

# Poul-AR®

## Valorization of poultry manure

### Fertilizer and energy from poultry manure

#### Application

In contrast with generic manure types, poultry manure is very rich in nutrients as nitrogen (N) & phosphorus (P), but also in organic material. Both the form and the N/P ratio in which the nutrients are present make the manure less suitable for direct application as natural fertilizer. It leads to the release of large and undesired amounts of volatile ammonia into the environment. At the same time the effective N/P nutrient ratio of poultry manure implies that the legislatively restricted applicable amount of phosphorus is rapidly reached, which requires additional amounts of nitrogen to reach the proper fertilizer characteristics and performance.

Secondly, traditional manure treatment processes are unable to successfully deal with poultry manure, which is therefore mostly regarded as a waste stream and discharged or incinerated.

#### Process

Within the Poul-AR® process, eco-innovative principles and technologies are applied, resulting into a sustainable route to nutrient recovery and energy efficiency from poultry manure. The approach makes use of subsequent biological and physico chemical treatment steps. The first step in the process is biological ammonification in which organic nitrogen is biologically converted into ammonia. The second step recovers ammonia present in the broth via air stripping.

The recovered ammonia is fixated with sulphuric or nitric acid as an ammonium salt (sulphate, nitrate) to produce the desired fertilizer. The residue rich in organics can now be digested to produce biogas which can be used as a source of heat and electricity (see the scheme below).

#### Results

From the scheme below it is clear that the Poul-AR® process itself produces valuable **high-grade N-fertilizer**. The ammonia liberated from the matrix is fixated with nitrate or sulphate, while forming an ammonium salt. In the case ammonia is fixated as nitrate the highest N concentration can be obtained, 255 kg N/m<sup>3</sup> NH<sub>4</sub>NO<sub>3</sub> product. Another output of the Poul-AR® process is the effluent itself, which is now low in nitrogen which makes it **suitable for anaerobic digestion**. The effluent has the optimal temperature to directly pass on to a (thermophilic) digestion step.

The high organic fraction of the manure is equivalent to a high **biogas** potential. This biogas can be used in a CHP to produce heat and electricity. The heat produced can be integrally used by the system itself, while only 10% of the energy produced will be used by the system. The remaining electricity can be used at the location and reduces energy costs significantly.

The solid fraction from the digesting process can be dried up to 80% of dry matter by using the heat of the CHP. This solid fraction contains a high concentration of phosphorus and can be used as a **dry P-fertilizer**.

