However, the specific load and power consumption do not address quality
ondribnennya.

DA comparative evaluation of means using energy intensity indicator $E_{Categories}$considering the achieved degree of grinding:

$$E = \frac{q}{\lambda}, \tag{2}$$

where - $N_{Section}$a powerfulness consumed for grinding (net of losses idling); λ- The degree of grinding material processed.

Andle, in which case the energy assessment is carried out without regard to uniformity of grain size grinding products that are not fully satisfies the efficiency of feed. It is known that the fractional decrease in the coefficient of variation of the product during the grinding of feed materials for every 10% during the feeding of animals in the technological equivalent additional production efficiency or save 1-3% of the feed. Therefore, to assess the qualitative aspect of the process and grinding tools, in addition to the degree of grinding material or size of the final product, must be considered and uniform fractional composition of feed particles.

PID the comprehensive evaluation and comparison of energy efficiency options and means of grinding processes
proponuyetXia [3] to determine uniformity considering fractional
the composition of the final product as follows:

- in general:

$$E_{for} = \frac{q}{\lambda\left(1-\frac{\nu}{100}\right)}; \tag{3}$$

- prand the same size and normalized values of the coefficient of variation of the fractional composition of the product:

$$E_{p} = q\frac{\nu}{\nu_{Categories}}, \tag{4}$$

where - E_{for}thnerhoyemnist process taking into account the achieved degree of grinding material processed and uniformity of fractional composition of the obtained product (complex criterion); E_p
– thnerhoyemnist process according considering uniformity products crushing regulatory requirements; $v$and$v_{Categories}$,respectively - actual and normative values of the coefficients of variation of the fractional composition chopped forage.

Noiseth dossurvey findings there is Identifytion aboutAIN criteriato VHinyuvannya and selection methodology of comprehensive comparative evaluation tools for grinding grain feed.

Rezultaty research. Dll justify the choice of another embodiment grain grinders must first of all determine the list of criteria optimization for further construction of the objective function. As mentioned above, it is reasonable for the comprehensive evaluation of energy efficiency and process quality of the product. There are basic criteria and requirements for quality grinding feed [1], the average size of the feed particles (grinding module M) should be scientifically sound zootechnical requirements; coefficient of variation of the fractional composition of grinding products should not exceed 45-65%. The upper limit recommended for small and medium grinding grain, lower - for coarse grinding.

HoweverExcept the final product size and uniformity of fractional composition must take into account other indicators. In particular, regardless of the ultimate size of the particles during the grinding of grain feed is undesirable formation of dust fractions (according requirements mashynovyprobuvalnyh organizations, which may not exceed 20%). Excessive dust results in a loss of food, excessive electricity for crushing process, reducing the durability of machines and increase operating costs.

Pilovydni particles badly eaten by animals and worse digested [1, 4].

Limited availability and whole grains in grinding coarse grains (0.3-0.5%), ie no more than 6 grains per 100 g of crushed product.

DA comparative evaluation and selection Cutter grain propose a method to use the resulting index even assti [5]. It is based on the formation of generalized index through intuitive evaluating the impact of partial indicators of quality *k1*,... *kn* on the quality of the resulting system of its functions. Evaluation of the impact of given group of experts - experts who have experience in developing such systems. The most widely used

among rezultuyuchyh showingers even assti aboutkept anddytyvnyy, multyplikatyvnyy and mynimaksnyy performance.

For additive coagulation resulting index is the weighted sum of normalized partial indicators, while
multyplikatyvne clotting - a product of the normalized parameters, elevated to the power of (exponent - weight) [5, 6].

Prand implementation of multi comparative assessment appropriate in our opinion, to use the method of additive coagulation parameters. Used when
criteriaher independent on the importance and can be measured in a quantitative scale. The objective function is:

$$f = \sum_{i=1}^{n} c_{and} \bar{k}\, and \rightarrow extr \tag{5}$$

wher $\bar{k}$ - *And th* distinctand optimality criterion in normalized form
e k_{and}
with$_{and}$- Weight of significance *I*-gat a certain criterion,

$$\sum_{and=1}^{n} c_{and} = 1; c_{and} > 0; and = 1, \ldots, n. \tag{6}$$

Bemask weight coefficient significance criteria *with*$_{and}$is given by:

$$w_{and} = \frac{\sum_{i=1}^{n} \delta_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} \delta_{ij}}, \tag{7}$$

where - BaFlax VHinca fromnachuschosti *i*-gabout criterioning, δ_{ij} asand dato *j*-m
expertm*and*-volumein value criterion; *j*- Index expert; *i*- Index criteria.

