Ministry of Agriculture, Nature Management and Fisheries

Policy Document on Manure and Ammonia

landbouw, natuurbeheer
en visserij

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1 INTRODUCTION

Halfway through the 1980s the Dutch government embarked on a policy to address the manure and ammonia problem. The policy was introduced in phases to give farmers the opportunity to meet environmental demands and convert to environmentally friendly production. During the first phase the environmental burden would have to be stabilized. To achieve this manure production rights and use standards for livestock manure were introduced. During this phase the industry was also encouraged to find ways to solve the manure problem. The second phase was introduced to achieve an actual reduction of the environmental burden. Use standards were tightened and reduction targets were set in such a way that farmers would have the opportunity to work towards meeting the new standards. The agricultural sector has certainly made an effort: investments were made into environmentally friendly technology and management was improved. In this way the targets set for the first and second stage have been realized.

By the end of the third phase (1995 to 2000) the final objective of the Dutch manure and ammonia policy, the equilibrium between inputs and outputs, would have to be a fact. How this was to be done was outlined in the former cabinet's Policy Memorandum on Manure and Ammonia (Phase Three). Central to the Policy Document was the reversal from a generic to a farm-oriented approach. Loss standards for phosphate were proposed, which would establish total allowable surpluses. The envisaged equilibrium between inputs and outputs would have to be achieved in this way. The government and the industry agreed that a study would be carried out to investigate the feasibility of the proposed loss standards.
When the Policy Memorandum was worked out into concrete measures the first problems began to present themselves. First, a change-over from the old system to the new would demand much more time than was initially envisaged.
Second, developments in large-scale manure reprocessing were lagging behind. This would make it impossible for farmers to sell their surplus manure and meet tightened loss standards.
And finally the study carried out by the government and the industry showed that the gap between environmentally acceptable losses and unavoidable losses (those that occur with good agricultural practice) could not be bridged. This meant that an equilibrium between inputs and outputs, the target set for the year 2000, was unrealistic.
On 4 October 1994 a letter was sent to the Second Chamber of Dutch Parliament urging for a reconsideration of the outlined policy. After consultations the Second Chamber agreed there was a problem and that the proposed ammonia and manure policy had to be reviewed. The Second Chamber urged to consider whether a reduction in herd numbers would be an option. It was also decided that a new policy document would have to be drawn up.

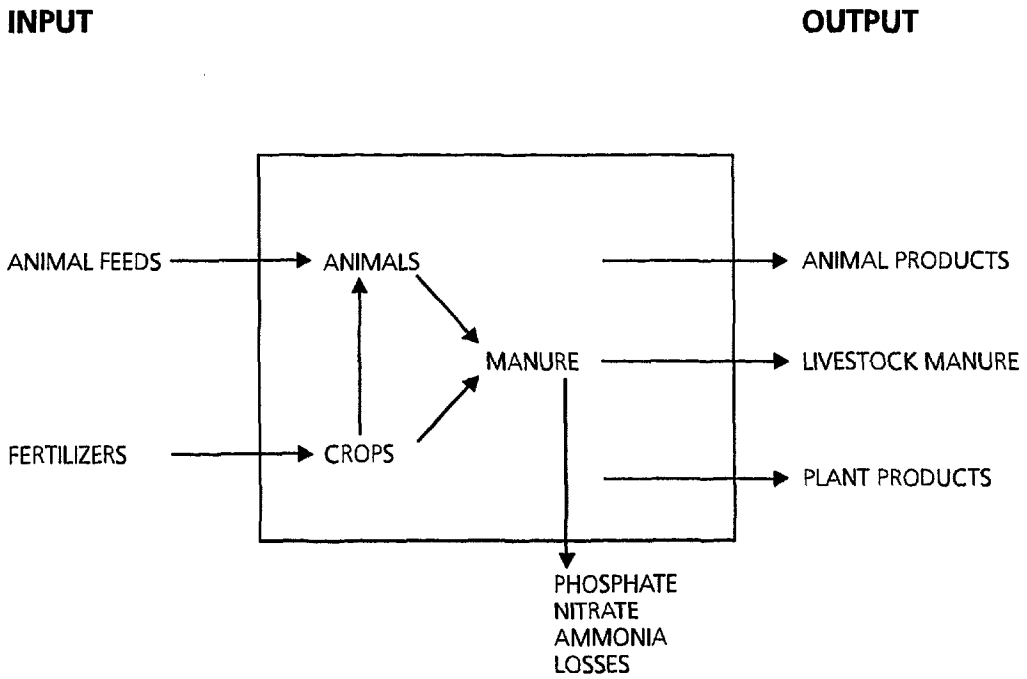
This policy document, which was presented to the Second Chamber on 6 October 1995, outlines the new manure and ammonia policy. It presents the strategies proposed for the next 10 to 15 years. It indicates the directions agriculture should take to become a clean agriculture. This policy paper is not a blueprint: it leaves room for details to be fleshed out. This is to be done in co-operation with other authorities and the organizations most closely involved.

2 ANALYSIS OF THE MANURE AND AMMONIA POLICY

2.1 The manure and ammonia problem in Dutch agriculture

Dutch agriculture is an intensive agriculture. This means that on average stocking density per hectare is high and crop production is intensive. In order to realize high levels of production mineral input (via fertilizers, manure, animal feeds) is high. It is true that minerals leave the farm in products but in national terms mineral inputs are far higher than mineral outputs. Minerals such as nitrates and phosphates applied in excess leach from the soil into the ground and surface waters and ammonia from livestock manure is released into the air.

FLOW CHART OF MINERALS



LOSSES = INPUT MINUS OUTPUT

Mineral losses from agriculture have a damaging effect on the quality of water, soil and air. When high nitrate concentrations are found in water the water must be purified before it can be used as drinking water or as raw material for the food industry. In 2000 water companies will have to spend an extra Dfl 30m a year on water purification. These extra costs are inevitable on account of the after-effects of high nitrogen inputs in the past. In the short term, i.e. up to the year 2000, savings can be made of Dfl 10m a year.
In the longer term, however, i.e. after the year 2000, water purification costs will probably rise by tens of millions of guilders a year, but the extent of this rise depends on the policy pursued.

A surplus of phosphates and nitrates in ground and surface waters leads to eutrophication which has a damaging effect on biodiversity (disappearance of plant and animal species, excessive growth of algae). This has its repercussions on outdoor recreation (swimming, fisheries).
Ammonia emission from agriculture causes acidification and eutrophication of forests and nature areas and puts an excessive burden on groundwater. As a result the health of our forests and nature is deteriorating.
Under a plan for the survival of forests and nature an annual sum of Dfl 70m will be spent, up to the year 2010, to combat the effects of eutrophication, acidification and drying of forests and nature areas. The 'Natuur en Milieu' environmental group estimates the total costs of eutrophication and acidification resulting from agriculture at an annual Dfl 450 to 600m in the year 2000. As of 2015 this may rise to Dfl 1bn if the present policy continues.

Agriculture is not the only sector that burdens the environment with phosphates and nitrogen. But its contribution to surface waters - 30% of total phosphate pollution and 75% of total nitrogen pollution - is substantial. Also more than half of total acidification from Dutch sources can be traced to ammonia emission. Agriculture is responsible for 90% of all ammonia emission. The burden placed on the environment by agriculture should therefore drastically be reduced to meet the targets laid down in the National Environmental Policy Plan. The Netherlands has also committed itself internationally as it is among the signatories to the EU Nitrate Directive and the North Sea and Rhine Action Programme.
To reduce the environmental burden of phosphates and nitrogen the following issues have to be addressed:

- the over-application of livestock manure;
- the over-application of inorganic fertilizers;
- ammonia emission.

The burden placed on the environment by agriculture is not the same everywhere. Dutch agriculture is a highly differentiated sector and so some areas are worse affected than others. There are large differences per region and per sector but also per farm. Possibilities to address the problem vary as does the extent to which efforts are to be made.

Since the early 1980s the agricultural sector has done much to try and reduce the environmental burden.
Between 1985 and 1994 nitrogen losses to the soil (inputs minus outputs via products) decreased by 16%. They would have increased by 40% without the policy for manure and the milk quota system.
The use of nitrogen fertilizers has been reduced by almost 30% since 1985.
Since 1980 there has been a 26% reduction in ammonia emission from manure. Phosphate losses have been reduced by 25% since 1987.

The total net costs for agriculture to meet environmental standards (including those concerning eutrophication and acidification) increased from an annual Dfl 23m in 1985 to Dfl 606m in 1994.

