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MODERN CONSTRUCTION OF BIOGAS PLANTS FOR PROCESSING BIRD LITTER

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Annotation

The article provides a broad overview of the many technological challenges to study the physical, chemical and other properties of poultry manure, its processing, application and storage. There is information on the factors that prove that poultry manure is an effective organic fertilizer and at the same time, a dangerous source of environmental pollution when untreated.

Keywords.

organic waste, biomass, methanogens, psychrophilic, mesophilic, thermophilic, digester.

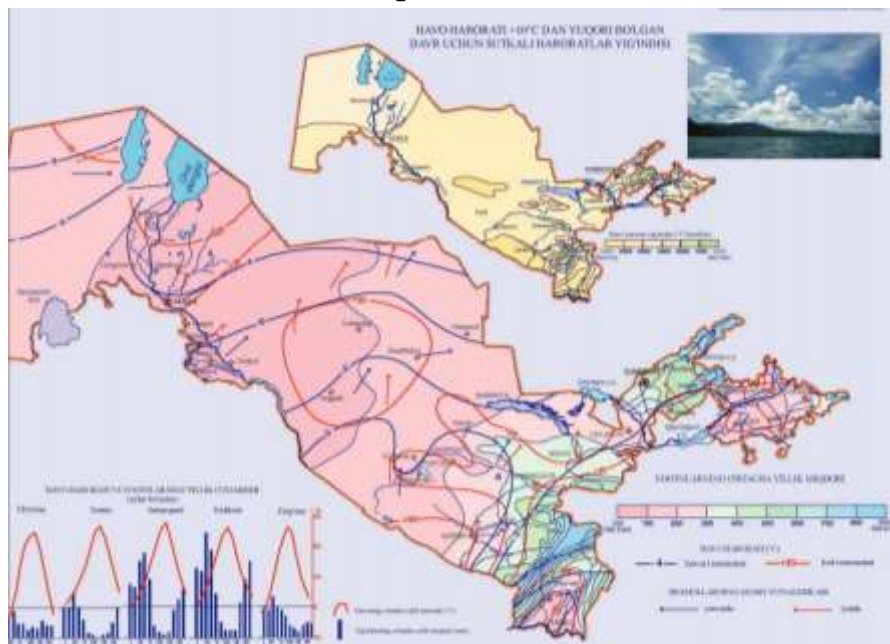
Introduction.

Strategic directions for the development of agriculture in the Republic of Uzbekistan, in the conditions of market relations for representatives of any sphere, it is important to obtain accurate information about the geographical location of the waste processing facilities of the poultry farm in a short time. Last century, the system of the geographic information technology (GIS) today is becoming an integral part of agriculture. Effective operation and environmental safety installation of biogas plants in the regions of the Republic of Uzbekistan is impossible without modern GIS technology.

Since the Republic of Uzbekistan has a sharply continental region of Central Asia. When establishing biogas plants or complexes one should not only consider

the times of winds, but should analyze the terrain of the installed objects according to the climatic maps of Uzbekistan (pic-1). When determining the area and volumes for which the processing plant or remote sensing (DZ) using one of the programs of the geographic information system –Global Mapper [4].

In the world, conservation and the rational use of resources continue to play a major role in the production of any type of product. As an integral part of the agro-industrial complex, the poultry industry has reached such a threshold that further development of eggs and dietary meat requires the transition from extensive development to intensive development. This is due to the development and implementation of new technological methods, methods and processes that guarantee the country's nutritional needs. It should be ensured not only the minimal cost of the product, but also the conditions for the efficient use of local secondary resources, with no adverse impact on the environment.



One of the peculiarities of the acceleration of poultry is the widespread introduction of poultry breeding and storage facilities in poultry factories. This will allow increasing the production capacity by 2-3 times, increasing the availability of poultry eggs and meat products per unit of poultry, reduce material and technical costs and avoid the use of rare-earth coating. However, the introduction of poultry batteries in poultry factories has led to serious problems with the collection and processing of poultry manure, the purification and disinfection of wastewater during the supply of water to poultry and sanitary maintenance in poultry rooms. Liquid garbage can be a potential source of environmental disasters, not only in poultry factories near populated areas, but also

in adjacent areas where poultry factories are not equipped and poultry manure is a valuable organic fertilizer. research aimed at solving a range of problems.

