

Farming strategies in the continuously evolving European dairy market – a comparative case study of five different EU countries

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Abstract: In recent years, a number of events have resulted in a volatile dairy market. The gradual reduction of the CAP and the recent abolition of the milk quota system, which was installed in 1984, has resulted in a more and more market-oriented sector. The abolition of the milk quota coincide with a number of other factors that influence the dairy price, including a reduced Chinese dairy powder market and an import ban from Russia. A significant task in agro-food studies is to understand how different farming systems respond to regulatory interventions and how regulatory interventions can be used to promote resiliency. In this paper, we will explore how different European dairy farming systems have reacted to the recent volatility in the milk market and discuss the implications for the resiliency of the dairy sector. Empirically, the analysis will draw on statistical data on dairy production, farm structure and market configuration extracted from the EUROSTAT and FAOSTAT databases and qualitative and quantitative data from case studies in five different European countries, derived from the SUFISA project (Denmark, Greece, France, Latvia and United Kingdom). Based on the analysis we will discuss how regulatory and market conditions may be managed to promote resiliency in the primary production.

Keywords: Milk quota, milk price, farming systems

Introduction

A significant task in agro-food studies is to understand how different farming systems respond to regulatory interventions and how regulatory interventions can be used to promote resiliency. In this paper, we will explore how different European dairy farming systems have reacted to the recent milk price crisis and discuss the implications for the resiliency of the dairy sector.

Milk is the single most important product sector in terms of value of agricultural output, and milk is produced in every EU member state. However, within the union the size and agricultural importance of the dairy sector varies considerably between member states and across regions. Dairy products accounted for 13,7% of total agricultural production in 2006 equalling a value of more than EUR 42,5 billion (IPTS, 2009). However, dairy products are generally consumed in the market in which they are produced and the extent of international trade in dairy products is limited, representing just 7% of global dairy production.

A number of policy and market changes in recent years has resulted in a highly volatile dairy market. This opposes more than 30 years of stable dairy market conditions. Changes include a gradual reduction of the CAP and most recently, an abolition of the milk quota system, which has been in place since 1984 (Veerman et al., 2016). The quota system has capped dairy production and maintained stable prices. The abolition of the milk quota on April 1st 2015 is

an important regulatory change that have had a significant impact on the European dairy farming system and has resulted in an increasingly market dependent sector. The abolition of the milk quota coincides with a number of other factors that influence the dairy price, including a reduced Chinese dairy powder market and an import ban from Russia. Hence, producers now have to adapt to much more volatile market conditions.

Even though European farming is supported based on the same Common Agricultural Policy (CAP), the farming systems of various European countries differ substantially in terms of size, organization and the use of technology. The ambition of this paper is to explore how the different European dairy farming systems have reacted to these changing market conditions.

The paper is based on a farming system theoretical framework, which implies that we observe the farms within the five different countries as an assemblage of different farming systems. A central idea in farming system theory is drawing a distinction between the system and the surrounding environment (Darnhofer, Gibbon, & Dedieu, 2012; Ison, 2012). We understand farming systems as socio-technical systems that are assembled by social and material factors with a particular purpose in mind. In our case of transforming various inputs factors to milk, thereby providing a livelihood for the farmer. Hence, another important feature is that farming systems operate in meaning. This is particularly evident in dairy production where many different actors are mobilized in the transformation such as pastures, cows, farmers, employees, dairies, milking parlours, mortgage providers etc. These actors are all attuned to a particular mode of production. The systemic organization of the farms implies that events in the environment of the system will always be interpreted by the system and the system may adopt changes according to this interpretation (E. Noe & Alrøe, 2012; E. B. Noe & Alrøe, 2015). This also implies that different systems will always respond differently to changes in their environment (biophysical, economic, social and institutional) (E. Noe & Halberg, 2002). Hence, by exploring how the systems respond to a particular perturbation we will also be able to generate a better understanding of the systems and the foundations for a resilient development of our food system.