2.2 The manure problem

2.2.1 Livestock manure

The livestock sector in the Netherlands is a highly intensive sector: i.e. very high stocking rates are found on a fairly limited land area. This is made possible by importing large amounts of animal feeds. As a result the livestock sector produces far more manure than is needed which in turn leads to the over-application of manure on crops. The problem of over-application varies per region. Areas of intensive livestock production are found in the east and the south of the Netherlands. The problem therefore is worst in these areas.

Over recent years the manure policy was aimed at reducing the surplus of livestock manure. Measures were introduced to cover manure production and sale.
Manure production rights were introduced to restrict the production of livestock manure and animal feeds with low mineral contents were promoted. Consequently phosphate levels in manure fell by an average 10%.
The sale of manure was promoted. The redistribution of manure, moving the manure from areas of high stocking densities to areas of lower stocking densities - arable farming areas - has taken off (see Table 2.1). So has the export of high-quality poultry manure (see Table 2.1). However, manure reprocessing on a large scale has not come up to expectations in spite of a whole package of promotion measures (see Table 2.1). Manure reprocessing has turned out to be far more expensive than was initially thought on account of high costs for the development of new technology, expensive treatment processes and the difficulty of finding outlets for the reprocessed products.

Table 2.1 Redistribution, reprocessing and export of manure in m kg P_2O_5

	1988	1994
Total redistribution	54	67
of which in areas of intensive production	32	26
Reprocessing	1	2
Export	1	12
Total	56	81

Source: Stichting Landelijke Mestbank

As can be seen from the above the producers with high manure outputs were presented with high extra costs. To minimize these costs it is important that producers be given a number of options so that they can choose the measures that suit their situation best. This may vary per sector and per farm.

Use standards for manure have been tightened gradually over the years to enable producers to keep the right balance between manure production and sale. Therefore, on a national scale, we do not now find ourselves with a manure surplus that cannot be sold. A further tightening of standards, however, which will be necessary to meet environmental targets, is likely to upset this balance if no additional measures are taken.
If the above measures, like improved animal feeds, redistribution, exports and reprocessing, fail to produce the desired result there is nothing for it but to reduce manure production by restricting manure production rights. It is therefore imperative that every effort be made to realize solutions to the problem of surplus manure.

2.2.2 Fertilizers

The problems arising from the over-application of inorganic fertilizers are quite different from those caused by the over-application of manure. Fertilizers are relatively cheap and can be applied more accurately. In such crops as grass, which are not adversely affected by the application of high doses but give lower yields when doses are low, fertilizers are used generously. In livestock farming such large doses are quite common. High doses are also found in bulb-growing and in field vegetable production. Much less so in arable farming where large amounts of (nitrogen) fertilizers affect the quality of the product.

It has been found that the use of fertilizers can be reduced drastically if farmers are more aware of unnecessary losses. By means of minerals accounting farmers can keep a check on the minerals that enter and the minerals that leave their farm. Not only the environment will gain by a reduction of mineral losses; farmers themselves will profit as well. Improved fertilizer recommendations and the replacement of fertilizers by manure has led to a 30% reduction in fertilizer use over recent years.

2.2.3 The manure and ammonia problem per sector

The contribution to the manure and ammonia problem differs per sector.

Table 2.2 Contribution per sector (1993)

	Number of animals	Share in manure production	Share in manure surplus
Cattle	4.8m	49%	4%
Pigs	15.0m	34%	58%
Poultry	96.0m	17%	38%

Source: CBS/LEI-DLO

The cattle farming sector (some 62,000 farms) is varied. A large proportion of the sector still consists of traditional land-using systems where farmers grow their own fodder and can spread the manure on their own land. By reducing fertilizer input and improving their animal feed it is not difficult for these farmers to meet the tightening standards and achieve clean production methods.

The sector also includes a large number of intensive producers, who even with reduced fertilizer input and improved animal feeds still cannot dispose of all their manure in a responsible way since their land area is fairly limited. For these farmers there are several options to meet the tightening standards. First, they can dispose of their surplus manure by selling it. They can also reduce their manure output by reducing their stocking rates per hectare. This can be done by selling the less profitable cows and increasing the milk yields of the remaining cows to fill the quotas. There is also the option of buying more land.

Around 10,000 cattle farms also have pigs. The land on these farms is primarily used for home-grown fodder. Generally, the pig slurry has to be disposed of elsewhere.

Pig production (some 10,000 farms) is characterized by very high stocking rates. Pig producers in general have very little or no land on which to spread their slurry and their surpluses are therefore generally high. To meet environmental quality standards pig producers have to dispose of part or all their slurry by selling it. This can be done by redistribution (selling the slurry to arable farmers to spread on the land) or by reprocessing (selling it to a reprocessing plant). The latter method is relatively expensive. It is also difficult to export pig slurry: it cannot compete with poultry manure and there are EU provisions to contend with (92/118/EEC).
Pig producers can reduce their mineral output by using low-phosphate feeds and improving their water management. Another option is treating the slurry on site: withdrawing water from the slurry reduces volume and transport costs.
Pig producers will be faced with a challenge now that slurry disposal costs are rising on account of mounting competition and fewer outlets. Pig producers' profits have been falling over recent years. The sector is faced with falling prices, cut-throat competition, structural problems and animal health and welfare problems. A major restructuring of the pig sector is the only solution.

Another sector with high stocking rates is the poultry sector (some 2,000 farms). These farms also have to dispose of virtually all their manure. The advantage of poultry manure however is that it is drier and of a better quality than pig slurry. It is not too difficult to sell poultry manure on the domestic or foreign markets. It is in this sector that the export of manure has really taken off. Consequently the poultry sector stands a better chance to meet environmental standards. Still, as in the pig sector, profits have been falling, and animal health and welfare standards are being stepped up.

For the arable farming and horticulture sector (some 38,000 farms) it will not be too difficult to meet tightening standards provided they are careful in their use of fertilizers and manure. Too high doses of nitrogen affect the quality of products. If the manure supplied from elsewhere is used during the growing season the sector need not worry about mineral surpluses becoming too high. However manure is also used outside the growing season as the manure also contains organic substances that benefit soil structure. This is an environmental hazard as the nitrogen not absorbed by the soil is leached to ground and surface waters. As manure surpluses rise and arable farmers get paid for taking in manure, it will progressively be more difficult for arable farmers to observe use standards. We must see to it however that the surplus manure problem is not shifted from intensively farmed regions of livestock production to less intensively farmed arable regions.
There are also some 4,000 arable farms which combine arable and livestock farming. These on the whole have enough land on which to spread their manure and still meet environmental quality standards.

In bulb-growing and in field vegetable production there is also a potential environmental hazard. High doses of fertilizers allow producers to harvest more than once a year, as in cabbage growing for instance. In bulb-growing high fertilizer input does not affect the quality of the end product. High mineral inputs are therefore quite common in this sector also because fertilizer costs are relatively low.

2.2.4 Differences between regions

The different sectors are not distributed evenly over the country. Pig and poultry production are concentrated in the south and east of the Netherlands. Livestock production in these areas is also intensive generally. It is in these areas therefore that most of the manure surpluses are found. Soils in these areas are also more susceptible to leaching than in other parts of the country.
In the north and west of the country where arable farming and horticulture predominate, livestock production is more extensive. The number of intensive farms is small and those that have a manure surplus find a ready market with arable farmers nearby, which helps to keep transport costs low.
The tightening of standards will affect sales of manure and in areas of intensive production this will be most keenly felt.

2.3 The ammonia problem

2.3.1 Reduction of emission and deposition

Ammonia emission from farms must be reduced to lessen the burden placed on forests and nature areas. Ammonia loss into the atmosphere is caused by animal housing and manure storage (36%), manure spreading (50%) and animals in the field (14%). This is in the absence of emission-reducing measures. However these figures can be reduced by such measures as low-emission application and covering manure storage tanks. Reducing ammonia loss in animal housing is also possible but depends very much on the sector involved.
The costs of building low-emission housing are appreciably higher than those of low-emission application. Moreover, since spreading accounts for 50% of ammonia loss, low-emission application is by far the most cost-effective measure to reduce emission.

Obviously farms in the near vicinity of forests and nature areas place a heavier burden on these areas than the more distant farms. To reduce ammonia deposition in forests and nature areas the building of low-emission housing is the most effective measure for farms in their proximity. Farm relocation is another option.

2.3.2 Emission-reducing options per sector

Livestock production accounts for 55% of all ammonia emission from agriculture. Ammonia emission can be reduced by low-emission application and the covering of manure storage tanks. Other emission-reducing options are selling less profitable animals, increasing milk yield per cow and improving animal feeds. The introduction of low-emission housing units in livestock production would be less effective here than in other sectors. Low-emission housing units are on the market but the systems are still in their infancy.

