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REDUCING THE ENVIRONMENTAL IMPACT OF THE POULTRY INDUSTRY**

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In this study, the sustainability of such method of poultry litter (PL) utilization as hydrothermal carbonization was assessed. This research includes brief overview of alternative poultry waste utilization method of hydrothermal carbonization (HTC). Environmental and engineering aspects have been reviewed. Studies have shown that hydrothermal carbonization of the poultry litter decreases waste up to 10% of original mass, alleviates environmental pollution induced by land spreading and concentrates nutrients in a sterile and easily transportable material.

With the concentration of poultry industry and increase in operation size in Ukraine, more litter is produced. Considering massive environmental impact of landfilled poultry litter, especially to soil acidification, alternative poultry waste treatment technologies should be assessed from environmental point of view as well as their further application in Ukrainian agriculture sector.

Poultry litter (PL) is heterogeneous waste consisting of faeces, bedding material, feathers, urine and waste feed and is the most suitable manure feedstock for thermal conversion processes. In addition, use of poultry litter as organic fertilizer in agriculture has become less acceptable due to excess nutrient in the soil.

Experiments with producing bioenergy from the livestock waste has clearly indicated that thermochemical conversion processes have the capability to convert animal by-products into combustible gases, bio-oils and solid product which can be used as a soil amendment/fertilizer.

Among them the hydrothermal carbonization (HTC) process that is regarded as an eco-friendly thermochemical process suitable for wet biomass and bio waste may be considered to be a suitable solution for this problem. The main advantages of the hydrothermal carbonization process are the considerable decrease in weight and volume, the ability to convert wet biomass and bio waste into a sterile material and large amounts of co-produced heat.

During hydrothermal carbonization processing, the wet biomass and bio waste undergoes a number of complex chemical reactions such as dehydration, decarboxylation, hydrolysis and aromatization reactions. As a result, a solid residue (named hydrochar or HC), a liquid by-product and some gaseous products are formed.

One the main aims of this research is to determine optimal process parameters in order to produce a hydrochar with better chemical, physical and fuel properties compared with the raw biomass/biowaste.

The HTC process is self-contained and hence emission of greenhouse gas is minimized or prevented and indeed can contribute to GHG mitigation, especially if the solid hydrochar is then put into the ground as a means of carbon sequestration.

The obtained hydrochar, which is proposed as a soil amendment and as a substrate for environmental remediation, is carbon and energy-dense. Moreover, hydrochar produced from PL has a comparable heating value to brown coal and can be identified as an effective sorbent for potentially hazardous organic compounds.

The quality and yields of the hydrochar depend on the composition and conditions of the process such as treatment temperature, residence time, pH, etc. Only outputs of the process are biochar and small amounts of non-toxic gases and tar.

In – depth study of the hydrothermal carbonization process has shown it's great potential for poultry litter and other bio waste recycling. Using the hydrothermal carbonization process in Ukrainian agriculture could be an eco – friendly way to mitigate damage caused by large scale farming units and to improve soil fertility in regions with low organic soil matter content.

The hydrothermal carbonization of PL process is a technology that can significantly increase the effectiveness of recycling the poultry litter and make the poultry industry more sustainable.

Aforementioned technology has an important role in implementing of sustainable development concepts in Ukrainian agriculture sector.