Overview on measures taken to reduce ammonia emission in the Netherlands with respect to agriculture (manure and stables)

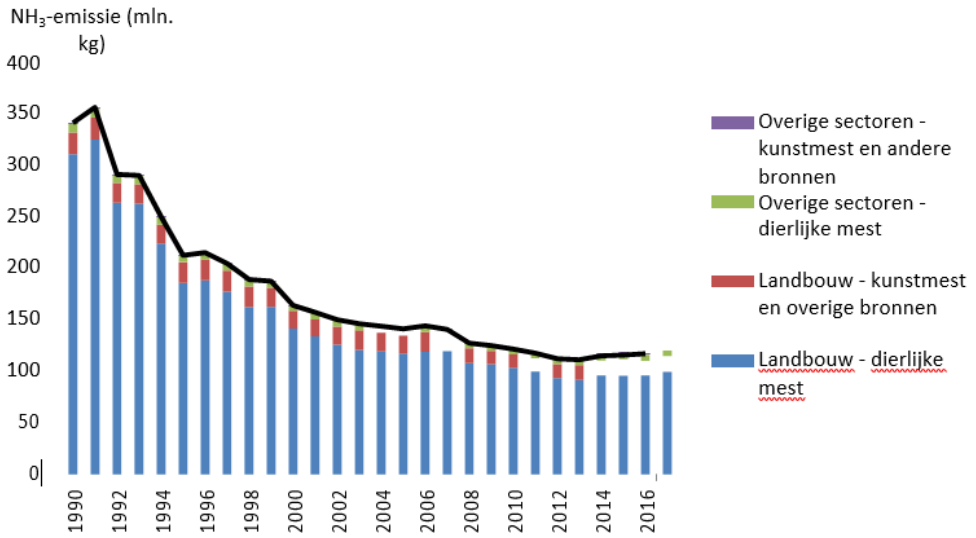
On March 24th, a telephone conference took place between DG ENVI and MIN LNV (NL) about prolongation of the derogation from the Nitrates Directive. It was agreed MIN LNV would send additional information to DG ENVI regarding measures to reduce ammonia emissions in the agricultural sector (more specifically: emissions from manure and from stables) in the Netherlands. This paper provides an overview of measures currently in place (that have been implemented in the past), new measures that have been decided upon by the Dutch government, and further measures that are currently under consideration.

Introduction

Initiation on policy on manure started in 1984 and was performed by a phased implementation[1]:

- 1984-1989
  By restrictions on production in livestock farming through manure productions quota in poultry and pig farming, later converted to production rights, applications standards and stimulation of manure distribution
- 1990-1994
  Tightening production restrictions and application standards, stimulation of manure processing and ammonia policy focusing on low-emission manure storage and application
- 1995 – present
  Equilibrium fertilization for phosphate, from manure and fertilizer. In the last phase, a large number of adjustments (including, usage standards from 2006) and additional measures were implemented to achieve the set goals (e.g. the introduction of the system of phosphate rights for the dairy sector).

The figure below shows the trend on emissions into the atmosphere from livestock manure and fertilizer inside and outside agriculture (mln. Kg NH_3)[2] until the year 2017.



[1] https://www.wur.nl/upload_mm/8/8/2/e6ca112c-0ce3-4518-99e8-3443459b1daf_16-N%26M0144%20Oene%20Oenema%20bijlage%201.pdf

[2] Bruggen, C. van, A. Bannink, C.M. Groenestein, J.F.M. Huijsmans, L.A. Lagerwerf, H.H. Luesink, S.M. van der Sluis, G.L. Velthof & J. Vonk (2019). *Emissions into the atmosphere from agricultural activities in 2017. Calculations using the NEMA model*. WOt-technical report 2019-147.

Regulations to reduce ammonia emission in agriculture
Slurry (the mix of solid manure and urine) is the main source of ammonia. Specific regulations to reduce ammonia emission in livestock farming are focusing on three subjects:

1. Application of animal manure

a. Restrictions in when manure can be applied (closing periods)

Animal manure is not allowed to be applied during the whole year because of a.o. weather conditions. For the different types of soil, closing periods are obliged.

The current regulation as of 1 January 2019 is as follows:

Month	Grassland				Arable land			
	Solid manure and stitch-proof sewage sludge on sand and loess soil	Slurry and liquid sewage sludge on sand and loess soil	Solid manure and stitch-proof sewage sludge on clay peat soil	Slurry and liquid sewage sludge on clay peat soil	Solid manure and stitch-proof sewage sludge on sand and loess soil	Slurry and liquid sewage sludge on sand and loess soil	Solid manure and stitch-proof sewage sludge on clay peat soil	Slurry and liquid sewage sludge on clay peat soil
January	Not allowed	Not allowed	Not allowed Solid straw-rich manure is allowed	Not allowed	Not allowed*	Not allowed		Not allowed
February		Not allowed until 15-2		Not allowed until 15-2		Not allowed until 15-2		Not allowed until 15-2
March								
April								
May								
June								
July								
August						Not allowed **		Not allowed
September	Not allowed	Not allowed	Not allowed as of 16-9	Not allowed	Not allowed*	Not allowed as of 16-9		Not allowed as of16-9
October	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed*	Not allowed		Not allowed
November	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed*	Not allowed		Not allowed
December	Not allowed	Not allowed	Not allowed Solid straw-rich manure is allowed	Not allowed	Not allowed*	Not allowed		Not allowed

* Solid animal manure and sewage-resistant sewage sludge on arable land on sandy and loess soil may be used all year round when planting park and fruit trees.
** Slurry and liquid sewage sludge on arable land may be used on all soil types until September 15 if a green manure crop is grown for at least 8 weeks, or flower bulbs or winter rape are planted after harvest. These crops should be planted the 15th of September at the latest.

