The financial impact of growth of Dutch dairy farmers in preparation of the milk quota abolishment.

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Content

Abstract

The milk quota was introduced in 1984 to limit the overproduction of milk in Europe. This overproduction was caused by the Common Market Organisation of Europe which ensured farmers with minimum prices. Due to minimum prices in combination with a decreased cost price of milk as a result of technological progress, there was a large production surplus. With the milk quota there came an end to this overproduction. But due to a growing world market and a will of Europe to liberalize markets in general and meet the demands of the world dairy market, in 2008 the decision made that the milk quota would be abolished in 2015. The abolishment of the milk quota lead to a lot of growth in numbers of cows in the Dutch dairy sector. After 2015 the total amount of dairy cows grew more than 20% (CBS, 2018). After the abolishment of the milk quota the milk price decreased, this resulted in a lot of farmers with financial troubles. In this research the financial performance of farms with different levels of growth are compared, the goal is to describe if growth caused problems with the abolishment. The financial performance of the different groups of growth would be measured by three key figures. The key figures used are: gross cash flow, critical milk price and the booking capacity. These were chosen after literature research and interviews with experts from the Rabobank, ABN-AMRO and Alfa Accountants. The groups of the growth were based on the growth of 2008-2016, because in 2008 the abolishment was announced. Distinction in growth was made between growth in cows per farm and growth of cubicles per farm. With the use of SPSS the data of groups was analysed. Eventually there was no significant difference between different groups of growth in cows and cubicles for all three financial key figures. It is possible that the financial impact was more present in 2017 and 2018 due to implementation of phosphate rights. Recommended is to expand the database with more years after the abolishment of the milk quota to really conclude there are no differences in financial performance between different groups of growth.

1. Introduction

April 1, 2015 was a memorable day for dairy farmers in the whole of Europe. On this day the milk quota was abolished after 31 years. Not for all countries in Europe this was a big thing because only the Netherlands produced enough to exceed the milk quota the last years (Grinsven van, 2015). The milk quota has been an important limitation. Some Dutch farmers even called this day “liberation day”, because they were finally able to produce without an expensive limitation.

Result of the removal was a large increase of dairy cows. In 2012 there were 1.475.000 dairy cows in the Netherlands. The total amount of dairy cows increased rapidly after 2015 with more than 20% to a peak of almost 1.750.000 dairy cows in 2016 (CBS, 2018).

The growth of the dairy sector was not a surprise. Research before removal of the milk quota stated that the growth would be the most in north west of Europe, especially the Netherlands. They predicted a growth of 10% to 20% for the long term. However, the Dutch dairy farmers reached this growth within a year, coming of a surprise to many people. The speed of the growth could be explained by the high milk prices in the period directly preceding the abolition of the milk quota (Meester, 2016).

The abolition of the milk quota was expected when it happened. The abolition was announced many years before, so farmers could anticipate on the new situation. However, the introduction of the phosphate reduction plan and phosphate rights in the years after, was ad-hoc regulation. Therefore, these years were full of uncertainty and farmers could not anticipate. This in combination with the highly volatile milk price of the last years these times were hard for dairy farmers. Various evaluations about the financial situation of Dutch dairy farmers were published in the popular press. In 2016 one on three dairy farmers were in financial problems, according to the largest financial organization in agriculture Rabobank (NOS, 2016). But it is not sure which farmers had these financial problems. In this research different farmers with different levels of growth before the abolition of the milk quota are compared to find out on which group there was the biggest impact.

Research objective:

What was the financial impact of growth of Dutch dairy farmer in preparation of the milk quota abolishment?

Research questions

1. What are the details and background of the milk quota?
2. Which growth dairy farmers made before the abolishment of the milk quota
3. How can the financial performance of dairy farmers best be expressed?
4. What impact had the abolition of the milk quota on the financial position of dairy farmers?

The report is composed as followed, in chapter 2 the background information of the milk quota will be described. followed by chapter 3 about financial key figures in the dairy sector. After that the material and methods will be described followed by the results of the research. Finally, the results will be discussed, and conclusion of the report will be provided.

2. Background Milk Quota

April 1, 2015 was a memorable day for dairy farmers in the whole of Europe. On this day the milk quota was abolished after 31 years. Not for all countries in Europe this was a big thing because only the Netherlands produced enough to exceed the milk quota the last years (Grinsven van, 2015). The milk quota has been an important limitation. Some Dutch farmers even called this day "liberation day", because they were finally able to produce without an expensive limitation. But what was the milk quota? To answer this question first the background of the milk quota is discussed.

Till the 1950's mixed farming was the standard. Every farm had a few cows, for milk, meat or the manure. Milk was used as food but also used as a basis to make butter and cheese. In these times the demand for milk was high, but with the few cows for each farm it was not possible to meet the demands. But in the late 1950's this turned around (Van der Ham, 2008).

In the treaty of Rome, signed in 1958, the six-member states of the European Economic Community (EEC) laid the basis of the Common Agricultural Policy (CAP). The free market in agriculture did not work, there was a lot of scarcity of payable food (Carels & van Gijseghem, 2003). This had to change so the CAP was established with the following objectives (de Bont, 2003):

1. Increase agricultural productivity
2. To ensure a decent standard of living for farmers
3. To stabilise the market
4. To ensure a decent food supply
5. To make food payable for customers

Income policy

When a government want to influence the market mechanism of agricultural products to their own goals, like they want with the CAP, there are two possibilities. A Common Market Organisation (CMO) and a surcharge system. Both systems have a different impact on the international and national market. Below both systems are further explained (De Hoogh, 1988).

Common Market Organisation

In a CMO the prices of products coming from the agricultural sector are influenced. This can be done with different instruments developed by different countries and circumstances. The instruments can be divided into two main categories: limitation of the supply and increase of demand on the national market. For most industrialized countries the price level of agricultural products is way below the preferred price level for a good income for farmers. So, a support of price level is needed, because almost all countries operate in an international market a national market policy always needs a trade policy to protect their own market. Different measures for limitation of the supply are:

- Import duties, so the products from third countries are always above a price minimum so national market is not affect with cheap products from other countries
- Quantitative limitations or quotas on import through limitation on the import licences, so less products on the market
- Limit national production with production quotas, so less products on the market

Different measures to increase demand:

- Export refunds, so stimulate sales to third countries.
- Intervention price, so products are bought by the government for a minimum price. The products are stored and brought back on the market when prices are better.
- Subsidize processing of products, so products are used more.

