

## Ammonium sulphate from co-digestion of corn silage, chicken manure and other biowaste by BENAS process

**Keywords:** Ammonium sulphate • anaerobic digestion • FiberPlus • N recovery

### Key facts:

- **Product Category:** According to the new Fertiliser Regulation it should be able to be categorised as a PFC 1(C)(I)(b): Liquid inorganic macronutrient fertiliser
- **Input material:** maize silage and poultry manure
- **General appearance:** colourless liquid product
- **Nutrient Content (N-P-K %):** around 5% N in fresh weight
- **Product market status:** advanced development stages
- **MS Authority permit availability:** by German fertilizer regulation
- **Geographical area:** EU
- **Product price:** (€/ha, € / kg N; € / kg P<sub>2</sub>O<sub>5</sub>): 300 €/kg N



### Summary:

The BENAS biogas plant uses a modified stripping process to recover the ammonium nitrogen from digestates. By adding a cheap FGD gypsum, it produces a concentrated marketable ammonium sulphate solution (25% AmS) and a solid calcium carbonate fertilizer (Lime, 70% DM). The BENAS process recovers 67% of NH<sub>4</sub>-N as AmS and 6% of NH<sub>4</sub>-N as Lime. It also reduces the greenhouse gas emissions by lowering CO<sub>2</sub> emissions from digestate transportation and reduce ammonia, nitrate and nitrous oxide emissions.

The produced AmS solution can be used for producing mineral fertilizer solutions or for upgrading manure or digestate low in N content. It benefits as its neutral pH is well tolerated by plants. The concentration of 25% AmS avoids evaporative crystallization, making it a suitable for direct application on crops. In order to reduce the risk of emission during application, it is recommended to apply the AmS solution via injection or immediately incorporated into soil after surface application.

### How to use:

- **Type of farming:** conventional
- **Cultivation methods:** open field, greenhouse...etc
- **Recommended crops:** all crops in need of nitrogen, especially sulphur demanded
- **Application doses :** depend on the sulphur content and the crop demand

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### Key product features:

- Neutral pH=7,5
- Liquid fertilizer
- Containing 25% AmS in fresh weight.
- Containing 48-57 g NH<sub>4</sub>-N and 56-65 g sulphur in per kg product

### Key product benefits:

- The neutral pH in the AmS solution is well tolerated by plants
- The high concentration of 25% avoids evaporative crystallization, making it a suitable for direct application on crops.
- The AmS solution is rich in plant available N (NH<sub>4</sub>-N 48-57 g/kg) and S (56-65 g/kg) as added value to meet the specific requirements of some crops.
- The product can be used for producing mineral fertilizer solutions or for upgrading manure or digestate low in N content.
- The recovery of N reduces emission of ammonia, nitrate and nitrous oxide from digestates.

### Competitive position and advantages:

- A recovery rate of 80% of ammonia contained in the digestate.
- Decrease greenhouse gas emissions by lowering CO<sub>2</sub> emissions from digestate transportation and reduce ammonia, nitrate and nitrous oxide emissions.
- Storage and transport costs will decrease with the implementation of the N stripper.
- The reduce N content in digestate, bypassing restrictions on N application rates.
- The recovered AmS solution is a marketable fertiliser for closing fertilizer loops