b. Restrictions in how manure can be applied (low-emission techniques)

In 1990 manure was only applied above the ground. After that, the share of low-emission application techniques increased. In 2010 the sod fertilizer was the most important technique on grassland, and fertilizer injection on arable land. In 2010 the above-ground application mainly concerns the application of solid manure. Table 1 shows the share of low-emission manure application techniques (%) for grassland and arable land from 1990-2010:

Tabel 1. Aandeel mesttoedieningstechnieken (%) voor grasland en bouwland

		1990	2000	2005	2010
Grasland	zodenbemester	0	53	56	56
	sleufkouter	0	22	14	12
	sleepvoeten en sleepslangen	0	19	23	23
	bovengronds	100	6	7	9
Bouwland	mestinjectie	0	46	34	61
	zodenbemester	0	0	0	8
	sleufkouter, sleepvoeten en sleepslangen	0	0	6	13
	onderwerken in 1 werkgang	0	11	27	3
	onderwerken in 2 werkgangen	0	37	27	11
	bovengronds	100	6	6	4

As a result of adjustments in regulations, the use of low-emission manure application techniques has increased significantly from 1990 to 1995 (see Appendix 1 - table B14.2 for the use of techniques and table 14.1 for the animal manure shares on grassland and arable land).

In 1990, 100% above-ground application was applied to both grassland and arable land. In 1994 this was still 30% on grassland and from 1993 already 0% on arable land. In 1995, above-ground application on grassland had been reduced to 2%. In later years, the use of low-emission techniques continued. The basic principle is that, when applying fertiliser on grassland using livestock slurries or liquid sewage sludge, it is injected into the soil, as this achieves the lowest emission of ammonia. Grassland is normally fertilised by spreading fertiliser on the ground (amongst the grass), usually using what is known as a trailing shoe slurry applicator. Since 2012, restrictions were imposed resulting in that this method was only permitted on clay and peat soils, because fertilisation systems where fertiliser is injected into the soil require heavy tractor units, and these soil types have insufficient load-bearing capacity. Even so, it was agreed in 2014 that techniques that lay livestock slurries down on the soil will also be prohibited on clay and peat. Since 2019 the use of the trailing shoe slurry applicator and systems based on the same principle is prohibited on sandy and loessial soils. On clay and peat soils the use is allowed under the condition of 1:2 dilution.

For solid livestock manure or solid sewage sludge on grassland, restrictions apply to spreading during the winter period, primarily due to the risk of ammonia emission, because these fertilisers cannot be worked into the ground then. There are therefore no restrictions on spreading on arable land, because the fertiliser application can and must be low-emission there, since it can be worked in. On arable land, the basic principle applies that only fertilising systems are permitted where the

livestock slurries or the liquid sewage sludge is injected directly into the soil or is applied using a system that is enclosed down to the ground and is worked into the soil in the same pass (with the same machine).

2. Storage of manure

Since January 1990 the obligation was imposed to cover manure silos applies to reduce ammonia emissions.

3. Low-emission stable systems

Several regulations have been imposed to reduce ammonia emissions from stables. As of 8 December 2005, new ammonia pig and poultry houses were subject to statutory ammonia requirements in kilograms of NH3 per animal location in the Decree on low-ammonia housing for livestock farming (see Enclosure 1, Table 1). As of 1 January 2012, all existing pig and poultry houses had to meet the statutory ammonia requirements in kilograms NH3 per animal place from the Decree on low-ammonia livestock housing.

The Decree on low-emission housing entered into force on 1 August 2015 (see Enclosure 1, Table 2). This includes the statutory ammonia requirements in kilograms NH3 per animal place for new dairy, pig and poultry houses that were built before 1 July 2015 (column A). Column B contains the standards for new houses built after 1 July 2015 and before 1 January 2018. Column C contains the standards for new houses built after 1 January 2018. As can be seen in the table, the ammonia requirements for new houses have been phased in since 2015 for the various animal categories.

New measures to reduce ammonia deposition on N2000-areas
To tackle the problem of ammonia deposition on N2000-ares, the Dutch government has – as a first step in a structural approach to address this issue – decided upon the following measures with regard to the agricultural sector:

- Extension of the subsidy regulation on restructuring of the pig farming sector. In addition to the earlier announced budget of € 120 mln, an additional € 60 mln was made available in November 2019. Furthermore, the government decided in February 2020 that all pig farmers who meet the established criteria, after assessment by RVO.nl, will receive a subsidy. Because RVO.nl is still assessing, it is not yet known exactly how many pig farmers it concerns. Latest insights indicate 500 pig farmers meet all the criteria (excluding odor score). A more precise figure of pig farmers involved in the scheme is expected this summer.
- Targeted buy-out of livestock farms around Natura2000-areas. A budget of € 350 mln was made available for this.
- Subsidy module for source-oriented sustainability of stable and management measures. A budget of € 172 mln was made available for this.

Further measures under consideration
In February 2020 the government announced that further measures are considered. The following measures are currently under discussion and being drafted. More details on how and when the measures will be implemented are expected before the summer.

- Reduction of the amount of rough protein in feed for cattle.
- Increase of the amount of hours of outdoor grazing for dairy cattle.
- Reduction of ammonia emissions in manure application, e.g. by diluting slurry before application.
- Introduction of coaches to help farmers take nitrogen-reducing measures at their farm.
- Introduction of general termination regulation for farmers who want to cease their business.

Furthermore, in December 2017 the government announced a fundamental reconsideration of manure policy. Addressing the issue of ammonia emissions is an important element in future manure policy. Also, based on the results of the subsidy scheme mentioned above, an approach for the rolling out of low emission stable techniques will be decided upon.