



PBL Netherlands Environmental
Assessment Agency

Evaluation of effectiveness of Dutch manure and fertilizer act - 2000-2015

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RIVM, Deltares, CBS



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Crisis or BAU?

Alternative
facts and
water
standards

Public
debate on
manure
fraud

Fear of
loss
derogation

20%
growth of
dairy

Declining
confidence
in science
and policy

Main conclusion

Current water quality
ambitions in many Dutch
regions incompatible with
current nutrient intensive
agriculture



Comparison Denmark – Netherlands around 2010

	DK	NL	DK/NL
Surface area (million ha)	4.29	4.15	1.03
Inhabitants (million)	5.6	16.7	0.33
Population density (inhabitants/ha)	1.3	4.0	0.32
Agricultural land (million ha)	2.64	1.88	1.40
Cereals (million ha)	1.47	0.22	6.7
Potatoes (million ha)	0.04	0.16	0.2
Sugar beet (million ha)	0.04	0.07	0.5
Rape seed (million ha)	0.16	0.00	65.2
Silage maize (million ha)	0.17	0.23	0.7
Temporary grassland (million ha)	0.32	0.23	1.4
Permanent grassland (million ha)	0.19	0.77	0.2
Other crops (million ha)	0.24	0.34	0.7
Bovine (million head)	1.56	3.94	0.40
Dairy cows (million head)	0.57	1.48	0.38
Pigs (million head)	12.82	12.29	1.04
Poultry (million head)	19.24	98.34	0.20

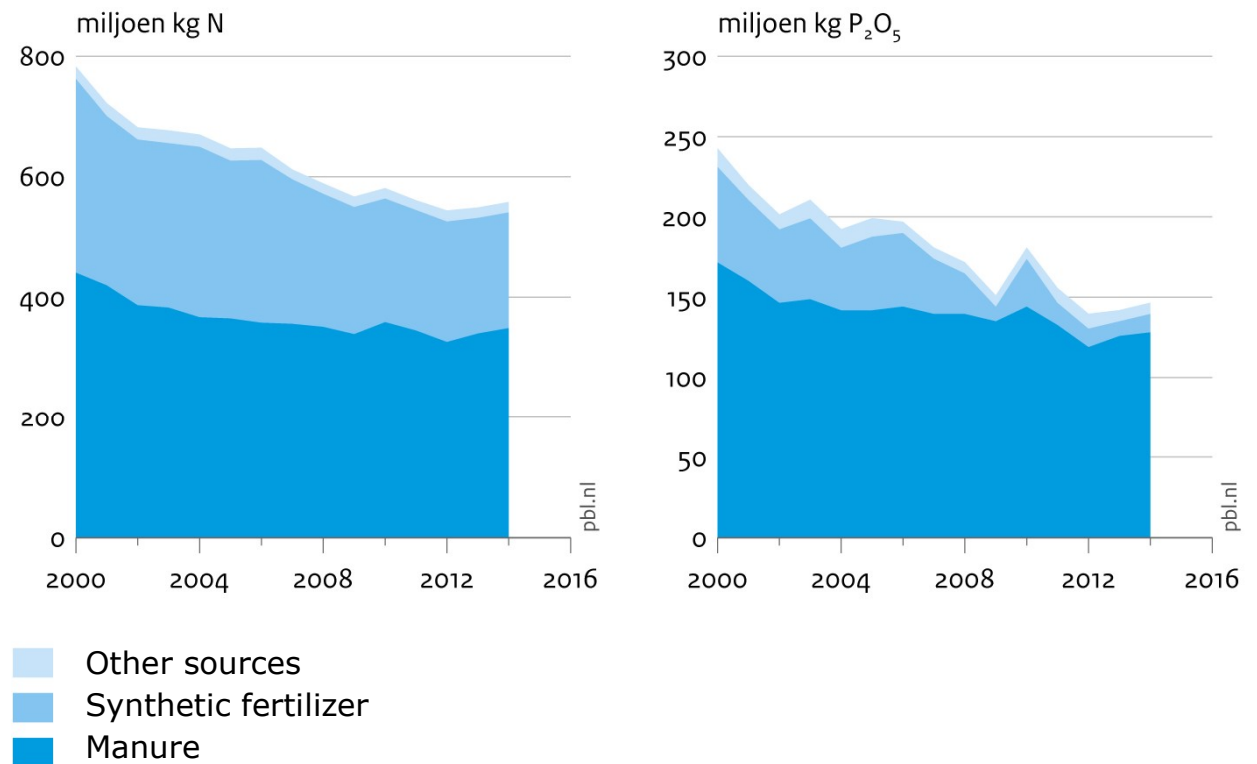


Source: Dansk Statbank and CBS



Nutrient input on agricultural land:

60% N input and
90% of P_2O_5 input
from manure



Bron: CBS Statline



Evaluation of Dutch Manure & Fertiliser Act 2016



Evaluatie Meststoffenwet 2016: Syntheserapport

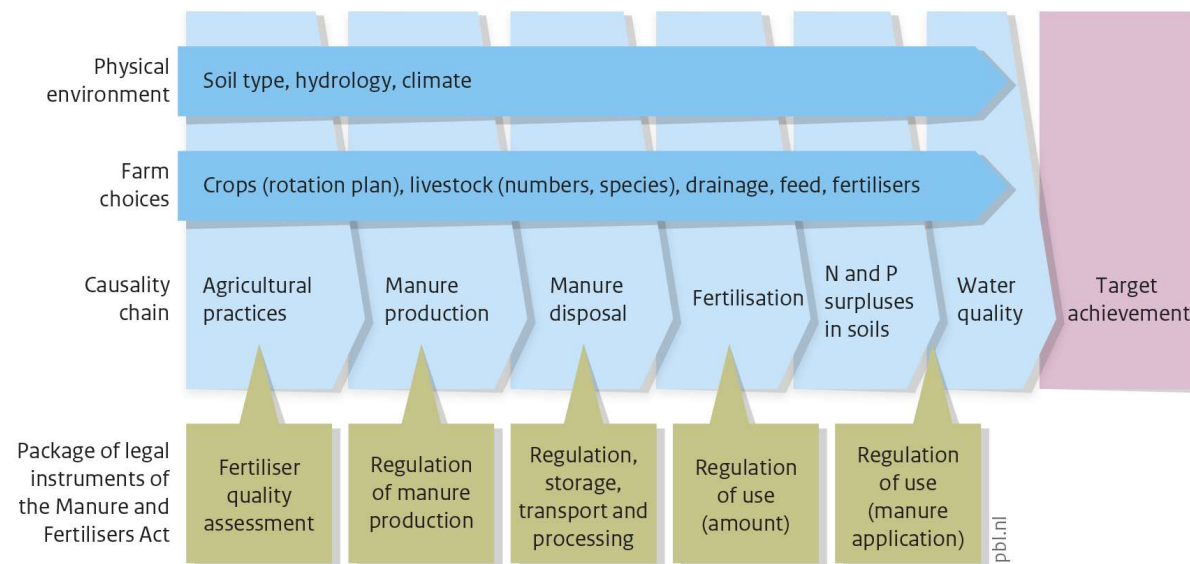


- On request of Ministries of Economic Affairs and of Infrastructure & Environment
- Legal obligation for accountability towards the Dutch parliament
- Review the degree of reaching targets, its effectivity and efficiency
 - Focus on period 2006-2015
 - Evaluate effect of 4th (2010-2013) and 5th (2014-2017) Nitrate Action Programme (Nitrates Directive)
 - Forward look (2027) in view of targets of Water Framework Directive
 - Input 6th Nitrate Action Programme (2018-2021) negotiations in 2017
- Sources
 - Underpinning research by Wageningen University & Research, RIVM, Deltares, CBS

