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Manure separation to better distribute organic matter at farm level ( )

Mestscheiding om organische stof op bedrijfsniveau beter te verdelen (NL)

Separation of cow manure is a common practice on dairy farms in The Netherlands to improve the nutrient use efficiency.

Het primaire doel van mestscheiding is de productie van een dikke
fractie met hoge gehalten aan organische stof en mineralen en een laag vochtgehalte. Een dergelijke geconcentreerde
fosfaatrijke fractie is een waardevolle organische meststof en kan over grote afstand vervoerd worden. De
dunne waterige fractie, met daarin het grootste deel van de stikstof, kan op eigen grond of in de nabije omgeving als
meststof worden aangewend of verder worden gezuiverd tot loosbaar water.

Slurry manure is fed through a manure separator that separates much of the thick material from the liquid portion. These fractions differ in the proportion between P and N; the thick fraction contains relatively more P than the thin fraction.
The thick fraction is used on maize fields or as substrate in cow stables; the thin fraction, with the larger part of the nitrogen, can be used on other parts of the farm or is exported from the farm to be treated for discharge in the environment. Due to stricter regulations for the application of N and P to crop land and grassland, less manure may be applied to the land. If manure must be exported because the threshold for P is reached, this implies that also N is exported from the farm.

Purpose of the Technology: Slurry from livestock consists of more than 90% of water. The primary purpose of manure separation is to produce a thick fraction with high contents of organic matter and nutrients and a low moisture content. The thick fraction is a valuable fertiliser and can be transported over large distances. The thin fraction, with the larger part of the nitrogen, can be applied as fertiliser on the farm, on farmland in the proximity, or can be treated into a quality suitable for discharge in the environment or water drainage system.

Manure separation allows farmers to use organic matter from manure more efficiently at the farm level. Manure separation increases the efficiency of processing and using manure in 5 ways:

1. By concentrating phosphorus in the thick fraction the volume of manure to be exported can be decreased, and also the export of nitrogen from the farm.
2. Manure separation creates three types of manure (thick, thin and mixed), which allows for differentiated application to different fields and crops, and reductions on requirements for artificial fertiliser.
3. Manure separation decreases the volume of manure to be exported from farms, and therefore saves energy and transport costs.
4. The thick fraction can be stored in stacks, taking up less space.
5. The thick fraction can be used as substrate in stables, replacing costly sawdust.

Establishment / maintenance activities and inputs: Purchase a manure separator. Periodically feed your collected slurry manure through the separator and then apply the thick portion to your fields. Discard the liquid portion.

Natural / human environment: Dairy farming on sandy soils in the eastern part of The Netherlands. Stricter manure regulation originting from the Nitrates Directive sets a limit on the amounts of animal manure for farms on sandy and loess soils in the eastern and southern part of The Netherlands.

: Haarlo - Oude Eibergen, Gelderland,

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- 6.59421, 52.10475

: (approx. < 0.1
2 (10))

?:

: 10
( )

(> 50)

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Thick separated manure (Henk Leever (Oude Eibergenseweg 13, 7273 PJ, Haarlo, Netherlands))

Manure Separator (Henk Leever (Oude Eibergenseweg 13, 7273 PJ, Haarlo, Netherlands))

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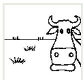

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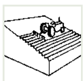

- A2: /

- Labour. Equipment.
- **Euro**
- ( ) 1 USD = 0.94 Euro
- 255.70

1. Buy a seperator (/ : None)

			(Euro)	**(Euro)**	**%**

Seperator	Machine	1,0	5320,0	5320,0	
				5'320.0	
				5'659.57	

1. Operating separator (/ : once per year)
2. Applying both thick fraction manure and RDM manure (/ : once per year)

			(Euro)	(Euro)	%
Labour	ha	1,0	127,68	127,68	100,0
Sampling manure	ha	1,0	21,28	21,28	100,0
Machine use	ha	1,0	308,56	308,56	100,0
rent of manure separator	h	1,0	16,5	16,5	100,0
depreciation costs	m3	1,0	0,65	0,65	
maintenance	machine	1,0	0,3	0,3	
Electricity	ha	1,0	3,72	3,72	100,0
Extra Potassium	ha	1,0	10,64	10,64	100,0
				489.33	
				520.56	

< 250
251-500
501-750
☑ 751-1,000
1,001-1,500
1,501-2,000
2,001-3,000
3,001-4,000
> 4,000

☑

182 days of precipitation annually
Thermal climate class: temperate. Mean monthly temperature varies between 2-17 °C (LGP 240-269 days, mean monthly temperature varies between 2-17 °C)

☑ (0-2%)
☑ (3-5%)
(6-10%)
(11-15%)
(16-30%)
(31-60%)
(>60%)

☑

☑ 0-100
101-500
501-1,000
1,001-1,500
1,501-2,000
2,001-2,500
2,501-3,000
3,001-4,000
> 4,000

(0-20)
(21-50)
(51-80)
☑ (81-120)
☑ (> 120)

