Netherlands Journal of Agricultural Science 49 (2001) 117-134

Mineral policy in the Netherlands and nitrate policy within the European Community

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Received: 5 June 2001; accepted: 3 November 2001

Abstract

In the Netherlands, the manure problem has been on the political agenda for many years as a result of conflicting objectives within society. Since the 1980s, measures have been taken to reduce the environmental impact of manure to meet national and international – mainly European – environmental objectives. The infringement procedures of the European Commission and the court rulings on the Pig Farming Restructuring Act have forced the Dutch Government to tighten its manure policy. The integral approach the Government has opted for, is based on a combination of the MINeral Accounting System (MINAS) and manure disposal contracts, both of which are to be implemented within the framework of the Nitrate Directive of the European Union (EU). The Dutch Government advocates realization of the Directive's objectives but at the same time claims some freedom in selecting the means to attain these goals. This has resulted in points of discussion with the EU. This paper reviews the history of manure legislation in the framework of environmental policy of the Netherlands and the EU, describes the adaptations that the Dutch Government has made to meet the requirements of the EU Nitrate Directive, and discusses the points on which both sides have different opinions.

Keywords: environmental policy, manure policy, animal production rights, Dutch legislation, EU Nitrate Directive, Mineral Accounting System, nitrate standards, mineral balance.

Introduction

The manure problem has been on the political agenda for many years as a consequence of conflicting objectives in society, such as between economic and environmental issues. Essentially, the reason for the 'manure problem', which in fact is a nutrient surplus problem, is the high intensity of Dutch agriculture, especially in terms of animal density, which in 2000 was 3.9 Animal Units per hectare, compared with, for instance, 3.1 in Belgium and 1.6 in Denmark. The dairy farming sector benefits from the favourable environmental conditions that allow high grass yields, while the proximity of the harbour of Rotterdam has led to intensification of landless animal husbandry because of the favourable terms of trade between meat and concentrates. The Common Agricultural Policy of the EU has created these favourable conditions,

and the associated divided responsibility between the EU (price and market policy) and the national governments (structural policies) has strongly contributed to these developments (De Wit *et al.*, 1987). The problem was aggravated because of internal Dutch political relations that provided a strong position to the agricultural sector, and resulted in delayed policy measures. However, since the 1980s, measures have been taken to reduce the environmental impact of manure to meet national and international environmental objectives. The measures allowed farmers to adapt gradually to increasingly tighter environmental requirements and to adopt environmentally friendly production methods. Recent developments, however, indicate that to realize international environmental objectives, especially those laid down in the Nitrate Directive of the European Community, a drastic change in manure policy is indispensable. Moreover, the Dutch Government has the opinion that, considering the need to protect the natural environment, the soil, water and air, any further delay in revising its manure policy is unacceptable. In the modified manure policy, manure production and the possibilities for its application and disposal are explicitly linked by the introduction of a system of manure disposal contracts.

Two important developments formed the direct reason for an innovation and for further tightening of the manure policy: (i) the infringement procedure by the European Commission on the grounds of insufficient implementation of the Nitrate Directive, and (ii) the court rulings around the Pig Farming Restructuring Act. There is an urgent need to tighten the manure policy to meet the targets of the Nitrate Directive, as a conviction by the Court of Justice of the European Communities eventually may result in very high fines.

In this paper, attention is first paid to the 'old' manure policy (1984–1998). Then the EU Nitrate Directive, the need for adaptation of the manure policy, and the 'new' manure policy (from 1998 onwards) are discussed, and finally the points of discussion with the European Commission are reviewed.

The policy instruments

The 'old' manure policy

In the Netherlands, measures to reduce the impact of manure on the environment have been implemented since 1984. From the onset, these measures aimed on the one hand at a restriction of the use of nutrients, and at the other hand at a restriction of the volume of animal manure produced. In 1984, the *Temporary Act Restriction Pig and Poultry Husbandry* was introduced to prevent further expansion of the pig and poultry sectors, followed – in 1986 – by the *Soil Protection Act* and the *Manure Act* regulating production and application of animal manure. The increasing concern about the environment resulted in 1989 in the formulation of the *National Environmental Policy Plan* (NMP; Anon., 1989) and the elaboration of the concept of sustainable agriculture in the *Agricultural Structure Memorandum*. In these policy documents attention was paid to the nitrate load of ground- and surface water originating from the agricultural sector. In 1991, the *EU Nitrate Directive* (Anon., 1991) was

issued as a result of increasing international concern. Not only agriculture was taken into account: at about the same time the *EU Urban Wastewater Directive* was issued. In the Netherlands, the growing attention for the nitrogen (N) problem was expressed, amongst other things, in the policy document *Note on the Nitrogen Problem* (Anon., 1992) and in the *Letter of the Ministers of Housing, Spatial Planning and Environment* (VROM) *and of Agriculture, Nature Management and Fisheries* (LNV) *to Parliament (1992)*. The general concern for agricultural sustainability from an environmental point of view resulted in the establishment – in 1991 – of the Experimental Dairy Farm 'De Marke', with the main goal to realize the objectives formulated in the NMP.