When production is lower than the demand the government earns extra money with import duties. When the production is higher than the demand the government must pay for storage of intervention products and export refunds, which is costly. When the government intervenes the market with income political reasons it will change the price levels and price relations of the products. With these changes the production and the usage of the products and its substitutes will be influenced. The national production will be increased, even when products of the international market are cheaper. But the usage of the product will decrease because of the higher price, this will stimulate the usage of substitutes. The national income will also change when a country introduces a CMO and has an important role as importer or exporter on the market. A CMO will result in more products on the market, when a country has a major role in the world market eventually the world market price will decrease. When a country is a big importer of the products this will lead to a benefit, but when the country is an exporter this will lead to higher export costs. This will affect all countries on the world market. But this is hypostatical, because it is not possible for a country to increase production within a year, this takes time, so this will slowly influence the world market, so the market can anticipate on that. But a price decrease is inevitable. The importing countries (mainly developing countries) can profit from the price decrease, but this is only for the short term. Because on the long term the development of their own agricultural sector will be negatively influenced by the cheap import products. When more and more countries choose to protect their own market, the result will be stable prices on their own national market, but the international market will fluctuate more and more. So, countries dependent on import must cope with these large fluctuations, which can result in a shortage of products on certain moments (De Hoogh, 1988).

Surcharge system

With a surcharge system the income will be supported without influence on the market through direct income supporting measures. The national market is not protected from world market and incomes of farmers are assured with surcharges. Surcharges can be granted on different criteria, some examples:

- Surcharge per delivered product. Also called ‘deficiency payment’, this is used in the United States.
- Surcharge per hectare cultivated crop, or per animal.
- Surcharge on income of the farmers, so income will be complemented to a minimum level.

A combination of different options is also possible. Also, a policy with a combination of a CMO and surcharge system is possible. But in general, a CMO is more used than a surcharge system.

In a surcharge system all of income supporting measures are paid by the government. So, the expenses of the surcharge system will be paid by taxpayers. The height of these expenses is proportional to the national production of the product. So, when national production is lower than national demand a surcharge system also charges the taxpayers, but the consumers pay less for the product than in a CMO. This is because in a surcharge system prices are not influenced. When prices are not influenced

the hypothesis is that the balance between supply and demand will not change. But when deficiency payments are used there is a stimulus to produce more, when surcharges per hectare or animal are used this stimulus will be less. But still production will be stimulated more than without a surcharge system. When production is increased due to a surcharge system, international markets are also affected, but not as much as with a CMO. This because the national markets are still open and operate on the same price level as the international markets.

By most western countries a CMO is preferred above a surcharge system. This because in term of expenditures a CMO is cheaper, this because a huge part of the extra income of farmers is paid by the consumers. With a surcharge system the government must pay all the surcharges itself. Another important factor is the difficult implementation of a surcharge system. The administrative foundation must be good because it is a lot of work and administration to control every criterion a surcharge is given for (De Hoogh, 1988).

Common Market Organisation Dairy Sector

Eventually to achieve the five objectives of the CAP a CMO was established. The CMO of the dairy sector was based on the following three principles (Gemeenschappen, 1980):

1. Price arrangements: Target price for milk, intervention prices for butter and skimmed milk powder
2. Intervention arrangements: storage of butter and skimmed milk when prices are low.
3. Arrangement for trades with other countries: export refunds and import duties.

The goal of the CMO was to achieve the target price for milk, the price paid for milk on the market. The target price was determined every year, this was done with all the member states in the beginning of every year from 1968 till 2003. When cheaper dairy products are imported in the EEC import duties had to be paid to make up for the difference in price. When products are exported the difference in price was compensated with export refunds. Furthermore, within the EEC it was possible that the government bought the overproduced milk for the intervention prices and store the products to bring it back on the market when there was a shortage (Heringa, 1998).

There was a lot of criticism on the CAP and the price support, within and outside the EU. Research from the US (Borrel & Hubbard, 2000) stated that the CAP is responsible for a cost borne by individuals, groups and countries. This because the special treatment for farmers is paid by consumers and taxpayers. Also because of the CAP the EU changed from a net importer to a net exporter, so the European Union was accused to be a major source of disruption and instability on the global agricultural markets. This can be seen in table 1, the prices in the EU are way higher than world prices, up to 438% (sugar).

Table 1: Prices for certain agricultural products in the EEC compared with world price levels [a], 1967/68 (Fennel, 1997)

Product	EEC common price UC/100 kg. (1)	World market price UC/100 kg. (2)	(1) as a %age of (2)
Soft wheat	10,70	5,80	185
Hard wheat[b]	16,10	8,10	200
Husked rice	18,00	15,30	117
Barley	9,10	5,70	160
Maize	9,00	5,60	160
White sugar	22,30	5,10	438
Beef	68,00	38,80	175
Pig meat	56,70	38,60	147
Poultry meat	72,30	55,00	131
Eggs	51,10	38,70	132
Butter	187,40	47,20	397
Olive oil[b]	115,60	69,80	166
Oil seeds[c]	20,20	10,10	200

a) Reference period differs for various products
b) including direct production aids
c) wholesale entry price

The CMO was planned to be introduced in 1970, eventually the CMO was introduced in July 1968. The goal was to establish a good income for dairy farmers and affordable dairy products for the consumers. Eventually the CMO reached its goal. Farmers had stable incomes and clarity for a longer period of years. Furthermore, farmers and dairy processors were always assured of selling their products for a reasonable price because of the intervention arrangements and good intervention prices. So, it was attractive for farmers to expand their milk production. In 10 years (1973-1983) the milk production in the EEC grew with more than 20% (Woestenborghs B. , 2015).

So as said, the grow possibilities were huge for dairy farmers. As seen in table 2, the increase in large farms was huge. Eventually this growth lead to problems in the EEC because the demand did not grow as much as the supply. The growth of population did not increase that much, and the consumption of milk and cheese had only a slight increase. The consumption of butter decreased because of health issues. The result was increasing intervention stocks which costs the EEC a lot of money for storage but also for export refunds because the world market price was lower than the intervention prices (Woestenborghs B. , 2015).

Table 2: Average annual growth rates[a] for the numbers of farms in the size classes in the Netherlands (Huettel & Jongeneel, 2011)

Herd-size class		Pre-quota period 1972-1983	Quota period 1984-2006
Small:	1-30 cows	-10,2	-8,55
Medium:	31-70 cows	1,25	-3,28
Large:	71-100 cows	11,42	-2,72
Very large:	>100 cows	14,4	-0,27
Total		-4,83	-4,39

[a] Annual growth rates are derived using logarithmic growth rates.

