ORGANIC AMENDMENT AND BIOFUELS OF WASTE INDUSTRIAL LIVESTOCK COMPLEXES OUTPUT AS A NICHE FOR SMALL BUSINESSES

Nikolay V. Obolensky[1],
Marina S. Vandysheva[2]

Summary

The article covers the arguments for starting small businesses in the Nizhny Novgorod region for the production of synthetic " decomposed horse manure " – costly mineral fertilizers and biofuels substitute – biogas and pellets of waste industrial livestock complexes, spent grains and chopped straw. The list of references contents the sources set out the vision of the authors of the technology of biogas production from agricultural waste industries, including the usage of the cavitation effect for the biogas substrate preparation with hydrodynamic heat generator-destructor, as well as using the chopper forage for breaking straw with the size of its chaff, not exceeding 25 mm.

Keywords: small businesses; industrial livestock complexes waste; synthetic decomposed horse manure; fertilizer; biogas; pellets.

Introduction

The total amount of industrial livestock complexes waste in the Nizhny Novgorod region averages about 4 million t a year: 2,7 million t of KRS manure, 0,7 million t of pork manure, 0,4 million t of chicken dung, about 15 thousand t of KRS and horses manure.

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[1] Prof. PhD, Nizhny Novgorod State Engineering-Economic Institute, Doctor of Engineering, Professor, Knyaginino, Nizhny Novgorod region, Russia.

[2] PhD, Nizhny Novgorod State Engineering-Economic Institute, Chief teacher, Knyaginino, Nizhny Novgorod region, Russia.

Not processed or incorrectly processed waste don't work properly entering into the soil or reduce crops productivity; accelerate the soil degradation; contain environmental hostile elements (ammonium nitrogen and nitrite nitrogen, helminth eggs, pathogenic bacteria, viruses, etc.).

1 t of manure (dung) is a source for producing 70 … 80 m3 of biogas suitable for industrial usage. For example, on "Seymovskaya" LLC poultry plant receive to 100 thousand tons of dung a year which could be source for 7 … 8 million m3 of biogas making. This source energy would be enough for heating more than 500 thousand m3 of industrial premises in the Nizhny Novgorod Region.

The biomass remained after biogas receiving recycled by anaerobic microorganisms (0,9 yield factor) is used as organic fertilizer. Using 1 t of any kind manure (dung) it is possible to make 4 t of useful organic fertilizers on the basis of which can make the basis for 24 t of soils production for lands near testing grounds, garbage dumps, heathlands and the waste degraded lands recultivation.

Utilizing 1 t of any kind of manure (dung) it is possible to make to 3 t of suitable for champignons cultivation substratum (thus the effeciency of mushrooms production will make not less than 600 … 700 kg in terms of 1 t of manure).

1 t of chicken dung (or any kind of dung with addition of beer pellet, crushed straw, etc.) is capable of preparing to 5 t synthetic "decomposed horse manure". This product is possible to apply for fields fertilization without any risk for environment for various crops: horticultural, grain, non-root crop vegetable (for example, cabbage, tomatoes, cucumbers, etc.) and fodder.

The duration organic fertilizer

The duration organic fertilizer of this type action fluctuates within 3-4 years (on suspend soils), to 6-8 years (sandy loam). The maintenance of nutritious elements on active ingredient is to 2 % on the average, P2O5 – to 1,5%, K2O – to 3% (in terms of solid). Thus, 1 t synthetic "decomposed horse manure" (at a solid ratio to water 1:2) contains: to 7 kg of nitrogen, to 5 kg of phosphorus, to 10 kg of potassium.

In case of application of 10 t synthetic "decomposed horse manure" per 1 hectare it is possible almost completely refusing mineral amendment application because the specified amount of organics in the top soil provides about 70 kg of nitrogen, 50 kg of phosphorus and 100 kg of potassium (active ingredient). If the fertilization correspond 30 – 60 t of a manure per hectare on the average, the need for mineral fertilizers will completely disappear

(especially considering that the price of mineral fertilizers is unacceptable high for agricultural producers nowadays).

