Development of dairy farming in the Netherlands in the period 1960-2000

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The report gives a brief description of the development of dairy farming in the Netherlands during the period 1960-2000. The report provides a statistical review of the development of the Dutch dairy sector. It also provides an overview of technology development in dairy farming in the Netherlands. The application of new technologies is set against the background of some major changes in agricultural policies.

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Preface

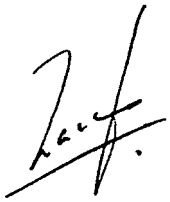
'The Experience of Dutch Agricultural Development and its Importance to China' is a joint research project of the Agricultural Economics Research Institute of the Chinese Agricultural Academy of Sciences (IAE-CAAS) in Beijing and the Agricultural Economics Research Institute (LEI) of Wageningen University and Research Centre in The Hague. The Chinese Ministry of Agriculture, the Dutch Ministry of Foreign Affairs (Asian Facility) and the Dutch Ministry of Agriculture, Nature Management & Fisheries jointly finance the project. The objectives of the project are:

- to reveal the causes of the considerable differences between agricultural productivity in China and the Netherlands, and to find ways to improve the efficiency of Chinese agriculture;
- to analyse developments in Chinese agriculture with special reference to market opportunities for Dutch agribusiness;
- to provide the Chinese partners with on-the-job training, to familiarise them with research approaches and methodologies used at LEI.

This case study details the technical development of the dairy sector in the Netherlands between 1960 and 2000. The authors are by P. van Horne and H. Prins from the agriculture division of LEI.

We hope the results will contribute to the further development of dairy in the Yangtze Delta and to the fruitful cooperation between those involved in the Chinese and Dutch dairy sectors.

The managing director,



Prof. Dr. L.C. Zachariasse

Summary

Dairy production is one of the most important production sectors in Dutch agriculture. The last forty years have seen important changes in the dairy sector. Milk production grew enormously during the first part of this period, although after 1984 this development was halted by a change in EU dairy policy. The number of dairy farms decreased dramatically and milk production per hour and per hectare showed a strong increase in particular until 1985. These developments were technological changes and should be seen against the background of changes in the economic environment, institutions and market conditions.

The main technological changes during the first half of the sixties were the large-scale introduction of the milking machine and the introduction of the tractor (see table 1). The milking machine made it possible for one worker to milk more cows thereby reducing labour costs per kilogram of milk. This period also saw the introduction of artificial in-semination.

The second half of the sixties can be characterised by specialisation in dairy farming. The investments in milking machines, milking parlours and pipelines for the transport of milk convinced many farmers to specialise in dairy production. Many farmers with dairy cows stopped farming.

Table 1 *Summary overview of development in dairy farming in the Netherlands (LEI data)*

Period	Land/ farm (ha)	Yield /cow (kg)	Cows /farm (#)	New technology input
1961-1965	14	4,120	18	- wide-scale introduction of milking machines - artificial insemination
1966-1970	16	4,350	22	- higher fertiliser use on grassland - specialisation in dairy
1971-1975	20	4,875	34	- milk cooling tank - from hay to grass-silage - loose housing system with cubicles
1976-1980	22	5,340	48	- maize feeding - higher concentrate feeding
1981-1985	25	5,700	54	- cow identification for individual feeding - wide-scale use USA Holstein-Friesian blood
1986-1990	29	6,575	49	- embryo transplantation
1991-1995	31	6,975	51	- environmental protection (e.g. manure injection)
1996-2000	35	7,525	55	- introduction milking robot

A further enlargement in the scale of production was stimulated in the seventies by the introduction of the cubicle shed and the milk-cooling tank. The European Union stimulated this process by subsidies. The introduction of the cooling tank made it possible to reduce the transport costs of the dairy factories by changing the system of transporting the milk to the dairy factory from milk cans to milk tank. The dairy factories stimulated the introduction of the milk-cooling tank on farms because of this advantage in transport costs.

Two important changes in the seventies took place with respect to roughage. The first change was from the production of hay to the silage of grass. This made it possible to reduce labour costs and improve the quality of the feed. The second change was the introduction of the production of maize and the feeding of maize silage to cattle.

