Nominal voltage, V	5 ... 12
Input impedance, Ohm	400 ± 50
The highest limit of measurement, H	5000
degree of protection	IP 68

At each stage experiment conducted a series of studies 3 to 5 attempts each. Used cargo weighing 450 kg, 1200 kg and 1800 kg.

During the experiment tryfaktornoho recorded, the following system parameters: traction rope efforts; efforts rope-stretching; speed drive drum.$S_{\text{к}} S_{\text{р}} n_{\text{б}}$

The use of variable loads allows approximately reflect the diversity of production conditions in the cutting areas.

Conclusion. To confirm the adequacy of the results of research methodology was developed for experimental research. The scheme arrangement, mounting and experimental data collection system for further processing. Based on the results studied the dynamics of movement above the mechanical system. The results of the data collected subsequently invited to compare with theoretical research.

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In Article rassmotreno Conducting experimental Studies Changed usylyya in Cana odnobarabannoy lebёdky. Present scheme naturnoy model with ustanovlennым-rehystryruyuschym the measuring equipment and method of conducting the experiment.

Perehodnoy mode usylye, experiment, *rehystryruyuschee the measuring-equipment.*

The paper considers pilot study changes in rope -drum efforts winch. Shows a diagram of full-scale model with established measurement and recording equipment and methodology of the experiment.

Transient behavior, effort, experiment, measuring and recording equipment.

UDC 662.763.3.2

INVESTIGATION OF GRADUAL SUPPLY OF SUBSTRATE A BIOGAS REACTOR

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The results of experimental studies of biogas with a gradual loading of the substrate. The dependence of the average output of biogas in the gradual supply of substrate per cent updated the substrate.

Biogas digesters, kosubstrat, progressive download, crude glycerin, livestock manure, biogas reactor.

Formulation of the problem. At periodic load substrate digesters exist peaks 1-2 maximum yield of biogas arising during the transition from exponential phase to a phase of slower growth [1]. The maximum biogas yield observed for several days, after which the intensity of its generation is gradually reduced until the complete cessation. Time for complete decomposition of biomass under anaerobic digestion can be 30-45 days, but the biogas yield in this case is low and does not ensure the profitability of the biogas plant.

Analysis of recent research. For uniform distribution of biogas out of time used to gradually feed in digesters substrate in which the substrate is fed during the day a large number of small portions, while removing waste bioshlamu. Thus each new portion of the substrate that is loaded into the digesters will generate a maximum output of biogas (Fig. 1)[2]. The highs of each portion of the substrate loaded

***Supervisor - PhD VA Dubrovin**

form the total output of biogas digesters, which will significantly exceed the biogas yield at periodic loading. And, the more you will load new portions of the substrate, the more uniform will be a joint biogas yield [3, 4].

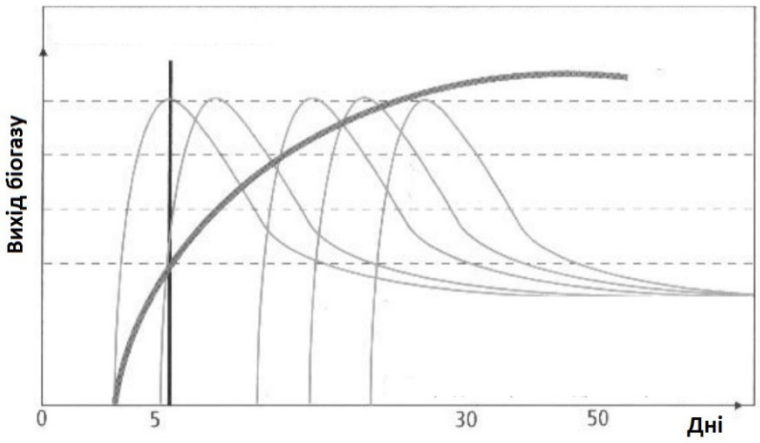

Fig. 1. Schematic representation of the formation of biogas output with continuous loading of the substrate in the digesters [2].

The purpose of our research is experimental setting influence the output of biogas daily download volume of the substrate in its gradual feed.

Results. We conducted a study of the process of gradual supply substrate in laboratory digesters biogas plant (Fig. 2).

Fig. 2. Experimental biogas plants.

