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## HANDLING OF ANIMAL MANURE

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## SUMMARY

In 1984 and in 1987 a fairly drastic policy was formulated to solve the environmental problems caused by the overconcentration of minerals from animal manure. To prevent the problems from growing any further, farms with a production of more than 125 kg. phosphate per hectare per year may not expand the livestock production unit. Apart from this, extensive regulation has been introduced with regard to the spreading of manure during certain periods and to the fixing of standards for the use of animal manure. Because of the scale of the problem, a phased approach has been adopted.

Under these rules more than 15% of the Dutch livestock farms must dispose of their manure elsewhere in the first phase up to 1991. The average costs per farm per year have been estimated at ca. 5.400 guilders per farm. The investment costs for extra manure storage capacity come to a total of 1.572 million guilders. The "polluter pays" principle is applied. As a result, the so called surplus levy has meant an extra cost item of 42.7 million guilders per year for all the farms affected.

In the coming years, ammonia emissions from livestock production will have to be drastically reduced. There has been increasing awareness that this problem and the related problem of overconcentration of minerals from animal manure must be solved integrally. An integral plan is therefore being drawn up.

## 1. INTRODUCTION

As a result of geographical, physical and socio-economic factors livestock has expanded considerably in the Netherlands in the past decades. The picture is as follows:

Table 1: Development of the livestock population.

	1970	1975	1980	1983	1984	1985	1986
dairy cows (x m)	1.9	2.2	2.4	2.5	2.5	2.3	2.2
veal calves (x m)	434	471	582	597	638	638	690
pigs (x m)	5.5	7.2	10.1	10.5	11.1	12.3	13.4
chickens (x m)	55.4	68.1	81.2	82.2	83.4	89.9	92.3

Source: CBS (Central Bureau of Statistics),

LEI (Agricultural Economics Research Institute).

The outcome of this development is that on a large number of farms more manure is produced than needs to be spread on the agricultural land belonging to those farms. Most of these are pig and poultry farms, but some are cattle farms with a high stocking density.

The development of manure production is as follows (see table 2).

Table 2: Development of manure production in thousand million kg.

	1960	1970	1975	1980	1982	1984	1986
cattle (liquid manure)	48.8	56.1	64.3	67.2	68.2	78.6	69.8
veal calves (liquid manure)	0.2	0.9	1.0	1.3	1.3	1.8	2.8
pigs	4.0	8.9	12.2	14.6	14.7	15.9	19.2
poultry;							
- laying hens (liquid manure)	---	---	---	---	---	1.5	1.6
- laying hens (solid manure)	0.7	0.7	0.9	1.3	1.5	0.28	0.3
- broilers (solid manure)	0.2	0.3	0.3	0.4	0.4	0.3	0.4

Source: CBS/LEI.

This means that in 1986 245 million kg. P2O5 and 465 million kg. N were produced.

Farmland receives an overconcentration of minerals from animal manures. The result is that nitrogen in the form of nitrate leaches into the groundwater, which is used for drinking water, and phosphate leaches into the ground and surface water. Together with the runoff of nitrogen and phosphate this constitutes an important contribution to the eutrophication of the surface water.

In addition ammonia from animal manures also increases the acidification problems in the Netherlands.

The ammonia emissions from the livestock production industry in percentages in 1986 were as follows:

Table 3: Ammonia emissions from the livestock production industry in percentages (1986)

Animal category	Ammonia emission in percentages			
	Housing and Manure storage	Manure spreading	Grazing period	Total
cattle	19	31	10	60
pigs	12	15	--	27
poultry	7	5	--	12
veal calves	0	1	--	1
Total	38	52	10	100=216.000 tonnes NH3/year

Source: LEI.

## 2. POLICY

The Dutch government has decided to approach the manure surplus problems from several different angles simultaneously.

It aims are:

- to reduce the mineral content of manure by reducing the mineral content of feedstuffs;
- to stimulate the treatment and processing of manure, for example for export;
- to increase the marketing possibilities for manure by means of quality improvement; and last but not least
- to issue regulations regarding the production, spreading and removal of manure.

The opinion was that it is undesirable to allow the manure problem to grow any further. To prevent a further increase in manure production until solutions to the surpluses were found, an Act came into force in 1984 which made expansion of pig and poultry production virtually impossible. This interim Act anticipated measures which have come into force on 1 May 1987.

These measures mainly concern:

1. a reformulation of the ban on expansion which has been in force for two years;
2. the spreading of animal manure i.e. maximum standards and bans during certain periods;
3. a levy on surpluses;
4. the keeping of manure records as the basis of levy and control (will not be dealt within this paper).

### 2.1. Ban on expansion

Because of the lack of satisfactory solutions it is now prohibited by law to increase the output of manure or slurry per holding beyond the standard of 125 kg. phosphate per hectare per year. For the farming world these rules have serious consequences.

## 2.2. The spreading of animal manure

### Maximum quantities

The use of animal manure makes an important contribution to the excessive fertilization of agricultural land. Legislation has therefore been enacted to remedy this situation. The standardization of the use of animal manures is based on the phosphate content of the manure. Different crops absorb different quantities of phosphate. The standards accordingly differentiate between grassland, fodder maize land and arable land. The maximum permitted quantities of phosphate per hectare will be reduced by phases, as a result of which the spreading of animal manure will constitute a decreasing burden on the environment. To effect an equitable balance between the interests of the environment, the possibilities of finding solutions to the manure surplus problems, and the financial and economic consequences for the industry the government has opted for a phased reduction of the permitted maximum quantities. The standards and the phasing are as follows (see figure 1).