All specified nutritious elements have a bound state being in the condition of the organomineral banding therefore the processes of their washout with superficial drains won't be observed, ground waters penetration will be lacking (this fact is very important from the ecological point of view). The same statement will be fair in case of the increased regulations of synthetic "decomposed horse manure" application as well, for example, to 300 – 500 t per 1 hectare.

The synthetic "decomposed horse manure" application would allow to improve either agrochemical properties of the soil or its physicomechanical and physical and chemical properties. So, the introduction of each one hundred tons synthetic "decomposed horse manure" will provide a surplus of humus content in the plough-layer at the level of at least 0,10 – 0,15 % in a year, thus the humus will have more the humate origin. Due to thermodynamic bifurcations the finished compost will be completely coherent on the osmotic pressure and microbiological index, and it will be completely neutralized from possible pathogenic and phytopathogenic infections and other invasions as well.

The increased rate of synthetic "decomposed horse manure" application (from 100 to 500 per hectare) will allow to reclame effectively all heathlands, waste, degraded and washed away lands which for any reason were disposed from agricultural turnover. It is especially instant because of need of ensuring the food security of the country that is impossible without the recovery of soil fertility and increase of productive capacity of the earth.

Thus, the utilization of bird's dung in the full scale will allow to remove a problem of fields fertilization in the central part of the Nizhny Novgorod region, especially at the residential suburbs.

Besides, the implementation of organic fertilizers production on the basis of chicken dung will allow poultry farms to reduce ecological intensity in the territories adjacent to their industrial zones.

The need for high-quality organic fertilizers is having by the owners of homestead farms and garden sites. 90% of these areas are situated along the main region routes.

On the basis of synthetic "decomposed horse manure" it is possible to create various potting soil suitable for agriculture usage (for example, for landscaping), and also for the needs of gardening service of N. Novgorod.

In case of the additional shop on operational development of standard shampinyon substratum compost launching it will be possible to develop the guaranteed cultivation of champignons in industrial-scale volumes, in the Nizhny Novgorod region all over the year.

For the start of small business for synthetic “decomposed horse manure” production it is needed the special fund which should be created by the ministry of agrarian and industrial complex of the Nizhny Novgorod Region organization where the following means could be flown down:

the costs of the enterprises relative on waste disposal of production from the territories of the entities;

the ecological payments affiliated with waste utilization from the territory of the entities;

the ecological penalties and sanctions connected with failures in utilization, storage and conversion of chicken dung;

target expenses of the entities on the conversion of organic waste organization;

the resources of land fund allocated by the N. Novgorod government on recultivation and recovery of soil of agricultural usage;

the loan from innovative fund of the governor of the Nizhny Novgorod region;

the purpose-oriented loans of the ministry of agrarian and industrial complex of the Nizhny Novgorod region;

the investments of the entity, taking into account taxable basis decrease at the volume of investment amount;

the investment attraction of external investors.