Pig production has a 30% share in ammonia emission. This figure too can be reduced by low-emission application. The development of low-emission pig units is a recent development. Low-emission systems are quite expensive but the costs are expected to fall. In addition to lowering slurry volumes these systems not only improve the animal's living conditions; they also improve animal health.

The best emission-reducing measure in the poultry sector (15% of total emission) would be to improve housing systems. This sector leads the way in the development of low-emission housing systems and this option is therefore the most effective way toward emission reduction and producing high-quality dry manure.

2.3.3 Differences between regions

As three-quarters of the ammonia released into the atmosphere disperse over a distance, livestock producers all over the country contribute to the ammonia problem. In this sense the problem is a national one and calls for a national approach.

One quarter of the ammonia released is deposited near the source. Much of the ammonia deposition in forests and nature areas thus comes from nearby farms with high stocking densities.
Still, not all forests and nature areas are susceptible to the same degree. Much depends on type of soil and vegetation.
Sandy soils are most susceptible to acidification and forests and nature areas on such soils are worst off. Sandy soils are mostly found in the east and south of the country and since these are also areas of intensive production the ammonia problem is most keenly felt there.

The ammonia problem therefore demands a national as well as a regional approach.

3 POLICY OUTLINES

Clean production methods are an absolute requirement in agriculture. Not only with an eye on our environment, but also to secure the competitive edge and the international image of Dutch agriculture. This requirement brings on the need to significantly reduce mineral losses in agriculture. The rate of reduction depends on a careful weighing of interests. An adequate balance must be struck between the necessity to restore the quality of our environment as soon as possible and the interests of an agricultural sector faced with making great sacrifices.

Experience has shown that policies are only effective if they are realistic and practicable. If aims with a limited feasibility are pursued it does not encourage any new steps, and having to comply with unfeasible standards invites fraud. A clear policy is required that is feasible for the sector and enforceable for the government; a policy that is just to the farmers and from which the environment will gain.
In all this it is important to make an appeal to the dynamism and innovative capacity in agriculture. Providing clear objectives for the longer term stimulates the sector and enables it to make the necessary adjustments and investments.

The key factors to an environmentally friendly agriculture will be enterprise, farm improvement and technological innovation. They will sort maximum effect if the diverse circumstances within the agricultural sector are taken into account in the manure and ammonia policy. Where regulation is required, it should be flexible to allow for farmer creativity and enterprise. A differentiated approach rather than a generic one is called for. Farmers will be allowed to choose the measures that suit their situation best.
Flexibility is also required to allow for regional differences. In regional problems, appropriate solutions will be welcomed from regional authorities and public bodies. The national government will restrict itself to designing a policy framework and facilitating processes.

A generic approach is less effective in this phase of the manure and ammonia policy, even where stricter regulation is called for. In this complex policy area government intervention will be most effective where the environmental risks are greatest, taking account of the diverse circumstances farmers are faced with.

Working towards environmentally friendly production demands farmers to make great efforts. Increasing awareness and encouragement of good practices are often better incentives to change than a command and control approach. Policies should not exclusively target the most polluting farms. By exempting farmers who already do well, an incentive is created for others to follow suit.

The government must keep regulation to a minimum, as agriculture is heavily burdened with regulation already. More regulation is only acceptable to improve environmental quality, and new rules must not only be practicable, but also enforceable, to ensure that those living up to them will not have to pay for those that are not.

Progress will be monitored carefully. A monitoring system will be set up to get an insight into the adjustments required.

Finally, the design and implementation of the minerals policy must be linked up with other current priorities, such as quality assurance. Where possible problems will be addressed in cohesion.

4 TOWARDS AN ENVIRONMENTALLY FRIENDLY PRODUCTION

In the coming years policy will focus primarily on the farms placing the heaviest burden on the environment. In this way the greatest risks are tackled first and regulation is kept to a minimum. Regulating a limited group also makes for easier implementation and enforcement. The target group will be extended gradually, allowing the system to remain practicable throughout and to benefit from experience gained with the new regulation system.

In general it can be said that the farms posing the greatest environmental risks are intensive livestock farms with great mineral losses and a relatively limited land area. The aim was to find a simple system to differentiate between these and more extensive, less environmentally hazardous farms. Although the mineral loss per hectare is the central issue, measuring mineral losses per farm seemed too great a technical and administrative burden. Instead, stocking densities, expressed in livestock units per hectare, are taken as the yardstick. As livestock registration is required for any system, this measure does not involve extra paperwork.

The standard unit for livestock density and for mineral production per hectare is one dairy cow, which is equivalent to one livestock unit (LU).
From 1998 to 2002 a minerals accounting system is only obligatory for farms with a livestock density of 2.5 or more dairy cows per hectare. For farms with other animals an equivalent target will be used.
In 2002 the standard at which minerals accounting becomes obligatory will be lowered to 2 LU/ha (see Table 4.1).
Such a system is not obligatory for farms with a livestock density between 1.5 and 2 LU/ha. For them it is quite easy to spread their manure on their own land in an environmentally responsible and economically efficient manner. However, under the present circumstances there is no guarantee that production will be environmentally responsible as inorganic fertilizer use may be high. Farms with 1.5 to 2 LU/ha are encouraged to reduce their mineral losses voluntarily. The situation will be monitored and in 2005 it will be decided whether minerals accounting will be introduced for this group as well.

4.1 Basic set of measures

A set of measures which has proved its effectiveness in the past will become applicable to all farms as a basic package. It contains the following measures:
- a ban on spreading manure in autumn and winter, now to start on 15 September for non-leaching-prone grassland;
- when spreading manure to make use of techniques that keep ammonia emission to a minimum;
- to cover stored manure.

4.2 Intensive livestock production units

At first, only pig and poultry farmers, mixed cattle and pig farmers and intensive cattle farmers will have to register mineral losses. Until 2002, this amounts to approximately 35% of all farms and 50% of livestock farms.

As concluded in Chapter 2, there are large differences between sectors and farms. As the possibilities to reduce mineral losses differ so much from farm to farm, it is important that the regulation system allows individual farmers to choose the measures that suit their situation best.

4.2.1 *Minerals accounting*

The best way to make farms account for the methods they use, to take account of differences within sectors and to stimulate technological development and enterprise is a minerals accounting system (MINAS).

The minerals accounting system involves a registration of the mineral inputs (nitrogen and phosphate) used on a farm in fertilizers and animal feeds, and the mineral output in the form of products and manure. The difference between inputs and outputs is the mineral loss which ends up in the environment. When the loss is larger than the allowable standard, a levy applies.
The system enables individual farmers to give evidence of the effects of their efforts to produce in an environmentally friendly way.
The minerals accounting system has been developed jointly by the industry and government in the past few years. It has its weaknesses, particularly as to incentive effect and enforceability, which was brought out by a series of tests. The same weaknesses were found in the present manure accounting system. It is expected that with an equilibrium on the manure market and a number of conditions met, the minerals accounting system will be satisfactory as to incentive effect and enforceability. The additional conditions will be realized through legislation. Valuable insights have been gained in the working of minerals accounting, and the system has been improved by reliable analysis and sampling methods and by the comparison of data from farmers, input suppliers and the processing industry. Manure distributors will now also be involved in the system. To aid its enforceability and enable timely adjustments monitoring will be important.

Minerals accounting does not require much extra paperwork for farmers, as the input and output values required feature in the financial adminstration already. The burden of implementation for the government is considerable, but is restricted somewhat because only part of the farmers are obliged to take part. Farmers pay part of the cost of minerals accounting via a levy on surplus manure.

Farmers have a choice between an exact declaration of losses or declaration of a standard amount. With an exact declaration, the specific mineral contents are recorded of all the substances entering and leaving the farm. This system is intended for farms with many possibilities to influence mineral contents in inputs and outputs. Recording the exact amounts is farm more time-consuming and costly as the manure that leaves the farm will have to be sampled and tested. Each farmer must decide if the use of exact declaration offsets the savings on manure disposal cost.
Not all intensive livestock farms will want to declare exact amounts of minerals losses. Standard declaration involves less paperwork for both farmers and the government.

Introduction of the system is scheduled for 1998. The present manure accounting system will then expire. The manure disposal plan as anticipated in the Policy Memorandum on Manure and Ammonia (Phase Three) will be scraped.