Physical content. Fresh poultry manure represents a grey-green mass with a porous structure. Poultry manure by its mechanical composition is 90-95% of the particles are relatively hard, with large internal and external pores, due to the fact that they are not completely sticky. The basis of it is small fractions, residues of organic and mineral feed, seeds of different plants.

The total mass of poultry manure is 0,1-1,0 mm. About 30% of the total mass is composed of particles smaller than 0,1 mm. Fractions contain more organic matter than large particles.

Poultry manure has less water than cattle or pig manure. Humidity of adult poultry stored in cages ranges from 65 to 75%. This indicator depends largely on the age and breed of chickens, their feeding conditions, their nutrients, and the ambient temperature.

The physical properties of poultry manure fully reflect the physical constants, such as α static slope of natural slope, coefficient of friction at the beginning of movement ρ , and the scattering γ .

These values are significantly dependent on the moisture content of the material. (Figure 1).

According to the physical properties of poultry manure, the data can be used to calculate the working bodies of drum poultry dryers, to design bunker-packing material and load-unloading transporters. Moisture of poultry manure has to be shown as a major factor affecting heat absorption and transmission (Table 1).

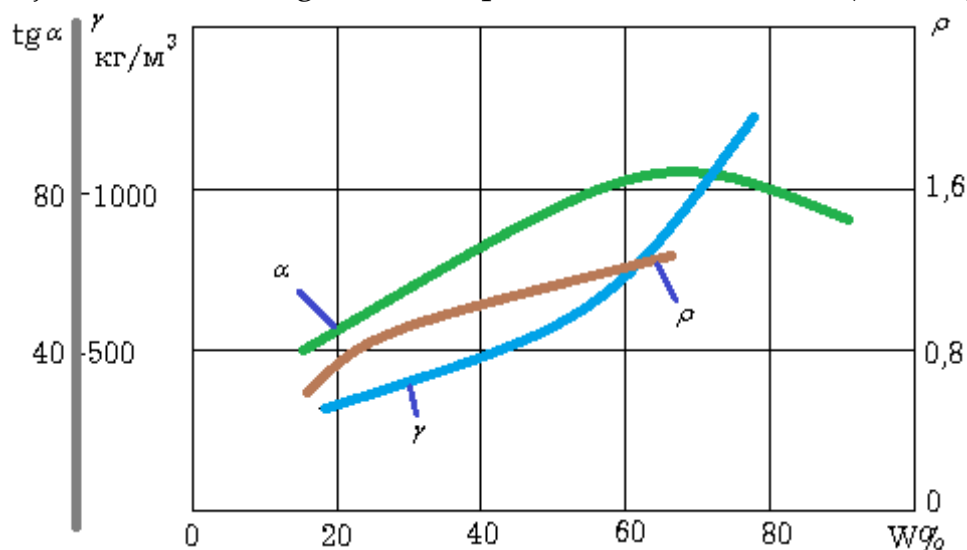


Figure 1. Humidity depend on the physical properties of poultry manure: a- static angle of natural slope; ρ - coefficient of friction at the

beginning of movement; γ -is a drop density.

The data from Table 1 show that with the increase in humidity of poultry manure from 4,5 to 62%, the heat capacity of the bird increases from 1,5 to 4 kJ/kg-degree; the thermal conductivity also increases (5,0-65) by 10-2 W/m.gr. The temperature permeability coefficient (1,8-0,02) decreases by 10-7 h/s

Thermal-physical characteristics of poultry manure allow to determine the laws of heat mass transfer, which are used to substantiate the temperature changes on the design of poultry manure desiccators (direct currents, currents, etc.)

Table 1.