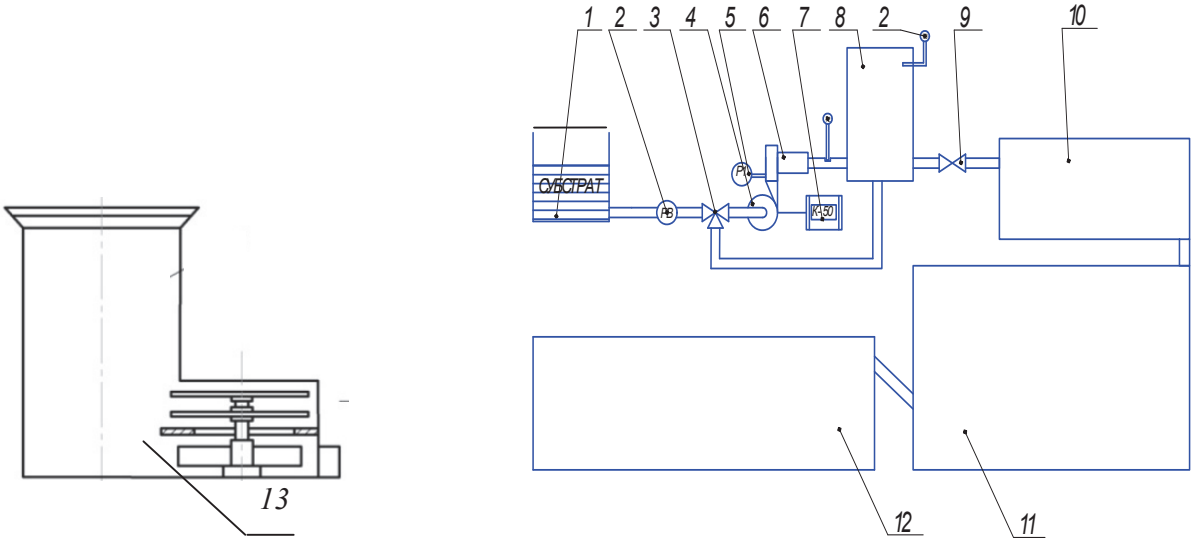
Certainly the questions connected with loan allocation or with investors attraction should be directly coordinated either ecological orientation or economic parameters, in a particular with cost efficiency of organic fertilization production, for example, on the basis of deep conversion of chicken dung (as the one of possible options of utilization).

In case of implementation of the project on utilization and deep conversion only of bird’s dung the cost efficiency can make at least 250 … 300 million rubles a year.

The papers [1 – 5] cover the technology authors vision of biogas receipt from waste of agricultural productions, including the usage of cavitation effect for substratum in installation preparation (fig. 1) for biogas output [6] in which the hydrodynamic thermal destructor generator is applied [7].

From a loading hopper (1) milled biomass is pumped over by the centrifugal pump (4) via the hydrodynamic heatgenerator destructor (6) allowing to create the effect of cavitation which destructive force destroys elements, dangerous to environment and gives to initial raw materials with homogeneous consistence at the reservoir (8) which it is deliverit to the bioreactor by drift (10) where a uniform mixing of the pulp by the screw is conducted and it moves to the methane-tank (11). The installation for biogas deve-

lopment has a reservoir (12) for the recycled by aerobic microorganisms biomass which is used as fertilizer, and also is completed with a flowmeter (2), the three-tradable crane (3), the manometer (5) and a measuring set (7).



Draw 1 – Installation for biofuel output

Decomposed horse manure

The preparation synthetic "decomposed horse manure" requires grain sorghum head chop with a size up to 25 mm. Modern grinders of straw allow to make it only with a minimum size of 100 mm. Therefore we offer to complete installation [6] with the grinder of rough forages (13) borrowed from the formula-feed aggregate [8], providing crushing of straw to 25 mm.

The crushed straw is an important component not only for obtaining synthetic "decomposed horse manure", but also for biofuel production formed as a pellet that is caused by its following properties: it is rather difficult to use straw for direct burning as at stages of collection, transportation and storage, and at a stage of direct burning. It is connected with inhomogeneity of straw, rather high humidity, small volume energy content, rather low temperature of melting of ashes and the increased chlorine content. Straw, as well as biomass in general, is neutral fuel for CO2, that is consumption of CO2 from the atmosphere in the course of growth of cereal cultures corresponds to issue of CO2 in the atmosphere when burning straw; low price; harmlessness for environment; the minimum fireproof remaining balance (which is fertilizer for plants); minimum area of storage, minimum amount in transit; possibility of transportation by road tankers and pneumotransporters; the maximum safety in case of storage and transportation (aren't explosive, aren't subject to spontaneous ignition); don't decay in case of

long-term storage; don't cause allergic reactions, don't transfer seeds of weeds and insects – wreckers. Burning 2000 kg of fuel granules allocates as much heat energy, as burning: 3200 kg of wood, 957 m3 of gas, 1000 l of diesel fuel, 1370 l of fuel oil.

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