LIVESTOCK RESEARCH
WAGENINGEN UR

Mineral concentrates from animal manure

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Introduction

In the Netherlands in regions with high livestock production, mineral input and output are not balanced. Legal restrictions on the use of animal manure force an increasing number of livestock farmers to export manure from the farm. Transport distances and costs are increasing. Manure treatment is a way to reduce the cost if a mineral concentrate derived from the manure has comparable properties as a chemical fertilizer and can be applied as such to replace artificial fertilizer.

In the pilot project Mineral Concentrates from 2009 to 2011 the technological, agricultural and environmental aspects of the production and application of mineral concentrates from animal manure are studied. Seven producers and a large number of users (arable farmers) participate in the project. The project is funded by the Dutch government and organizations of livestock farmers.

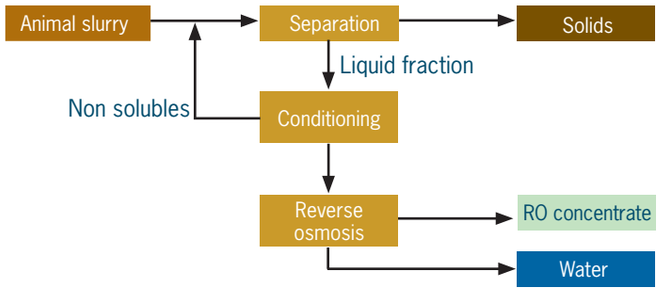
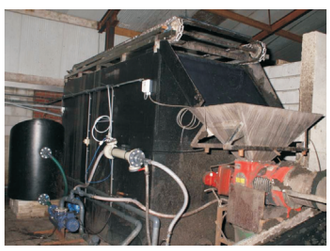


Figure 1 General scheme of production process of mineral fertilizers from animal slurry

Production process

Generally the production of mineral fertilizers from animal slurry is achieved in a three step process (Figure 1):

(1) Separation into a solid fraction and a liquid fraction.
(2) Conditioning of the liquid fraction: removal of non soluble material and colloid organic particles. The removed material is recirculated in the process.
(3) Reverse osmosis of the conditioned liquid into a concentrate and water (permeate). The water is discharged into the sewer or surface water. RO concentrate = mineral fertilizer



Screw press and flotation unit

Reverse osmosis

Table 1 Characteristics of pilot plants

Plant	Capacity (t/a)	Pre treatment	Separation	Conditioning
A	70,000	Anaerobic digestion	Centrifuge	Ultra filtration
B	50,000	-	Belt press	Dissolved air flotation
C	25,000	-	Belt press	Dissolved air flotation
D	10,000	-	Screw press	Dissolved air flotation
E	5,000	-	Screw press	Dissolved air flotation
F	70,000	-	Belt press	Dissolved air flotation
G	15,000	Anaerobic digestion	Centrifuge	Ultra filtration

Pilot plants

In Table 1 characteristics of the seven participating treatment plants are given. Plant A and G process pig and cow slurry respectively together with biomass in a biogas production facility as a pre treatment process. The other plants process mainly pig slurry. Different technologies are used for separation and conditioning of the liquid fraction. Reverse osmosis is the final step in the treatment process of all plants.

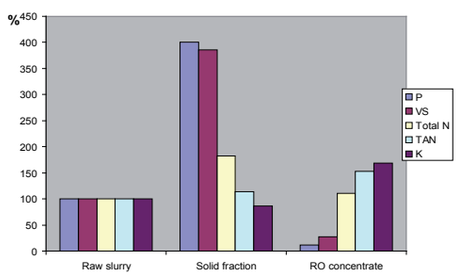


Figure 2 Relative concentrations of volatile solids (VS), Total N, ammonia N (TAN), P and K in solid fraction and RO concentrate as compared to raw slurry

Composition of end products

The treatment plants generate two valuable end products: (1) solid fraction with high content of P and volatile solids and (2) RO concentrate mostly composed of anorganic material with N and K as main minerals (Table 2 and Figure 2).

Table 2 Average composition of raw slurry, solid fraction and RO concentrate from pilot treatment plants (g/kg)

	Raw slurry	Solid fraction	RO concentrate
Total N	5.5	11.7	7.1
TAN	3.6	5.0	6.4
P	1.4	6.7	0.2
K	3.9	3.7	7.6
VS	43	203	15

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