

# Fractionation of poultry litter for ash and nitrogen separation



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By: **Natalie Taupe**<sup>1</sup>, **Sandra Varin**<sup>2</sup>, **Witold Kwapinski**<sup>1</sup>, **JJ Leahy**<sup>1</sup>

Gasification is gaining attention as a waste treatment option for poultry litter (PL). Research is focusing on investigating the behaviour of ash transformation during gasification, since alkali metals are known to be carried over from the ash into the gas phase causing operational problems, such as agglomeration, corrosion, slagging and fouling. Also nitrogen is volatilised at high temperatures reducing the fertilizing value of the PL. Alkali metals and nitrogen can be removed by leaching the PL with water; however this requires another drying step prior to gasification. Our investigation assesses the benefits of fractionation by sieving PL as a possible pre-treatment solution.

PL was divided into two batches. The first batch was sieved to three fractions > 850 µm, 180 µm – 850 µm and < 180 µm and the second batch to > 1000 µm, 180 µm – 1000 µm and < 180 µm. Small manure particles, feathers and fine bedding material accumulated in the fine fractions, while coarse fractions of bigger bedding particles and agglomerated manure were retained.

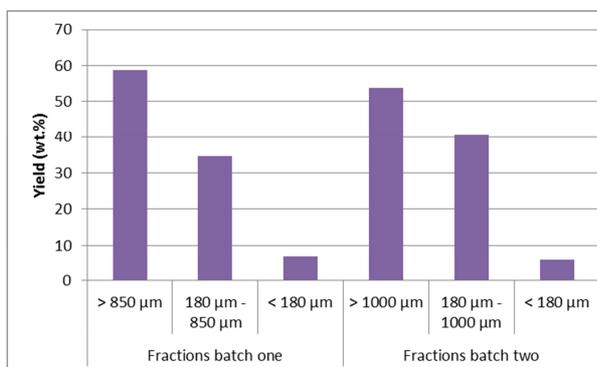


Figure 1: Yield (wt.%) of the different fractions obtained after sieving the raw poultry litter

More than 50 wt.% of the PL had a particle size larger than 850 or 1000 µm (Figure 1). The ash contents were low in both coarse fractions and high in the fine fractions compared to the raw PL. The biggest decrease in ash content was - 5.6 % for the coarse fraction (> 850 µm) of batch one and the biggest increase in ash content was + 35.5 % for the finest fraction (< 180 µm) of batch one (Figure 2). Nitrogen was concentrated in the fine fractions. The biggest decrease in nitrogen content was - 34.7 % for the coarse fraction (> 1000 µm) of batch two and the biggest increase in nitrogen content was + 110.7 % for the finest fraction (< 180 µm) of batch two (Figure 2).

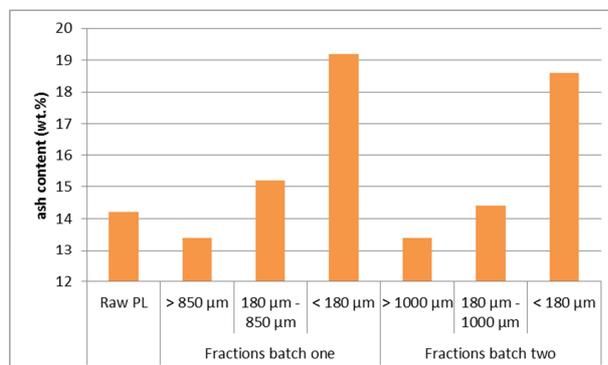


Figure 2: Ash content (wt.%) in the raw poultry litter and the different fractions

Sieving of PL as a pre-treatment for gasification indeed can be used to obtain a coarse fraction with lower ash and nitrogen contents, while obtaining ash and nitrogen rich fine fractions. The separation of nitrogen was greater than the separation of ash. For some gasification and feeding systems, sieving of the feedstock is a required or beneficial pre-treatment anyway. The sieving behaviour of PL depends on the bedding material used in the poultry sheds. In our study the bedding material was Sitka spruce wood chips. Other bedding materials should be investigated further. In addition the separation of alkali metals should also be examined in the future.

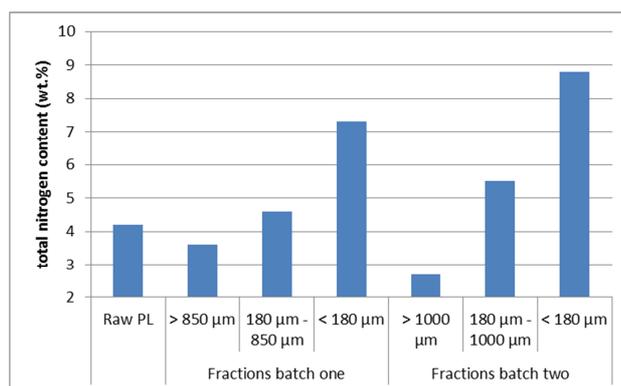


Figure 3: Nitrogen content (wt.%) in the raw poultry litter and the different fractions

Contact: [Natalie.Taupe@ul.ie](mailto:Natalie.Taupe@ul.ie)

<sup>1</sup> Chemical and Environmental Science, University of Limerick

<sup>2</sup> Institut national des sciences appliquées (INSA) de Toulouse