Operation Categoriesormuvation dLakewill toiklyuchyty toSectionlil Categoriesand integrated VHge f oneb tothiryuvannya, toelychynand interval solderstimulated fromrequired set criteriaa, and tacossame utochalso presents yogiabouteqstremalnist. Dll tovetion norpro meansHb showingers even $k_1 \ldots, k_i$ toykorystovuyut expression [6]:
assti

$$\bar{k}_i = \frac{k_i}{k_{i0}}, \tag{8}$$

where k_{i0}- Some reference (threshold) value ki-indicator of quality.

Summarizing all the above, we suggest using
following a comprehensive methodology for comparative evaluation of processes and technical means of grinding grain based indicators of

energy intensity and quality shredding.

DA comparison of grain grinders are appropriate choices the following criteria:

k_1- Specific energy process, kWh / t;
k_2- Coefficient of variation,%
k_3- Out dust fraction,%
k_4- The number of whole (not broken) grains%.
Stilland toybip UMOzhlyvlyuye forlasychnu onstanovku tasksand
mathematical optimization:

$$\left.\begin{array}{l} f_{for}(k_1, k_2, k_3, k_4) \to \min \\ \text{fromand conditions} \\ k_1 < k_{10} \\ k_2 < k_{20} \\ k_3 < k_{30} \\ k_4 < k_{40} \end{array}\right\}, \quad (9)$$

where *k10*...*k40*- Limit values of the variables

$$k_{10} = 20 kW \cdot d\ from/t, k_{20} = 45\%, k_{30} = 20\%, k_{40} = 0.5\%.$$

Pidstavyvshy these values in the formula (4) we obtain expressions for the normalized values of quality:

$$\bar{k}_1 = \frac{k_1}{20}, \bar{k}_2 = \frac{k_2}{45}, \bar{k}_3 = \frac{k_3}{20}, \bar{k}_4 = 2k_4. \quad (10)$$

The resulting normalized values are dimensionless quantities.

The result is a complex dimensionless parameter f_{for},fromand which may make a comparative assessment of grain grinders.

In December 2013 at the feed shop NUBiP of Ukraine NDH "Agronomy Research Station" was conducted product testing valtsedekovoyi (drum)
grainnodrobarky. During the test the above parameters were studied: the specific power consumption *q*processin grinding, coefficient of variation *v*, The output of dust fractions *p*, The number of *z*cilyh grains. Data obtained during the test valtsedekovoyi
grainnodrobarky, compared with corresponding unit of feed used on the farm
(Tablel.
1).

1. Porivnyalni data.

Arregattas	Kultura	Modul grinding	Milling	*q*KW gU / t	*v*%	*p*, %	*z*, %	*Fk*
1. In thealtse-Dekov	barley	1.69	average	5.8	12	2.7	0	6.43
2. BMK-1		1.74	average	9	24.5	15	0.8	14.1

As the table shows, valtsedekova (drum) crusher has a lower index $f_{k,}$ udemonstrates the feasibility of its use in terms of energy consumption and quality of grinding, which is a prerequisite feed efficiency and increased livestock production.

Conclusion. Identifyneither criteriath tand IUthenwild dPERMITSlyayutsya fromdiysnyuvaty comprehensive comparative evaluation processes and technical means of grinding grain into account of energy intensity and quality of grinding, which is a prerequisite feed efficiency and increased livestock production.

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Variant proposals usovershenstvovanyya comparative methods otsenyvanyya yzmelchenyya machines for grain fodder.

IZmelchytely grain Quality yzmelchenyya grain proyzvodytelnost, ənerhoemkost, the degree yzmelchenyya.

A variant of improvement methodology of comparative evaluation of machines for grinding grain feed.

Grinders of grain, quality of grain refinement, performance, consumption, degree of comminution.