Changes in thermal and physical properties of poultry manure from its moisture and temperature

Temperature °C	Comparative heat capacity, weight/ degree				Thermal conductivity coefficient, Vtt /M degree 10 ⁻²				Thermal conductivity coefficient , m/c 10 ⁻⁷			
	Humidity of poultry , %											
	,5	8	5	2	,5	8	5	2	,5	8	5	2
2					5							0,2
0	,5	,0	,9	,6	,0	,0	,0	9	,8	,3		0,004
4					5							0,3
0	,5	,3	,9	,7	,0	,0	,0	1	,3	,4		0,01
6					5							0,4
0	,4	,1	,9	,7	,0	,0	0,0	8	,3	,4		0,01
8					6							0,4
0	.4	,1	,0	,0	,0	,0	1,0	5	,6	,4		0,02

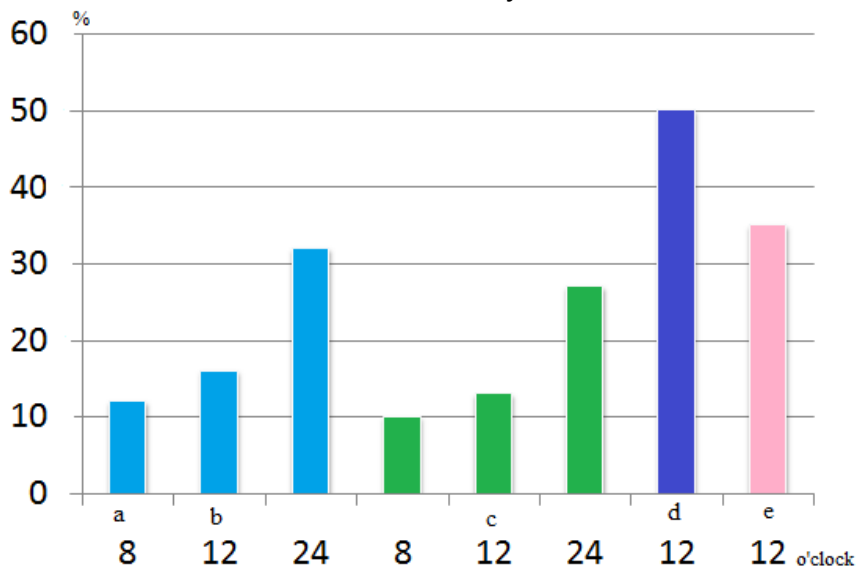
In modern poultry factories, one man's poultry manure depends on the type, age, feeding conditions, and feed quality of the poultry (Table 2). Depending on the type, age and feeding conditions of poultry manure can be dehydrated according to these indicators (Figure 2).

Drying of chicken manure for 1 to 40 days is 12% for 8 hours, 16% for 12 hours and 32% for 24 hours. Drying of chickens and adult chickens in cages is 10% after 8 hours, 13% after 12 hours, and 27% after 24 hours.

Capacity of poultry manure (calculated from poultry waste storage) is 0,7-0,8 t /m³, its usefulness is 17,3%, humidity is 55-60%.

When chickens are fed on cages containing boxes of manure on the floor, 60% of poultry manure is deposited in cans and 40% in beds, where the manure of poultry is 50% and humidity is 50-60%.

When storing poultry in floors, the construction process is faster. Within 12 hours drying of manure in turkeys, ducks and geese is 35% and in chickens 50%. According to the generally accepted estimates, the daily amount of manure per farm animal is twice the amount of dry feed consumed during that time.



a-poultry drying time, hours.

b-drying for 1-40 days, % .

c-drying of chicken litter in cells, %.

d-drying of chickens stored on floor cans, %.

e-drying of ducks, turkeys and geese stored in floor cells.

Figure 2. Drying of poultry manure by different types of feeding:

a-when stored in cells 1- 60 days drying of chicken and turkey chickens; b - drying of chickens, turkeys and chickens over 60 days; c-drying of chicken, turkeys, ducks and geese stored in cages.

Table 2

Manure excretion by poultry species and age groups.

Type of poultry	Adult poultry	Daily discharge of poultry manure by different age (daily) groups (1g per bird)												
		141-180	31-60	61-150	1-63	64-140	141-180	1-56	1-119	120-210	120-240	57-112	112-161	64-240
Egg laying														

chickens														
A group of chickens	189	-	-	-	-	-	-	-	-	-	-	-	-	-
A group of industry	175	24	97	176	-	-	-	-	-	-	-	-	-	-
Chickens grown for meat	276-300	-	-	-	158 **	-	-	135*	-	-	-	-	-	-
		-	-	-	140	184 p	28 8	-	-	-	-	-	-	-
Turkeys	450	-	-	-	-	-	-	175	-	-	-	36 4	42 0	-
	-	-	-	-	-	-	-	-	37 8	450 p	480 p	-	-	-
Ducks	423	-	-	-	384	-	-	382	-	-	-	-	-	-
Geese	594	33 0	48 0	-	-	-	-	-	-	-	-	-	-	495

Chemical composition. Of all kinds of organic fertilizers, poultry manure is undoubtedly the best fertilizer in terms of its nutritional elements and more favorable for plants. The chemical composition of poultry manure is complex and non-homogeneous, as shown in Figure 3 schematically.