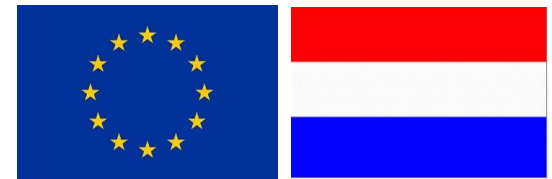


Dutch Manure & Fertilizer Act targeting improvement of water quality

Intervention points in the Dutch Manure and Fertilisers Act in relation to agricultural activities and water quality



Source: PBL



National approach:

- EU Nitrate Directive
- EU Water Framework Directive

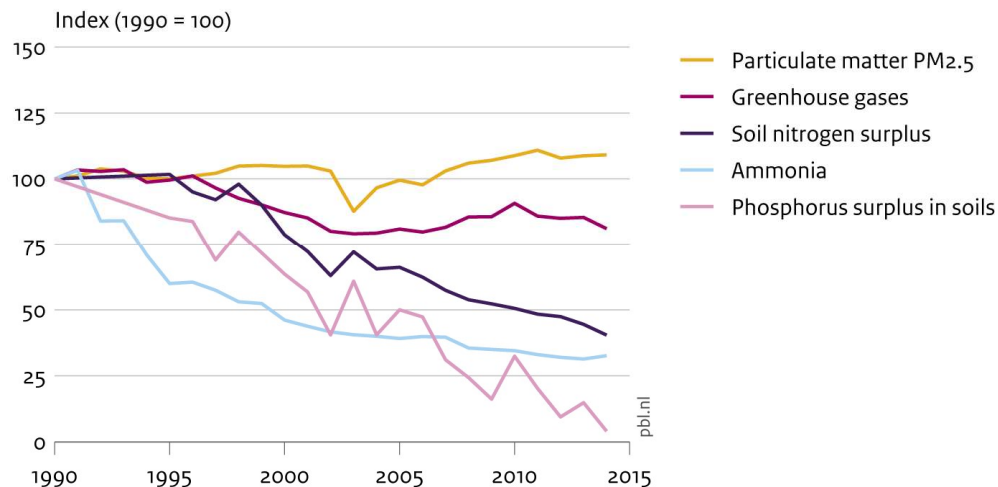
Protecting quality of soil,
groundwater and surface water





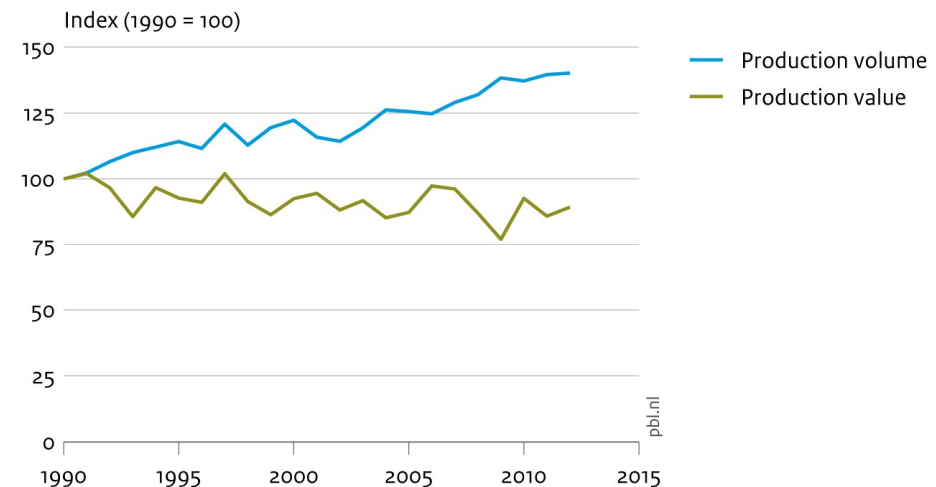
Solving the Dutch manure problem is a balancing act between environmental and economic values

Environmental pressure caused by agriculture



Source: Pollutant Release and Transfer Register; CBS

Production volume and value of agribusiness

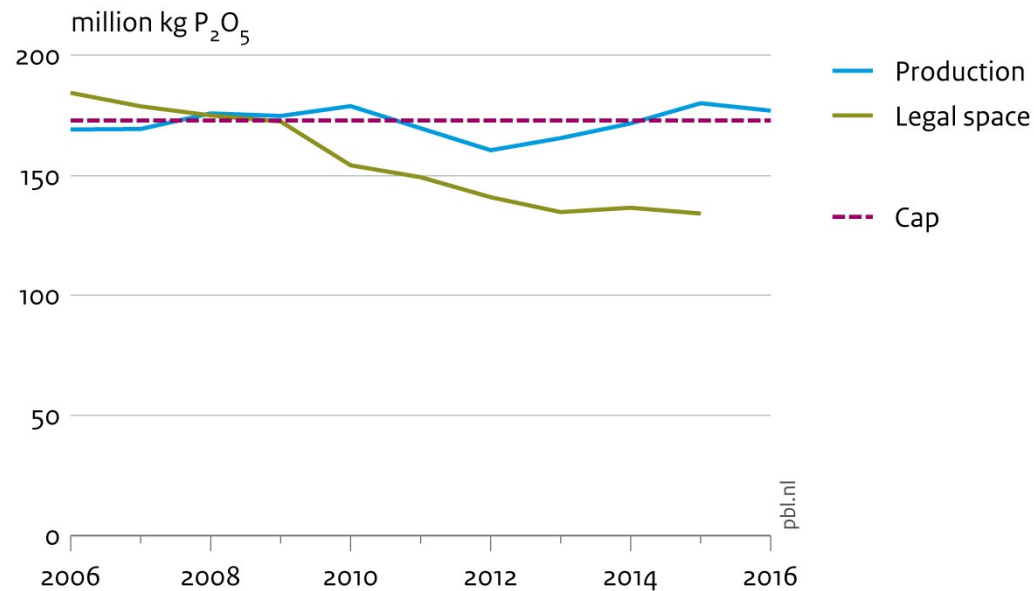


Source: CBS

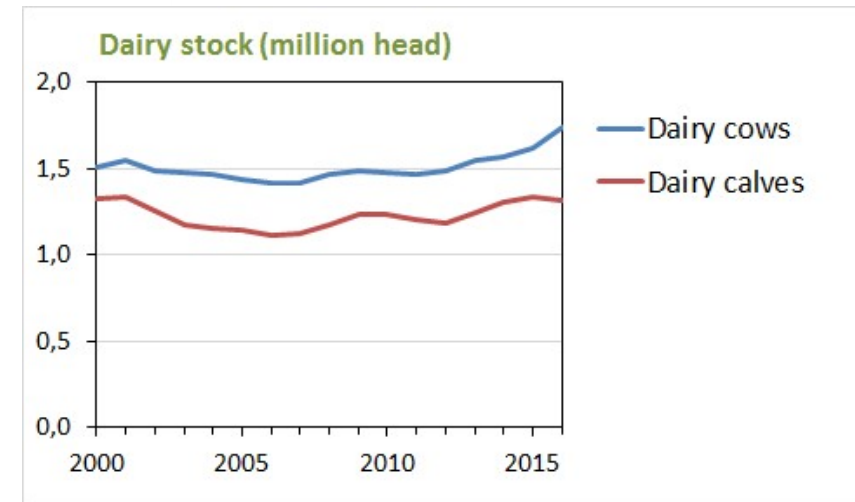
Agricultural production is economically and ecologically very efficient per unit of product, but because of its volume, environmental pressure remains high