Data sources and methods

The dairy production systems in the five different European countries (Denmark, Greece¹, France, Latvia and United Kingdom) have all been analysed in a mixed method study in which a number of different methodologies have been employed to acquire both quantitative and qualitative data. The analysis is structured in three sections; initially we explore the historical foundations for the regulator and policy conditions in the dairy sector on a European level. Secondly, we explore how the dairy production systems in Denmark, Greece, France, Latvia and United Kingdom have been impacted by the changing dairy policies and the resulting volatile dairy prices in a comparative mixed method case study, derived from the SUFISA project. Thirdly, we discuss the similarities and differences in the strategic response of the farmers and discuss the implications for the future resiliency of the dairy sector.

The key approach taken in the SUFISA project and in this article is to put the farmers at the centre of the research, in order to get their perspectives on the conditions under which they operate and the strategic response they adopt to meet the challenges they observe.

As a basis of this article the market and production systems have been analysed by using descriptive statistics, extracted from the EUROSTAT and FAOSTAT databases and qualitative data characterizing the farming systems in 5 different European countries. Furthermore, a number of different data sources have been acquired to analyse the five case studies. Initially, a media analysis was conducted (which covered national, regional and specialised media from 2005 to 2016), as well as a desk-based analysis of market conditions and regulations (sources reviewed included: academic publications; government and policy documents; market research and consultancy reports; industry reports and NGO documents), supplemented with

¹ The greek case study concerned goat milk for Feta production, hence, the results of some of the greek data is not fully comparable to the other cases.

20-30 expert interviews. Following analysis of the resultant data, two-three focus groups (FGs) were held with dairy farmers in a particular region in each of the five countries. The focus groups and interviews were recorded, transcribed verbatim and open coded according to a grounded research methodology. Subsequently the codes from the different interviews have been compared and the list of codes have then been condensed in a process of constant comparison to produce unequivocal categories of the statements (Corbin, 1998; Silverman, 2011). Lastly, a phone survey was conducted among the farmers in case study regions. All information obtained in the survey should refer to the business's latest completed financial year. The number of respondents vary slightly between the countries, ranging between 82-200, see table 2. The difference in the number of respondents is not considered a problem as the general characteristics of sales and marketing arrangements only vary very little within each country.

A detailed account of the research methodology adopted in the SUFISA project and the full dataset on which this article is based can be found in the dairy sections of the five national reports, in which the results have been reported.

The changing European dairy policies

The EU sets out the overarching policy and regulatory conditions for farmers within the union. The policy that applies to the member states is laid out in the Common Agricultural Policy (CAP). The most important instruments include production quotas, direct payments, and intervention storage.

The CAP has been in effect since 1962, although the policy focus has been changed several times to cut spending and to include new policy areas such as rural development and environmental protection. The recent abolition of the milk quota system marks an important point in a long transition of the European agricultural policies. In this analysis, we focus on the period after this abolition in 2015. However, it is important to bear in mind that dairy farming systems are the result of a long process of adaptation to different policies and to understand the behaviour of farmers under the current conditions we need to understand the basics of the change.

The CAP has played a fundamental role in shaping European agriculture and regulation of the dairy sector. The objectives of the agricultural policy of the EC subsidies are stipulated in article 39 of the treaty of Rome, To: "(a) increase agricultural productivity, by ensuring the rational development of agricultural production and the optimum utilization of the factors of production, particularly labour, (b) to ensure thereby a fair standard of living for the agricultural population (...) (c) to stabilise markets; (d) to guarantee regular supplies; and (e) to ensure reasonable prices in supplies to consumers (EC, 1957). Hence, the treaty of Rome stress the interdependence between agriculture and society, but it also institutionalizes productivity improvements as the means for agriculture to fulfil its social contract.