After the introduction in the European Union of the milk quota system in the eighties, the focus in the Dutch dairy sector changed from expanding production to reduction of costs. In artificial insemination a change took place from breeding dual-purpose cows (milk and meat) to breeding cows with a high milk yield with the help of imported sperm from bulls from America. At the same time a personal computer was introduced to give each individual cow the right amount of feed for the optimal milk yield. The introduction of embryo transplantation significantly increased the number of high milk yielding cows.

In the nineties the environment became more and more a subject of concern. Dairy farming is one of the sources of environmental pollution. Many regulations came into force to reduce pollution. As a consequence many new techniques were introduced to reduce air and water pollution and to make a better use of available manure.

An important event for the nineties was the introduction of the milking robot, a Dutch invention. At the end of the nineties half of the 500 robots in Europe could be found in the Netherlands. A further increase is expected as the milking robot helps to reduce labour costs and contributes to the health of the cow.

1. Introduction

Since land and labour are expensive in the Netherlands, the production systems used in agriculture are generally intensive. Land and labour productivity are high to be competitive with other production areas. Due to economic growth, land and labour are becoming more and more expensive. As a consequence there is a need for a continuous increase in productivity to maintain competetivity. Dairy farmers make this increase in productivity possible by a continual adaptation of new technologies. Agricultural policies of the Dutch government and later of the European Union have stimulated the modernisation of dairy farming.

The current use of fertiliser on grassland is about 300 N per hectare, the milk yield per cow is 7,500 kg and 1 worker can handle more than 50 cows by using modern housing systems, automatic milking and some of the fieldwork is done by contractors. Under the climate conditions prevailing in the Netherlands, grass and maize are the most suitable crops for dairy production. Since nitrogen is cheap leguminous crops like lucerne are not used in intensive systems, also because of the complicated farm management. In addition to grass and silage the cows get about 2,200 kg of concentrate per year. This includes the concentrate for young stock (200-250 kg). Almost all farms use cubicle sheds in combination with parlour milking. This has many advantages: lower labour input, easier to mechanise and manage and improved animal health and welfare.

2. Statistical review of Dutch dairy sector 1960-2000

This section describes the trends in the Dutch dairy sector based on the evolution of a number of indicators between 1960 and 2000. The data are partly derived from the annual agricultural censuses carried out by the Central Bureau of Statistics (CBS). Another part of the data is derived from the Farm Accountancy Data Network of the Agricultural Economics Research Institute (LEI). The first source consists of data of all farms with at least one cow. The second source is a representative sample of farms specialised in dairy with a farm size above a minimum threshold. These specialised farms represent more than % of the total milk production in the Netherlands.

In 2000, the number of dairy cows was at the same level as in the beginning of the nineteen fifties. However, important changes have taken place during this period. Until 1984 the number of milking cows increased year by year, reaching an almost seventy percent higher level than in the early fifties. Later the number of dairy cows decreased year by year. This drastic change in development was largely due to the introduction by the European Union of a milk quota system per member country. The introduction of this quota system was necessary to limit the surplus production of milk in the European Union. At the time of its introduction, the level of the milk quota for the Netherlands was such that milk production had to be decreased. In addition, after 1984 the level of the quota was reduced several times. Consequently the development of milk production reversed. In 1984 milk production was twice as much as in 1960, while afterwards it declined by 16%.

Table 2.1 Development of dairy farming in the Netherlands

	1960	1985	2000
Farms with dairy cows x 1,000	185	58	29
Dairy cows x 1,000	1,628	2,367	1,504
Dairy cows per farm	9	41	51
Milk yield per cow in kg	4,205	5,371	7,034
Milk production x 1 mln kg	6,721	12,525	11,173 a)

a) 1999
Resource: Land- en tuinbouwcijfers, different years.

The changes in the acreage for roughage were limited since 1960. It remained nearly stable until 1985 and afterwards it declined by 9%. However it has to be kept in mind that roughage is not only used for dairy cows but also for beef cattle and sheep. During the seventies and eighties part of the grassland was substituted by maize land.