In the first years the EEC was always able to get rid of the intervention stocks. The accumulated stocks before 1978 are slowly sold due to a good world market price. But after 1982 the production increased that much that the intervention stocks reached levels that were never reached before. Due to increasing criticism on this system in July 1983 the EEC decided to work out a plan to limit the milk production and to bring back the intervention stocks to acceptable levels (Woestenborghs B. , 2015).

Milk quota

To achieve the goals of limiting milk production and lower the interventions stocks there were two options. First option was to decrease to target price with 20% to 30%, option two was to introduce a production quota (Hooyberghs, 2005). The first option lead to a lot of criticism from farmers organisations because it would be catastrophic for the incomes of the farmers. So, the second option was chosen, this was the start of the milk quota. Inspiration for the milk quota came from the sugar quota which was introduced in 1968. Also, there was a milk quota in countries like: Canada, Switzerland, Sweden and Finland which gave the EEC inspiration for their milk quota. When introduced the quota was meant to stay for a 5-year term. The maximum volume for milk production was 103.7 million ton per year. This was based on the production of 1981 plus 1%. Each member state got their own freedom to implement the quota system. Most of the member states chose for a quota per farmer, but some countries chose for quota per milk processor (Commissie van de Europese Gemeenschappen, 2002).

To stimulate farmers to keep their production to their quota a fine was given if a farmer produced too much, to so called superlevy. With this money the cost of disposal of extra milk would be financed. The superlevy was stated on 75% of the target price (Woestenborghs B. , 2015).

After the first years the milk quota was evaluated. The first goal of limiting the milk production was reached. However, the second goal of getting rid of the intervention stocks was not reached. Instead of decreasing the intervention stocks the stocks grew to 1.3-million-ton butter and 800.000 ton skimmed milk powder. Conclusion, the milk quota had to shrink. In 1987 and 1989 the quota was lowered with 3%, in 1990 and 1991 the quota was decreased with 2.5%. Also, the superlevy was increased to 100% of the target price and the government stopped with intervention purchases. Also, the term of 5 years was extended with 3 years, and in 1992 the milk quota was extended with 7 years. These measures together with an investment of 3 billion to get rid of the butter stocks lead to a decrease of stocks to 100.000-ton butter and nearly empty skimmed milk powder stocks. In the years after the stocks would be complemented to an acceptable level and were held on this level.

Halfway the 90's everything was under control. Milk production was limited and stocks were held on acceptable levels. Milk prices were good and farmers had a good income. Still there was a lot that changed in the dairy sector. The number of dairy farmers decreased with 40% and the number of cows on a farm increased with 25% (Commissie van de Europese Gemeenschappen, 2002). In table 2 the annual growth rates of different farm sizes is summarized. So large and very large farms had a huge growth before the quota period, in the quota period al lot small and medium sized farms stopped.

Reforming milk quota

criticism against the protecting CMO was still increasing. This because the economic and politics changed a lot since the introduction of the milk quota. In 1992 the begin of the end of the price support and market protection was made with the Mac Sharry-reforming. All reforms of the CAP before 1990 were meant to secure farmers income and price support was the most important factor in this (Daugbjerg, 2003). But in 1992 this changed with the Mac Sharry-reforming because for the first-time export refunds and import duties were lowered. This led to a renewed approach of the CAP. The basis of the reforming exists of two elements: Lowering the guaranteed prices and instead of guaranteed prices direct income support. The main reason for the Mac Sharry-reforming was to lead the EU milk prices more towards the world market prices (PLATTEAU J., 2006).

In the new negotiation rounds of the World Trade Organisation and the enlargement of the EU from 15 to 25-member state in 2004 this reforming was given an extra push. To prepare Europe for the removal of the milk quota it was decided the milk quota would grow on a yearly basis with 0.5%. But in any case, the milk quota would still stay until 2015. The final decision would be made in 2008 (PLATTEAU J., 2006). So, in 2008 the historical decision of removal of the milk quota was made. In the following years (2009 till 2014) the quota would be increased with 1%. This to prepare EU farmers for the removal without the extra superlevy or quota costs.

Before the final decision of removal of the milk quota the milk price was good in 2007 and 2008. But due to the bank crisis which lead to a recession of the worldwide economics the milk price plummet. The milk crisis led to a lot of protests and eventually the intervention purchases and the export refunds were increased. In the end of 2009 the milk price was on the same level as before the crisis. The crisis was a wakeup call for the free market future of the dairy sector. This wakeup call lead to the launch of 'Het Zuivelpakket' by the European commission. 'Het Zuivelpakket' was approved in 2012. The goal was to strengthen the dairy sector and prepare it for the more market oriented and sustainable future to retain the market for a new milk crisis. The member states have the possibility to obligate contracts between farmers and milk processors. Also, it gives farmers the opportunity to negotiate in a collective for milk contracts. At last 'Het Zuivelpakket' makes the market more transparent. The measures of will be used until 2020 (Europese Commissie, 2016).

Consequences abolition milk quota

So, there it was, April 1, 2015 the milk quota was removed after 31 years. Due to good prices in 2014 a lot of farmers invested in growth. This resulted in a large increase of dairy cows. In 2012 there were 1.475.000 dairy cows in the Netherlands. The total amount of dairy cows increased rapidly after 2015 with more than 20% to a peak of almost 1.750.000 dairy cows in 2016 (CBS, 2018).

The growth of the dairy sector was not a surprise. Research before removal of the milk quota stated that the growth would be the most in north west of Europe, especially the Netherlands. They predicted a growth of 10% to 20% for the long term. However, as seen in figure 1 the Dutch dairy farmers reached this growth within a year, coming of a surprise to many people. The speed of the growth could be explained by the high milk prices in the period directly preceding the removal of the milk quota (Meester, 2016).

3. Financial and technical numbers

In this report the financial data of Dutch dairy farms are utilized, as they were available from one of the larger farm accountancy companies. However, a large number of farm performance figures were available on the database. It is important to select the proper financial indicators. In this chapter we will review existing literature on farm performance indicators and present the results of interviews with employees of the financial agricultural sector. Based upon this information the economic farm performance indicators that fit the best with the objectives of this research were chosen.