In volume digesters 29 m3 zavantazhuvalosya 4.2 kg substrate consisting of 1.7 kg cattle manure, 2.5 kg water and 0.05 l crude glycerol (3% by weight of the substrate). Digesters filling ratio was 0.5, coefficient of discharge - 0.28. At 2-3 day fermentation was observed maximum yield of biogas. At this time in methane tanks daily added the new portion of the substrate at a rate of 1/30, 1/20, 1/10 and 1/5 of the loaded portion of the substrate. Weight substrate and its individual components in downloading are shown in the table. 1.

1. Weight substrate and its individual components when downloading digesters.

Indicator	Percentage of substrate updated			
	1/30 (3.3%)	1/20 (5%)	1/10 (10%)	1/5 (20%)
The initial substrate loading, kg	4.2	4.2	4.2	4.2
Downloading substrate, kg, incl .:	.1422	.2132	.4264	.8527
cattle manure, kg	0.057	0,085	0.17	0.34
water, kg	.083	0,125	0.25	0.5
crude glycerin l	.0017	0,0025	0,005	0.01
Daily discharge bioshlamu kg	.1422	.2132	.4264	.8527

Research results in the gradual release of biogas substrate loading shown in Fig. 3, which shows that the fermentation is accompanied by two peaks of maximum output of biogas.

Fig. 3. Generation of biogas through gradual loading of the substrate.

The origin coincides with the first peak, followed by a fading generation of biogas and fermentation sixth day there is a second peak generation. After 8 days of fermentation biogas output stabilized in the next days there is relatively uniform generation of biogas from a slight increase in its output in time. The average biogas yield at 3.3% daily updates downloaded from the substrate at the beginning of the fermentation of 141 cm3 / h, with 5% of the substrate update - 226 cm3 / h, 10% - 317 cm3 / h, 20% - 577 cm3 / h. Deviations biogas output from the average usually is 6-8%. As the number of downloads substrate overnight biogas output deviation from the mean value will decrease.

Fig. 4 shows the dependence of the average output of biogas in the gradual submission of updated interest substrate which approximated by a linear function:

$$Q = 2504 \cdot Д + 75{,}29 \text{ when R2 = 0,9902,} \quad (1)$$

where: Q - biogas yield, cm3 / h; D - the fate changed with respect to the substrate loaded%.

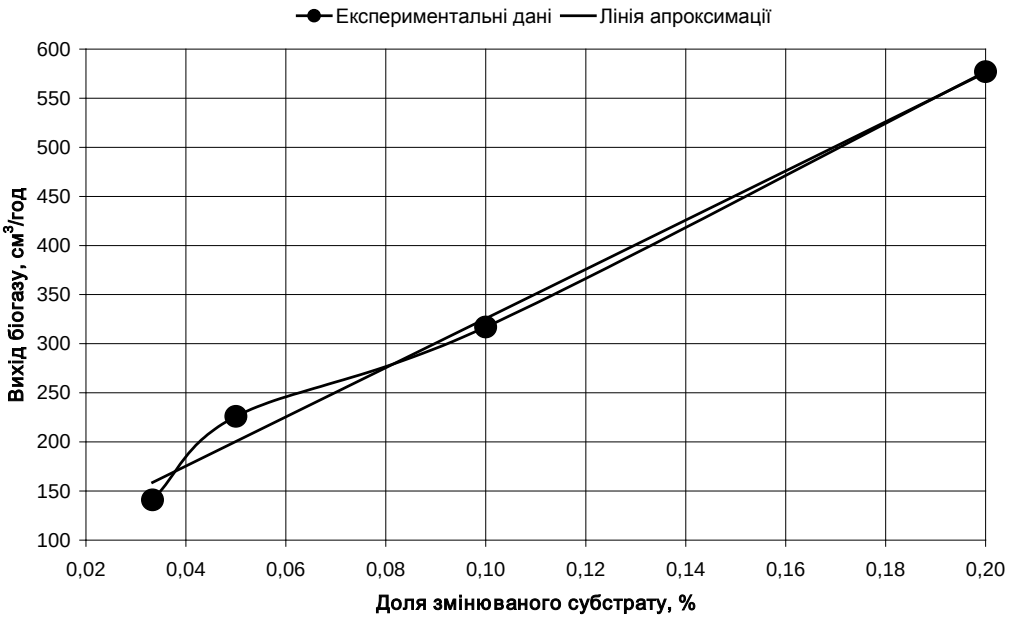

Fig. 4.The dependence of the average output of biogas in the gradual supply of substrate fate modified substrate.