The late 1970's and early 1980's marks the beginning of a new area for the EC policies, as food security no longer has the same focus. At a European level, the productivist policies are questioned due to their cost and the resulting overproduction. Therefore, a quota system was implemented in 1984 that put a ceiling on the dairy production. The CAP was reformed initially in 1984, where milk quotas were introduced, in 1988 where an expenditure ceiling was imposed on the European Council, but most significantly with the MacSharry reform in 1992. In the MacSharry reform that the CAP policy was fundamentally changed by abolishing price support in favour of income support in the form of direct payment. This lowered the price support by 29% for cereals and 15% for beef and compensated by introducing direct payments, based on the size of the farmed area (Otte Hansen, 2001).

In 1995 agricultural became part of the GATT negotiations because EU's foreign trade partners were discontent with EU's support of its own agricultural sector (Otte Hansen, 2001). To honour the WTO obligations and ensure a viable budget for the coming enlargement of the union a significant policy shift took place with the agreement on of the „Agenda 2000“, in 1999 and the „Fishler reform“ that was completed in 2003 (IPTS, 2009; Swinbank, 2008). In relation to dairy

production, this meant that quota abolition was fixed for April 1st 2015. Furthermore, the prices for the market interventions (buying into storage) for butter and SMP were lowered. These instruments were previously important stabilizing mechanisms of the milk price within the union as intervention purchases put a floor on the producer milk price. When market conditions allow, butter and SMP are sold back on the market (European Commission, 2018). The effect of the fischler reform was significant already in the preceding years, where milk supply in the EU previously was quite stable and quotas were binding in most years until 2004. However, from 2005 onwards, some member state deliveries have increasingly fallen short of the quota.

The CAP Health Check review in 2008 resulted in a confirmation of the decision to abolish milk quotas by 2015, in order to completely liberalize milk production across Europe (European Commission, 2009). To ease the transition to a market without quotas it was decided to gradually increase the quotas by 1 % annually in the period 2009-2013.

In 2012 the Milk Package was implemented, which aimed at softening the impact of quota abolition, and today this is one of the foundations of EU policies of dairy production (European Commission, 2013). The basic idea was to ensure a long-term future and sustainability of the dairy sector, by enhancing information availability and market transparency. Furthermore, the milk package carries a provision to encourage farmers to enter into Producer Organization, thereby ideally improving the market power of the dairy producers.

As of April 1st 2015, the EU abolished its quota policy, thereby cancelling its limits on production. The abolition of the milk quotas has been one of the most significant change of conditions for European Dairy farmers in recent years, as producers are no longer limited in their production by a quota system, but rather by the capacity of their farms. However, the abolition of the milk quotas also implies a greater flexibility for each farmer, as he no longer has to consider quota limits, but is able to produce at full capacity.

Recent schemes introduced include the possibility of financing storage costs (90-210 days). The products remain the property of operators, who are responsible for selling them once the contractual storage period has elapsed. The European Commission re-opened Private Storage Aid on 5 September 2014 in response to the threat of market disruption due to the loss of the Russian export market (European Commission, 2018). PSA is a payment made by the European Commission to processors in return for keeping products in storage and off the market for an agreed period. PSA was extended to remain open until 30 September 2016, due to ongoing market difficulties. The butter and cheese schemes closed on this date but PSA for SMP was extended further and closed on 28 February 2017.

Hence, the CAP regime has moved away from a production-oriented policy underpinned by price support to a 'multifunctional' policy in which numerous aspects of farming are emphasized. Furthermore, collectively milk prices were supported by intervention purchasing, which has now been reduced and supplemented with provisions to ensure a better collective organization. The reforms were politically necessary, but also destabilized the agricultural commodity prices, resulting in an increasing volatility. In the past 5 years conditions on the milk market has changed considerably. However, long-term economic predictions indicate that the world market milk prices are expected to continuously decrease due to technological development, such as automation, breeding and increasing efficiency. Therefore, an important market condition is a decreasing world market milk price and a more volatile market situation. The question is, which strategies producers will adopt to meet the challenges that arise from such conditions?