The number of farms with cows decreased continuously. In 2000 only 29,000 farms with dairy cows were left compared with over 185,000 in 1960 (see table 2.1). Many farm-

ers stopped farming and a number of farmers with dairy cows specialised in another direction. Most of the farmers with milking cows now specialise in dairy production. Consequently the number of dairy cows per farm increased from 9 in 1960 to 51 in 2000. Only in the second half of the eighties did the number of milking cows per farm decrease somewhat due to the introduction of the quota system. The milk production per dairy cow increased strongly, in particular after 1970. In 1999 the milk production per cow was more than 50% higher than in 1970. As a consequence of the increase of the number of cows per farm and the growth of the milk yield per cow the milk production per farm showed a continuous increase (see figure 2.1). All these developments are related to the technological developments, which are described in this report and to changes in policies and economic environment.

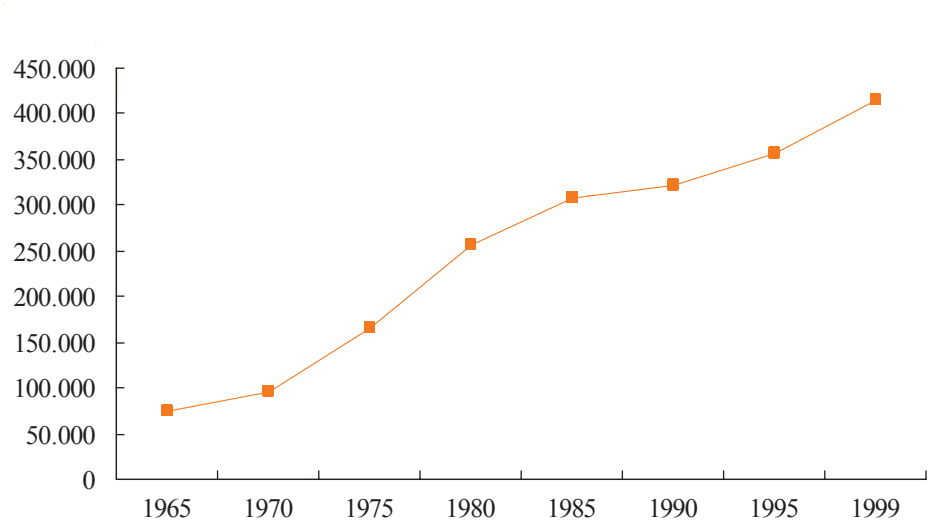


Figure 2.1 Production of milk in kg per farm

It was not only the number of farms with dairy cows which declined during the last decades, but also the number of labour hours per farm. On the specialised dairy farms in the Farm Accountancy Data Network the number of labour hours decreased by more than 25% from 5,350 in 1965 to 3,900 in 1999. As the milk production increased during this period the labour productivity expressed as the production of milk per labour hour showed a strong growth (see figure 2.2). In 1965 72 labour hours were needed for the production of 1,000 kg milk and in 1999 only 9.5. In the eighties and nineties, however, the increase of this indicator was not as high as it was in the sixties and seventies.