Fresh poultry manure, calculated on dry matter 30,2-35,6% crude protein, 12,3-14,3% crude fiber, 30,0-37,6% nitrogen-containing extra active, 3,4-5,0% fat and 11,5-16,6% ash. Poultry manure contains more nitrogen, phosphorus and potassium than cattle and pigs. The content of nutrients in poultry manure can vary significantly depending on the feeding and storage conditions (Table 3).

Absolute dry mass of poultry manure is a material dried in constant thermostat at 105°C for a specified period.

Table 3

Quantity of nutrients contained in poultry manure with different humidity depending on the method of feeding and age of poultry (%)

Indicators	Fresh poultry manure .				Absolute dry mass of poultry manure.			
	Moisture	N	P2O5	K2O	Moisture	N	P2O5	K2O
Chickens are grazing on pastures	60,80	1,65	1,00	0,62	12,01	4,36	3,67	1,83
Chickens are grazing in cages	60,80	1,65	1,00	0,62	12,01	4,36	3,67	1,83
Chickens are	60,80	1,65	1,00	0,62	12,01	4,36	3,67	1,83

grazing in cages								
Chickens are grazing in cages	65,70	1,50	0,87	0,58	10,80	5,43	4,54	2,20
When fed in fetus	73,51	1,72	0,92	0,60	12,70	5,50	4,86	2,50
When chickens fed in meat	68,90	1,76	0,69	0,40	10,10	5,25	4,43	1,90

The chemical composition of poultry manure depends largely on the initial moisture content of the raw material (Table 4).

Table 4

The amount of nutrients in chicken manure depending on the moisture content

Humidity of chicken manure , %	Content of nutrients , %		
	N	P ₂ O ₅	K ₂ O
70	1,20	0,75	0,60
50	2,00	1,25	1,00
30	2,80	1,75	1,40
14	4,00	2,50	2,00

Conclusion. The content of nutrients in poultry manure also depends on the amount of micronutrients in the diet of birds (feathers). The content of nitrogen in poultry manure without feathers and feathers is 1,57%, phosphorus 0,40% and potassium 0,35%. In poultry manure with these compounds, nitrogen is 1,69%, phosphorus-0,62%, potassium-0,64%, that is, the presence of feathers and feathers in poultry manure leads to an increase in its nitrogen, phosphorus and potassium content.

In addition to the main nutritional elements, poultry manure also contains the following trace elements: calcium - 5%, magnesium-0,2, copper-0,008, manganese - 0,004, zinc - 0,0026, cobalt - 0,08, sulfur - 0,14 and 0,0045%.

The broiler manure and bedding mixture contains an average of 25% moisture, 1,7 nitrogen, 0,81 phosphorus and 1,25% potassium. Chicken manure contains on average 40% moisture, 1,3% nitrogen, 1,2% phosphorus and 1,1% potassium.

The value of poultry manure as fertilizer depends on the diet of poultry. To determine the fertilizer value of poultry manure, it is advisable to calculate the biogenic content of each fracture based on liquid and dry matter. The total nitrogen and liquid content are 50%, phosphorus 40...50, potassium 70-80%. Ammonium

nitrogen in poultry manure is 25%. Manure in mixed poultry contains: total nitrogen – 3,6%, phosphorus (R_2O_5) - 3,4%, potassium (K_2O) – 2,0% dry matter.

Poultry manure is an effective organic fertilizer and, at the same time, a hazardous source of pollution of the environment, water, soil and air, causing discomfort to the population when transporting, storing and burying it in untreated condition.

The study of the physical, chemical and other properties of liquid manure in poultry makes it possible to more fully address many technological issues of its processing, use and storage.

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