

# Exporting excessive P from the farm in thick fraction

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## Summary

- Separation of slurry enables to export P in thick fraction with reduced mass transport and loss of N from the farm.
- We tested three slurry separators: the screw press, the pressure role and the decanter
- For P, the performance of the decanter is best, but it is also the more expensive one.

## Background

Often, intensive farms are obliged to export animal manure N or animal manure P, to prevent excessive inputs on their farmland. Farmers with excessive manure P only and no excessive N, will try to reduce costly mass transport and to keep the N on the farm. Export of P with the thick fraction may help. Benefits depend of the performance of the separators and the costs of separation.

## Methods

We tested three separators: the screw press, the pressure role and the decanter (Figure 1), to establish:

1. the distribution of total mass, N and P over the thick fraction and the thin fraction
2. the contents of N and P in the thin and liquid fraction and
3. the contribution of separators to reduction of off farm transport and net costs.



Screw press



Pressure role



Decanter

Figure 1: The separators tested at experimental farm KTC De Marke.

## Results

Table 1 shows which part of the ingoing material (slurry, N and P) is collected in the thick fraction (i.e. the separation efficiency). P is concentrated in thick fraction and N is hardly concentrated in the thick fraction. P separation efficiency is highest for the decanter. Table 2 shows the contents of P and N in the slurry and in the thick fraction separated from that slurry.

Table 1: The part of the slurry and slurry N and slurry P that is collected in thick fraction for different separators.

|            | Screw press | Pressure role | Decanter |
|------------|-------------|---------------|----------|
| Total mass | 21%         | 15%           | 34%      |
| P          | 39%         | 25%           | 67%      |
| N          | 24%         | 18%           | 40%      |

Table 2: P and N contents in slurry and thick fraction (TF).

|   | Slurry | TF Screw press | TF Pressure role | TF Decanter |
|---|--------|----------------|------------------|-------------|
| P | 0,7    | 1,3            | 1,2              | 1,5         |
| N | 4,4    | 4,9            | 5,3              | 5,1         |

## Implications

Export of P from the farm in thick fraction enables to reduce the volume of mass that is transported and the amount of N that is lost from the farm (Table 3). Thus, separation can be interesting for farms that are obliged to export P from their farms. For farms that need to export N, the reduction of mass transport with thick fraction is negligible and slurry separation is efficient nor profitable.

Table 3: Amount of total mass and N that is associated with export of a kg P from the farm.

|            | Slurry | TF Screw press | TF Pressure role | TF Decanter |
|------------|--------|----------------|------------------|-------------|
| Total mass | 1347   | 747            | 838              | 689         |
| N          | 6.0    | 3.7            | 4.4              | 3.4         |

To export P in thick fraction, sufficient thick fraction must to be produced. Suppose slurry contains 0,7 kg P per ton and the separation efficiency for P is 25%. Then, 4 tons of slurry must be separated to produce the 0,7 kg P in thick fraction that is present in 1 ton of slurry. So, if the separation efficiency for P is too low, too much slurry must be separated which is too costly. The high separation efficiency for P is an important benefit of the decanter.

The price of separation may vary from 1 Euro per ton (screw press and pressure role) to 3 or 4 Euro per ton slurry (decanter). Export of slurry, in some regions costs up to 14 Euro per ton. Hence, it is very costly to export P. Under Dutch circumstances slurry separation can be profitable. Some arable farmers are keen on thick fraction, while they want to be payed to accept slurry. This can be a reasons to start separation.

## Recommendations

- It can be profitable to export the P in thick fraction. Make an assessment based on general rules.
- When the outcome of the assessment is promising, test a separator on the farm, because the results can be very different dependant of the characteristics of the slurry.
- Think about the farm logistics before you start. Can products be stored at your farm?
- Separation products can be used for different purposes (use of thick fraction as bedding material and optimal distribution of products on land). Try to combine benefits.