Each of the five countries that we analyse in this paper have a different history in the European Union. France was one of the founding members of the community and member since its foundation in 1957, whereas United Kingdom and Denmark both joined in 1973 and Greece followed in 1981, hence these countries have all experienced the process of policy transformation of the productivist European agricultural policies. In that regard, Latvia is rather different, as they first became a member of the EU in 2004 along with nine other East European countries. Furthermore, the countries all have a different history, institutions and varying biophysical conditions that have given rise to quite different dairy production systems.

Results

In this section, we will explore the effect of the quota abolition, initially by exploring its effect on price and production. Afterwards we will more closely examine the characteristics of the different production systems and explore the strategies that farmers have adopted in the different countries to meet the changing conditions.

Development in price and production

The dairy price and production volumes continuously evolve both on an annual basis and in a longer-term perspective, see table 1. Annual variation are particularly due changes in fodder composition, timing of calving and access to grazing in the summer times. However, there are large variations between the countries, see figure 1, for instance farmers virtually maintain a continuous production throughout the year, while production in LV varies by about 15 % point annually. In the long-term perspective, we have generally witnessed an annual production increase in all countries since 2010, except for GR. Most significantly in LV, although also coming from a rather low starting point. Interestingly the development since the beginning of 2015 also marks a period of change in the dairy sector, the trends in GR, LV is halted, and instead we see a rapid production increase in DK and a declining production in FR. Our research particularly indicate two explanations for this development. First, as the only country in the analysis, DK has been limited in their production by the milk quota, and when the quotas are abolished production naturally increase, which is also highly encouraged by the dairies. However, as interviewees noted, the removal of quota influences the wider milk pool and opens up the market, particularly at a European level. Secondly, dairies in FR have had no interest in expanding production in times of low prices and have deliberately not purchased more milk than what they can also sell.

The period up until 2006 is characterized by a rather stable commodity price, although there is annual variation. This is likely due to the interventionist policies of the CAP. However, the gradual market internationalization is quite evident in the years after about 2005, where prices have fluctuated considerably. There is a clear tendency towards a the similar world market trends that produce cycles of high and low prices, which also indicate an effect of the world market on the local production systems. Hence, prices are generally high in the years 2007-2008 and 2013-2014, while they are low in 2009-2010 and 2015-2016. The amplitude of these cycles range between 10-20 EUR/100 kg milk reflecting about 50 % of the average commodity price (2006-2018), highest in LV (EUR 17-20) and lowest in GR (EUR 10). It is however important to note that the European intervention policies have put a floor to the milk price, and the cycles thus does not reflect the cycles in an undistorted market.

Although the market is increasingly liberalized, there is also considerable variation among the dairies in the different countries in terms of the prices they offer their producers, see figure 3. The regional differences in dairy prices are mainly due to a difference in the local market configuration, product variations and a difference in the integration in the world market. Furthermore, there are also country specific variations, as farmers in LV generally have received prices below the world market price, while farmers in GR have received high and relatively stable prices. An explanation for this development is LV's reliance on the Russian food market and therefore a more profound market impact of the Russian food embargo; in contrast, the dairies in GR are more focused on the lucrative fresh milk market in GR and therefore not very influenced by these global market variations. Interestingly, what we have seen in recent years is also a convergence of the milk-prices in the five countries, likely reflecting the gradual world market exposure of European Dairy farmers following the market liberalization.

The development of dairy price and production is quite different from one country to the other and countries like Denmark and Latvia have witnessed a general production increase throughout the period, while other countries like France and Greece have witnessed a decline in their production. However, in the five dairy case studies, we currently observe the same structural tendencies. The farms keep getting bigger and there is a tendency towards farmers that try to improve the efficiency of their production because of the market situation. However,

this improvement of efficiency takes place on a very diverse backgrounds, hence the starting point in the different cases are quite different.