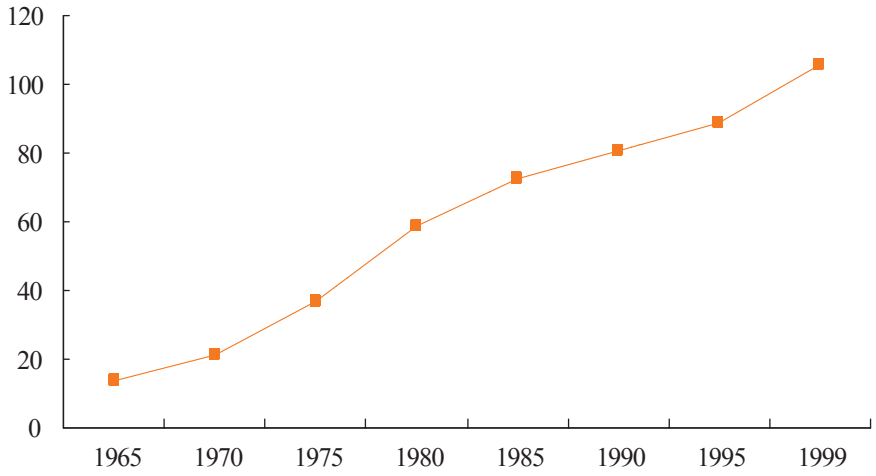


Figure 2.2 Production of 1,000 kg milk per hour of labour

The size of the specialised dairy farms in the Farm Accountancy Data Network measured in hectares also increased. In 1965 it was only 14 hectares, but by 1999 it had increased by almost 150% to 35 ha. Most of this acreage is grassland and maize. The milk production per hectare grassland and maize more than doubled between 1965 and 1980 (see figure 2.3). This was partly the result of the use of more fertilisers and concentrates. After the introduction of the quota system the production of milk showed a temporary decrease, but in 1999 it was almost as high as in 1985.

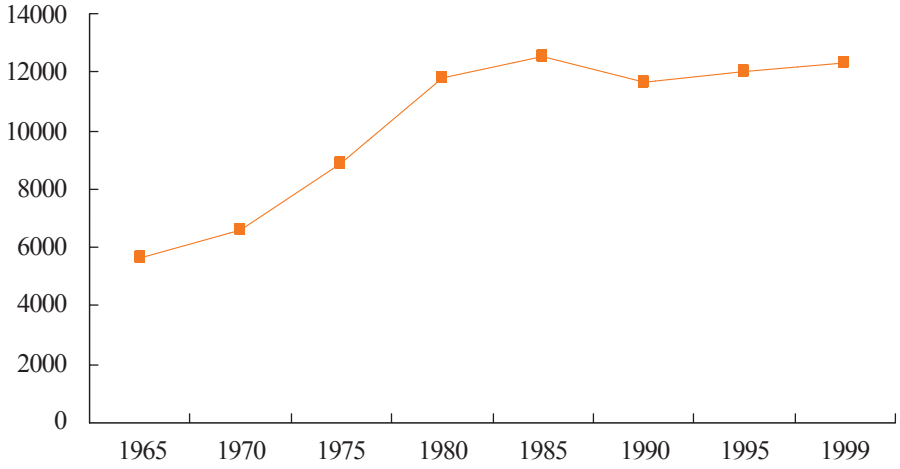


Figure 2.3 Production of milk in kg per ha grassland and foddercrops

The increase in land and labour productivity was partly the result of substitution of land and labour by capital. As an indicator for this substitution the value of machinery per farm can be used. In 1999 this value was on dairy farms in the Farm Accountancy Data

Network, measured in prices of 1999, almost six times as high as in 1965. However, expressed per kg milk, in 1999 the value of the machinery was only 5% higher than in 1965. It can be concluded that not only labour and land productivity increased but also factor productivity.

3. 1960-1980: fast growing production of milk

3.1 Introduction

The period 1960-1980 can be characterised by a fast growing production of milk per farm. This was accompanied by a strong growth in labour productivity. These developments were largely due to a number of changes in production technology. These developments were stimulated by the agricultural policy of the Dutch government and afterwards by the agricultural policies of the European Community. In this respect the Dutch Agricultural Development and Reorganisation Fund has played an important role. On the one hand subsidy schemes were set up for farmers who want to leave farming, while on the other hand grants were made to improve the company structure of those who stayed on. An important scheme of the fund was the interest subsidy (1972-1985), a consequence of the EU guideline 72/159 stimulating the modernisation of agricultural enterprises with development possibilities. Of the support granted, a subsidy on the interest of loans, the European Orientation and Guarantee Fund compensated 25%. In addition many dairy farmers, particularly the younger farmers, made use of the Agricultural Loan Guarantee Fund. This fund, set up in 1951, targeted profitable investments by farmers with inadequate securities. The fund guaranteed the bank the payment of interest and repayment of the loan if the farmer was unable to do so. In the period 1972-1985, 60% of the expansion of dairy livestock was in enterprises that were in receipt of the interest subsidy. This chapter describes the most important changes in production technology.