It became increasingly clear that effective policy required a system that takes into account the large differences between sectors and regions in terms of manure surpluses. So in 1998, following consultation between the agricultural sector and the Government, the MINeral Accounting System (MINAS) was introduced as a central instrument for restricting emission of nutrients to the environment. MINAS involves registration of mineral inputs (nitrogen and phosphorus) in fertilizers and feed, and of mineral outputs in products and manure on individual farms, and definition of permitted levy-free surpluses, in dependence of farm structure.

Regulating manure application

Regulations restricting application of fertilizers are the most important measures to reduce environmental impact. In the period 1987–1998 the most important regulations for animal manure were those formulated in the *Decree on the Use of Animal Manure*, based on the *Soil Protection Act*. This decree specifies restrictions on the annual dose of animal manure – the so-called application standards – in addition to regulations on timing and methods of application. The decree was adapted continuously in the course of time, to tighten the restrictions (Table 1), and to include the manure of an increasing number of animal species. The standards for application levels were based on the phosphorus content of animal manure, and because of the rather narrow phosphorus/nitrogen ratio, this directive also restricted the environmental impact of N.

Table 1. Dynamics of legislation with respect to the application of animal manure and chemical fertilizer in the Netherlands. Application standard: supply-based kg P_2O_5 ha^{-1} per year.

Year	Land use		
	Arable land (excl. maize)	Grassland	Maize land
1987	125	250	350
1991	125	250	200
1995	110	150	110
1998	100	120	100
2000	85	85	85
2002	80	80	80

Source: Neeteson & Schröder (1999).

On 1 January 1998, MINAS replaced the application standards for animal manure and other organic manure to allow a more accurate control of manure use. This was necessary, on the one hand for proper enforcement and prosecution policy, on the other hand to allow for rewarding innovative farmers for their efforts.

The restrictions on the permitted times and methods of application formulated in the *Directive Utilization Animal Manure* remain in force along with MINAS. In MINAS also chemical fertilizer application is regulated. Moreover, both N and phosphorus are explicitly regulated. In principle, all losses of phosphorus and N to the environment at farm level that exceed the loss standards are levied, irrespective whether they originate from organic manure or from chemical fertilizer. As the farmer attempts to avoid paying levies, he will try to reduce the phosphorus and N losses by adaptations in farm management, or through additional disposal of manure on other (arable) farms. From 2001 onwards, also extensive livestock farms, arable farms and horticultural farms are obliged to comply with MINAS.

In their letter to Parliament of 2 December 1998 (Anon., 1999c), the Ministers of VROM and LNV announced acceleration of the introduction of stricter loss standards as of 2000 and of further tightening in 2008/2010 (Table 2) of the N loss standards for dry sandy soils and löss soils.

In tightening the restrictions on the use of animal manure within the framework of the *Soil Protection Act* and the *Manure Act* in the 1980s and 1990s, the introduction of legislation was phased in such a way that the socio-economic consequences for the livestock sector would be reduced. In this context, development of alternative options was taken into consideration, like manure processing, more efficient feeding and export of manure. In case these options would present sufficient possibilities for solving the problem, the reduced possibilities for manure application in the Netherlands – resulting from the tighter standards – would not have to lead automatically to a reduction in the volume of manure produced and thus to a reduction in total animal population.

Regulating manure production

Given the continuing expansion and intensification of the Dutch livestock sector, it appeared unavoidable in the 1980s to regulate both manure production and application.

Control of manure production aimed in the first instance at avoiding aggravation of the problem of manure surpluses resulting from the continuing expansion of the livestock sector. So in 1984 the *Temporary Act Restriction of Pig and Poultry Husbandry* was introduced, which in 1987 was replaced by prohibition of expansion and displacement of manure production. Since the specification, in 1994, in the *Act Displacement Manure Production*, of the conditions under which displacement of manure production can take place, this set of rules and regulations is referred to as the *System of Manure Production Rights*. The measures with respect to the production volume were extended in 1987 from pigs and poultry to cattle and turkeys and in the subsequent years to other animal species.

In the course of the 1990s, the volume policy increasingly aimed at maintaining a

Table 2. Illustration of the gradual tightening of the standards for the maximum nutrient application rates (kg N/P_2O_5 ha^{-1} per year) for arable land and grassland.

Year	Nitrogen application standard; animal manure		Nitrogen application standard; manure disposal contracts		Phosphate application standard		Nitrogen application standard				
	Arable land	Grassland	Arable land	Grassland	Arable land	Grassland	Arable land peat	Arable land clay/ sand/löss	Arable land dry	Grassland	Grassland clay/peat sand/löss	Grassland dry
'98/'99	–[1]	–	–	–	40	40	175	175	175	300	300	300
2000	–	–	–	–	35	35	150	150	150	275	275	275
2001	–	–	–	–	35	35	125	150	125	250	250	250
2002	190[2]	300	170[3]	300	30	25	110	150	100	220	220	190
2003	170	250	170	250	20	20	100	100	60	180	180	140

[1] Not applicable.
[2] If relatively N-rich animal manure is used; with less N-rich manure the standard of 170 may be realized in 2002.
[3] 210 for maize land.
Source: Anon., 2000.

national balance between the production and the disposal possibilities of animal manure. Such a balance is essential for the realization of the targets specified within the framework of the manure policy. As long as the total national manure production exceeds the quantity that can be applied at the producing farms – or that can be disposed of (for free or at a price) to other end users (arable farms) – livestock farms will have to make high costs to dispose of their manure, provided they can find clients. For the individual farmer, voluntary reduction in animal number does not present a realistic alternative, as that would seriously deteriorate his financial position, and as the high costs associated with manure disposal are increasingly difficult to bear, pressure will increase to illegally dispose of the manure. If the Dutch Government does not formulate supplementary regulations, there is a serious risk that the fertilizer standards – irrespective whether these refer to utilization or to loss – will be dodged at a large scale.