The growing difference between organic and conventional milk prices, which is a notable feature of the milk markets in Denmark and UK, is another interesting feature of the changing conditions. The trend can be attributed to an expanding domestic and German organic market and therefore a higher European demand for organic milk, but also the fact that a number of organic dairy producers converted their production to conventional when the quotas were abolished in 2015 (Vidø, Schou, & Zobbe, 2015).

Production system characteristics

The five countries are all quite different in terms of structure and organization of dairy production, see also column 1 in Appendix 3. This for instance is reflected in four different characteristics of the farming systems, how farmers contractually are related to the dairy market, and the temporality of this relation and, the structure of the dairy farms. The orientation of the production systems vary considerably, and countries like DK and FR have a large export of dairy products, while GR and UK are net importers of dairy products. The structure of the dairy farms vary considerably between the five countries, but there is also a considerably variation within each of the countries, see figure 2. DK is the country with the most homogeneous and intensive dairy production systems, as a majority of farms contain more than 100 cows. The survey explores the nature of the market relationship between the farmers and dairies in one particular region in each of the countries. Farmers in DK and FR primarily are organized in collective organizations, such as cooperatives that are responsible for processing and selling products. Farmers in GR on the other hand primarily associated with dairies based on individual sales contracts. In UK and LV, the farmers are almost equally divided between individual and collective sales agreements. The benefit of the cooperative organization is that the added value of the processing of the milk also benefit the farmers, however, private dairies may offer better prices, particularly in periods with high demand for dairy products. The duration of the contract is also quite important, particularly for dairy farmers as it takes a long time to establish a dairy production and once in place, milk will continuously be produced and it is a perishable product that need to be processed rapidly. Generally, farmers in DK FR and UK have quite long running contracts, typically ranging more than a year, see figure x. On the opposite farmers in GR have shorter time binds, typically ranging less than a year and farmer in LV are again very heterogeneous as about 50 % have contracts with a duration of less than a year and another 50 % have contracts of more than two years.

Strategic response of the farming systems

Furthermore, a number of local issues, such as value-chain configuration, market dependence and local market characteristics influence the farming systems and their ability to cope in times of crisis. Whereas, some dairy production systems rely highly on local markets and the production of fresh products, such as UK, Greece and to some extent Latvia other countries like France and Denmark are more reliant on export markets and they are therefore more influenced by the dynamics on the world market.

In spite of a different starting point in structural and organizational terms there is little overall variation between the countries regarding the strategic response of the farmers in the present situation, see Appendix 1. A majority ranging from 50-60 of the survey respondents for instance indicate that they plan to “maintain the existing scale of operation”, see figure 6. Furthermore, a minority of 20-35 % indicate that they plan to expand the existing scale of operation, this is most pronounced in GR, LV and UK. Furthermore, a minority of less than 20 % indicate that they intend to either abandon farming or reduce the existing scale of operation, this is most pronounced in FR and DK. For the Danish case, this may be because a large number of dairy farmers already expanded their operations prior to the quota abolition and because there are, a number of older farmers who intend to retire once the property prices improve.

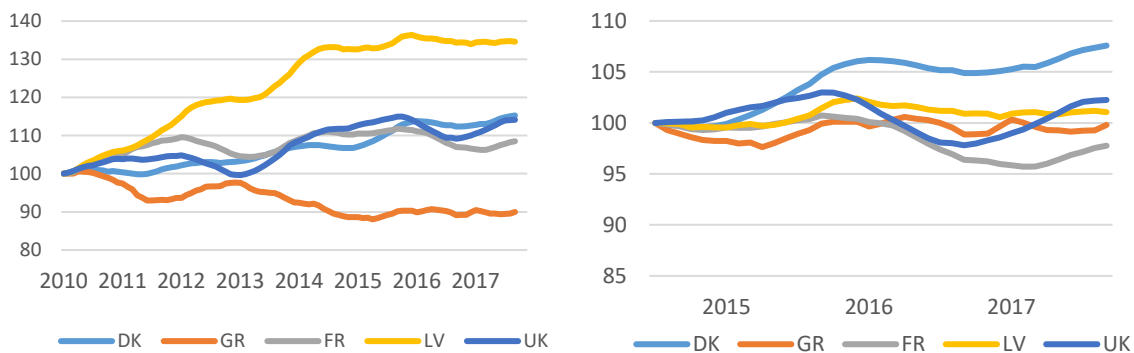
To explore the changes that farmers intend to implement to meet their strategic ambitions the survey included a question addressing the changes to the farm business that the farmers expect to implement in the coming 5 years. Between 35-60 % of the respondents, indicate a