3.2 1960-1965: from hand-milking and horse traction to milking machines and tractors

In this period an average farm had only 10 to 15 hectares of land and the yield per cow was around 4,100 kg. Cows were kept in traditional barns and tied up during winter. Particularly during the winter, this was a labour intensive housing system. Milking by hand was still common practice. One worker could handle 10 to 15 cows. It was during this period the large-scale introduction of milking machines took place. The milking machine had been introduced earlier in the Netherlands, but cheap labour available after the second world war and technical problems with the first prototypes delayed the great breakthrough towards the early sixties. Between 1960 and 1965, the number of milking machines grew from 39,000 to 63,000. Milking parlours were not used at that time. The bucket milking system was common. In the winter, when the cows were tied up, the milker went to every individual cow. In the summer the cows were tied up during the milking too, either in the tie-up cowhouse or at a special movable fence. The milker usually milked with two or three buckets. The milk was delivered in milking cans.

This is also the period in which the tractor was introduced to almost all farms. Soon after World War II the tractor was introduced in Holland (Marshal plan), first on machine-corporations and contract work companies and later on the bigger farms. In the early six-ties the medium-sized and even most of the smaller farms switched over to mechanical traction.

3.3 1965-1970: towards specialised farms

According to LEI data the average size of farms did grow slightly. On average the cow got 900 kg of concentrate. In this period more farms specialised on one 'agricultural activity'. With the investment in milking machines and parlours many farmers decided to specialise their farms on dairy. The milking machines developed. Pipelines were introduced to trans-port the milk from the cow to the can. The fertiliser input on grassland grew in this period from 175 kg to 230 kg of N/ha.

3.4 1971-1975: modernisation of the housing system, mechanisation of roughage production and improvement of infrastructure

Modernisation of the housing system
In this period an almost revolutionary switch from traditional to modern housing systems took place. Cubicle sheds in combination with parlour milking were introduced on many farms. Cubicle sheds were mostly provided with slatted floors. Under the slats, and some-times under the entire house, some of the slurry (or even all slurry) could be stored. At the same time on almost all farms cooling tanks were introduced. From 1970 the number of tanks grew from 25,000 to 45,000 in 1975.

Table 3.1 Development of mechanisation on specialised dairy farms a)

	1965	1980	1999
Farms with milking machine (%)	-	98	100
Farms with milking tanks (%)	0	100	100
Farms with cubicle (%)	0	45	80
Tractors (HP/Farm)	25	-	172
Milk production per farm (x 1,000 kg)	74.2	256.3	414.6
Value of machinery in guilders per kg milk/prices of 1999	0.98	0.94	1.03

a) Sample of representative farms

Before its introduction in the Netherlands, the cooling tank (an American) was used in Scandinavia and England. Between 1971 and 1975 the introduction of the cooling tank was stimulated by both government and the dairy industry. Smaller farms in particular

were granted subsidies to install a milking tank. This made it possible for the dairy factories to change the milk transport system from the farm to the factory from transport in cans to transport in tanks. The milking tank was part of a further development towards more mechanisation on the dairy farm.

Mechanisation of roughage production

In the sixties a lot of grass was still harvested as hay. Hay was stored in haystacks and fed to the cows during the winter. Harvesting the hay, storing it and also feeding the cows was very labour-intensive. In the middle of the sixties research focussed on storage methods through grass silage. With this method the drying period for the grass on the field is just some days, which is a big advantage in the Dutch climate. Between 1970 and 1980 the percentage of hay in the diet of the dairy cows (as % of the Dry matter offered) changed from 70% to 20%. At the same time mowing, tedding and windrowing of the grass was mechanised. The switch to silage instead of hay implicated an adjustment of management. The silage made it possible to harvest high quality young grass (high energy-contents per kg dry matter). Over the years the method of ensiling improved. The period required to dry the grass was reduced to 1-2 days. This was important because of minimising the risk of loss of quality because of rainfall. The reduction of the drying time was made possible by a conditioner constructed on the mower and by tedding and windrowing soon after mowing. If necessary, additions were added to ensure a good ensiling process. This all required a lot of advanced machinery on the farm. The development of the mechanisation can be illustrated by the amount of horsepower of tractors and of labour. In 1965 mechanisation was very low. The average farm produced about 75,000 kg of milk. This required more than 5,000 hours of labour. On most farms a 20-30 hp tractor was available. The value of the total machinery was about *f* 72,000 (value 1999, see table 3.1).