3.1. Literature review financial key figures

In this paragraph existing literature on financial performance of dairy farms is reviewed. Literature used originated from the United States and the Netherlands. Underneath the different studies are reviewed:

In the paper “Dairy farm financial performance: firm, year and size effects”, (Wolf C.A., 2016) dairy farm financial performance is evaluated by financial ratios from three university business analysis programs. The paper stated that the key dimensions of farm financial performance are profitability, solvency, and liquidity. To account for farms size ratios are used, so comparing across farms will be easier. To measure the profitability the rate of return of assets is used, this is defined as operating profit divided by total farm asset value. To measure the solvency the debt-to-asset ratio is used. At last the liquidity of farms are compared, this is done with the Current Ratio. The Current ratio indicates the extent to which current farm assets cover current farm liabilities. Current is defined in this ratio as less than a one-year period.

In the paper “Financial Performance of New England Dairy Farms”, (Wadsworth, 1992), classify 124 New England dairy farms according to their financial performance. After classification the explanations for the variation of financial performance were found with the use of logit regression. To classify the farms Melichar’s procedure was used. The Melichar’s procedure combines debt-to-asset ratio, return on assets, return on equity and equity level to determine a farm’s financial position. The debt-to-asset ratio equals the total debt as percentage of total farm assets. Return on assets equals the net farm income before interest payments, minus the value of unpaid labour as a percentage of the total farm assets. Return on equity equals the net farm income minus the value of unpaid labour and interest payments as a percentage of equity. Equity level is calculated when total farm assets are decreased with debt. After determination farms were divided into four financial position categories: good, fair, stressed and vulnerable. Farms classified as vulnerable are facing financial troubles and may not survive. The stressed group is heading for financial trouble unless returns improve. In the classification fair farms may not be able to sustain their equity and fully service debt in the long term, but not in trouble yet. Good farms have no problems at all. Variables which had a significant influence on the financial performance are: production per cow, farm operating expense per cow, milk price, non-milk sources of farm income, farm size, farm location, and land purchases in the last five-year period.

The goal of the report “Gevolgen van groei voor financiële resultaten op melkveebedrijven in Nederland en EU”, (Zijlstra J., 2012), was to get more insight in the growth process of the Netherlands and the EU in the first 10 years of the century. Also, there is looked at the impact of investments in growth for the financial farm results. In the financial comparison two groups are used, the first group are the most successful growers and the second group are the least successful growers. The divide the farms over the groups key figures income and booking capacity are used. Income is returns minus all costs. To calculate the booking capacity the depreciation is added to the income and the taxes and private expenses are deducted from that. Concluded from the research is that there is a large variation between the groups of growth in both key figures. The most significant difference between the group was the control of the costs.

In the report “Beter zicht op rendement van investeringen”, (Zijlstra, 2012), the most common key figures of investment are gathered. The most common key figures used in the Netherlands are:

- Cash flow: Difference in revenue and expenses, representing the operating activities of an organization.
- Booking capacity: With the booking capacity the liquidity of a company can be reviewed. With liquidity it is meant the ability to pay the payment commitments of an investment.
- Floor price: The floor price is the milk price which is needed to pay all payment commitments, with exclusion of amortisation and replacement investments. This because these two could easily be stopped for a while. These two costs are also the difference between floor price and critical milk price.
- Net cash flow (margin): Cash flow after all payment commitments are done.
- Critical milk price: The critical milk price is the milk price in the future which is needed to pay all payment commitments.
- Gross cash flow: Net cash flow without interest and amortisation. Cash flow when no loan is needed.

3.2. Experts from the sector

In the last paragraph we looked at key figures of financial performance in the literature. To get a more recent and broader view experts from the sector are interviewed to find out what they think is important. Next to the financial key figures, they were asked which technical key figures are important to influence the financial performances of dairy farms. The experts who participated in this research were Harm Folkers from ABN AMRO, Marijn Dekkers from Rabobank and Jan Kappers from Alfa Acountants.

ABN AMRO:

For the financial aspect it is important to look at the margin per kg of milk and margin per cow. The margin per kg of milk/cow is calculated by dividing the operating profit by the amount of milk/cows. The other important financial number for ABN AMRO is the booking capacity. At last the gross cash flow is used to compare farms on their technical results, because with the gross cash flow farms are corrected for their assets land and buildings.

With the technical performances it is possible to indicate the craftmanship of a farmer. For the technical performance ABN AMRO looks at the production per cow and the protein and fat content of the milk. Other important is the longevity of the cows and their total life production. The rate of culling and the mortality of cows are important factors in this. At last the production of roughage per hectare is important, the more high-quality roughage produced on the farm the less feed has to be bought. (Folkers, 2018)

Rabobank:

For the financial performance of dairy farms Rabobank looks at booking capacity and gross cash flow. With the booking capacity the Rabobank is able to see if a farm has enough cash flow and is able to pay back the loan. With the gross cash flow they are able to rate the tuning between land, building and labour.

The technical performance of dairy farms is rated on operating profit. The operating profit has a high correlation with the technical performance of farmers. But it is difficult to say why the operating expenses are high or low than you have to look at individual technical performances like milk production and feed costs (Dekkers, 2018).

Alfa Accountants:

For financial performance Alfa Accountants looks at the critical milk price. With the critical milk price, it is easy to see when a farm is profitable or not, because when the critical milk price is lower than the actual milk price the farm makes profit. Other important factors are booking capacity. When you look further at the financial numbers the operating profit and gross cash flow are also important numbers according to Alfa Accountants. What has not been noted yet but is important are the other incomes. It is important because than it is possible to look at the performance of the dairy farm on its own.

For technical performance Alfa Accountants goes more in depth than the banks. The technical performance is rated by kg milk per cow, kg milk per ha, amount of young stock, contents of milk (protein, fat, urea), replacement percentage, amount of concentrates used and price level, dry matter per hectare and available labour (Kappers, 2018).

3.3. Financial performance scheme

To summarize this paragraph a calculation scheme for the financial performance is made, see figure 1. Most financial key figures are displayed in this scheme, the financial key figures used for the analysis are highlighted in blue. The three are booking capacity, critical milk price and gross cash flow. Booking capacity is used because in all Dutch literature and all experts from the sector named this figure. Critical milk price is used to see in a short overview which farm is profitable or not. Gross cash flow is chosen because the differences in level of financing are taken away so farms who invested could easily be compared with the rest of the farms.