Decreasing legal application space P_2O_5 , increasing production

Legal space and production of phosphate



Source: CBS Statline

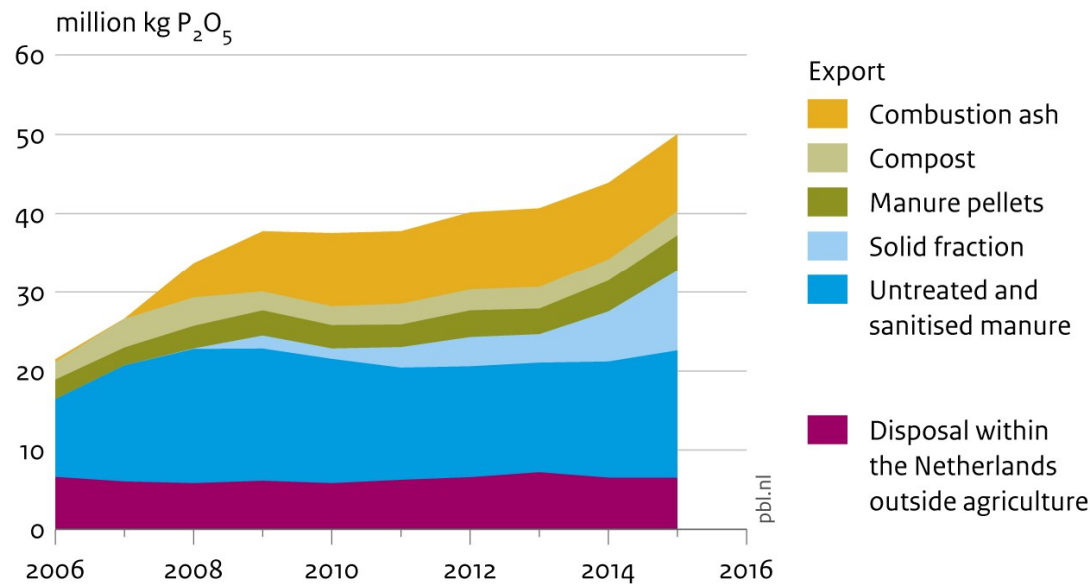


- 20% growth of dairy production
- national ceiling for manure production at 2002 level (173 million kg P_2O_5)
- condition for nitrogen derogation



Almost one third of the manure production is disposed off outside Dutch agriculture

Manure disposal outside Dutch agriculture

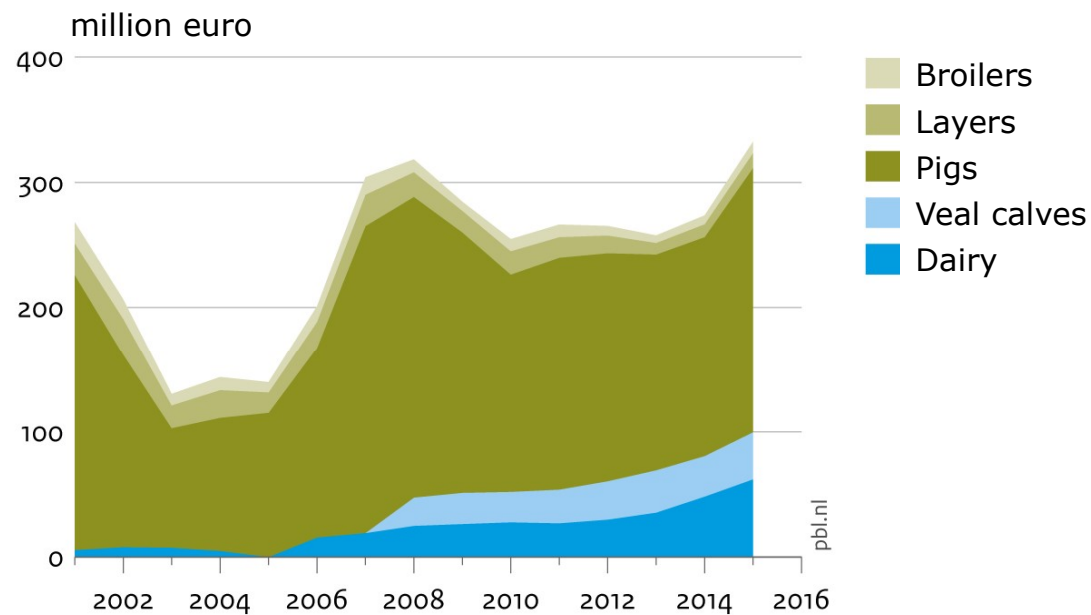


Source: CBS; adaptation by PBL





National cost manure disposal around 300 million euro/year



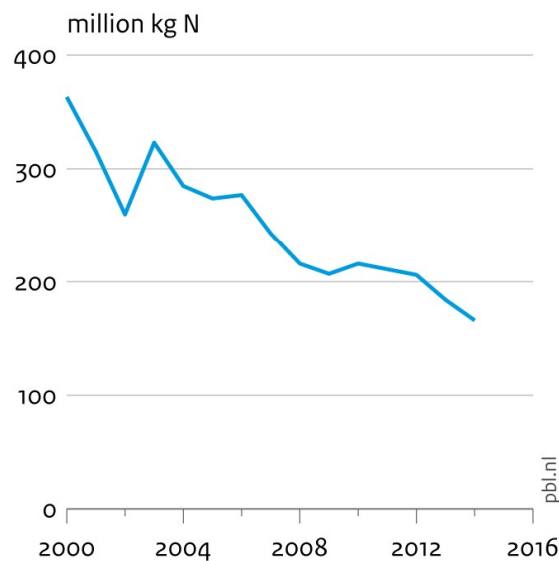
Bron: Wageningen Economic Research Agrimatie; bewerking PBL

Farm cost (1000 euro/yr)	2006	2015
Dairy	0.7	3.4
Pig	17	43
Layer	15	12
Broiler	18	15