4.2.2 *The loss standards*

The difference between input and output of minerals is called mineral loss. To facilitate the introduction of minerals accounting part of the losses are considered allowable and no levy has to be paid on them. Mineral loss standards have been set until 2008/2010 (see Table 4.1). This enables farmers to make plans for investments and farm improvement. The loss standards until 2008/2010 are based on the following key objectives:

- to make a great leap forward in reducing the environmental impact of farming;
- to follow a phased approach to enable the sector to adapt and to avoid unacceptable social and economic consequences;
- to base the standards on good agricultural practice and minimum use of manure.

The loss standard for nitrogen in 2005 is such that in a large part of the country the quality requirement for groundwater concerning nitrates can be met. However, for the vulnerable sandy soils a further reduction of nitrogen losses is required. The choice of the loss standards for 2008/2010 is informed by present insights into the reductions required to meet environmental quality objectives. It is uncertain if in this way a balance will be achieved between the application of manures and fertilizers and the mineral requirements of the soil.

Due to the exceptional intensity of livestock production in the Netherlands compared to other EU member states, the policy intentions are at odds with the objectives in the EC Nitrate Directive. In the Dutch situation the implementation of this directive requires drastic measures which take time. Also, the objectives will have to be achieved via a different route. This will require consultations with the European Commission. According to present data, loss standards of 180 to 200 kg nitrogen per hectare are required to meet the objective from the Rhine and North Sea Action Programme to reduce the nitrogen level by 50% in relation to 1985.
With the introduction of the minerals accounting system in 1998 allowable loss standards will come into force for the first time. For phosphate (P_2O_5) the allowable loss will be 40 kg/ha, and for nitrogen 300 kg/ha for grassland. (Allowable losses for arable land will be determined later depending further research.)

In anticipation of the system's introduction, the use standard for phosphate for grassland will be lowered from 150 to 135 kg/ha per year. In this way, the average loss on grassland (55 kg/ha) is brought down to about the same level as the present average loss on arable land. This measure is also expected to have a limiting effect on nitrate pollution. It is included in the draft amendment to the Use of Livestock Manure Decree.

In the year 2000 the allowable phosphate loss will be set at 35 kg/ha per year and that of nitrogen at 275 kg/ha. In 2002 the allowable phosphate loss will be down to 30 kg/ha and the nitrogen loss to 250 kg/ha per year. The allowable loss levels for 2000/2002 are based on current insights into what is agronomically feasible. At present, average losses in livestock areas are 65 kg of phosphate and 370 kg of nitrogen per hectare. The targets will considerably reduce the burden on the environment and slow down the rate at which soils become saturated with phosphate.
It is found that farms where manure is applied efficiently in line with the current use standards are able to meet the anticipated nitrogen loss standards. Phosphate loss standards, however, are generally not entirely met. Many farms will have to make considerable efforts to meet the stricter standards.

For a number of farms these efforts will involve cuts in income, with potentially large differences between farms. On average, incomes in livestock farming will be Dfl 1000 lower in 2000, which is 3% less than they would be on account of autonomous developments. Incomes of pig farmers will be an average Dfl 7000 lower, or 15% less than what is expected on account of autonomous developments. Poultry farmers and arable farmers are virtually unaffected economically.
Other effects are a drop in employment and added value (Appendix 2).

The next step is scheduled for 2005: a decrease of the allowable phosphate loss to 25 kg/ha per year and of the allowable nitrogen loss to 200 kg/ha.
Eventually in 2008/2010 levels of 20 kg of phosphate loss and 180 kg of nitrogen loss are to be reached. This will not have any negative consequences for soil fertility, also because 'reparation dressing' is allowed (see section 4.2.4).

4.2.3 Levies

Levies are to be paid on mineral losses exceeding the allowable standard.

The levy depends on the extent to which the allowable loss is exceeded. The levy rates are progressive: the more the standards are exceeded, the higher the fine. Until 2005 farmers are to pay a levy of Dfl 5 per kg for the first 10 kilos exceeding the standard, and Dfl 20 for every additional kilo (see Table 4.1).

To enforce an efficient redistribution of manure surpluses, the levy for exceeding the phosphate loss standards will have to be relatively high. For the levies to be effective, the higher levies must be higher than the most expensive disposal option. To facilitate the transition to tightened loss standards levies make measures such as improved feed, manure application management and manure redistribution at short range worth the effort.

The reduction of nitrogen losses is effected through reduced inorganic fertilizer use. A nitrogen levy will be determined later, dependent on the cost involved in meeting the loss standard. The levy can be relatively low and a progressive rating system is not necessary.
An information campaign will stimulate farmers to reduce inorganic fertilizer use, which often is also economically more efficient.

4.2.4 Reparation dressing

Joint studies carried out by the government and the industry indicate that stricter loss standards can lead to a lower phosphate level in the topsoil. In soils with a low phosphate level and in phosphate-fixing soils, the stricter standards can affect soil fertility and result in lower crop yields. To counter this effect, an allowance is made for 'reparation dressing'.
The allowable phosphate loss can be set at 50 kg per hectare if farmers are able to prove with soil samples that phosphate levels are low. The reparation dressing tool will be tested for enforceability to enable uniform application. The tool will be introduced simultaneously with the minerals accounting system.

4.2.5 Integral environmental licence

In the coming years other instruments will be investigated to reduce regulation and to contribute to more environmentally friendly methods in agriculture which will be less of a burden for both farmers and government.
Experiments are being considered with integrated environmental licences.
In selected municipalities the manure and ammonia regulations may be temporarily lifted and replaced by integrated environmental licences. Farmers whose environmental management is in order would be granted such a licence, which covers ammonia emissions, manure distribution, mineral ledger and pesticide use.
Municipalities would have to apply to be granted this experimental status, and would have to consult farmers, environmental organizations and water quality managers before they do so. Such integrated environmental licences must be as environmentally effective as the general regulation.

4.3 Non-intensive livestock farms and holdings without cattle

Approximately two-thirds of farms (arable farms and horticultural holdings and the less intensive cattle farms) operate below the livestock density standard and will until 2002 only be subject to a basic set of measures applicable to all farms.

4.3.1 Manure supply

With such a large group exempt from further regulations, it must be avoided that the manure surplus problem is passed on from livestock farmers to arable and less intensive cattle farmers. Taking on manure for use on one's land will increasingly become a source of income, which is liable to lead to less desirable practices.
To prevent this situation the amount of manure supplied to farms that remain below the livestock density standard should be registered and not exceed a maximum to be set.
Such a registration system of manure supply is required also to complement the minerals accounting system, for manure can be channelled off to farms for which minerals accounting is not obligatory. Here, too, the supply standard will be enforced with fines levied on the amount supplied in excess of the standard.

The supply permitted is based on the average phosphate requirement in cropping programmes of arable farms and extensive livestock farms in the Netherlands. The height of the supply standards ensures a sufficiently low nitrogen use as well.
If no manure is produced at a farm, a maximum of 80 kg/ha of phosphate may be supplied in the form of manure and other organic fertilizers. The supply standard will be gradually lowered to give farmers a chance to adapt to tightened standards. From 1998 the supply standard for manure and other organic fertilizers will be set at 120 kg/ha of phosphate for grassland and 100 kg/ha of phosphate for arable land. In 2000 the supply standard for both will be lowered to 85 kg/ha and in 2002 to 80 kg/ha (see Table 4.1). With 80 kg of phosphates it is expected that environmental problems as a result of the use of manure and other organic fertilizers will no longer occur.
Farms producing manure are only allowed to take on manure from elsewhere insofar as total use at the farm does not exceed the supply standard.
For farms for which the minerals accounting system is not obligatory, the supply standard will replace the phosphate use standard in 1998.

For organic farmers this standard could be unworkable as they cannot fall back on inorganic fertilizers. To meet the needs of organic agriculture a further elaboration of these measures is required.

4.3.2 Fertilizer use

The use of inorganic fertilizers is not regulated for non-intensive livestock farms and holdings without livestock. However, this does not mean there are no environmental risks. In particular for farms with a livestock density above 1.5 LU there is a risk that nitrogen losses will exceed the allowable loss. Also at less intensive livestock farms and arable farms losses are often higher than strictly necessary due to high (nitrogen) fertilizer use.
To stimulate these farms to adopt minerals accounting and manage their minerals more efficiently extension and education will be used. Experience has shown that farmers, when aware of their mineral losses, are willing to reduce them and so cut back on their expenses. Monitoring will have to show if the farms with a density of 1.5 to 2 LU per hectare have actually reduced their mineral losses. In 2005 it will be decided whether this group will be brought under obligatory minerals accounting.