In the 1990s it became increasingly clear that fixing the volume of manure production (i.e., avoiding further increase) would be insufficient to maintain a balance between production and disposal, and that additional measures were necessary to *reduce* that volume. This reduction was necessary because the possibilities for application of manure in the Netherlands would be further reduced as a result of the increasingly tighter standards. It further became increasingly evident that this reduction could not be compensated by alternatives like manure processing, export of manure and animal feeding measures. Without additional measures, the balance would be threatened, with the risk of a permanent manure surplus at national level. So tightening of the loss standards in accordance with the time path defined in the letter *Integrated Approach to the Manure Problem* (Anon., 1996) to Parliament, necessitated additional measures.

The manure surplus of 14,000 tons of phosphate[1] (Anon., 1999a) was considered to originate largely from the pig sector. On 1 September 1998, the *Pig Farming Restructuring Act* came into force, replacing the quota for manure production rights by a system of pig production rights. This act combined different instruments linked to the system of pig production rights, and aimed at a 25% reduction in pig manure production, equivalent to 14,000 tons of phosphate. These instruments were: (i) a generic reduction in the production quota for each farm, (ii) a reduction in pig production rights in case of selling the rights to another farm or transferring the farm to another owner, (iii) purchase of pig production rights by the Government, and (iv) measures relating to animal nutrition.

In formulating the target for the pig sector it was assumed that about two-thirds of the manure produced in the poultry sector – equivalent to 20,000 tons of phosphate – would be exported and would not therefore form part of the total manure load in the Netherlands. In autumn 1998, however, it became clear that the poultry sector was gradually expanding and that the possibilities for export of manure had been overestimated. So also for this sector additional measures appeared necessary. On 10 April 1999 a bill was presented to the Lower House, introducing poultry production rights,

[1] In Dutch manure legislation, (the surplus of) phosphorus (elemental P) is *always* expressed in phosphate (P_2O_5). That unit is therefore applied in this paper when referring to policy documents.

implying in fact a freeze of the poultry sector at the level of 6 November 1998, i.e., the date the measure was announced. This bill came into force 1 January 2001.

The EU Nitrate Directive

The *EU Nitrate Directive* (Council directive 91/676/EEC), announced in 1991, obliges the member states of the European Union to reduce the nitrate load from the agricultural sector to ground- and surface waters to acceptable levels, and to avoid further pollution from that source. Nitrate pollution from agricultural sources primarily refers to nitrate leaching associated with manure application. So the *Nitrate Directive* specifies measures related to that subject. But in a more general sense it also applies to chemical fertilizers.

According to the *Nitrate Directive* the member states are obliged to take measures for the so-called 'nitrate-sensitive zones'. These are defined as zones where the nitrate concentration in groundwater exceeds or could exceed 50 mg l^{-1} if no action is taken, and as zones draining on surface waters that contain or could contain nitrate concentrations exceeding the levels specified in the *EU Drinking Water Directive*. So the standard of 50 mg l^{-1} and the concentrations specified in the *Drinking Water Directive*, are targets for the acceptable nitrate levels. Other criteria, however, also play a role. For instance, the *Nitrate Directive* also applies to areas draining on natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters that are eutrophic, or could become eutrophic in the near future if no measures are taken. The nitrate concentration in the surface waters of the areas draining on these fresh- or salt-water bodies by itself is immaterial. Moreover, the Directive does not refer to nitrate only but to all N-containing compounds.

The N load of fresh- and salt-water bodies has been further regulated in an international context, i.e., in the *Rhine Action Programme* and the *North Sea Action Programme*. In both programmes an obligation is defined to attain a reduction in the N load in 1995 compared with 1985, of 50%. In the meeting of the Ministers of the OSPAR-Committee (Oslo and Paris Commissions for the Protection of the Marine Environment of the Northeast Atlantic) in 1998, agreements were reached with respect to the strategy aiming at a situation in 2010 where eutrophication of the sea is halted. If member states implement the necessary measures in their total territory, identification of specific vulnerable areas is not necessary. The Netherlands has classified its total territory as nitrate-vulnerable zone.