Figure 1: Maximum application of phosphate from animal manure in kg. per hectare per year.

Phase period	Grassland	Fodder maize land	Arable land *
1. 1 May 1987 - 1 Jan. 1991	250	350	125
2. 1 Jan. 1991 - 1 Jan. 1995	200	250	125
3. from 1 Jan. 1995	ca. 175	ca. 175	125
4. from ca. 2000	end standard	end standard	end standard

\* Average.

Around the year 2000 the amount of phosphate applied to the soil in animal manure will not exceed the amount extracted from the soil by crop plants.

### Bans during certain periods

The rules concerning the spreading of animal manure are to be introduced in phases. A compromise has been sought between what is desirable for the environment and what is feasible from the point of view of farm management and farm economics. The possibility to realize sufficient storage capacity for manure in the short term has played a major role in the drawing up of the rules on the spreading of animal manure.

Rules have only been laid down for the first phase which lasts until 1990. No decisions have yet been taken for the subsequent period. The present rules are as follows (see figure 2).

Figure 2: Bans on the spreading of animal manure (1st phase)

Land use	Commencing date	Period
grassland	1 Oct. 1988	1 Oct. - 30 Nov. and when there is snow on the ground from 1 Jan. to 15 Feb.
Fodder maize land and arable land on certain sandy soils	1 Jan. 1988	from the harvest (around 1 July) to 31 Oct.
Fodder maize land arable land on certain sandy soils with an after-crop		1 Oct. - 31 Oct.

### 2.3. Levy on surpluses

In its search for solution to the manure surplus problems the government has adopted the principle that the polluter should pay. It has accordingly introduced a special levy on surplus production of manure to be imposed on farms with a manure surplus. The size of the surplus levy increases with the quantity produced (see figure 3).

Figure 3: The system of surplus levies.

Production in kg. phosphate per hectare per year	Levy per kg. phosphate per year
0 - 125	no levy
126 - 200	Dfl. 0.25
more than 200	Dfl. 0.50

There are various possibilities for the levy to be reduced, for example when dry chicken manure is produced. The funds raised in this way will be used to promote the efficient disposal of manure. Among the facilities to be financed by the levy are a national "manure bank", central manure storage facilities and manure treatment and processing or destruction plants.

### 3. THE AMMONIA POLICY

The goal of the ammonia policy as part of the anti-acidification policy is to reduce the ammonia emissions from the livestock production industry by 50 percent in the year 2000 compared with 1980. This can be achieved by:

- a regulation that provides that on uncultivated arable land the manure must be worked into the ground at the latest on the day following the day of spreading;



- specific measures aimed at the reduction of ammonia emissions.

At the moment measures have been or are being taken to restrict the ammonia emission:

- a) from livestock housing and manure storage facilities
- b) in the spreading of manure
- c) by adjustments in the composition of manures.

In addition, the introduction of the superlevy has caused a substantial reduction in the cattle population in the past few years. This reduction has a major impact on the volume of the total ammonia emissions.

### 3.1. Integral approach

Measures to solve the manure surplus problems and measures to reduce the acidification caused by agriculture should be coordinated. When solutions are chosen a shift of the problems should be prevented. In concrete this means that the solutions chosen should improve both air quality and the quality of ground and surface water. Changes in the application of the manure in order to reduce the ammonia emission (for instance injection into the soil) can lead to a higher level of nitrogen in the soil and thus to more nitrate leaching into the ground water, if the total quantity of manures and fertilizers remains the same. To prevent a shift of the problem, in this case more nitrogen leaching into the ground water, it is therefore desirable to adjust the total amount of nitrogen applied.

One way of doing this is to decrease the amount of fertilizer applied. Because of these and other interrelationships the government has decided to draw up an integral plan to realize the NH<sub>3</sub> emission objective in conjunction with the reduction of the problems concerning minerals from animal manures. In this plan proposals will be developed to improve all aspects of nitrogen managements on farms. This plan will be ready by the end of 1988 or the beginning of 1989.

## 4. CONSEQUENCES FOR LIVESTOCK PRODUCTION

The tackling of the manure surplus problems has several financial and economic consequences for livestock production. A total survey of the costs for the sector can be drawn up (see table 4).

Table 4: Total costs for the livestock production sector.

	total costs (x Dfl. 1 m.)	number of farms	costs per farm
<u>Annual costs</u>			
- transport of manure surplus (1985)	122.8	22,633	Dfl. 5,425,--
- surplus levy (1986)	42.7	42,903	Dfl. 994,--
<u>Investment costs</u>			
- manure storage (1986)	1,572.5	80,000	Dfl. 19,656,--

Source: LEI.

The costs can vary rather widely per farm. Especially the farms with little or no land will have to pay a lot. Because as yet cattle farms do not have much storage capacity, they in particular will have to invest in new storage facilities.

4. CONSEQUENCES FOR LIVESTOCK PRODUCTION

The lack of adequate veterinary services... and economic consequences for livestock production... of the costs for the livestock sector... to be taken into account...

Table 4: Total costs for livestock production... and to be taken into account... and to be taken into account...

Annual costs	Transport of manure	135.8	25.611	241.243
surplus (1985)				
surplus levy		42.7	62.303	211.954

(1986) of manure and animal... of livestock production... investment costs... (1985) of manure... source: ... The costs are very high... with livestock... will have... of livestock... - being... verified... all... effect... is... with... will...

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