4.3.3 Bulb-growing, field vegetable production and greenhouse horticulture

In the western Netherlands, the area where bulb-growing is concentrated, manure is often spread in excess. With regard to pesticide use this sector has opted for a covenant with water managers and the provincial authorities. It is now being investigated if this covenant can be extended to mineral losses.

Field vegetable production is less concentrated. A first analysis of the mineral problems in this sector was completed only recently. In the coming years an approach will be developed to tackle them.

Greenhouse horticulture has specific environmental problems regulated by a specific approach (based on the Pollution of Surface Waters Act, among others). This plan, developed jointly by the greenhouse horticulture sector, water quality managers and provincial and national government, provides for an integral approach of environmental requirements, of which mineral use is one. Environmental organizations are also involved.

Table 4.1 Loss standards, progressive levies, supply standards, LU thresholds and their interrelations

	1998	2000	2002	2005	2008/2010
Phosphate loss standard (kg P_2O_5/ha)	40	35	30	25	20
Nitrogen loss standard* (kg N/ha)	300	275	250	200	180
Low levy (Dfl 5) for phosphate loss of (kg P_2O_5/ha)	40-50	35-45	30-40	25-30	(1)
High levy (Dfl 20) for phosphate loss exceeding (kg P_2O_5/ha)	50	45	40	30	(1)
Phosphate supply standard (kg P_2O5/ha)		85	80	80	80
on grassland	120				
on arable land	100				
Registration obligatory at LU number	2.5	2.5	2.0	2.0	(1)

* Standard applies to grassland; exclusive of deposition and mineralization.
(1) To be determined later.

5 ENCOURAGEMENT AND RESTRUCTURING

5.1 Farm improvement and adjustment in farming methods

To make a substantial reduction in the burden placed on the environment farmers must adjust their farming methods and invest in cleaner technology. The options vary per sector and per farm (see sections 2.2 and 2.3). In cattle farming, apart from adjustment to farm management (including inorganic fertilizer reduction), investments will be made in cleaner technology such as spreading equipment, manure storage tanks, feed computers, low-emission housing units and improved fertilizer distributors. In pig and poultry production investments will focus on low-emission housing, adjusted feeding systems and systems to reduce the amount of manure to be disposed of.

The greater part of the necessary environmental gain can be realized by improving management and adjusting farming methods, which does not require major investments. This calls for more knowledge of the mineral flows on the farm and the possibilities of managing these flows.

Because the Dutch livestock sector operates on the international market it must continue to develop in order to maintain its competitive edge. Investments in clean technology having an impact on farm management (adjustments to housing and feeding systems) will sooner be profitable if they coincide with investments aimed at farm improvement. First, because the economic basis of the farm is strengthened. Second, because it is cheaper to install low-emission housing, adjusted feeding systems or adjusted manure storage when a farmer is already modernizing his buildings. Farm improvement is necessary to keep the sector alive and kicking.

5.2 A balance between manure supply and demand

Fertilization standards will be tightened on a step-by-step basis (see Table 4.1). To be able to satisfy the requirements for mineral losses livestock farmers will either have to produce less manure or dispose of more manure.
As use standards are still relatively high, there is as yet sufficient potential in the Netherlands to dispose of the total quantity of manure produced. Supply and demand of manure are reasonably balanced and we do not now find ourselves with a nationwide surplus that cannot be disposed of. So far the efforts made by the industry to reduce manure surpluses have kept up with the tightening of fertilizer application rates.

Not only do tightened standards result in less scope for disposing manure at the farm where it is produced. The potential for selling manure to third parties decreases as well because arable farmers have to reduce their use of manure. If there is insufficient potential to dispose of the total amount of manure produced in the Netherlands in an environmentally responsible way, a national manure surplus will develop.

For several reasons the development of a national manure surplus is undesirable.
Due to competition for the limited scope for disposal the cost of manure redistribution will increase. Minerals accounting then will become more susceptible to fraud. Irrespective of the price they are willing to pay a number of farmers will not be able to redistribute their manure in a responsible way simply because there is no physical space. If this is the case, pressures on livestock farmers to dodge the rules will increase.
Increasing redistribution costs may also negatively affect our international competitive position. Therefore we must see to it that the production of manure is reasonably balanced by the potential for redistribution.

To form a picture of the situation that is anticipated the developments in the various sectors were assessed for the production and disposal of livestock manure under the set of measures described in Chapter 4 (see Table 5.1 and Appendix 3).

Table 5.1 Estimates of national manure production and sales in 1996, 1998, 2002 and 2005 (in m kg P_2O_5) on the basis of the proposed standards

	1996	1998	2002	2005
Phosphate production	206	200	190	185
Surplus per farm	88	92	87	86
Redistribution	71	69	49	49
Export/processing	14	15	20	20
National surplus	3	8	18	17

In cattle farming the number of animals will further be reduced in the years ahead as a result of the milk quota system and increased milk yields per cow. Minerals accounting will stimulate farmers to sell less profitable cattle. In addition, manure redistribution contracts can be entered into with neighbouring arable farmers growing fodder. Expectations are that the sector will be reasonably able to redistribute its manure in a responsible manner.
The poultry industry produces high-quality manure which can be sold abroad. Expectations are that this sector will succeed in exporting the main part of its manure.
Pig production has to resort to more refined feeding measures to reduce the amounts of phosphate and nitrogen produced. The possibilities of redistributing manure will decrease because due to the introduction and tightening of supply standards a more limited share of pig manure can be sold in areas where there is no manure surplus. Distribution can be improved by recycling manure on the farm and by concluding 'fodder for manure' contracts. Large-scale manure processing, which was anticipated to contribute considerably to solve the manure surplus problem, has hardly got off the ground, which adds to the problems in pig production.

Expectations are (see Table 5.1) that phosphate production between 1998 and 2002 will reach such levels that despite the efforts referred to it will not be possible to redistribute the manure in the Netherlands and keep within the standards. Extra efforts are required to achieve an adequate balance between the supply and demand for manure.

5.3 Encouragement and restructuring policy

Encouraging farm improvement and balancing the supply and demand of manure are objectives that largely reinforce one another. For farm improvement creates room for investments in environmentally friendly farming methods and the control of manure redistribution costs is important to maintain a strong competitive position relative to other countries.
Livestock production in the Netherlands, pig production in particular, is going through a period of restructuring. The industry faces many challenges. The success of the manure and ammonia policy depends on whether and to what extent the sector will succeed in changing over to clean methods of production while at the same time maintaining its competitive edge.

To obtain maximum success the government is responding to the far-reaching developments in the sectors by pursuing a targeted policy of encouragement and restructuring. Wherever possible the dynamics of the restructuring process will be used to reinforce the sectors and have the environment benefit at the same time.

The following set of measures was proposed.

5.3.1 Innovation of management and methods

The innovation and improvement of management and methods require more knowledge from farmers of the mineral flows on the farm and methods to reduce mineral losses into the environment. Farmers are encouraged to obtain the knowledge necessary to produce in an environmentally responsible way. Research aims at increasing insights into how to reduce mineral losses at the farm and how to develop good agricultural practice. Extension and demonstration projects will aim at improving mineral man-

agement and reducing mineral production (e.g. by lowering the mineral contents in animal feeds). Farms are screened to give farmers an insight into how management methods on their particular farm can be adjusted to realize environmentally friendly production. Some farmers will have to make major changes in their farming methods.
Up to 2002 the government has earmarked about Dfl 65m for these measures (Appendix 1: demonstration, research and development).

5.3.2 *Investments into clean technology*

Apart from adjusting their management methods farmers have to invest in clean technology. Technology to dispose of the manure surplus (e.g. manure recycling at the farm), technology to reduce ammonia emission (e.g. low-emission housing, low-emission manure application machines) and technology to reduce mineral losses (e.g. adjusted fertilizer distributors).
The government supports the industry in developing and investing in cleaner technology in several manners. First, by carrying out targeted research into clean technology. Second, by granting investment subsidies to farmers to encourage them to invest in clean technology and by granting tax reliefs. There are also subsidies for investments in large-scale manure processing.
Third, by stepping up the introduction of new low-emission housing by earmarking more money for ammonia monitoring to have new housing systems admitted sooner.

Up to 2002 the government has earmarked a total amount of Dfl 80m (Appendix 1). Besides, about Dfl 82m has been earmarked for large-scale manure processing between 1996 and 1998.

5.3.3 *Mobility and farm improvement*

A number of farms is situated on such locations that there is limited potential for farm improvement, for instance, near a sensitive nature area or in an area with few possibilities of structural manure disposal in the neighbourhood. Mobility should therefore be encouraged.