The *Nitrate Directive* includes rules for the use of animal manure and chemical fertilizers. The obligations stipulated in the Directive have to be implemented in phases, and the measures have to be formulated in national action programmes. Although the rules at first sight may seem rather global, in practice they oblige the member states to include in their national legislation many very detailed rules on the use of animal manure and chemical fertilizers. The core of the Directive is that a balance should be reached between N supply and N demand of the crop (vegetation), where supply includes both animal manure and chemical fertilizers. In the further elaboration of the rules, standards have been identified for the maximum doses of animal manure only. Member states eventually should guarantee that annual applica-

tion of N in the form of animal manure at farm level does not exceed 170 kg ha^{-1}. Only for the last year of the period covered by the first action programme, which ended on 20 December1999, an application rate of 210 kg ha^{-1} was allowed. The European Commission, however, has indicated that the standard of 170 kg ha^{-1} has to be realized in the last year of the second action programme, which means per 20 December 2002.

According to the *Nitrate Directive*, member states have the right to specify animal manure doses that differ from the 170 and 210 kg ha^{-1} referred to above. A higher application rate can be allowed, provided the objectives of the *Directive* will still be realized and the higher rate can be justified on the basis of objective criteria as laid down in the *Directive*. These criteria include, in any case, long growth periods of the crops, crops accumulating large quantities of N, high precipitation surpluses and soils conducive to high rates of denitrification. If member states allow higher rates of manure application, they have to inform the European Commission. The Commission judges the justification of the exception on the basis of the information provided by the member state, and asks advice from the so-called Nitrate Committee, consisting of representatives from all members states.

Implementation

On 10 September 1999 the plans for adaptation of the manure policy were presented to the Dutch Lower House (Anon., 2000). Two important developments underlying the need for adaptations were quoted:

1. The anticipated case at the European Court of Justice. The European Commission maintained its point of view that the total system of rules and regulations in the Netherlands does not guarantee adequate and timely realization of the requirements of the *Nitrate Directive*.
2. The judicial rulings with respect to the *Pig Farming Restructuring Act*. These rulings resulted in abandoning an important component of the volume policy, thus seriously threatening effective realization of the objectives of the manure policy and the *Nitrate Directive* in the future.

Court procedure with respect to insufficient and delayed implementation of the Nitrate Directive

In large parts of the Netherlands, current nitrate loads of upper groundwater and N concentrations in surface waters are still too high. Where the nitrate load of ground- and surface water currently is below the threshold value, the Dutch Government wishes to guarantee this also for the future. Moreover, according to the *Nitrate Directive*, measures must be implemented in areas draining on fresh- and salt-water bodies that currently are eutrophic or are threatened by eutrophication. As mentioned earlier, to avoid discussion on the spatial extent of possible measures, the Netherlands has specified its whole territory as nitrate-vulnerable zone.

Timely implementation of the *Directive*, however, appears problematic because of

the intensive nature of the Dutch agricultural sector. From the start, tension has existed between the phased Dutch manure policy – aiming at reducing the socio-economic consequences – and the obligations stipulated in the *Directive*. This specially refers to the standards for the maximum dose of animal manure and the time path. This tension has been emphasized repeatedly in Dutch policy documents.

On 15 December1997, the Netherlands submitted the action programme for the period till 20 December 1999 to the European Commission (Anon., 1997). In this action programme, *realization of the objectives* of the *Directive* was emphasized, rather than *the standards for application* of animal manure. The action programme indicated that for a large part of the Dutch territory the objectives would be attained in 2008/2010. For the first period of four years, the core of the action programme consists of MINAS, the *Decree on the Use of Animal Manure*, and the restrictions originating from provincial regulations for the use of manure. The latter are based on the *Environmental Management Act* and the *Act on Pollution of Surface Waters*. The system of pig production rights of the *Pig Farming Restructuring Act* and the system of manure production rights of the *Manure Act* have been included in the action programme as necessary additional measures. They are needed for effective realization of the objectives of the *Directive*.

When on 29 September 1998, because of inadequate implementation of the *Nitrate Directive*, the European Commission formally started an infringement procedure against the Netherlands, this country announced a tightening of its policy, which otherwise would not have been implemented until after the first action programme. This announcement, however, did not keep the Commission from formulating a so-called reasoned opinion, in which it concluded that the Netherlands with respect to a number of important issues had not met the obligations resulting from the *Nitrate Directive*. The general conclusion of the Commission is that the Dutch measures, including the announcement of tighter policies, are insufficient to timely meet the requirements of the *Nitrate Directive* (Anon., 1999b). Some of the shortcomings identified by the Commission primarily have the character of a formal statement that legal measures have been announced, but that these have not been passed or implemented. Other shortcomings identified by the Commission are more fundamental:

1. Without questioning the system of loss standards as such, the Commission concludes that at the moment, but also in the years ahead, a substantially higher rate of application of animal manure is permitted than specified in the *Nitrate Directive*. According to the Commission, the announced tightening of the standards, as specified in the bill submitted to the Dutch Lower House on 6 October 1999, is a step in the right direction, but is not sufficient.
2. The *Supplementary Nitrogen Policy* announced in the letter of 2 December 1998 for the sandy soils and the löss soils susceptible to leaching, is insufficient and comes too late.
3. The regulatory levies on nutrient surpluses are not prohibitive: they make it too attractive for farmers to redeem excess surpluses.
4. In calculating the permitted surpluses, there is an imbalance between expected N demand of the crops and N supply, taking into account the soil store, net mineralization, deposition and biological fixation.