Nowadays the average farm produces 415,000 kg milk, requiring less than 4,000 labour hours. Mechanisation has grown to a value of *f* 425,000 per farm and the tractors on the farm have a total capacity of 172 hp. This might seem quite a lot, but expressed per 100 kg milk mechanisation did not change much. Labour per 100 kg milk fell by almost 90% in 35 years (see annex 2 and figure 2.2).

Improvement of infrastructure

Another development to facilitate the exploitation of grassland in the seventies was the parcellation and reallocation of the land. Almost all farms in the Netherlands participated in the so-called 'ruilverkavelingen'. This implied enlargement of the parcels, levelling, exchange of land between farmers, improvement of drainage and accessibility, sometimes even moving complete farms to another location. The government supported these expensive operations by providing high subsidies and a government service supervised the land consolidation projects

3.5 1976-1980: the introduction of the milking tank and maize

From milking can to milking tank

In this period the dairy industry completely converted to the use of milking tanks on the farms. The industry no longer only stimulated the use of milking tanks, but also forced farmers to switch, so that the dairy industry could complete the change of the milk transport system to transport of milk in tanks.

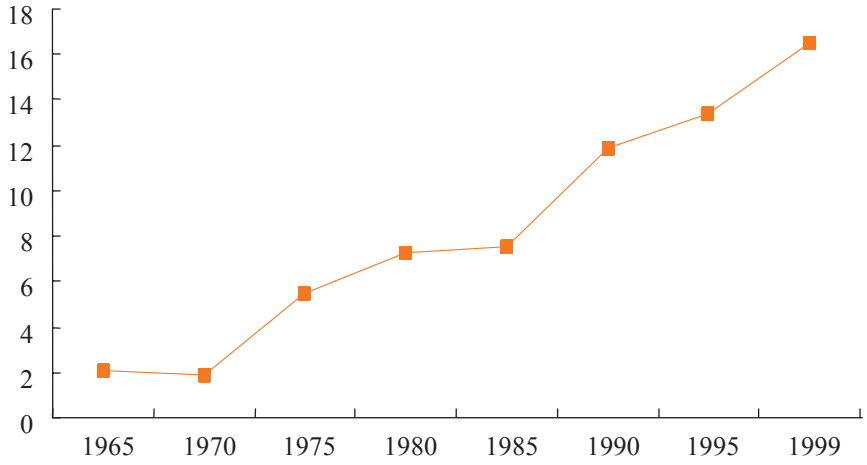


Figure 3.1 Maize per percentage of grassland and fodder crops

The advance of maize

As a result of breeding, maize 'breeds' became available which were suitable for the Dutch climate. Feeding maize silage to the dairy cows is attractive for farmers, as the protein content of maize is lower than that of grass. For that reason maize can play an important role in the optimisation of the feed ration. Although maize is an expensive crop it is particularly popular on the sandy soils in the Netherlands. For the Netherlands as a whole the area of maize as a percentage of the area of grassland and fodder crops increased from 2% in the sixties to more than 16% in the end of the nineties (see figure 3.1). On the sandy soils up to 50% of the winter diet currently consists of maize silage (see table 3.2).

Table 3.2 Forage in the diet of dairy cows (as % of dry matter offered) in winter (estimate by S. Schukking, 2000)

	1960	1970	1980	1990	2000
Hay	90	70	20	5	5
Grass silage	10	28	55	65	60
Maize silage	-	2	25	30	35

4. 1980-2000: Focus on quality, environment and labour productivity

4.1 Introduction

The development during the last two decades of the century differs in many aspects from that of the previous period. An additional factor during this period was the continuous need to increase labour productivity. However the circumstances under which this had to be realised changed. Most important was that it was impossible to increase the production of milk any further, even though this was required as a result of measures introduced by the EU. In addition the focus of society became more directed at the quality of the environment. New legislation came into force to protect the environment and to reduce pollution. For the dairy sector, legislation aimed at reducing air and water pollution was particularly important. Dairy farms have to satisfy the criteria for environmental licences, entailing costs in the form of specific investments required to adapt the concern, for example to be able to store enough manure in the right way and to apply it properly to the land. These regulations are also increasingly influenced by European policy. In addition more farmers try to distinguish themselves in the market by sustainable production (organic or ecological products) and thus in some cases obtaining higher prices for their products. The government has stimulated such developments in recent years.