To prevent the expansion of manure production the rights for producing manure will remain necessary, both those attached to the land and those not attached to the land. To guarantee sufficient mobility and potential for farm improvement the Manure Production Relocation Act, under which the relocation of rights not attached to the land is allowed, will remain in force and not expire in 1997.

25% of manure production rights will continue to be siphoned off when rights not attached to the land are transferred. Without vitally hampering farm improvement 50% siphoning can be introduced when production rights are transferred and the farm in question is continued on the same location. Farm transfers within the family will be exempted. All this will make an extra contribution to prevent the development of a national manure surplus while the potential for farm improvement is retained. The total yield of the siphoning operation is estimated at 7m kg of phosphate up to 2002.

The percentage siphoned off when a farm is relocated will thus be lower than when the farm taken over is continued on the same location. This will stimulate farms to settle at a greater distance from the national ecological network and contribute to the development of closed breeding and fattening farms, which will prevent the introduction of diseases.
It is being examined whether it is possible and desirable to further encourage relocation at a greater distance from the national ecological network under the Relocation Act (see section 6.3).
Mobility will also be furthered by providing a number of tax reliefs in case of farm relocation (see section 6.3).

5.3.4 *Buying up manure production rights combined with restructuring*

One of the options to prevent the development of a national manure surplus is to generically reduce the volume of production rights. Initially however this will result in not using total farm capacity. The farms then will suffer an additional loss of income, which will narrow the already small margins and affect the potential for (environmental) investments. Therefore this option has not so far been chosen.

We have opted for an approach which on the one hand makes it possible to reduce the volume of the manure production rights and on the other enables farmers seeing little future for their farm to wind up their business in a socially responsible manner.

To facilitate matters we have decided to establish a restructuring fund. With the money from this fund manure production rights not attached to the land will be bought up to prevent the development of a national manure surplus. Another reason for establishing a restructuring fund is that the set of measures imposed on the industry will result in extra costs at the farm level. Consequently a considerably large group of farms may run into continuity problems. It is important that this process be monitored in a socially responsible manner.

Initially the fund will aim at sectors and areas which require the greatest efforts.
Earlier analyses have shown that pig production will have the most trouble disposing of excess manure. The sector is facing problems in other areas as well: market, structure, animal health and welfare. The government certainly has a task here. A restructuring operation which is a direct consequence of government measures must be supervised, the more so since the government used to encourage certain developments that have led to the present situation. Active support of pig production restructuring therefore has priority.
In addition, the fund will focus on the concentration areas because efforts here must be greatest. How the means will be applied will be discussed with the industry and the government.

Part of the fund will be directed at farmers winding up their business any time in the near future. For instance, farms with an elderly head and no successor. The moment of winding up can be accelerated by the set of measures. In principle these farms can trade their manure production rights on the market. By using a buying-up scheme in the form of a tender the fund can participate in the market and buy up production rights. The reduction of the national volume of production rights can thus be stepped up. The price offered will be in line with the lowest current market price. In this way a threshold is established to offer potential outgoers a guaranteed sum without pushing up prices. Moreover, structure improvements in the stayers' farms will not be hindered either.

Another part of the restructuring fund will focus on a combination of winding up and farm improvement.
Young farmers, for instance, will normally not consider winding up their businesses. Various circumstances, including the set of measures proposed and the policy on health and welfare, may cause a farm to decline. Given the assets and liabilities winding up will often not directly help. These farmers will then feel forced to continue their business. There are no means to invest in the farm and there is no financial scope for private spending. The farm and those depending on it will embark on a path of social decline. The sector as a whole will weaken as well as no investments are made in these farms, which involves risks to, for instance, animal health.
These young farmers will not benefit when manure production rights are bought up at market prices. Offering considerably higher prices will however disrupt the free play of market forces, thus barring the improvement of healthy farms, whereas these farms should be encouraged to develop. Part of the fund will therefore be applied to a combination of winding-up and improvement.

Groups of farmers (outgoers and stayers) can submit plans to the fund. These plans should aim to reduce manure production on the one hand by buying up part of the manure production rights of those winding up. On the other hand the plans must aim at restructuring, for instance, by making available part of the manure production rights of outgoing farmers to the improvement of the farm of those staying on. This approach enables farms to wind up in a socially acceptable manner and other farms with a bright outlook to be strengthened using the free play of market forces.

Means

The restructuring fund will be placed with the 'Stichting Ontwikkelings- en Saneringsfonds voor de landbouw'.
For the 1996-2002 period a total amount of Dfl 475m has been earmarked, to be used evenly over the years. These amounts should take 10m kg of phosphate of manure production rights out of the market. The measures proposed will have to be agreed on by the European Commission.

The use of the restructuring fund will result in a smaller but healthy, strong and clean sector, well up to foreign competition.

The total policy, including encouragement and restructuring measures, is made up in such a way that expectations are that a national manure surplus will not develop or will be very small (see Table 5.2). Of course there are many other factors in play.

Table 5.2 Effects of the encouragement and restructuring policy (in m kg P_2O_5)

	1996	1998	2002	2005
Total phosphate production	206	200	190	185
National surplus	3	8	18	17
Bought up/siphoned off	-	7	17	17
Remainder	3	1	1	0

5.4 Monitoring and evaluation

It is very important that the effects of the policy measures are followed and visualized through monitoring. In 2000 monitoring may show that insufficient manure rights have been bought up. If so, we have to consider whether adjustment of the system of purchases is necessary and whether this will have consequences for the size of the restructuring fund.

Monitoring will also follow the development of different solutions to manure surpluses (animal feeds, distribution, processing and export and numbers of animals) and report on it annually.
Stock will be taken for the first time in 2000. Preferably, the two concentration areas and the non-concentration areas will be considered separately to visualize the differences between the regions. The industry and other authorities in the areas will be involved in the evaluation.

If evaluation unexpectedly shows that despite the efforts made by the government and the industry there is no way to avoid a national manure surplus, the balance has to be restored by reducing manure production rights not attached to the land.
This reduction will be prepared in time for it to be used whenever necessary. The realization of this reduction and percentages will depend on the results of the monitoring mentioned above. If the three regions are monitored separately, the reduction percentage between these areas may differ as well.

In order to consider whether the encouragement and restructuring policy is to be continued after 2002 and in what form an overall evaluation of the effects of the measures will take place in 2002.

6 THE POLICY ON AMMONIA

As described in section 2.3 all livestock farms in the Netherlands contribute to the ammonia problem. In regions of intensive farming (with high stocking densities) ammonia deposition is, however, highest. Particularly in these areas nature and forests are most easily damaged by ammonia. Because of the differences between the areas with high concentrations of animals and the rest of the Netherlands a regional approach to the ammonia policy was opted for.

The emphasis in the ammonia policy is on emission reduction. The objective is to reduce emission by 70% between 2000 and 2005 compared to 1980.

6.1 Low-emission application

Low-emission application is a relatively cheap method to reduce ammonia emission. Manure spreading accounts for about half of ammonia evaporation from agriculture. Low-emission application appears to be the most cost-effective measure to reduce ammonia loss into the atmosphere. Numerous technical innovations have considerably improved low-emission application techniques and now they can be used on different soil types. The policy aims to realize maximum results from low-emission application.

Meanwhile, measures having a less obvious effect on ammonia emission reduction have been approved to safeguard nature interests in marshy pastures, such as the slurry boom and manure spreading harrows (see Table 6.1). In line with the intention to realize maximum results from low-emission application and to start solving the problems in the areas that are threatened most, measures with a less obvious effect on ammonia emission will be allowed only outside the concentration areas.
In the areas with high concentrations of animals, where the ammonia problem is most keenly felt, only those measures which have a strong curbing effect on ammonia emission are allowed. Thus maximum environmental results are achieved using the method that is most cost-effective.

Table 6.1 Effectiveness of different low-emission application methods

Spreading method	Percentage of emission reduction
Surface spreading	0%
Slurry boom	about 50%
Spreading harrows	about 60%
Shallow injection	about 85%
Deep injection	about 95%

Although in arable farming and horticulture low-emission application is obligatory, surface spreading to control drift will be allowed in the northern Netherlands, which is in line with present exemptions.

Given future developments and possibly new cost-effective techniques, attempts are made to develop methods to quickly approve these techniques, for example by checking them for compliance with specified standards. This would also be a more firm guarantee that the machines will actually realize the emission reduction desired. Approvals also help guarantee control and make matters more transparent for farmers.