The conclusions of the Commission refer primarily to the period of the first action programme, i.e., 20 December 1995 – 20 December 1999, while the tightening of the N loss standards announced in the framework of the supplementary nitrogen policy, refers to the period following the first action programme. At the moment that the charges were filed, the period covered by the second action programme had not yet started and could not therefore formally be subject of the investigations of the Commission. However, the conclusions of the Commission are important for the period covered by the second action programme. It is expected that – without drastically adapting the policy – also the measures for the period covered by the second action programme will be subject to charges. The *Nitrate Directive* standards will then be tighter than in the period covered by the first action programme.

Consequently, a drastic adaptation of the manure policy was unavoidable. To meet its obligations with respect to the *Nitrate Directive*, it is evident that the Netherlands has to tighten the standards further than announced on 2 December 1998 in the letter to the Lower House. This is the more urgent, as a possible conviction by the Court eventually could result in very high fines for each day that the Netherlands does not comply. Further reflection on possible measures has resulted in the definition of a set of measures consisting of the manure disposal contracts, further tightening of the loss standards and increasing the levies.

Implementation of the anticipated measures is foreseen for 1 January 2002. On 25 February 2000, following further consultations with, amongst others, the Dutch Farmers' Union (LTO-Nederland), the Kok administration decided to slightly increase the loss standards for 2002 for both grassland and arable land in comparison with those specified in the letter of 10 September 1999 (Anon., 1999a). The anticipated measures for 2003 have not been changed.

As the Commission is of the opinion that the anticipated measures do not change the current legislation in the Netherlands, i.e., do not guarantee realization of the standards of the *Nitrate Directive*, it indeed has summoned the Netherlands for the Court of Justice. At the same time, however, the Commission has positively reacted to the anticipated adaptations of the manure policy.

Court rulings with respect to the Pig Farming Restructuring Act

The second argument for the adapted policy is based on the successive court rulings in the civil procedures started by the more radical Dutch Syndicate of Pig Farmers (NVV) and others against the Dutch Government with respect to the *Pig Farming Restructuring Act*. The court orders resulted in suspension of parts of the law for a period of one year, starting 23 February 1999.

The consequence of this court order was that, for this one-year period, the State was not allowed to apply the instruments included in the *Pig Farming Restructuring Act*, like maintaining a maximum on the number of pigs per farm. In addition, the instruments linked to the pig production rights and aiming at reducing the number of pigs, such as the generic reductions, could not be applied. So as a result of the court order, implementation of the policy of state purchase and of reducing pig production rights when these rights or entire farms are transferred, both aiming at a further

generic reduction in pig numbers, was seriously hampered and delayed.

The judgement of the Court in The Hague on 20 January 2000 changed the provisional decision taken in the summary proceedings of 23 February 1999. The Court reversed the interlocutory decree of 23 December 1998. It ruled that the system of pig production rights as such, the 10% generic reduction as specified in the *Pig Farming Restructuring Act*, and the abrogation as per that date of the 'latent' room within the non-land-based manure production rights, are all legitimate. The judgement implies that legally the situation reverted to the one before 23 December 1998. The maximum that had been set to the pig production rights, including the 10% reduction, could thus again be implemented for all pig farmers. The second generic reduction of 15% at most, was not approved.

As a result of these events, the Dutch Government in mid-1999 concluded that hardly any progress had been made with the necessary reduction in manure production of 14,000 tons of phosphate before 2002. On the contrary, the problem had aggravated because of the consequences for the manure surplus resulting from the necessary tightening of the manure standards in accordance with the *Nitrate Directive*. This tightening would lead to a reduction in the capacity for application and disposal of manure in the Netherlands, implying an expected surplus in 2003 of 24,000 tons of phosphate, and a corresponding amount of 48,000 tons of N (Anon., 1999d). Reconsideration of the policy instruments that aim at controlling the manure volume was unavoidable. Given that situation, additional measures are also necessary for livestock sectors other than the pig sector. Taking into account all livestock sectors, the logical choice was an integral approach, selecting a system based on a direct link between manure production on the one hand and the possibilities for application and disposal on the other, and deriving standards from the *Nitrate Directive*.

So the Dutch Government decided to implement a new instrument for volume control, i.e., a system of manure disposal contracts. Provided the system proves to be effective, it should in the long run completely replace the existing volume-control system of manure production rights, pig production rights and poultry production rights. The Government plans to completely abrogate all these rights by 1 January 2005. Introduction of this system will strongly affect the livestock sector in the Netherlands. Consequently, an extensive set of supporting measures has been formulated, both for farms that are being discontinued and for farms that continue.

Reflections

Regulating the use of animal manure and chemical fertilizer

Controlling the use of N by levies on phosphate and N surpluses

The quantities of nutrients used on individual farms are controlled by levies on phosphate and N surpluses as defined in MINAS. The levies on phosphate, which are linked to phosphate loss standards, play an important role in controlling the use of organic, particularly animal, manure. For the time being, phosphate losses associated with the use of chemical fertilizers are not included in the system of levies. Phos-

phorus is a stable element in controlling the use of animal manure. Contrary to N – that can be lost from animal manure in the form of nitrogen gas (N_2), nitrogen oxides (NO_x) or ammonia (NH_3) – phosphorus is not lost in gaseous form. Reducing the amount of manure to meet the phosphate loss standards contributes to a reduction in both the phosphate and the nitrate load, as reducing the amount of manure results in a proportional reduction in the quantity of N applied with the manure.