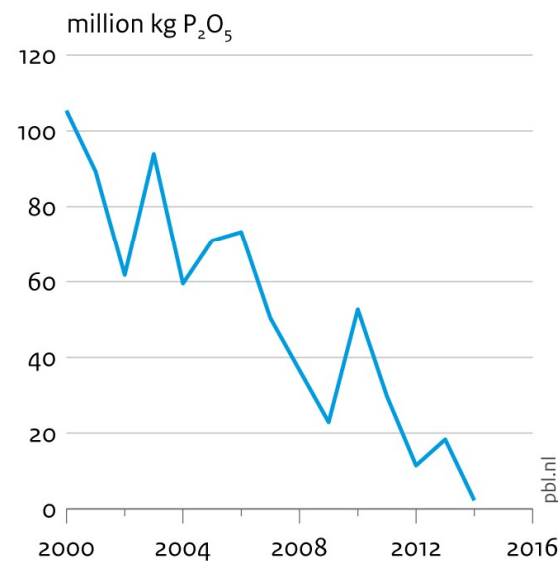
Balanced fertilization for phosphate reached in 2014

Nitrogen and phosphate surpluses on the agricultural soil balance

Nitrogen



Phosphorus



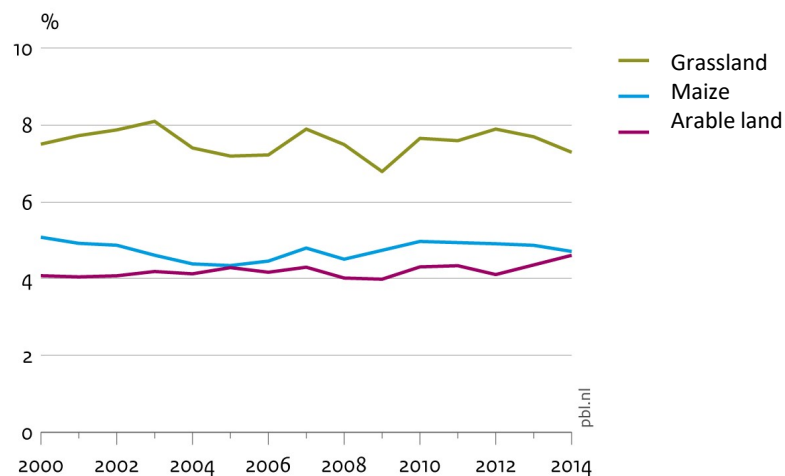
Phosphate balance:
Supply = removal

Source: CBS Statline



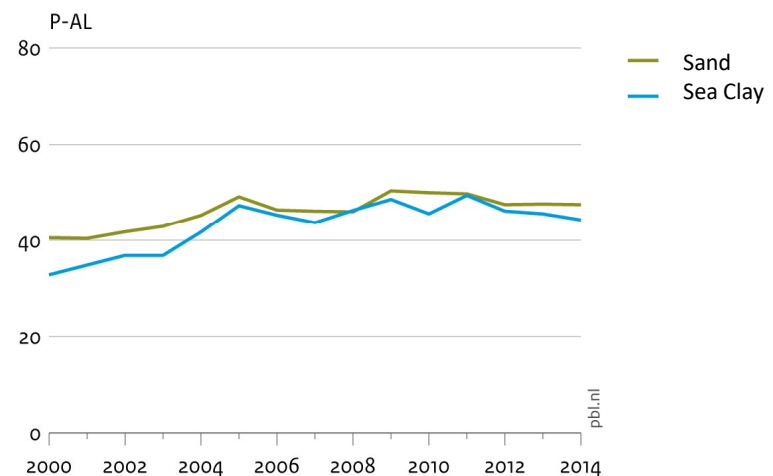
Farmers concerns about decreasing soil fertility not confirmed by field observations

Organic matter in topsoil agriculture



Bron: Eurofins Agro

Phosphate content in topsoil grassland



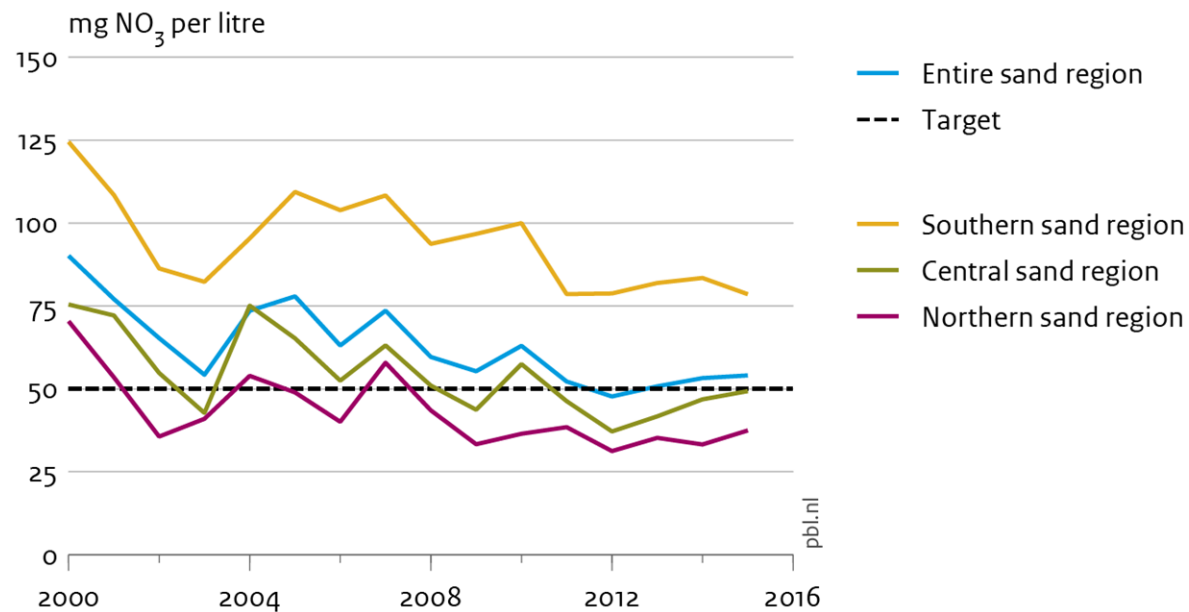
Bron: Eurofins Agro; bewerking PBL

- Decreasing trend of easily available soil phosphate (P-CaCl_2)
- Increasing trend in crop yields



Nitrate concentration decreases, but decrease levels off

Nitrate concentrations in upper groundwater, in sand region



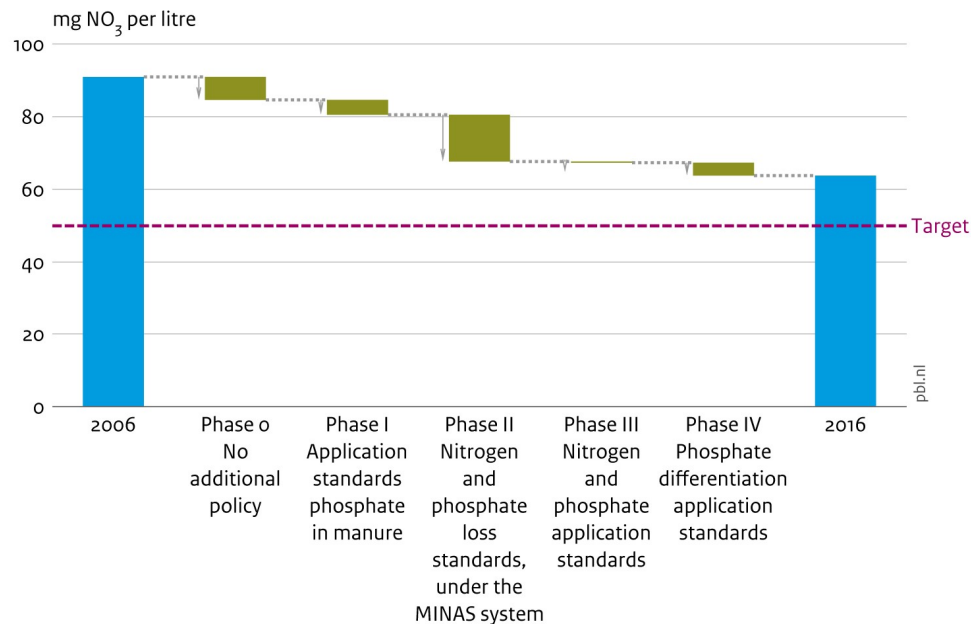
Source: RIVM

Stricter N policies for Southern Sand Region in 5th Nitrate action Programme (2014-2017)