6.2 Low-emission housing

Since low nitrogen levies do not really incite farmers to build low-emission housing, special requirements are made on housing systems to reduce ammonia emission.
Less intensive farms (with low stocking densities) will generally not need low-emission housing to

sufficiently reduce ammonia emission, unlike farms with more than 2 livestock units. On these farms ammonia emission are too high, in spite of the basic measures (covered storage tanks and low-emission application) and the fact that they meet the standards for nitrogen losses. This is why on farms with more than 2 LU ammonia emission from livestock housing will have to be reduced, for instance by adjusting existing buildings or building new housing.
The group of farms concerned is the same group that has been given priority in the manure policy. Given that housing is written down in about 15 years it is realistic to set the stocking density ceiling for low-emission housing at 2.0 LU right now.

The ALARA principle underlies the requirements for low-emission housing (ALARA stands for 'as low as reasonably achievable'). Application of this principle will have the effect that housing outside the concentration areas is subject to less stringent requirements than that inside. It is only fair that more stringent requirements should apply in concentration areas because the ammonia problems are more pressing there. Application of the ALARA principle also leads to differentiation per sector. There is more potential for realizing further emission reductions in poultry production than in cattle production.
The requirements for housing are laid down in environmental licences. To this end a General Order in Council on livestock housing will be brought into force in 1998. Existing structures need not meet the requirements straight away: a transition period based on the normal write-down period is provided for.

The introduction of new low-emission housing systems should not be hampered by red tape. Rules and regulations will be structured in such a manner that new low-emission housing will be quickly approved. Also by earmarking more funds for ammonia monitoring teams, the approval of new low-emission housing systems will be stepped up. Moreover, attempts are made to combine the requirements for ammonia emission reduction, smell reduction and animal welfare.
Besides, the introduction of new housing systems is encouraged by continuing to make farmers applying green-label systems eligible for tax reliefs and subsidies.

The previously announced levy on ammonia emission will not be introduced. The amount of paperwork is too high, control is difficult and it will have too little effect to enforce housing adjustments.

6.3 Additional regional ammonia policy

Even if generic emission policies are successful the deposition on forests and nature areas may continue to be too high due to the concentration of livestock farms in certain regions and around certain forests and nature areas.
In some regions total emission is to be further reduced because emission throughout the region remains too high due to the high concentration of animals.
In other regions livestock farms are concentrated directly around forests and nature areas. Because farms situated closer to a forest or nature area make a larger contribution to the burden placed on these forests or nature areas than more distant farms, such a concentration of farms may cause a high harmful ammonia deposition.
Because situations are so different for each region, the first responsibility for additional regional ammonia policies lies with provincial and local authorities. Additional regional ammonia policy is, moreover, connected with nature policies in the region in question and the approach to drying. For these matters the provinces are also the first responsible authorities.

The regions can address additional regional ammonia policies in several manners. For instance, by stimulating farm relocation away from a forest or nature area (national ecological network). A larger share of the ammonia discharged will then not be deposited on the sensitive area but on agricultural land, which will not be harmed. A second option is to reduce emission near forests and nature areas by making adjustments to the surrounding farms (fewer animals and less housing, have farms with less than 2 LU also introduce (minor) adjustments to housing). Moreover, more stringent regional housing requirements for farms with more than 2 LU can be introduced. Relocation away from the region can be encouraged as well.
Depending on the situation the most cost-effective mixture of measures must be opted for. The objective is to combine deposition and emission reduction with farm improvement.

Regional authorities can play a major part in the initiation and guidance of these processes. Consultations with regional authorities will start shortly and a path will be mapped out to jointly flesh out and implement the regional policy and area-specific approaches.
The government will abandon its plans for the imposition of rules to force down deposition. Forced farm relocations will therefore not be necessary.

The government will have an encouraging and facilitating role in this.

- Regions may apply to a grant scheme for area-specific environmental policies. The budget of the Ministry of Housing, Spatial Planning and the Environment shows Dfl 134m for the 1996-1999 period, inclusive of funds for source-specific ammonia policies.
- Relocation is encouraged because when manure production rights are relocated, the percentage siphoned off is lower than when the farm is continued on the same spot. It will be examined whether it is desired and possible under the Relocation Act to stimulate farms to relocate at a greater distance from the national ecological network by lowering or abolishing the percentage siphoned off.
- Farm mobility will be encouraged by tax relief measures. Moreover, it will be encouraged by exempting farms from transfer tax when they relocate away from the national ecological network.
- It might be considered to apply part of the restructuring fund for the pig sector to areas near the national ecological network.

In the context of the necessity of relocation provinces having room available for livestock farms might consider to increase the possibilities for settlement and thus strengthen the regional economy.

The Temporary Act on Ammonia and Livestock Farming, by drafting ammonia reduction plans and designating areas sensitive to acidification, enables regions to opt for a region-specific approach aimed at farm improvement and gain for the environment.

The existing problems with the Temporary Act were discussed with the Union of Netherlands Municipalities, the Industrial Board for Agriculture, the Dutch Agriculture and Horticulture Organization and the Netherlands Society for Nature and Environment. The Second Chamber of Parliament will be informed separately.

The Temporary Act will be reviewed in 1996, also to consider a possible sequence for after 1999.

7 SUMMARY

Minerals accounting

The manure policy is aimed at farms posing the highest risks to the environment. Minerals accounting makes farms with high stocking densities account for their mineral management. Minerals accounting is an input-output book-keeping system that will relate total applications of fertilizers to production. If the losses, which must be reported yearly, exceed the standards for phosphate and nitrogen set for that particular year, the surplus is fined. Legislation aimed at the introduction of minerals accounting is being prepared. It is to enter into force on 1 January 1998. From then on farms with more than 2.5 LU stocking rates must report their mineral losses. In 2002 the threshold will be lowered to 2 LU.

Minerals accounting enables farmers to visualize their individual efforts at reducing mineral losses. The system is of particular importance to farms with a high potential to influence the mineral levels in inputs and outputs. Because of the differences among farms farmers can opt for a standard or a more detailed declaration in their minerals accounting. The more detailed option will generally demand real levels for the input and output items on the mineral ledger. The standard option uses a limited number of items and mainly fixed amounts.

Farms with stocking densities below the threshold only must observe a basic set of measures applying to all farms. This will considerably reduce the paperwork for these farms. The problem of the manure surpluses should, however, not be shifted to arable farming or extensive livestock production. Therefore farms for which the minerals accounting system is not obligatory and which buy manure from a third party will be obliged to register this supply, which is allowed up to a ceiling. This ceiling will be gradually lowered until 2002. Organic agriculture will be looked at separately.

Use and loss standards

In 1996 the use standard for grassland will be lowered from 150 to 135 kg of phosphate per ha a year. When minerals accounting will be introduced in 1998 the loss standard will be 40 kg/ha of phosphate. In the period to 2008/2010 this standard will be gradually lowered to 20 kg/ha. The loss standard for nitrogen is 300 kg/ha of grassland in 1998. In 2008/2010 it will be set at 180 kg/ha.
Farmers working phosphate and phosphate fixing soils are given the opportunity to exceed standards for a limited period of time. Those who can demonstrate the need for 'reparation dressing' on the basis of soil sampling are allowed a 50 kg/ha of phosphate loss.

Encouragement and restructuring

To reduce the burden placed on the environment agriculture must adjust its methods and invest in clean technology. To retain its competitive edge agriculture will have to be able to combine these investments with farm improvement. The mineral management of individual farmers will be improved and they will be stimulated to invest in clean technology.

In addition, the package of standards will increase the tension between supply and demand of manure and further the development of a national manure surplus. The surpluses make the costs for manure distribution irresponsibly high and so susceptible to fraud. Research has revealed that minerals accounting in itself will not be able to withstand this pressure. Therefore the development of surpluses that cannot be disposed of must be avoided.

For reasons of mobility and farm improvement manure production rights should remain transferrable. The Manure Production Relocation Act will therefore remain in force. At the same time an extra contribution will be made to the reduction of manure surpluses by siphoning off part of the manure production rights when farms merge outside the family and when farms are continued on the same location.

Expectations are that pig production will have most trouble to redistribute its manure. The sector must be restructured and farm improvement is required. To this end a restructuring fund will be established. This fund will primarily be open to pig producers in the concentration areas.
Part of the fund will be used to take manure production rights via tenders out of the market. Another part will be used to reduce the manure surplus and at the same time reinforce the sector by means of restructuring. The restructuring aimed at should be given shape as much as possible by the sectors and the regions.
The set of basic measures aims to prevent the development of a nationwide manure surplus. It is therefore necessary to get a clear picture of the developments in manure production and redistribution potential. Monitoring programmes will be evaluated in 2002. In the unlikely event of the development of surpluses the equilibrium should be set by reducing manure production rights that are not attached to the land.