4.2 1980-1985: milk quota and artificial insemination

Quota for milk production: From quantity to quality
During the seventies milk production in the European Community increased very quickly. The self-sufficiency grew well over 100%. There were few opportunities to export milk products to destinations outside the EC and these were supported by high export subsidies. Stocks of milk powder and butter became 'mountains'. In 1983 a milk production quota was introduced for all the member countries of the European Community to stop surplus production. Each member country and each dairy farmer within the member countries was given a milk production quota. Both the milk production quota per member country and the milk production quota per dairy farmer were based on the production of milk during the last few years before the introduction of the system. Milk quotas have had an enormous influence on the development of dairy farming. The focus on expanding production changed to interest in reducing the costs. In particular the direct costs per kg milk fell. The yield per cow grew from 5,700 kg/cow in 1985 to 7,530 in 1999, whereas the amount of concentrate per cow stayed at the same level.

Moving up of the Yankees
After the Second World War, artificial insemination in dairy cows was organised in a 'structured' way. In 1983 more than 75% of the 'pregnancies' was achieved through artifi-

cial insemination (AI). AI gave farmers the possibility to use sperm from all over the world. In the USA breeding in dairy was more focused on milk yield alone. In the Netherlands most farmers concentrated on both a good milk yield and good meat production. With some reluctance many farmers started working with Holstein-Friesian blood imported through sperm from USA bulls. As a result, although milk yield further increased, the value of the calves for beef production declined.

At the same time individual cow identification was introduced. Milk yield was registered and this information was linked to the amount of concentrate fed to the cow. A personal computer was introduced into farm management, ensuring that every cow was given the right amount of feed needed for the optimal milk yield (see table 4.1).

4.3 1986-1990: new ways in breeding

New techniques to achieve a rapid increase of milk yield per cow
In this period the milk yield increased to an average of 6,575 kg due the introduction of HF blood. Another development in the field of breeding took place through the introduction of embryo transplantation. This technique made it possible to get 50 to 60 calves from one high yielding mother cow.

Table 4.1 Development in milk production on specialised dairy farms a)

	1965	1980	1999
Fertiliser in kg N/ha grass	175	325	295
Maize in % of acreage	2	7	16
Concentrates in kg/cow	1,025	2,100	2,150
Milk in kg/ha grass and maize	5,618	11,812	12,309
Milk yield in kg/cow	4,120	5,340	7,525

a) Sample of representative farms

4.4 1990-1995: the need to reduce pollution, a new challenge

First techniques to reduce pollution of the environment
Keeping dairy cows contributes to pollution of the environment in various ways. Air pollution occurs through volatilisation of ammonia during housing of the cows, from manure storage and application of manure on the land. The nitrogen loss through leaching of nitrate to the ground water is also a problem in the Netherlands. In particular, in water used for drinking nitrate can become a problem if it exceeds the limits of the World Health Organisation (WHO). For this reason on the EU level the Nitrate Directive came into force in the nineties setting limits for the use of manure on agricultural land. Finally phosphate can cause environmental problems. In the nineties many national regulations, partly based on the Nitrate Directive, came into force to solve those environmental problems. First of all, a roofed manure storage had to be available to reduce ammonia emissions. Manure applica-

tion was restricted to certain maximum levels and it was forbidden to apply slurry on the grassland in autumn and early winter. Traditional open application of manure was replaced by various systems based on injection of the manure into the soil.

4.5 1995-2000: introduction of the milking robot

Introduction of the machine milking robot in Dutch dairy farming
Since 1999 most dairy farms have to prepare an annual nutrient balance of their farm, in which all N and P inputs and outputs are recorded. The government wants to reduce nutrient losses by lowering the standards in the coming years. Farmers exceeding the standards will be required to pay a penalty.