- Derogation 250 → 230 kg/ha N
- N Applic Standards arable -20%
- Higher FEV for pig manure

Decrease nitrate after 2006 delayed effect of policies before 2006

Causes of the change in nitrate concentrations in upper groundwater in southern sand region, 2006 – 2016



Reasons that nitrate target not achieved in Southern sand region in spite of stricter N policies

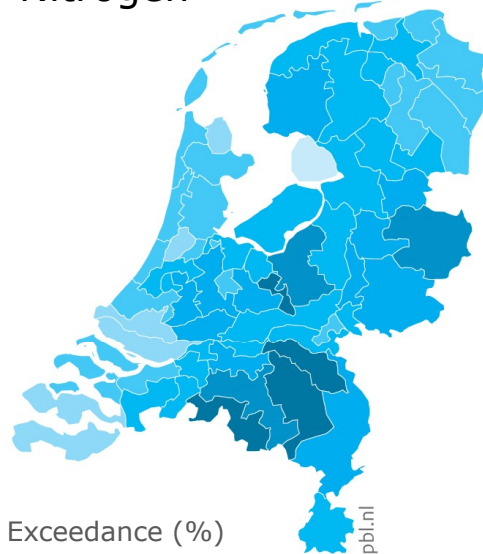
1. Increased application of manure separation

- Allows maximum use of legal space for manure application
- Reduces manure disposal cost
- Reduces potential decrease of nitrate leaching by stricter N application standards in 5th Nitrate Action Programme
- Nitrate model forecast 2027: 60 mg/l

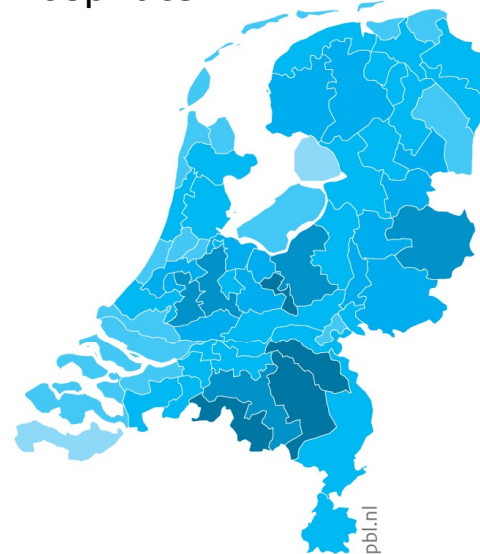
Source: STONE model by Wageningen Environmental Research; adaptation by PBL

Exceedance of statutory manure application standards in 2015

Nitrogen



Phosphate



Exceedance (%)

50 or less

81 – 100

131 or more

51 – 60

101 – 110

61 – 80

111 – 130

Bron: CBS

*Based on manure balance using farm data on
livestock numbers, excretion, and results from
mandatory administration of transported manure*

Reasons that nitrate target not achieved

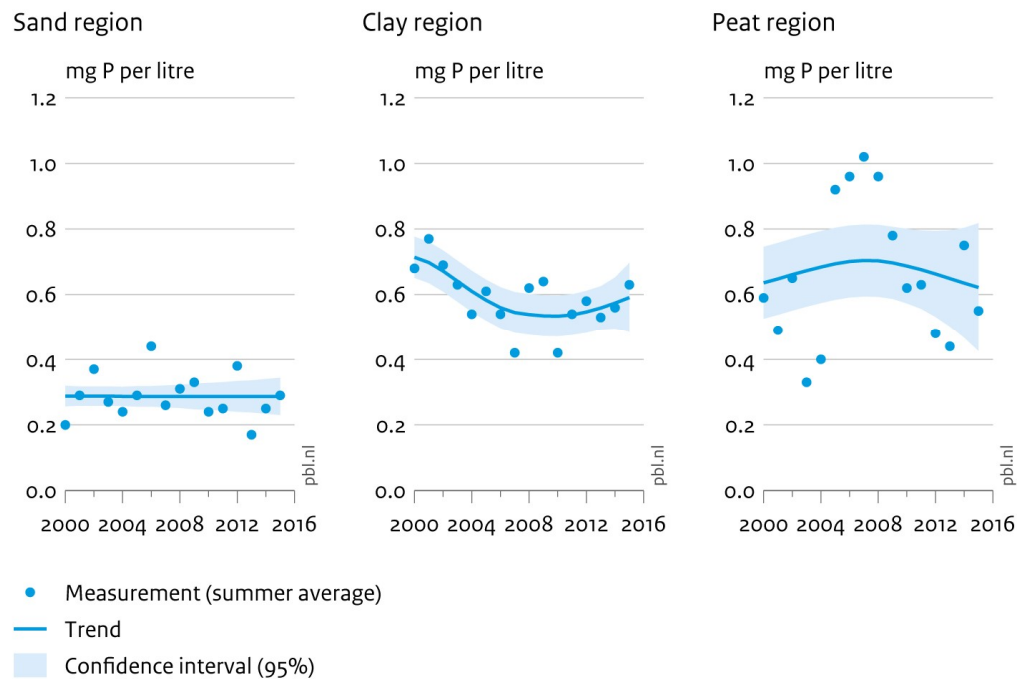
2. Manure fraud

- In Southern Netherlands 'Exceedance of legal application standards' is 5-30%
- may cause 5 tot 30 mg per liter additional nitrate leaching
- Administrative exceedance ≠ fraud
- Tackling fraud is opportunity for more effectivity