In addition, the levy on N in excess of the N loss standards plays an important role in reducing the nitrate load. This levy aims, amongst other things, at controlling the phosphorus/nitrogen ratio of the manure. It should stimulate farmers to take measures in the realm of animal nutrition, that not only reduce the phosphorus content in manure, but also its N content. If the levy would apply to phosphorus only, the lower phosphorus content in the manure could lead to application levels, unfavourable from the point of view of the nitrate load.

The levies on N also serve as a means to regulate the use of chemical N fertilizers, which in the Netherlands are responsible for almost 30% of the nitrate load from the agricultural sector. Contrary to the situation for animal manure, the *Nitrate Directive* does not specify standards for the maximum dose of chemical fertilizers. The *Directive* specifies, in general terms, the obligation to restrict the quantities of nutrients applied to the soil, including chemical fertilizers. So in calculating the N loss standards, losses from chemical fertilizer should also be taken into account. These standards are set higher therefore than would have been the case if they would only serve to control the dose of animal manure with its common phosphorus/nitrogen ratio.

The objective of the interaction between the levy on phosphate on the one hand – which only refers to organic manure – and the levy on N on the other, is to prevent that the room within the N loss standards associated with application of chemical fertilizer, may result in excessive N application in the form of animal manure.

Manure application rates in relation to the EU Nitrate Directive

To meet the standards specified in the *Nitrate Directive*, the Netherlands has to guarantee that at farm level the annual N application in animal manure will not exceed 170 kg ha^{-1}. For the period till 20 December 2002, an annual application of 210 kg N ha^{-1} is permitted. An amount exceeding 170 or 210 kg ha^{-1} can be allowed by derogation, provided the targets of the *Directive* can be realized and such a dose can be justified on the basis of objective criteria.

In common agricultural practice in the Netherlands, a maximum quantity of 170 kg N ha^{-1} in animal manure can easily be realized on arable land. Moreover, derogation of that standard for this type of land use cannot be justified on the basis of objective criteria. Within the system of manure disposal contracts, this standard will be introduced in 2002 already, which appears justified because of its effects on farm management. However, for maize land a standard of 210 kg ha^{-1} will be used in 2002, in accordance with the *Nitrate Directive*. With respect to the restrictions on the use of animal manure on the basis of MINAS, a choice has been made for a gradual introduction on all arable land (including fallow land under the set-aside regulations). The standards will be tightened in two steps. In this way, farm management can be gradually adapted. For the N-rich animal manure the norm of 170 kg ha^{-1} will

have to be attained only in 2003. For 2002, a dose of 190 kg ha^{-1} for arable land is considered. But this is well below the threshold value of 210 kg ha^{-1} that would be permitted according to the *Nitrate Directive*.

Appreciably higher amounts of animal manure are justified for grassland without jeopardizing the targets of the *Nitrate Directive* (Willems *et al.*, 2000). So for grassland, the Netherlands will apply the derogation included in the Directive. For 2002, the basis will be a dose of animal manure equivalent to 300 kg N ha^{-1}, and for subsequent years equivalent to at most 250 kg ha^{-1}. On 20 April 2000, the European Commission was formally informed about the application of the derogation, including its underlying justification. Until June 2001 the Commission had not given its final opinion about the Dutch derogation case.

The justification for the higher doses of animal manure on grassland is based on scientific analyses (Willems *et al.*, 2000). The basis for the analysis is the premise that the nitrate concentration in the upper metre of groundwater should not exceed 50 mg l^{-1} and that the Dutch contribution to the N load of coastal waters and the North Sea should be reduced by 50%. Moreover, implementation of MINAS, as defined for 2002 and 2003, is assumed, including tightening of the loss standards, higher levies, and introducing biological N fixation in the system. In defining the magnitude of the derogation in relation to the environmental targets, the inclusion of chemical fertilizers in MINAS has been taken into account.

According to the scientific analyses, the derogation for grassland can be justified on the basis of the extended growth period of grass and its high N uptake. These criteria are included as such in the *Nitrate Directive*. The temperate, humid climate of the Netherlands is very favourable for grass growth. The growth rate is high, the growing season is long and N uptake continues until October. This implies that N export in the harvested grass is much higher than that of the main arable crops, for which N uptake effectively stops in August. This higher N export in harvested grass justifies a substantially higher N application rate.

To estimate the quantities of N that can be applied in the form of animal manure, a differentiation was made in the analysis according to the main soil types and the major types of grassland use. The analysis indicates that for the 900,000 ha of grassland on soils with a high moisture supplying capacity, a derogation of 360 kg N ha^{-1} can be justified. For grassland on dry sandy soils susceptible to N leaching (about 100,000 ha), the amount is about 290 kg ha^{-1}. As excretion during grazing cannot be controlled by the farmer, the utilization efficiency of manure N is lower, so the losses are higher. This has been taken into account in the analysis.