334.575	+	Revenues						
115.500	-	Allocated expenses (feed, genetics, health, crops)						
219.075		Operating profit						
61.700	-	Unallocated expenses (Paid labour, insurance, maintenance)						
40.000	-	Paid interest						
117.375		Cash flow						
30.000	-	Private expenses						
17.708	-	Taxes						
69.667		**Booking capacity**	/	Milk deliverd 800.000 kg	=	0,09/kg		
35.000	-	Depreciation						
13.000	-	Replacement investments		Milk price / kg €0,35/kg	-	Booking capacity / kg €0,09/kg	=	Floor price €0,26 / kg milk
21.667		Net cash flow	/	Milk deliverd 800.000 kg	=	0,03/kg		
35.000	+	Depreciation						
40.000	+	Paid interest		Milk price / kg €0,35/kg	-	Margin /kg €0,03/kg	=	**Critical milk price €0,32/ kg milk**
96.667		**Gross cash flow**						

Figure 1: Investment calculation scheme Dutch dairy sector with example calculation. Key figures highlighted in blue will be used in the research

4. Materials and methods

In order to answer the research questions several methods were used. For question 1 and 2 a literature review will be conducted. For question 3 a literature review will be done, this will be complemented with interviews of experts. For question number 4 a data analysis will be done. In the following paragraphs the methods will be further described.

4.1 Literature milk quota

To answer **question 1 and 2** (1. what is the milk quota and 2. how did dairy farmers prepare for the abolishment) a literature review was conducted. To find literature about the milk quota Google scholar was used. Search term used was “Melkquotum” in the title, this resulted in 23 results. Most interesting was “Ontstaan, evolutie en stopzetting van de melkquota 1984-2015” this report contained a lot of information about the milk quota with new references. With the snowball effect more and more literature was found. To find more literature about the Common Market Organisation and the financial consequences of it also Google Scholar was used. The search terms “Financial effect Common Market Organisation” resulted in some interesting literature from the United states. Because the US literature was against the CMO also literature which was pro CMO was searched. This was searched in Dutch literature about agricultural politics. With the search term “financieel landbouwpolitiek” the article “EG-landbouwpolitiek van binnen en buiten” was found which gave a lot of information about the income policy.

4.2 Literature financial performance

To answer research question 3 (How can to express the financial performance) a literature was conducted and to complement the literature review interviews were send to experts from the sector. The literature review started on Web of Science, to find the literature the search terms were financial performance for the title and dairy in the topic. Out of this search 23 results came out. Out of these results the scientific papers “Dairy farm financial performance: firm, year, and size effects” came out as most interesting and was used as the first reference. After Web of Science the database of Google Scholar was used. Search terms were “Financial performance dairy farms” (all article), the result was 184.000 hits. To narrow down the amount of results the search from all article was changed in all in title. This resulted in 23 results, which resulted in the interesting scientific papers: “Financial performance of New England Dairy Farms” and “Measuring financial performance on dairy farms”. These papers originated all from the United States, because this report is about Dutch dairy farmers also Dutch papers were searched. This was done with the search terms “Melkveebedrijven financieel vergelijken” in Google scholar, this resulted in 975 hits. The most interesting papers was “Gevolgen van groei voor financiële resultaten op melkveebedrijven in Nederland en EU”. Also the project “Melken in de nieuwe realiteit” was interesting and had a lot of information on financial performances. For the interviews Pierre Berntsen of ABN-AMRO and Marijn Dekkers of the Rabobank were contacted by email. To get another view on financial performance than the bank view Jan Kappers of Alfa Accountants was contacted by email. They were asked what they thought were the most important financial key figures to compare dairy farms and which technical key figures were important to measure a dairy farms performance.

4.3 Available data

The dataset was made available by the accountancy firm Flynth. The dataset contains accountancy data from 3431 dairy farms from the years between 2004 and 2016. The farms were anonymized so their privacy was protected. Before the data analysis could have started the data set had to be cleaned and unreliable data had to be removed. This data cleaning was done in excel. There were a lot of farms with some years missing. For the analysis only farms with data of all years were used. To remove the farms with missing years an excel formula was made to calculate how much years of one respondent was present. All respondents with less than 13 years (2004-2016) were removed. This removal was done with the sort and filter option in excel. After this removal 1081 farms were left. To reduce the size of variables with no relevance were removed. There were 884 variables for each farm each year. Lots of the variables were double so these were removed right away. After that the variables were scrolled through by hand and irrelevant variables, like the number of sheep on the farm, were removed. There were 526 variables left. After that there was looked at unreliable financial key figures. The figures used were gross cash flow, critical milk price, profit and privat expenses. For gross cash flow all farms with higher than €70 / 100 kg milk were removed, for critical milk price above €55 / 100 kg milk, profit above €50 / 100 kg. After removing 895 farms were left in the database. Also, after checking the financial key figures it stood out that all numbers in 2004 were unbelievably high, so the whole year 2004 was removed from the dataset. After cleaning and removing the data the analysis could start.

4.4. Data analysis

To start analysing the different groups of growth were made. There were 9 different groups, group 1: growth of < 0%, group 2: growth of 0-10%, group 3: growth of 11-20%, group 4: growth of 21-30%, group 5: growth of 31-40%, group 6: growth of 41-50%, group 7: growth of 51-75%, group 8: growth of 76-100% and group 9: growth of >100%. The groups were made for different time frames, first for growth between the years 2008 till 2015 because in 2008 the abolishment of the milk quota was announced. Second group was for each year of the timeline. At first only these groups were made based on the growth in the number of cows, but also these groups were made on basis of growth of the cubicles.

After creation of these different groups the most important variables of the 526 were placed in the beginning of the document, this to make it easy to search these variables. But the other variables were kept in the database because there was a possibility those variables were helpful for the analysis. With this done the database was loaded into SPSS and a number of statistical analyses were carried out. First a descriptive analysis was carried out, where averages and variation were calculated for the overall data as well as for the group of farms as well as of the different growth groups was evaluated. The financial performance of different groups was determined. The financial performance was measured based on the gross cash flow, critical milk price and booking capacity. This was done in SPSS with the option custom table, with the t-test significance was searched within the column of the different groups of growth. With the results of the SPSS outcome tables were made in Excel to give a clear overview of the numbers.

4. Results

5.1 Descriptive statistics

In table 3 the growth, financial performance and technical performance are provided over the range of years. As can be seen the number of cows per farm increased every year, and the standard deviation increased also. So there arises a bigger variance within the farms. This is because some farms grow a lot more than the average. The growth in percentages is seen in the table. The growth in the years 2009 and 2010 was low in comparison with the other year. This can be explained by the milk price in 2009. The milk price was in 2009 was only € 27,58 / 100 kg milk. But the years with the highest milk price, 2013 and 2014, did not result in the highest growth. The milk production per cow increased over the years, the standard deviation increased slightly. The milk production per cow increased each year until 2010 then the milk production decreased to increase again in 2015 and 2016. Kilograms of milk produced per hectare increased almost each year, this could be explained with the growth in cows and increasing production. Milk price was highly variable trough the years with a maximum of € 43,37 / 100 kg milk and a low of € 27,58 / 100 kg milk.