No significant decrease phosphorus concentration in surface water

Phosphate concentrations, specifically in agricultural surface waters



Source: Deltares; adaptation by PBL

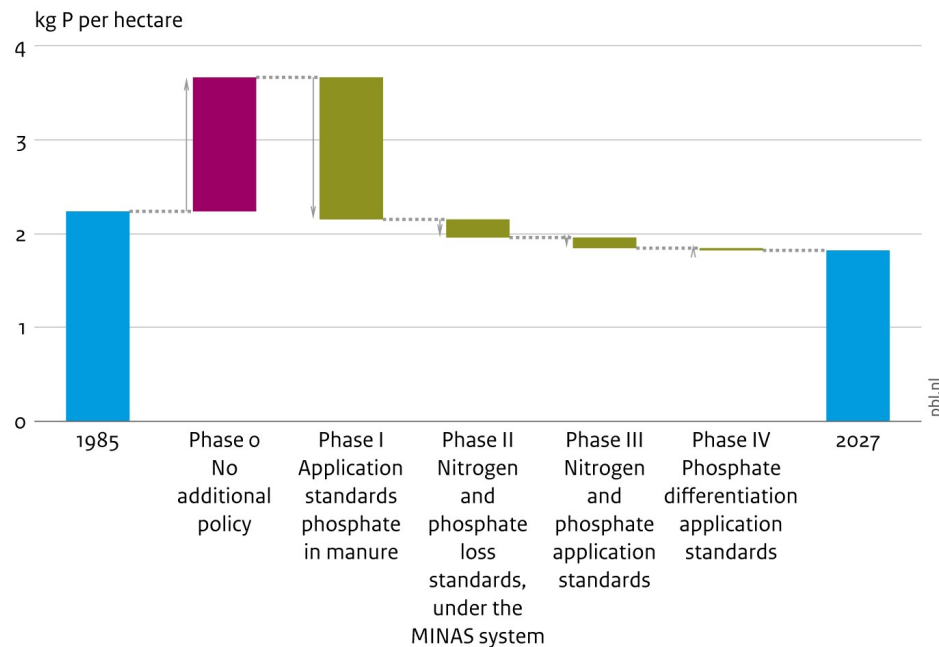
% monitoring sites satisfying water quality standards 2011-2014

N	36-52
P	46-59

Nitrogen concentrations
do decrease significantly

Phosphate policies were effective, but limited improvement water quality expected in 2027

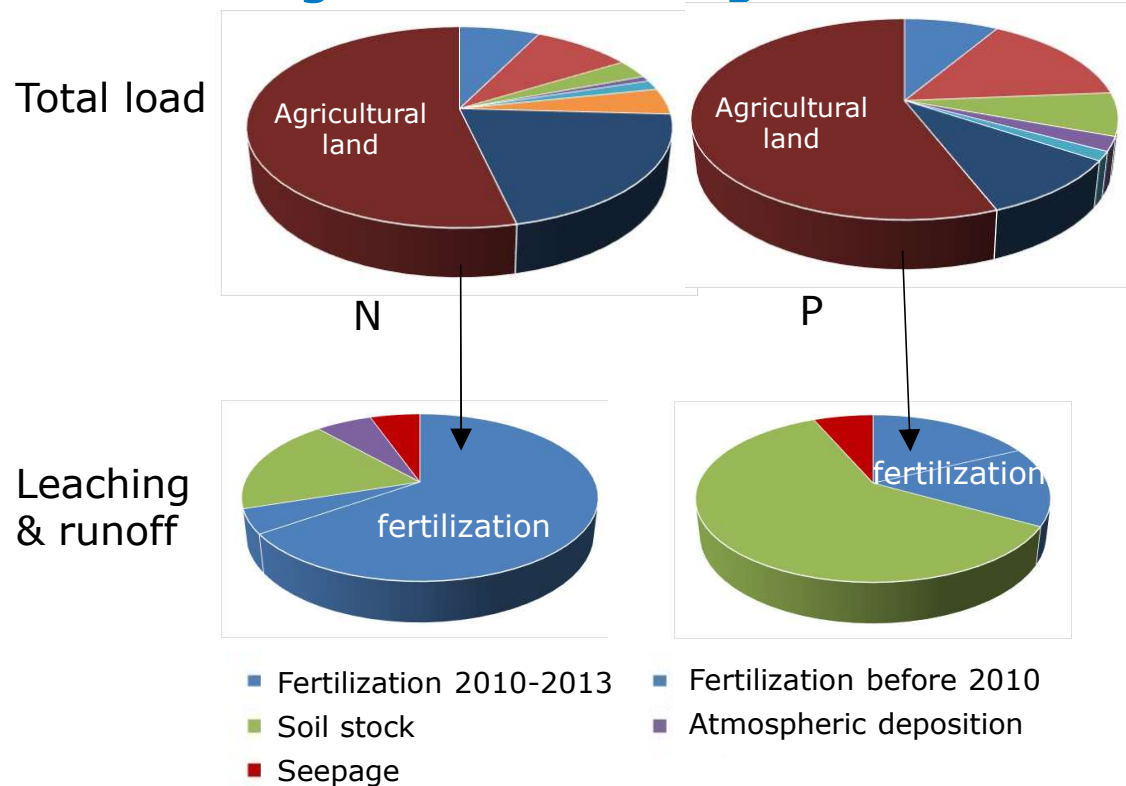
Causes of change in phosphorus loading of surface water, 1985 – 2027



Source: STONE model of Wageningen Environmental Research; adaptation by PBL



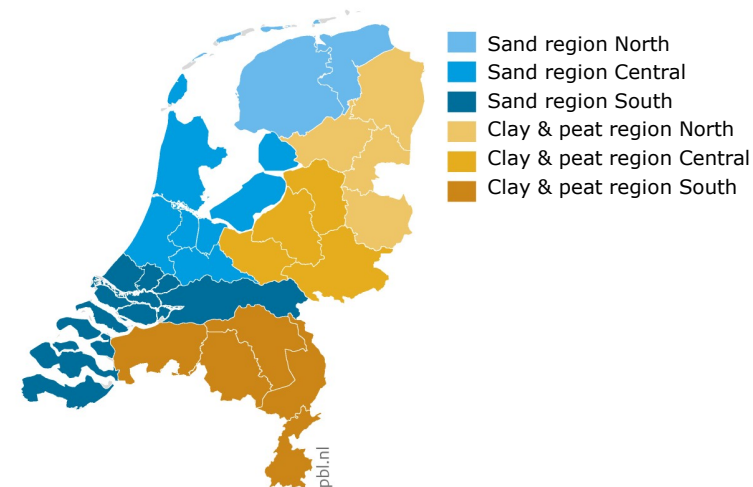
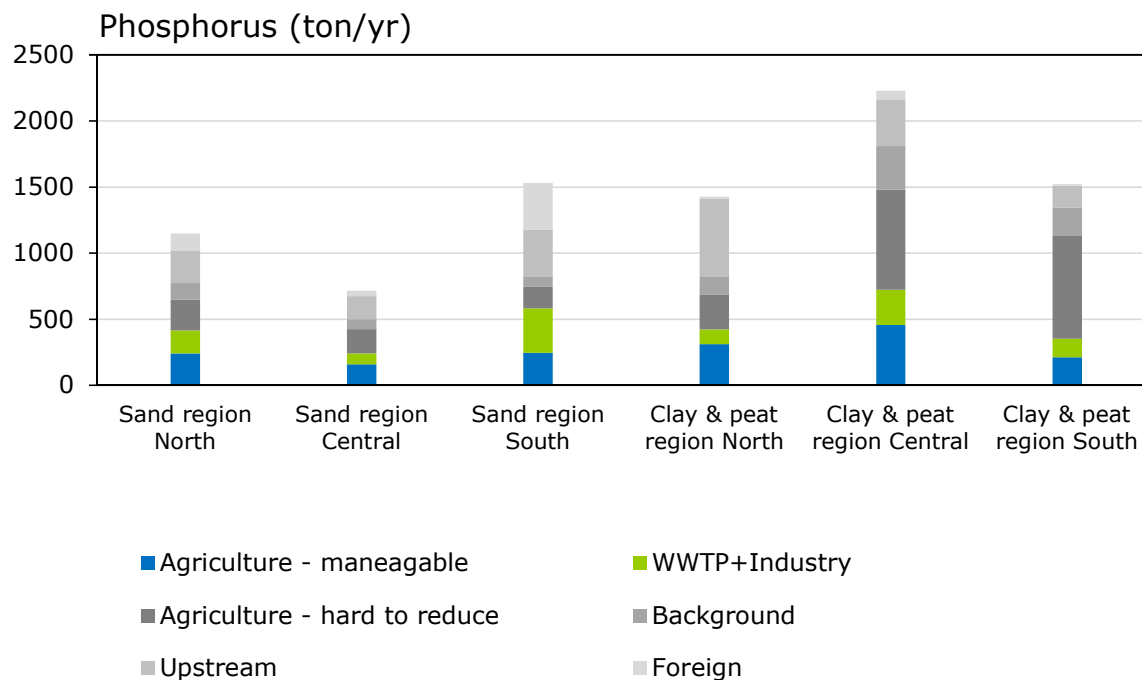
Share of agriculture in regional water load and WFD policy task