The policy on ammonia

The emphasis in the ammonia policy will be on emission reduction. Farmers having stocking densities below 2 LU will only have to deal with the set of basic measures. Farmers having stocking densities over 2 LU will be obliged to construct low-emission housing. A general Order in Council to this effect will be introduced in 1998. The policy on deposition reduction will be worked out at the regional level. The provinces will take the lead whereas the national government will play an encouraging and facilitating role.

APPENDIX 1

Survey of funds (rounded in Dfl m)

Relevant expenditure	1996	1997	1998	1999	2000	2001	2002	Art. no.
Encouragement policy								
Innovation of farm management and methods (demonstration, research and development)	10	10	9.5	9	9	9	9	16.03/16.04
Investments and facilities	7.4	14.5	16.1	13.1	10.1	10.1	10.1	12.02
Restructuring	15	60	80	80	80	80	80	12.02/VROM[1], V&W[2]
of which: VROM	5	10	15	10	10	10	10	
V&W	5	10	15	10	10	10	10	
Manure reprocessing	52.1	24.6	5					12.02
Implementation costs								
Levies bureau/National manure bank	21.7	20.3	33	27.9	27.9	27.9	27.9	12.01/12.02
Control by General Inspection Service	6	10	26	25.4	25.4	25.4	25.4	10.01
TOTAL	112.2	139.4	169.6	155.4	152.4	152.4	152.4	
Relevant receipts	1996	1997	1998	1999	2000	2001	2002	
Levies								
Surplus levy	33.3	28.4	27.4	27.4	27.4	27.4	27.4	12.02
Minerals levy				16	16	16	16	12.02
TOTAL	33.3	28.4	27.4	43.4	43.4	43.4	43.4	

[1] VROM = Ministry of Housing, Spatial Planning and the Environment
[2] V&W = Ministry of Transport, Public Works and Water Management

APPENDIX 2

Socio-economic effects of the environmental targets for 2000

1 General

The socio-economic effects on agriculture are not determined by the manure and ammonia policy alone. Autonomous developments following GATT agreements and the Common Agricultural Policy reforms also play a part.

The figures reflecting the socio-economic effects of the environmental measures aimed at 2000 are based on prior calculations in a study dealing with the socio-economic effects of the introduction of P and N loss standards.
These figures have been modified in accordance with the present manure and ammonia policy because:

- the present combination of phosphate and nitrogen loss standards is different from the loss standards proposed earlier;
- the present phosphate and nitrogen loss standards only apply to farms with more than 2.5 LU/ha for which a system of minerals accounting is obligatory;
- farms with less than 2.5 LU/ha are obliged to observe phosphate supply standards for the manure they buy in and other organic fertilizers.

2 Socio-economic effects in 2000

The following gives the effects of the proposed set of measures on return from labour, employment and added value taken over the whole production and marketing chain.
Three sectors have been looked at: the livestock sector, the pig sector and the poultry sector.
The table below gives the effects of the manure and ammonia policy compared to the effects of autonomous developments. This is the same approach as adopted in the socio-economic study referred to above.

Table Appendix 2
Socio-economic effects of the environmental measures aimed at in 2000 compared to the effects of autonomous developments (*)

	Return on labour	Employment (ALU)	Added value (Dfl m)
Livestock sector	– about Dfl 1000 (3%)	– about Dfl 1000 (0.7%)	– about Dfl 30 (0.5%)
Pig sector	– about Dfl 7000 (15%)	– about Dfl 700 (1.5%)	– about Dfl 40 (1%)
Poultry sector	zero decrease	zero decrease	zero decrease

* decrease in percentages compared to expected values in 2000.

3 Explanatory notes

The figures for the livestock sector are based on the interpolation of the results of the study referred to above for a P_2O_5 and N loss standard combination of 45/20 and 30/250.

The figures for the pig sector are mainly determined by market opportunities for the sale of pig slurry to arable farmers and extensive livestock producers. This in turn will be determined by the phosphate supply standard for manure.

For the poultry sector the figures are not affected by the manure and ammonia policy relative to autonomous developments.

APPENDIX 3

Estimated amounts of manure that cannot be disposed of nationally in 1996, 1998, 2002 and 2005

General

The following estimates are based on the 'Cijfers' Project scenario, the proposed set of measures and the expected developments in animal feeds, redistribution, export/reprocessing and number of animals.

Table 5.1 Estimates of national manure production and sales in 1996, 1998, 2002 and 2005 (in m kg P_2O_5) on the basis of the proposed standards

	1996	1998	2002	2005
Phosphate production	206	200	190	185
which can be disposed of on the farm	118	108	103	99
Surplus per farm	88	92	87	86
Redistribution	71	69	49	49
Export/processing	14	15	20	20
National surplus	3	8	18	17

Explanatory notes to the 1996 figures

The number of animals for 1996 is based on the CBS May census of 1994. The number of dairy cows is based on autonomous reduction following increased milk yield per cow and unchanged national milk quota.

Excretion is fixed for all categories of animal except for the categories of poultry and pigs used in minerals accounting. For poultry a 25% reduction and for pigs a 15% reduction of phosphate excretion is taken into account down from the fixed phosphate production standard. These are the expected net effects of the 30% reduction measure.

The redistribution figure for 1996 is based on proposed phosphate supply standards for manure and amounts to 71m kg P_2O_5.

The figure for export/reprocessing is based on provisional figures for 1994. The reprocessing figures for 1995 and 1996 will be lower. Exports of non-processed dry poultry manure are growing. This should compensate for the lower amounts of reprocessed manure.

Explanatory notes to the 1998 figures

The number of animals for 1998 is based on the CBS May census of 1993. The number of dairy cows is based on a further reduction following increased milk yield per cow and the national milk quota. Further improvements of animal feeds in the pig and poultry sector have been taken into account which would reduce phosphate production by 4m kg compared to 1996. Total phosphate production in 1998 would then be 200m kg.

Phosphate surpluses are determined by phosphate loss standards and the extent to which exceeding of the standard is bought off by paying low phosphate levies. Manure surpluses are based on a phosphate loss standard of 40 kg/ha and real average losses of 45 kg/ha.

Farm surpluses are based on phosphate production minus disposal on farm. In the 'Cijfers' Project scenario for 1998 108m kg of phosphate could be disposed of on the farm. What remains is a 92m kg farm surplus.

The redistribution figure is based on the proposed phosphate supply standards for manure. The 'Cijfers' Project scenario is based on fixed combinations of P_2O_5 and N loss standards. Since the present policy does not give N loss standards for arable farms and extensive livestock production the redistribution figure has been calculated differently.
For arable farms figures are based on a 100 kg P_2O_5 input from livestock manure per 300,000 ha on sandy soils. On clay soils this is 100 kg P_2O_5 input from manure per 150,000 ha and on peat 75 kg P_2O_5 input from manure per 150,000 ha.
For grasslands on extensive livestock farms a total P_2O_5 input of 11m kg was calculated.
The total distribution figure for 1998 thus adds up to 69m kg of phosphate.

The figure of 15m kg for export/reprocessing is based on a further increase in the export of poultry manure.

Explanatory notes to the 2002 figures

The number of animals for 2002 is based on the CBS May census of 1993. The number of dairy cows is based on a further autonomous reduction following increased milk yield per cow and the national milk quota.
Further improvements of animal feeds and herd reductions have been taken into account which would reduce phosphate production by 10m kg compared to 1998.

Phosphate surpluses in 2002 are set at real phosphate losses of 35 kg/ha. The 2002 farm surpluses are equal to phosphate production minus on-farm disposal at surplus farms at a phosphate loss standard of 35 kg.
In the 'Cijfers' Project scenario 103m kg of phosphate could be disposed of on the farm. What remains is a 87m kg farm surplus in 2002.

The 2002 redistribution figure is calculated as that for 1998 except that the phosphate supply standard was set at 80 kg/ha. The total distribution figure for 2002 thus adds up to 49m kg of phosphate.

As regards the size of export/reprocessing 20m kg of phosphate was taken based on a further increase in the export of poultry manure and a slight expansion of the processing capacity for pig slurry.

Explanatory notes to the 2005 figures

Reductions in the cattle herd and improved animal feeds will result in a 5m kg decrease in phosphate production compared to 2002.

The on-farm surplus for 2005 is set at real phosphate losses of 27.5 kg/ha. On-farm disposal at surplus farms extrapolated from the basic scenario of the 'Cijfers' Project is 99m kg of phosphate. What remains is a 86m kg farm surplus in 2005.

The size of export/reprocessing is equal to that in 2002.