Table 3: Descriptive statistics of farms used in the research

Year	n cows total	Std. Dev	Growth (%)	Std. Dev	Milk Price	Std. Dev.	FPCM/cow	Std. Dev	Kg milk/ha	Std. Dev.
2005	75,6	29,25	3,11	7,17	30,75	1,17	8508	961	14296	3721
2006	77,97	30,83	2,55	6,53	29,96	1,19	8620	935	14737	3843
2007	80,09	32,69	4,91	7,05	35,90	1,77	8703	981	14849	4035
2008	84,16	35,55	2,05	7,72	36,50	2,09	8680	945	15384	4518
2009	85,79	36,17	0,95	6,25	27,58	1,58	8763	954	15531	4341
2010	86,57	36,71	1,33	5,96	34,95	1,53	8979	983	15898	4590
2011	87,77	38,02	2,81	6,05	39,30	1,61	8959	972	15921	4728
2012	90,45	40,3	5,44	7,09	37,00	1,70	8799	977	15875	4770
2013	95,68	44,34	2,21	7,11	43,37	1,81	8798	965	16607	5170
2014	97,9	46,48	4,62	8,42	42,33	2,16	8792	991	16912	5561
2015	102,79	51,59	5,14	9	34,33	2,71	8951	1016	17458	5932
2016	108,66	56,46	-	-	32,39	2,99	9090	1071	18241	6331

5.2 Growth

In table 4 the 1-year growth, max growth per farm, growth in cows from 2008-2015 and the growth in cubicles from 2008-2015 are provided for the nine different groups of growth. In the first column the 1-year growth in cows is shown. Most farmers grew slowly, 55,5 % grew only 0-10% each year and only a few farms grew more than 20% in one year. In the second column the maximum growth of farms in one year is shown. Group 1 of < 0% growth is 0 because all farms had at least one year they grew in number of cows. The maximum growth of a farm is in most farms (more than 75% of the farms) below 20% in one year. In the third column the growth of cows between 2008-2015 is shown. Here are the groups more divided which means a lot of farmers took small steps each year what eventually resulted in an average to above average growth. In the last column the growth of the cubicles from 2008 to 2015 is shown. Seen is that the biggest group, 44,9%, are in the group 0-10. Almost all of them had a growth of 0, so they did not build extra cubicles. But the growth in cows on most of these farms were above 0, this means lot of farms did not have a full stable in the earlier years. What is notable that there are 51 farms which build more than 100% extra cubicles, but as seen in the third column only 14 farms grew more than 100% in cows, this the same for the group between 51% and 100% growth,

which means a lot of these farms have not filled new stables. This could lead to financial problems because less milk is produced than budgeted.

Table 4: Groups of growth

Growth (%)	1 year growth (cows)		Max grow per farm (cows)		Growth 2008-2015 (cows)		Growth 2008-2015 (cubicles)	
	n	%	n	%	n	%	n	%
<0	3477	32,4	0	0	113	12,6	69	8,9
0-10	5964	55,5	258	28,8	191	21,3	349	44,9
11-20	1105	10,3	486	54	203	22,7	46	5,9
21-30	147	1,4	109	12,2	153	17,1	44	5,7
31-40	21	0,2	19	2,1	103	11,5	47	6,0
41-50	12	0,1	11	1,2	48	5,4	48	6,2
51-75	10	0,1	9	1	48	5,4	65	8,4
76-100	3	0	2	0,2	22	2,5	58	7,5
>100	1	0	1	0,1	14	1,6	51	6,6
Total	10740	100	895	100	895	100	777	100

5.3 Financial performance

In this paragraph the financial performance of the different groups of growth are reviewed. The financial performance of the different groups is expressed in three different key figures: Gross cash flow, critical milk price and booking capacity.

In table 5 the gross cash flow per 100 kg of the different groups is shown. There are 2 numbers of gross cash flow, this is because a distinction is made between growth in cows per farm (group 1) and growth in cubicles per farm (group 2). The letters (a,b) behind the numbers show significance within the column (P<0.05). Distinction is made in growth in cows per farm and growth in cubicles per farm. In 2008 there is a small significant difference between the <0% group and the 31-40% group for the growth in cows. For the growth in cubicles there is a difference between 0-10% and >100%. With the results these significances could not be explained. Between the years there is a huge difference between the numbers. A big influence is the milk price, but the milk price was the lowest in 2009 but in comparison the gross cash flow was lower in 2016 than 2009. So, the milk price is a huge factor but there are also other factors.

Table 5: Gross cash flow per 100 kg milk of different groups of growth in 2008, 2009, 2014, 2015 and 2016 [1] significance are displayed with letter within the column (P<0.05)

Growth (%)			2008		2009		2014		2015		2016	
	N(1)	N(2)	GCF (1)	GCF (2)	GCF (1)	GCF (2)	GCF (1)	GCF (2)	GCF (1)	GCF (2)	GCF (1)	GCF (2)
<0	113	69	20,94$_{a}$	22,14$_{a,b}$	15,32$_{a}$	15,44$_{a}$	22,95$_{a}$	22,99$_{a}$	16,11$_{a}$	15,88$_{a}$	14,51$_{a}$	13,43$_{a}$
0-10	191	349	21,94$_{a,b}$	21,65$_{a}$	15,71$_{a}$	15,55$_{a}$	22,77$_{a}$	22,53$_{a}$	16,25$_{a}$	16,06$_{a}$	14,70$_{a}$	14,35$_{a}$
11-20	203	46	22,02$_{a,b}$	22,60$_{a,b}$	15,75$_{a}$	16,40$_{a}$	22,82$_{a}$	22,50$_{a}$	16,17$_{a}$	16,41$_{a}$	13,98$_{a}$	14,92$_{a}$
21-30	153	44	22,15$_{a,b}$	22,01$_{a,b}$	15,84$_{a}$	15,76$_{a}$	23,11$_{a}$	22,74$_{a}$	15,82$_{a}$	15,66$_{a}$	14,49$_{a}$	14,26$_{a}$
31-40	103	47	23,11$_{b}$	22,07$_{a,b}$	16,61$_{a}$	15,88$_{a}$	23,42$_{a}$	23,44$_{a}$	16,43$_{a}$	16,16$_{a}$	14,39$_{a}$	14,77$_{a}$
41-50	48	48	21,91$_{a,b}$	22,41$_{a,b}$	15,50$_{a}$	15,86$_{a}$	22,90$_{a}$	23,01$_{a}$	15,22$_{a}$	16,36$_{a}$	13,56$_{a}$	14,68$_{a}$
51-75	48	65	22,88$_{a,b}$	23,42$_{a,b}$	16,25$_{a}$	17,22$_{a}$	22,96$_{a}$	23,65$_{a}$	15,47$_{a}$	16,11$_{a}$	14,29$_{a}$	14,24$_{a}$
76-100	22	58	23,21$_{a,b}$	22,38$_{a,b}$	16,95$_{a}$	15,77$_{a}$	22,70$_{a}$	23,74$_{a}$	15,32$_{a}$	16,42$_{a}$	14,10$_{a}$	15,14$_{a}$
>100	14	51	24,23$_{a,b}$	24,39$_{b}$	17,75$_{a}$	17,38$_{a}$	21,75$_{a}$	23,66$_{a}$	15,47$_{a}$	15,82$_{a}$	13,75$_{a}$	14,81$_{a}$