National values	N	P
Share leaching and run-off from Agricultural land	54%	56%
Sub-share manure & fertilizer	70%	33%
WFD policy task for agricultural land	-26%	-39%
Sub-share manure & fertilizer	-20%	-40%

Groenendijk, v Boekel e.a., 2016: Landbouw en de KRW-opgave voor nutriënten in regionale wateren

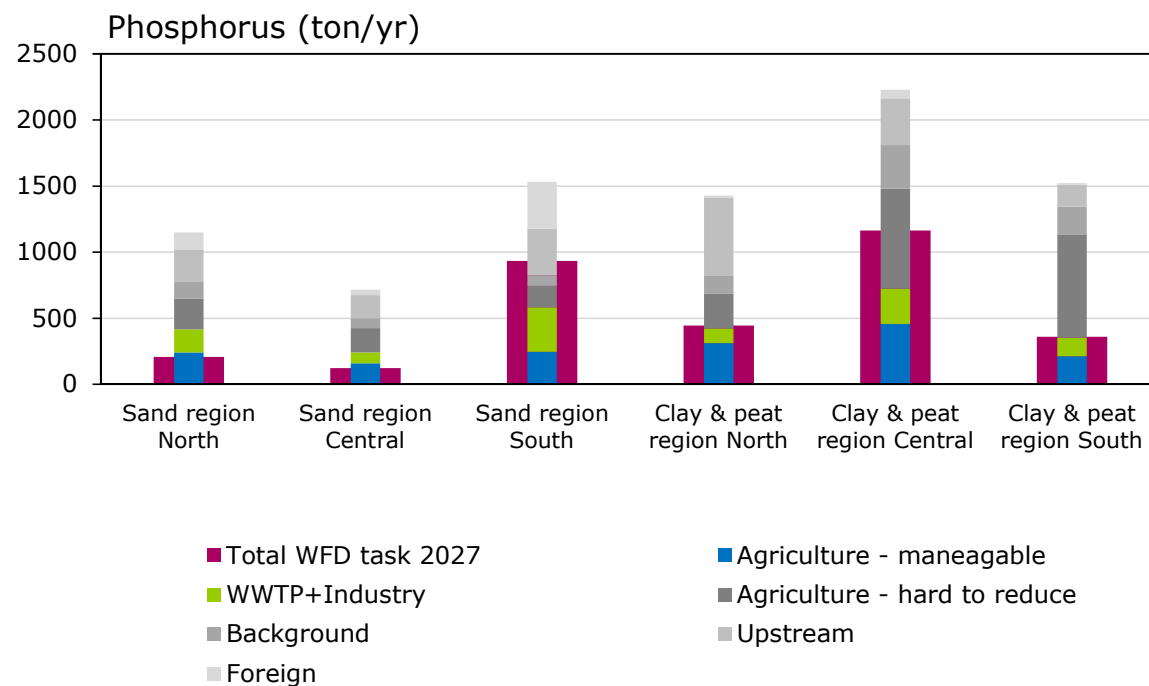
Regional sources of phosphate loads to water: What is due to agriculture, what is manageable?



Wageningen Environmental Research



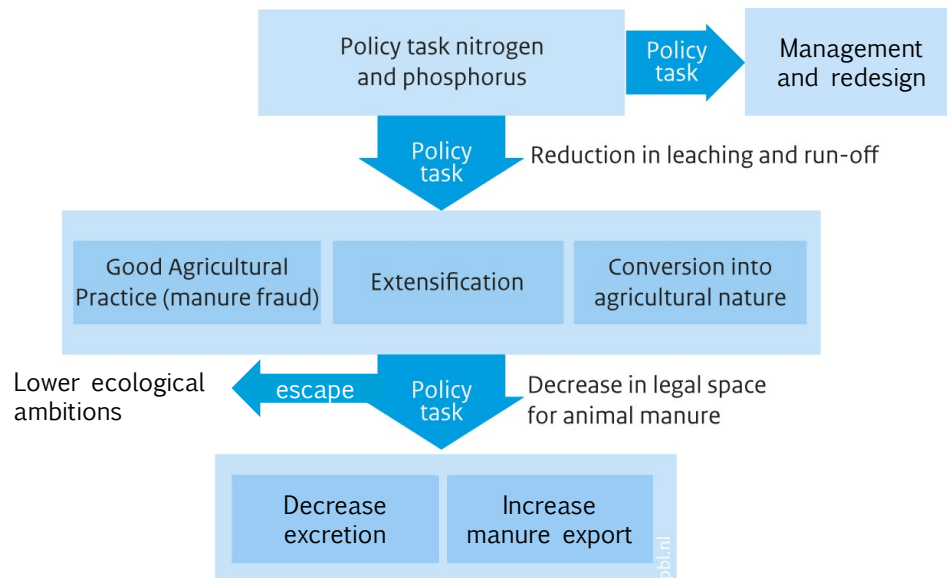
WFD-task surpasses maximum reduction potential and scope of Good Agricultural Practice



Wageningen Environmental Research

Effectiveness Dutch manure & fertilizer policy has reached its limit

Decision tree for regional nutrient policy



Source: PBL

In many regions reaching WFD targets is not compatible with Good Agricultural Practice and fertilization according to agricultural advice

Regional contracts can complement generic manure policy and provide part of solution