plan to invest in the production facilities, most pronounced in GR and LV. Furthermore, 20-40 indicate an ambition to specialize their production further, most pronounced in FR. However, there are also major points of divergence among the countries, for instance around 50 % of the respondents indicate an expectation to insure against crop or livestock losses in DK and LV. 70 % indicate a plan to add value, for instance by converting to organic production in DK (where prices for organic milk have been substantially higher for a long period) and 45-50 % indicate an expectation to insure income and develop new partnerships in LV. Hence, farmers strategic response to the changing conditions on the dairy market are both general and associated with the commodity type and specific and deeply embedded in local contextual features.

Farmers were also asked to answer what influence their decisions regarding your production and farming strategies. A number of factors are highlighted as the most important drivers of the farming systems across the different cases, particularly, changes of regulations, consumer preferences and behaviour and access to loans and credit are mentioned as important aspects, see Appendix 1. Furthermore, adverse climatic conditions are mentioned as important drivers particularly in FR and LV, also indicating that the European dairy farming systems are influenced by different biophysical factors in different places.

We also explored the strategies based on qualitative data obtained in interviews, focus groups and workshops. A key point here is that we observed a pronounced stratification of strategies in the dairy case, as each different actor group adopt their own strategy to manage the market conditions. The strategies that are adopted by downstream market actors like supermarkets or dairies form the conditions for the subsequent actors in the value chain. Hence, to understand the strategic response of the volatile dairy market we need to distinguish between different strategic levels of decision-making.

The strategic response of the dairies vary quite a lot among the different countries in the analysis, which is due to many different factors such as market orientation, size, product output and material setup. Therefore, the individual dairies adopt very different strategies, which depend on the particular market conditions under which they operate, i.e. the nature of their contracts with specific supermarkets, the market of the specific products they produce and the capacity in the processing system.

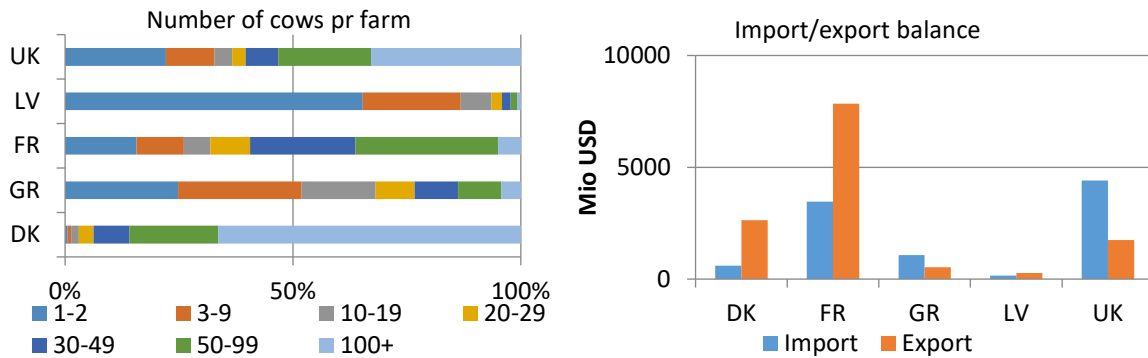


Figur 1: Raw milk collected at dairies, monthly data, and 12 md running average. Left normalized based on 2010. Right, Normalized based on 2014 (MMO, 2014).