GCF (1): Gross cash flow of dairy farms with n growth of cows from 2008-20015
GCF (2): Gross cash flow of dairy farms with n growth of cubicles from 2008-20015
1: Significance within colums

In table 6 the critical milk price of 100 kg milk of the different groups is shown. There are 2 groups of critical milk price, distinction is made between growth in cows per farm (group 1) and growth in cubicles per farm (group 2). The letters (a,b,c) behind the numbers show significance within the column (P<0.05). As seen only in the year 2016 there is some significant difference between some groups, but this is not enough to determine a trend. Something that is notable is the big difference of the critical milk price between different years. When the milk price is low in for example 2009 the critical milk price is also low. The difference with 2014 is around the 10 cents. So, when milk price is higher, farmers are also more likely to invest more / make more costs.

Table 6: Critical milk price of 100 kg milk of different groups op growth in 2008, 2009, 2014, 2015 and 2016 [1] significance is shown within the column with different letters (P<0.05)

			2008		2009		2014		2015		2016	
Growth (%)	N(1)	N(2)	CMP (1)	CMP (2)	CMP (1)	CMP (2)	CMP (1)	CMP (2)	CMP (1)	CMP (2)	CMP (1)	CMP (2)
<0	113	69	32,86$_a$	32,12$_a$	28,63$_a$	28,69$_a$	37,83$_a$	39,02$_a$	35,05$_a$	34,52$_a$	34,29$_a$	34,94$_a$
0-10	191	349	32,12$_a$	32,30$_a$	27,68$_a$	27,67$_a$	37,01$_a$	37,74$_a$	33,63$_a$	33,94$_a$	32,27$_{a,b}$	32,70$_{a,b}$
11-20	203	46	31,68$_a$	31,31$_a$	27,22$_a$	27,54$_a$	38,16$_a$	39,09$_a$	33,73$_a$	34,66$_a$	32,71$_{a,b}$	32,88$_{a,b}$
21-30	153	44	31,62$_a$	31,60$_a$	27,98$_a$	27,50$_a$	38,90$_a$	38,70$_a$	34,64$_a$	35,45$_a$	33,28$_{a,b}$	33,72$_{a,b}$
31-40	103	47	30,53$_a$	30,18$_a$	27,41$_a$	26,75$_a$	38,42$_a$	38,36$_a$	34,28$_a$	33,97$_a$	32,36$_{a,b}$	31,38$_{a,b}$
41-50	48	48	31,40$_a$	30,47$_a$	27,91$_a$	27,58$_a$	38,66$_a$	38,50$_a$	33,00$_a$	32,67$_a$	30,32$_b$	30,65$_b$
51-75	48	65	31,55$_a$	30,92$_a$	28,27$_a$	26,92$_a$	40,53$_a$	36,67$_a$	34,13$_a$	32,85$_a$	31,69$_{a,b}$	30,97$_{b,c}$
76-100	22	58	30,47$_a$	30,67$_a$	26,33$_a$	27,26$_a$	39,56$_a$	38,47$_a$	35,45$_a$	34,20$_a$	30,41$_{a,b}$	31,38$_{a,b}$
>100	14	51	31,79$_a$	29,71$_a$	26,05$_a$	26,97$_a$	37,12$_a$	38,09$_a$	33,33$_a$	35,39$_a$	29,49$_{a,b}$	31,95$_{a,b}$

CMP (1): Critical milk price of dairy farms with n growth of cows from 2008-20015
CMP (2): Critical milk price of dairy farms with n growth of cubicles from 2008-20015
1: Significance within colums

In table 7 the booking capacity per 100 kg milk of the different groups is shown. The letters (a,b,c,d) behind the numbers show significance within the column (<0.05). Distinction is made in growth in cows per farm (group 1) and growth in cubicles per farm (group 2). Between the groups there is no constant difference. Only in the year 2016 there is some difference in the group of growth in cubicles. In 2008 and 2009 the higher growth groups tend to have a higher booking capacity. Probably these farms wanted to growth in the further and strived to better results. In the last years 2015 and 2016 also these farms tend to have a higher booking capacity, this could be explained by the fact these farms have a lot more depreciation, this because the investments they have done.

Table 7: Booking capacity per 100 kg milk of different groups of growth in 2008, 2009, 2014, 2015 and 2016 [1]