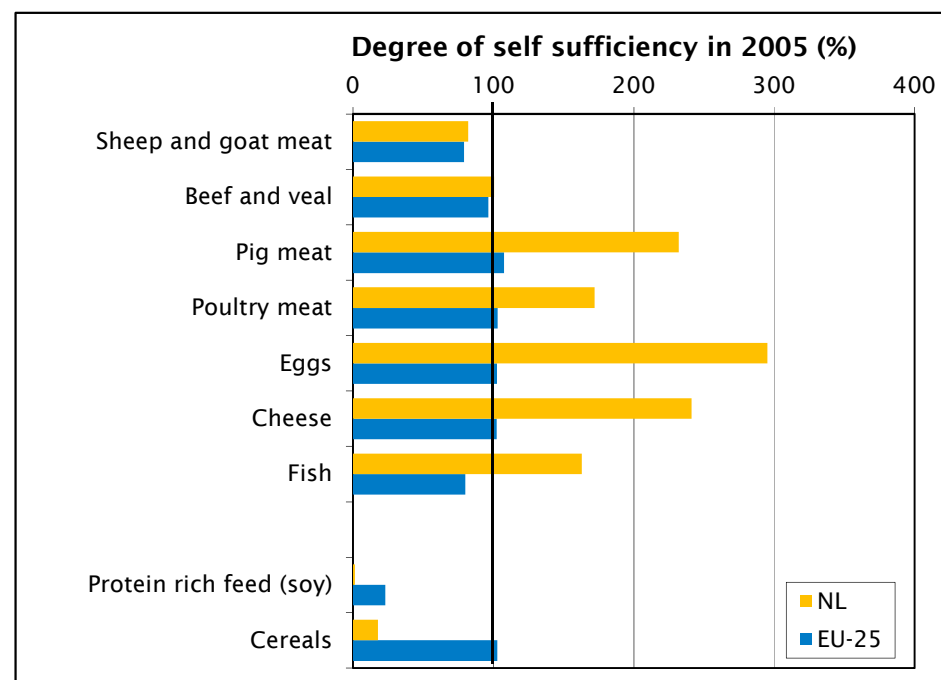
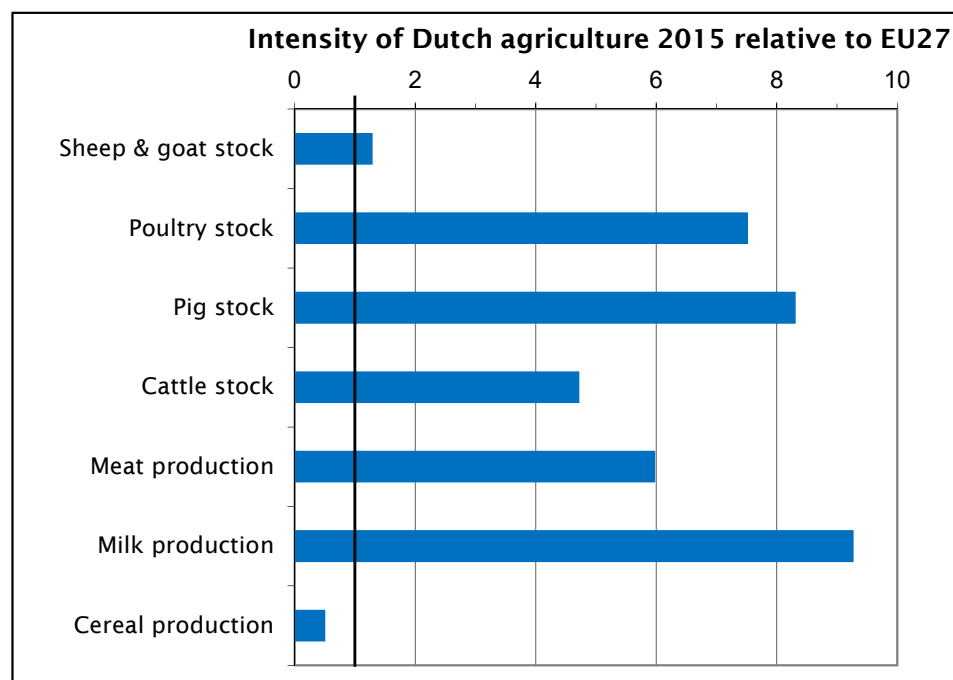
- Connect multiple actors and policy topics in region
- Collective farm approach: more effective and efficient than sum of individual farms to reduce economic loss of extensification
- Create price premiums and certificates
- Guidance by government still needed
- In line with regional approach WFD
- Demands support and confidence of farmers

Survey of farmers attitudes towards manure policy

- Farmers support for current manure policy limited
- Apparent concerns about soil fertility, manure fraude
- Improved communication of policies needed (dairy!)



Does Dutch agriculture fit in long term national and EU ambitions?



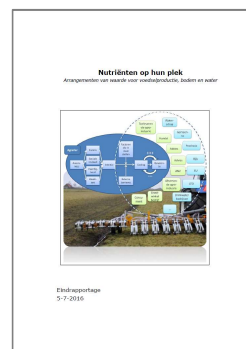
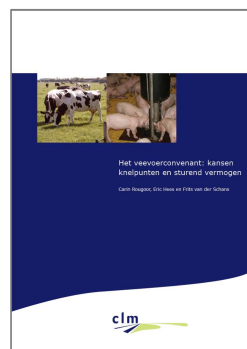
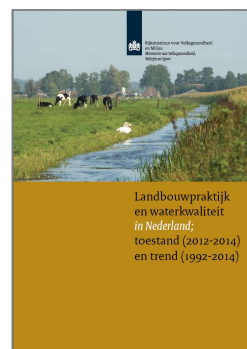


Main conclusions

- Current manure and fertilizer policy **stabilizes** environmental problems and pressure on manure market but **doesn't solve** the whole problem
- **Nitrate target not** within reach for upper groundwater in **southern sand** region
- Policies needed to **deal** with **manure separation** and manure **fraud**
- **WFD targets** for nutrients in regional surface waters **cannot be combined** with **current agriculture** in large parts of southern sand, central clay and peat region
- **Farmers** are main actor but often **not polluter**, or first responsible for solution
- **Regional contracts** in addition to generic manure policy **part of the solution**
- Stricter nutrient policies and **extensification** likely generate **societal benefits**



Thank you and all contributing researchers





Website (in Dutch)

themasites.pbl.nl/evaluatie-meststoffen-wet



Evaluatie Meststoffenwet

Home

Evaluatie Meststoffenwet 2016

Achtergronden Evaluatie Meststoffenwet 2016

Vorige evaluaties



Evaluatie Meststoffenwet

Minstens eens in de 5 jaar wordt de voortgang van de Nederlandse Meststoffenwet geëvalueerd. Daarbij wordt vastgesteld hoe doeltreffend en doelmatig het gevoerde beleid is.

De evaluatie wordt uitgevoerd door verschillende onderzoeksinstituten. Het PBL is verantwoordelijk voor het opstellen van de synthese van de evaluatie.

De laatste evaluatie is die van 2016, sinds 2000 is dit de vijfde evaluatie van de Meststoffenwet die door het PBL is uitgevoerd. Met alle de vorige evaluaties komen

Syntheserapporten

- › PBL Evaluatie Meststoffenwet 2016 - Syntheserapport
- › WUR Syntheserapport Ex Post - Effecten van het mestbeleid op landbouw en milieu: Beantwoording van de ex-postvragen in het kader van de evaluatie van de Meststoffenwet.
- › WUR Syntheserapport Ex Ante - Ontwikkeling van de bodem- en waterkwaliteit: Rekenvarianten voor de ex ante evaluatie van de Meststoffenwet 2016
- › WUR Eindrapport Belevingsonderzoek - Agrarische ondernemers over de mestwetgeving. Beleving van het mestbeleid: draagvlak, knelpunten en oplossingen in relatie tot mestaanwending en -productie.