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☑ / ( )
☑ (,)
/ ( )

(> 20
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/ ( )
(,)
/ ( )

☑ (>3%)
☑ (1-3%)
(<1%)

☑ < 5
5-50
> 50

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SLM

10%
10-50%
50%

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< 0.5
0.5-1
1-2
2-5
5-15
15-50
50-100
100-500
500-1,000
1,000-10,000
> 10,000

Other forms of exploitation

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expected, based on better targeted fertiliser application

expected due to increase of SOM

On artificial fertiliser (30-80% reduction on N fertiliser) and substrate for cow stables. But since the thick fraction contains less N per kg of P2O5 than the original mix, farners applying the thick fraction (for maize as described in this QT) may need to apply more articial N-fertilizer

Decreased costs for manure export from the farm: A smaller part of the total manure mix needs to be exported (ca 35% less N-export than without manure separation; 10-30% less net energy use)

Ease of manure storage — decreased / increased

Thick fraction is less voluminous and can be stacked

Energy use — increased / decreased

SLM: 4-7 GJ/ha
SLM: 3-5 GJ/ha
Energy use for manure transport, processing, digestion and fertiliser use

Expenses on machinery — increased / decreased

For farms with less than 1000-2000 tons of manure to be separated expenses on manure separation become larger

than benefits. Such farms could better hire a mobile separator, as in the descirption of this SLM technology.

Improved livelihoods and human well-being

decreased increased

Dairy farmers have learned more about the importance of soil organic matter for their production systems, and about the consequences of soil and manure management on soil organic matter and other aspects of soil health. This learning was brought by the exchange of knowledge between farmers and experts, and between farmers themselves. Farmers also profited from services provided to them by the farmers' foundations: shared investments (e.g. in the manure separator) and support in the application for subsidies to finance the SLM measure.

expected: reduction in leaching of nitrate and phosphorus due to better targeted manuring to plant needs

due to increased SOM

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due to improved manure composition for crop growth and build-up of SOM

due to better targeted fertiliser use to needs of crops and reduced use of artificial fertiliser (30-80% less supply of N-fertiliser required)

Emission of NH3

SLM: 18
SLM: 20

increased decreased

NH3 loss in kg/ha, for dairy farms with 1.75 cows/ha, manure prod of 255 kg N/haand other assumptions; model estimate

P2O5 surplus

SLM: 1
SLM: 4

increased decreased

P2O5 surplus in kg/ha, same conditions

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SLM: 12.5
SLM: 10.4

Reduced leaching of nitrate from fields where manure is applied due to less surplus of N in thin fraction(NO3-N in groundwater in mg/lfor farm with 1.75 dairy cows/ha)

Energy use

SLM: 4-7 GJ/ha
SLM: 3-5 GJ/ha

increased decreased

Energy use for transport of manure from farms, processing, digestion, fertiliser use

There is no evidence yet on economic and agronomic effects of using the manure separator in the area, so the land user's perspective cannot be given. Assessments of costs, effects and energy use based on modelling are available in the literature for dairy and arable farming in the NL in Schroder et al. (2009). These reveal that for farms with 1.75 to 2.18 dairy cows/ha and under conditions of manure production and application and manure regulations for this part of The Netherlands, the required export of N-manure could decrease by 35%, required N-fertiliser by 30-80%, and net energy use by 10-30%.

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1-10%
11-50%
> 50%

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0-10%
11-50%
51-90%
91-100%

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- increases soil organic matter

  How can they be sustained / enhanced? continued application of the measure and subsidy for maintenance of the manure separator by the Foundation; support to farmers in calculating parameters for manure separation specific for their farm (type of manure, concentrations, fields to apply to, livestock intensity)
- energy saving and reduced loss of N while maintaining equal levels of crop production

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- increases soil organic matter

  How can they be sustained / enhanced? continued application of the measure and subsidy for maintenance of the manure separator by the Foundation; support to farmers in calculating parameters for manure separation specific for their farm (type of manure, concentrations, fields to apply to, livestock intensity)
- increases available soil moisture
- reduces leaching of nitrate to the groundwater
- reduces energy use for manure handling and transport

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- there is still little experience with manure separation and there are many uncertainties relating to separation efficiency and financial aspects

Editors

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: 10 2015 : 5 2019

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https://qcat.wocat.net/km/wocat/technologies/view/technologies_1256/

SLM

- Hoe Duurzaam -
- Provincie Gelderland -
- ROM3D -
- Vitens - Laat Water Voor Je Werken -
- Wageningen Environmental Research (Alterra) -

- Preventing and Remediating degradation of soils in Europe through Land Care (EU-RECARE)

- Mestscheiding: relaties tussen techniek, kosten, milieu en landbouwkundige waarde - Jaap Schröder, Fridtjof de Buisonjé, Gerrit Kasper, Nico Verdoes & Koos Verloop, Plant and Animal Sciences Groups Wageningen UR, 2009.: http://edepot.wur.nl/50884