To arrive at simple, easily enforceable legislation, the Dutch Government decided to define a single derogation for the use of animal manure on grassland, acceptable for all soil types and based on sound scientific evidence. Taking into account the targets set in the *Nitrate Directive*, a derogation of 290 kg N ha^{-1} in animal manure appeared acceptable. Nevertheless, the Government has chosen for a derogation of 250 kg ha^{-1} for all grassland, starting in 2003. With respect to the nitrate target, this norm is on the safe side.

This choice has also been influenced by the need for dairy farms to change from permanent to restricted grazing. On more than half of the dairy farms, restricted

grazing is being used already, and in the future probably will be introduced generally, because of the levies on N surpluses and the tighter N loss standards. It nevertheless cannot be ruled out that on some farms the transition will not be made. On very intensive farms with a high production level, a higher N dose may be possible without violating the loss standards, while the *Nitrate Directive* specifies absolute, non-differential limits.

In the Dutch situation, a derogation lower than 250 kg N ha^{-1} is not desirable. If the permitted N level in the form of animal manure would be set below 250 kg ha^{-1}, intensive land-based dairy farms might be forced to apply additional N in the form of chemical fertilizer to safeguard crop yields. The production level of grassland in the Netherlands is high on all soil types and a dose of 250 kg N ha^{-1} in the form of animal manure can be applied without violating the protection level specified in the *Nitrate Directive*.

To allow farm management on dairy farms to gradually adapt to the new standards, a transition period of one year has been defined, i.e., from 1 January till 31 December 2002. At the same time, the permitted N dose in the form of animal manure on grassland has been set to 300 kg ha^{-1} per year. In view of the analysis by Willems *et al.* (2000), such a one-time high dose is acceptable without violating the standards specified in the *Nitrate Directive*. It should be realized, of course, that this higher dose is related to the norm of 210 kg ha^{-1} for the period till 20 December 2002, as based on the Nitrate Directive, instead of 170 kg ha^{-1}.

The Dutch Government has the opinion that there is strong scientific evidence for this derogation. It nevertheless is impossible to conclude in advance that the European Commission and the Nitrate Committee will agree. Given the complex relation between the use of animal manure, the regulatory mechanisms and the emissions to the environment, the European Commission is organizing at the moment an international review of the scientific report.

Consequences for the loss standards

To reduce the application rates of animal manure on agricultural land to the earlier-mentioned levels, the loss standards for both N and phosphorus in 2002 and 2003 will have to be drastically reduced. Tightening of the phosphorus loss standards is required to reduce the levels of animal manure that are applied. Tightening of the N loss standards is necessary, amongst other things, to ensure that the reduced dose of animal manure is not compensated by higher application rates of chemical fertilizer. This is of importance, because the *Nitrate Directive* only allows derogation provided that at the higher application rates of animal manure the *Directive's* objectives are still realized.

On 25 February 2000, following the earlier mentioned consultations with the main farmers' union, the Dutch Government decided to slightly increase the loss standards compared with those mentioned in the Letter of September 1999 (Anon., 1999a). Concurrently, the mineral load on ground- and surface water in the clay and peat areas of the Netherlands will be further quantified by research and monitoring. In 2002, in the context of a total evaluation of the manure and ammonia policy, it will be reconsidered whether adaptation of the loss standards for 2003 and later is

necessary. In this reconsideration the results of both the monitoring programme and the discussion with the European Commission with respect to the depth at which the nitrate concentration should be monitored, will be taken into account.

Soils susceptible to nitrate leaching

From 1 January 2003, lower loss standards have been defined for soils susceptible to nitrate leaching, i.e., dry sandy soils and löss soils with a deep groundwater table, where mobile nutrients such as nitrate that are not taken up by the crop are leached relatively rapidly. These soils have a low buffering capacity so that the nitrate concentration in the groundwater relatively easily exceeds the standard of 50 mg l^{-1}.

Increasing the levies

In the earlier-mentioned reasoned opinion, one of the main objections of the European Commission is that the levies in the MINAS system are insufficient to guarantee compliance with the regulations in the *Directive*. In fact the Commission requires that the height of the levies be prohibitive. In response, the Dutch Government has reconsidered the gradually increasing level of the levy on phosphate, and has concluded that a levy of Dfl. 20 (€ 9.08) per kg phosphate surplus above the standard is sufficiently high to control its use now and in the future. The height of the levy should stimulate farmers to select alternative options, such as manure disposal at larger distance and manure processing, rather than paying the levy.

The levy currently specified for N in the *Manure Act*, i.e., Dfl. 1.50 (€ 0.68) per kg in excess of the surplus, is sufficiently high to reduce N losses associated with the use of chemical fertilizer, especially as a reduction in fertilizer use results in lower costs for the farmer. However, the levy is too low to induce farmers to take measures that involve costs resulting from adaptations in animal nutrition, in the feeding system or in the grazing system. So it is proposed to increase the levy to Dfl. 5.00 (€ 2.27). As a transitional measure the levy will be increased gradually in the year 2002.

