PRETREATMENT EXTRUDED WHEAT STRAW SOLUTION $Ca(OH)_2$ TO INCREASE OUTPUT BIOGAS

I. Flonts, Ph.D.

S. Pidhovna, N. Holyash engineers

Separated subdivision NUBiP of Ukraine "Berezhany Agrotechnical Institute"

Among alternative energy sources is becoming increasingly important biogas, which is the product of agriculture - namely, waste disposal, which include manure, hnoyivka, straw, stalks and so on. In Ukraine excess straw and stalks of all plants is about 20 million tons.

Cellulose has a crystalline structure and therefore its biodegradation difficult. In addition, lignin, which is a part lihninotselyulozy complicates its availability for enzyme molecules.

Straw difficult to anaerobic fermentation because it contains solid lihninotselyuloznyy complex. Agricultural residues such as wheat straw, contain a high content of lignin, whose function is to provide structural support and protection from microbial lesions. Lignin is closely associated with cellulose and hemicellulose and makes them available for microbial degradation. Thus, there is a difference between the full content of organic biomass, which theoretically can be converted into biofuels, and the amount that is actually recycled microorganisms.

Lihninotselyuloznyy complex decomposes and does cellulose and hemicellulose available to microorganisms. The purpose of the pre-treatment is to destroy the crystal structure of cellulose and hemicellulose and lignin removal.

Chemical pretreatment methods are based on the ability of certain chemical compounds dissolve lignin or cellulose, but also lead to swelling or destruction of its structure.

Research pretreatment of wheat straw for biogas production with chemical agents, including straw processing solution $Ca(OH)_2$, which is relatively cheap chemicals.

The purpose of research - determine the intensity of methane fermentation wheat straw pellets, depending on the processing solution $Ca(OH)_2$ different concentrations (50 kg CaO / t of straw, 100 kg CaO / t of straw and 150 kg CaO / t straw) method of soaking in a solution of $Ca(OH)_2$ (prior to extrusion during extrusion, after extrusion). Soaking conducted 5 min at +20 ° C.

Materials and methods research. Measuring the amount of biogas was conducted by the method Kryvoruchko. For the experiment used plastic bags (fermenters), a device for sealing packages, pH-meter, calibrated cylinder. By the calculated amount of seed biomass was added at the rate of 1 part sample to 4 parts seed, squeezed air from the fermenter and hermetically zapayuvaly hole. By the sealed pouch hung weight and lowered in a package measuring cylinder. Thus defined initial volume of the investigated variants. Then pack hung in there and kept the thermostat at a temperature of 37,5° C for at least 35 days. Measurements of packet performed every seven days.

The objects of study were: wheat straw with Kozova Ternopil region (dry matter (CP) - 86.94 %) and seed (hnoyivka cattle) which filtered through the sieve.

Results. The results showed that pretreatment of wheat straw with different concentrations of $Ca(OH)_2$ increases the availability of hydrolytic enzymes to polymeric carbohydrates, which leads to splitting lihninotselyulozy and increase the yield of biogas.

The dynamics of gas production shows a sharp increase in activity over the next 14 days and decline. You can see that the dynamics of biogas does not change smoothly: there are periods of attenuation, and then increase the allocation of biogas. For 35 days the formation of gas in most cases ends. The largest biogas yield obtained with pellets extruded wheat straw, which is treated with a solution of $Ca(OH)_2$ (at the rate of 150 kg CaO / tonne of straw) during extrusion - 399 m^3 / ton, which is 63 % more output from biogas pellets extruded wheat straw which has not been treated with a solution of slaked lime.

Analyze more ways of handling slaked lime. When processing wheat straw to extrusion biogas yield increased, while the concentration of a solution of $Ca(OH)_2$ 50 kg CaO / t – 20 %, 100 kg CaO / t – 33 %, 150 kg CaO / t – 29 %.

The highest yield of methane (327 m^3 / t SD) obtained from wheat straw pellets, which are processed to extrusion solution of $Ca(OH)_2$ at the rate of 100 kg CaO / t (33 % more than the control experiment).

When processing wheat straw during extrusion biogas yield increased, while the concentration of a solution of $Ca(OH)_2$ 50 kg CaO / t – 54 %, 100 kg CaO / t – 61 %, 150 kg CaO / t – 63 %.

The highest yield of methane (399 m^3 / t SD) obtained from wheat straw pellets that are processed during extrusion solution of $Ca(OH)_2$ at the rate of 100 kg CaO / t (63 % more than the control experiment).

Processing wheat straw after extrusion solution of $Ca(OH)_2$ with different concentration increases biogas yield, while concentrations of the $Ca(OH)_2$ at the rate of 50 kg CaO / t – 35 %, 100 kg CaO / t – 40 %, 150 kg CaO / t – 35 %.

The highest methane yield (342 m^3/ t) obtained from wheat straw pellets that are processed after extrusion solution of $Ca(OH)_2$ at the rate of 100 kg CaO / t (40 % more than the control experiment).