It should be noted that at 50% of disposable daily change of substrate fermentation is terminated due to leaching of royal culture metanoutvoryuyuchyh bacteria. At 30% change in the substrate biogas yield does not decrease, but the heat of combustion of biogas, designed according to [5], resulting in an increase in carbon dioxide is 12-13 MJ / m3 (compared to 25 MJ / m3 JMA 24.14-3-561 : 2007 [6]). Therefore, the formula (1) is valid for a single daily changing substrate digesters up to 30%. Calculated estimate of the average output of biogas fermentation of cattle manure with the addition of glycerol to 3% by weight of manure, established by the expression (1) shown in Table. 2. For comparison in the table. 3 shows the basic indicators of the biogas plant digesters volume10 m3 depending on the daily output of biogas per unit weight of the substrate.

2. Calculated estimate of the average output of biogas fermentation of cattle manure with the addition of glycerol to 3% by weight of manure.

Daily change of substrate%	Exit biogas cm3 / h	Exit biogas l / (kg·day)
0	75.29	1.8
2	125.37	3.0
5	200.49	4.8
10	325.69	7.8
20	576.09	13.8
30	826.49	19.8

3. Key indicators of the biogas plant digesters volume10 m3 depending on the daily output of biogas per unit weight of the substrate.

Indicator	Disposable daily change of substrate%				
	2	5	10	20	30
Exit biogas, m3 / day	22.1	35.3	57.4	101.5	145.6
The volume of biogas used for useful purposes,%					
January	*	*	33.3	62.3	46.5
February	*	*	33.4	62.4	46.6
March	*	*	33.9	62.6	47.0
April	*	*	34.7	63.1	47.6
May	*	7.1	42.8	67.7	54.2
June	*	18.4	49.8	71.6	59.7
July	*	22.4	52.3	73.0	61.7
August	*	18.8	50.1	71.8	60.0
September	*	1.0	39.1	65.6	51.2
October	*	*	34.6	63.1	47.6
November	*	*	34.0	62.7	47.1
December	*	*	33.6	62.5	46.8
marketability factor	–	0.053	.393	.657	.513

*biogas produced is not enough to maintain temperature control digesters.

Conclusion. Gradual supply of substrate digesters provides greater volume and more evenly biogas yield over time compared with periodic filing. At one time a daily change of substrate to 20% biogas yield increases to 13.8 liters / (kg·day), with a calorific value of biogas is 25 MJ / m3. Rising disposable daily changes of substrate to 30% increased biogas yield to 19.8 MJ / m3, but at the same time due to increased content in the carbon dioxide calorific value decreases to 12-13 MJ / m3. In the case of 50% change of substrate methanogenic fermentation is terminated due to leaching of royal culture metanoutvoryuyuchyh bacteria.

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Pryvedenы эksperymentalnыh of research results in the production of biogas postepennoy Loading substrate. Opredelena dependence Medium Exit at postepennoy innings biogas substrate from the substrate obnovlyaemoho percent.

Biogas, methane tanks, kosubstrat, postepennaya Loading, sыroy glycerin, cattle manure, byohazovыy reactor.

The results of experimental studies of production of biogas at gradual loading of substrate. Determining the dependence of average yield of biogas at gradual supply of substrate from substrate percent updated.

Biogas digester, cosubstrate, progressive loading, crude glycerin, cattle manure, biogas reactor.

UDC 631.51.4

PERFORMANCE PARTS RESTORATION plunger fuel pump AGRICULTURAL MACHINERY

IL Rogovskiy, LL Rogovskiy, Ph.D.

The results of investigations of the properties and sizes of parts plunger recovery after nitriding, oksinitruvannyam, karbonitruvannyam and rotary chrome.

Plunger vapor recovery methods, properties, increase in size.

Formulation of the problem. Up to 50% of faults in diesel engines pryhodyatsya fuel equipment. In the most severe operating conditions plunger pairs fuel pumps due to dynamic loads and high pressure, the presence of corrosive and abrasive component parts in the fuel, wear and tear.

Due to the large number plunger and the complexity of their manufacturing advisable to restore detail, providing necessary technical conditions for their properties.

Analysis of recent research. Restoring precision pluzhennyh pairs, wear them tens of micrometers, there is a real opportunity to