			2008		2009		2014		2015		2016	
Growth (%)	N(1)	N(2)	BC (1)	BC (2)	BC (1)	BC (2)	BC (1)	BC (2)	BC (1)	BC (2)	BC (1)	BC (2)
<0	113	69	8,39$_a$	9,87$_{a,b}$	4,65$_a$	4,52$_{a,b}$	10,63$_a$	10,98$_a$	4,67$_a$	5,32$_a$	3,79$_a$	3,33$_a$
0-10	191	349	9,42$_{a,b}$	9,26$_a$	5,30$_a$	5,47$_{a,b}$	11,33$_a$	10,68$_a$	6,31$_a$	6,00$_a$	5,28$_{a,b}$	5,03$_{a,b,d}$
11-20	203	46	10,14$_{a,b}$	10,97$_{a,b}$	5,68$_a$	5,92$_{a,b}$	10,84$_a$	9,96$_a$	6,56$_a$	5,55$_a$	5,21$_{a,b}$	5,36$_{a,b,d}$
21-30	153	44	10,96$_{a,b}$	10,64$_{a,b}$	5,57$_a$	5,86$_{a,b}$	10,92$_a$	10,65$_a$	6,12$_a$	5,64$_a$	5,67$_{a,b}$	5,19$_{a,b,d}$
31-40	103	47	11,75$_b$	11,38$_{a,b}$	5,83$_a$	6,22$_{a,b}$	11,15$_a$	11,14$_a$	6,77$_a$	6,34$_a$	6,54$_b$	6,25$_{a,b,d}$
41-50	48	48	9,75$_{a,b}$	11,59$_{a,b}$	4,95$_a$	5,41$_{a,b}$	10,15$_a$	10,21$_a$	6,06$_a$	7,23$_a$	6,04$_{a,b}$	6,96$_{b,d}$
51-75	48	65	11,48$_{a,b}$	11,79$_{a,b}$	5,71$_a$	6,87$_{a,b}$	8,35$_a$	12,62$_a$	5,88$_a$	7,36$_a$	6,16$_{a,b}$	7,00$_{b,c,d}$
76-100	22	58	12,37$_{a,b}$	11,38$_{a,b}$	7,50$_a$	5,47$_{a,b}$	9,25$_a$	11,50$_a$	4,83$_a$	7,38$_a$	6,93$_{a,b}$	7,57$_d$
>100	14	51	11,12$_{a,b}$	13,50$_b$	7,91$_a$	7,50$_b$	9,87$_a$	11,10$_a$	6,07$_a$	5,76$_a$	7,04$_{a,b}$	6,64$_{b,d,e}$

GCF (1): Booking capacity of dairy farms with n growth of cows from 2008-20015
GCF (2): Booking capacity of dairy farms with n growth of cubicles from 2008-20015
1: Significance within colums

5. Discussion

The objective of this study was to analyse the choices, and their financial and technical effects, of Dutch dairy farmers in preparation of the abolition of the milk quota. At first the intention was also to analyse the effect of the phosphate rights but due to lack of data of the years 2017, 2018 that was not possible to analyse. In 2019 the changes will not be as big as in the years before due to the implementation of the phosphate rights in 2018, therefore 2019 is maybe not so interesting to include in the analysis. Because only 2017 and 2018 are needed this review could be done by the end of this year.

The literature study began a bit unorganised which resulted in a lot of reports but not really the ones which were useful for the report. Although not every report was free, there were enough reports to conduct the literature study. Experts out of the sector complemented the literature study, this was not really supported with literature, but it was a good addition because now practice and literature could be combined. Chosen was for two banks and two accountancy firms because expected was that both had a different view on financial results of dairy farms. Eventually Flynth did not respond so only Alfa Accountants, Rabobank and ABN-AMRO were left over. The difference between the banks and Alfa was that Alfa goes more in depth in the technical numbers and the reason why some key figures are high or low, the banks most of the time look only at some key figures.

The data set received from Flynth contained rough data. The database was filled with more than 3000 Dutch dairy farms with technical and financial numbers of the years 2004 till 2016. Not all farms had the numbers for all years, and reliable numbers so unreliable farms were removed, eventually 895 farms were left for the analysis, which is still a large number. The year 2004 was completely removed from the research because all numbers were unexplainable high, the reason for this is not found yet. For the further removal the numbers of gross cash flow, critical milk price and profit were used. The numbers used for gross cash flow were €70 / 100 kg milk, for critical milk price above €55 / 100 kg milk, profit above €50 / 100 kg milk. These numbers were chosen so the biggest outliers would be erased from the database. The key figures gross cash flow, critical milk price and profit were chosen because at first the analysis was meant to be done on these key figures. Because of the literature research conducted later profit was changed by booking capacity.

For the analysis 9 different groups of growth were made. group 1: growth of < 0%, group 2: growth of 0-10%, group 3: growth of 11-20%, group 4: growth of 21-30%, group 5: growth of 31-40%, group 6: growth of 41-50%, group 7: growth of 51-75%, group 8: growth of 76-100% and group 9: growth of >100%. There was chosen for this distribution, so every group had enough farms in it, only for the big groups of growth there were not many farms. But I did not want to put them together with another group because the difference in growth was that big. For each group the financial key figures gross cash flow, critical milk price and booking capacity were analysed. This because these were the most common key figures used in the Netherlands, this was found in the literature and the interview with experts.

But before the financial key figures were made first the descriptive statics of all the farms were made. Here the total cows per farm, growth, milk price and kg milk/ha were reviewed. As expected was the big growth in cows per farm since 2005. The biggest growth was in 2007, 2012, 2014 and 2015. Growth in 2014 and 2015 were expected because in 2015 the milk quota would be abolished. But the growth in the years 2007 and 2012 are a bit unexplainable, because also the milk price was not high in these years. Expected was that the milk production would also increase every year but as seen that was not

the case, milk production per cow increased until 2011 and after that it decreased to grow again in 2015. This decrease in milk production per cow could be allocated to the milk quota, because farms had more cows, so milk production had to decrease to keep milking under the quota. The milk quota is abolished in 2015 and noticeable is that after that year the milk production per cow increases again.

Following was the review of the growth of the different groups. It was surprisingly how many farms grew. Only 12% of the farms decreased in size and the growth between 0-10% was 20% of the farms so almost 70% of the farms grew more than 10%. Such growth was not expected. The steps of growth were small, so most of the time beneath 10% each year. Also, the difference in growth per cows and growth in cubicles was noticeable but expected, because this has been told in the media a lot of times (NOS, 2016).

Expected was that the group with the huge growth in cubicles had significant lower financial key figures because they are not able to deliver the milk the farms accounted for. Eventually it turned out that there were no significant differences in the financial key figures. But as said maybe this is the case in the years 2017 and 2018. Between the groups of growth in cows per farm there is also no difference, does this mean that growing is financially not profitable? Why would farms grow if it is not profitable? Growth is maybe sometimes not profitable, but that's not in all cases. When a new stable is built for growth the future perspective of the farms increases what will eventually lead to better income. Also, it is possible that not the financial key figures per 100 kg of milk did not change but the overall total of delivered milk grew so eventually the profit grew. So, growth is not always profitable especially it this time when milking an extra cow is expensive due to the phosphate rights.

6. Conclusion

The research objective was: what was the financial impact of choices Dutch dairy farmers made in preparation of the milk quota abolishment? To answer this question the financial key figures gross cash flow, critical milk price and booking capacity per 100 kg milk of 895 farms with different growths were analysed. After analysis the conclusion is that there is no difference between different steps of growth. So, there is no significant difference in financial impact of choices Dutch dairy farmers made in preparation of the milk quota abolishment.

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