At the end of this period about 500 machine milking robots were in use in Europe, 250 of which were in the Netherlands. After years of development this Dutch high tech invention is now finding its way to the early adapters in dairy farming. Besides large labour savings, machine milking also gives new opportunities to solve teat end lesions and mastitis infections due to increased milk yields. Introduction of machine milking has had a major impact on the whole farming system.

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Annex 1 Development of dairy farming in the Netherlands according to national statistics; all farms with at least 1 dairy cow

Table A1.1 Development of dairy farming in the Netherlands according to national statistics; all farms with at least 1 dairy cow

	1960	1965	1970	1975	1980	1985	1990	1995	2000	Source
Farms with dairy cow(s)	185,045 a)	161,946 b)	116,332	91,560	67,167	57,995	46,977	37,465	29,467	CBS
Dairy cows (x 1,000)	1,628	1,723	1,896	2,218	2,356	2,367	1,878	1,708	1,504	CBS
Dairy cows per farm	9	11	16	24	35	41	40	46	51	CBS
Grassland (x 1,000 ha)	1,327	1,337	1,334	1,286	1,198	1,164	1,096	1,048	1,012	CBS
Maize land (x 1,000 ha)		3	6	77	139	177	202	219	205	CBS
Milk production (x 1 million kg)	6,721	7,151	8,253	10,286	11,851	12,525	11,273	11,280	11,173	CBS/PZ d)
Milk yield (kg/cow)	4,205	4,200	4,390	4,650	5,080	5,371	6,069	6,612	7,034 c)	CBS/PZ d)
Farms with milk control and registration per cow						34,455	30,141	26,599	23,640	NRS e)
idem in %						77%	75%	80%	81%	NRS e)
Process computer for concentrate distribution						2,649	8,677	15,617		CBS

Annex 2 Development of dairy farming in the Netherlands according to the representative sample of LEI (BIN); specialised dairy farms

Table A2.1 Development of dairy farming in the Netherlands according to the representative sample of LEI (BIN); specialised dairy farms

	1965	1970	1975	1980	1985	1990	1995	1999
Dairy cows per farm	18	22	34	48	54	49	51	55
Total size per farm (ha)	14.4	15.6	20	22.1	25.1	28.6	30.6	35.2
Milk/farm (kg)	74,160	95,700	165,750	256,320	307,800	322,175	355,725	414,550
Grassland (ha)	12.9	14.2	17.6	20.1	22.7	24.2	25.5	27.9
Maize (ha)	0.3	0.3	1.1	1.6	1.9	3.4	4.1	5.8
Maize in % of total	2	2	6	7	8	12	13	16
Milk yield (kg/cow)	4,120	4,350	4,875	5,340	5,700	6,575	6,975	7,525
Fertiliser (kg N/ha grass)	175	230	265	325	350	300	295	295
Milk (kg/ha grass + maize)	5,618	6,600	8,864	11,812	12,512	11,673	12,018	12,309
Concentrates (kg/cow)	1,025	1,170	1,800	2,100	2,250	2,100	2,210	2,150
Cubicle sheds (in % of all dairy farms)		1	23	45	58	72	71	80
Milking machines (in % of all dairy farms)			98	99	100	100	100	100
Milking tanks (in % of all dairy farms)		0	60	100	100	100	100	100
Member NRS			48	53	57	74	83	90
Member Milk Control System			73	83	84	90	91	92
Labour hours per farm	5,350	4,500	4,500	4,350	4,250	4,000	4,000	3,900
Labour hours per kg milk	0.072	0.047	0.027	0.017	0.014	0.012	0.011	0.0095
Tractors (HP/farm)	25					139	154	172
Tractors (HP/kg milk)	0.34					0.43	0.43	0.41
Value of machinery (NLG, prices 1999)	72,000	86,000	135,000	240,000	286,000	347,000	372,000	425,000
Value of machinery (NLG/kg milk; prices 1999)	0.98	0.90	0.81	0.94	0.93	1.08	1.05	1.03