Regulating the production of animal manure: system of manure disposal contracts

To ensure effectiveness of the regulations aiming at a reduction in the use of fertilizers, particularly of MINAS, it is essential that production of animal manure at national level does not exceed the total quantity that can be applied at the own farm or disposed of to other (arable) farms. Considering the extent and intensity of the livestock sector in the Netherlands, additional instruments are required that aim at a direct control of the quantity of manure produced. The Government has opted for an integral approach, based on a so-called system of manure disposal contracts for all livestock sectors. The principle of the system is that the permitted quantity of manure produced on a livestock farm is directly dependent on the possibilities for its application on the same farm and on the possibilities for its disposal, taking into account the standards of the *Nitrate Directive*. If the farmer does not have enough land to use all of his own manure, he is obliged, prior to its production, to guarantee pos-

sibilities for its disposal through manure disposal contracts. These possibilities refer to manure application on agricultural land of third parties that are allowed to apply animal manure, taking into account the standards of the *Nitrate Directive* and their own manure production, and to disposal outside Dutch agriculture. The latter includes disposal of manure abroad via recognized exporters, either processed or not. Processing can take place on the own farm or in a recognized processing plant converting the manure into products that are no longer considered animal manure or into any other type of organic manure. Manure disposal also includes burning.

Compared with other animal licensing systems, the system of manure disposal contracts has a number of advantages: (i) the direct link with the standards defined in the *Nitrate Directive*; (ii) its emphasis on land-based systems; and (iii) conditions have to be satisfied before a license is granted.

The system of manure disposal contracts is to be implemented on 1 January 2002. For the time being, the manure production rights, the pig production rights and the poultry production rights will be maintained along with this new system. The arguments behind this decision are: (i) the new system has to prove its effectiveness in practice, (ii) existing animal licenses are a guarantee for a sound and enforceable introduction of the new system, and (iii) the animal production rights form the basis for various supporting measures that are taken within the framework of closing-down farms. However, it should be avoided that both systems aiming at controlling the quantity of manure produced in the Netherlands are maintained in parallel for too long. Stacking similar measures should be avoided as much as possible. So the animal production rights will be abolished as of 1 January 2005. Until that date, in order to produce animal products, including manure, farms will need animal production rights *as well as* manure disposal possibilities.

Discussion

The points of discussion between the Dutch Government and the European Commission deal with the flexibility and the room for interpretation of the *Nitrate Directive*. The formal objections of the Commission against the Dutch policy have been indicated above. Part of the criticism is directed towards the fact that the announced policy has not yet been implemented. This is a temporary problem that will disappear as soon as the policy is implemented.

A more fundamental point of criticism refers to the very system underlying MINAS and the loss standards. The Dutch Government is of the opinion that in implementing the *Nitrate Directive* the primary goal is *realization of the objectives*, allowing the member states some freedom in selecting *the means* to realize these objectives. The Dutch Government is also of the opinion that MINAS fits within the framework of the *Nitrate Directive*, irrespective of whether the loss standards are sufficiently tight to reduce the N load on ground- and surface water to the required level.

A complicating factor in the discussion for certain is that the Commission, in general, considers nutrient balances at plot level, and that it seems to have difficulties in

making the link with input-output balances at farm level, which is the basis for MINAS.

A second issue that leads to intensive discussions, both between the Dutch Government and the Commission and within the Netherlands, is the nitrate standard of 50 mg l^{-1} in the groundwater in relation to the *Nitrate Directive*. The discussions are about the justification of the absolute value of the standard and about the groundwater depth at which this should be determined. This is a relevant discussion, because it forms the basis for the evaluation by the Commission of both the effectiveness of the Dutch policy and the justification of the derogation. Because of human-toxicological reasons, the value of 50 mg l^{-1} has recently come under criticism. The value is considered unnecessarily low. A recent review by the World Health Organisation (WHO), however, gives no rise to a modification. Both, the European Commission and the Dutch Government follow the advice of WHO. The *Nitrate Directive*, however, does not explicitly specify the depth at which the standard should be attained. Although the Commission currently is drafting monitoring guidelines, these guidelines do not explicitly specify the depth either. Moreover, the Commission has indicated not to have the intention to grant legal status to the guidelines. In this context it should be noted that the effect of the value of the nitrate standards in the *Nitrate Directive* is less direct than in the Dutch MINAS. The *Nitrate Directive* is essentially a system specifying the means, while in MINAS the objectives are specified.

A final discussion point is the formal announcement by the Dutch Government to the European Commission that for grassland a derogation of the maximum N application rate in the form of animal manure will be applied, i.e., 250 kg ha^{-1} in 2003, compared with 170 kg ha^{-1} as specified in the *Directive*. The substantive arguments have been put forward already. The scientific analysis underlying the derogation is currently subject of an international expert review. It is to be expected that the results of this review will form an important factor in formulating the standpoint of the Commission with regard to the Dutch derogation.

The Dutch government wants to fully implement the EU *Nitrate Directive*. But it has the opinion that member states should be allowed some flexibility in its implementation. This discussion and the evaluation have not yet been brought to a conclusion. In the Netherlands, the manure policy is a highly political item that is under meticulous scrutiny of Parliament. It is also discussed with the farmers' unions and with environmental organizations. So it can be anticipated that in the near future further adaptations to the policy will be made.

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