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**HOW THE POST-ALCOHOLIC BARDS IMPACT  
DENSITY OF STRAW PELLETS AND INTENSITY  
OF BIOGAS PRODUCTION**

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Nowadays, utilization of post-alcoholic bards is major problem for distilleries. Some farm properties either use those bards for fertilization of soil which then used for grasslands and meadowlands, or utilize as natural food for farm animals. However, considering the short term of expiration date and low animal headcount in Ukraine, the current usage of post-alcoholic bards is not effective. This method can work only if small amount need to be utilized.

Lately, these bards are consumed in alcohol industry by using special fields for filtration where it starts to decompose with excretion of dangerous and poisonous elements into environment.

Technology of after-alcoholic bards' usage to produce biogas is novelty in domestic market while in advance European countries biogas installations successfully work using post-alcoholic bards from 1982.

The aim of research is to explore the opportunities how to use post-alcoholic bards made from corn grain especially as part of extruded straw and how this will affect the quality parameters of pellets as well as intensity of biogas production from it.

The wheat and rape straw have been used in experiments from harvest of 2016. The post-alcoholic bards' samples of corn grain were chosen at State enterprise “Kozlivskuy Spirituous Plant” in Ternopil region.

The straw from bales was chopped and extruded. The pellets were made using portable forms for granulating dry feed. The density of pellets of 8 mm in diameter was determined on a special plant for measuring the strength of granules. Those granules were made from the plant mass of applied force. The relative humidity was determined using a moisturizer BIO Moisture Wood. The incubation of the studied pellets was carried out in hermetic packets in thermostats at a temperature of 38 °C within 28 days. This was used to measure the intensity of biogas production in them.

During the study, it was established that the addition of neutralized post-alcoholic bards contributed to a significant increase in their density: for wheat – by 25,6 % ( $p \leq 0.05$ ) and rape – by 5,2%, as to compare with control samples.

Relative humidity of pellets of all investigated samples was in the range of 8,0–8,1%.

The intensity of biogas production from plant biomass, which consisted of extruded and pelleted wheat and rape straw, naturally increased from the 1<sup>st</sup> to the 28<sup>th</sup> day of the study. The highest intensity of biogas production was noted from the beginning to the 14<sup>th</sup> day of incubation. Therefore, the amount of biogas generated from the pellets of wheat straw on the 14<sup>th</sup> day of the experiment was 345 m<sup>3</sup> per 1 ton of substrate, which is 74% more than on the 7<sup>th</sup> day.

Over time, in packets on the 21<sup>st</sup> and 28<sup>th</sup> days compared with the 14<sup>th</sup> day of the study, a slight intensity of fermentation processes was observed, which in turn reflected a slight increase in biogas volumes at this stage. As a result, on the 21<sup>st</sup> day the amount of biogas increased by only 7%, compared with the 14<sup>th</sup> day; and on the 28<sup>th</sup> day – by only 12%, compared with the 21<sup>st</sup> day. The same biogas generation pattern was kept in experimental groups, where wheat straw pellets were incubated with additives post-alcoholic bards.

Conclusively, the process of biogas formation in packages with the rape straw was somewhat different from the packets of wheat straw. In this case, there was a gradual progress in increasing the volume of gas environment. So, on the 14<sup>th</sup> day compare to the 7<sup>th</sup> day the amount of biogas increased by 75% and 60% respectively. While in the control and experimental groups of packages, on the 21<sup>st</sup> day compared with the 14<sup>th</sup> day there was increased by 17% and 16% respectively; as in turn on the 28<sup>th</sup> day as to compare with 21<sup>st</sup> day – by 21% and 18%.

As a consequence, it has been found that in the creation of pellets made from extruded wheat and rape straw is advisable to use an additive of post-alcohol bards of corn grain in the amount of 15% of the total biomass. This will contribute to the increase density of pellets and intensification for the production of biogas in anaerobic conditions. These studies reveal great prospects for the use of post-alcoholic bards in the production of universal biomass pellets, which can be successfully applied in various biotechnological processes.

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