These different dairy strategies of course also code for different conditions at farm level and a difference in the strategies that can be adopted by the farmers, see Appendix 3. Hence, farmer's strategies need to be understood in relation to the different corporate strategies in the value chain, regional and national differences. Farmers however generally have very little strategic room for manoeuvre. This also illustrates the importance of developing sectoral strategies to address the issues that farmers are facing, because farmers are part of a complex value chain and strategies need to emphasize this. In effect, farmers have very little strategic room for manoeuvre, as the dairies (and other downstream actors who influence the dairies) set the conditions for the farming systems. Furthermore, the predominant strategy of improving efficiency will not necessarily improve the conditions of the sector as a whole because when all farmers are improving efficiency and expanding production simultaneously it also affects the quotation, and therefore only code for a further need for efficiency improvements.

Table 1: Total dairy production and production development in selected European countries 2014-2015 (Eurostat, 2017)

	Total production (1000 tonnes)				Development in production		
	2014	2015	2016	2017	2014-2015	2015-2016	2016-2017
EU28	148.418	151.719	152.429	154.873	2.2 %	0.5 %	1.6 %
Denmark	5.112	5.277	5.376	5.460	3.2 %	1.9 %	1.6 %
Greece	619	612	619	613	-1.1 %	1.1 %	-0.9 %
France	25.308	25.374	24.650	24.492	0.3 %	-2.9 %	-0.6 %
Latvia	804	807	814	812	0.4 %	0.8 %	-0.1 %
United Kingdom	14.828	15.191	14.542	15.062	2.4 %	-4.3 %	3.6 %



Figur 2: left: Number of dairy cows per farm in the five countries (reference). Right: Market characteristics, balance between import and export in the five countries (reference).

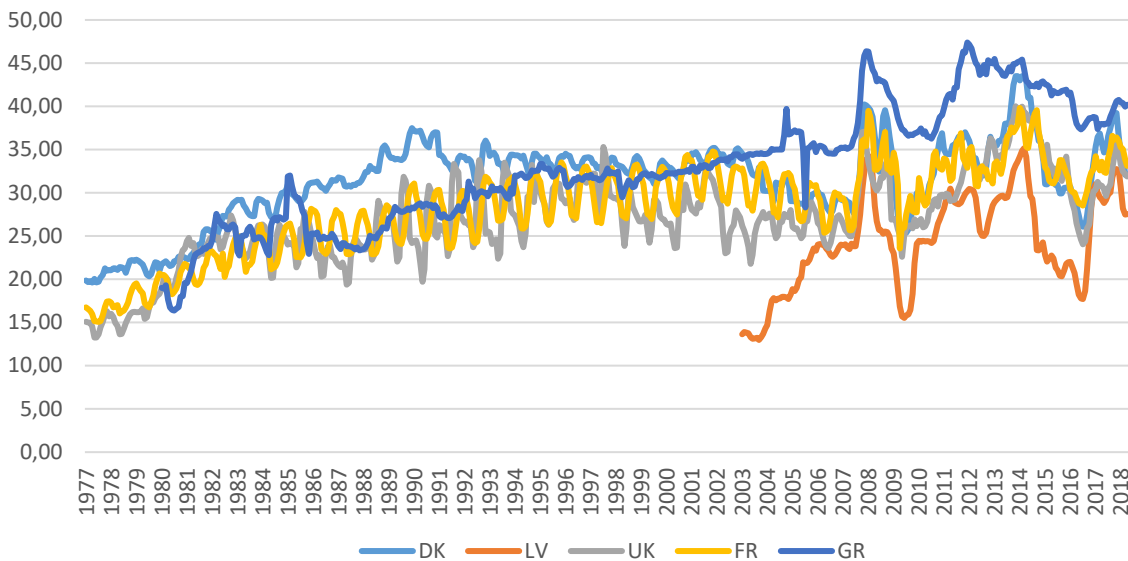


Figure 3: Monthly development in milk price (MMO 2017).

Table 2: General characteristics of the survey participants

	Collective	Individual	Size (ha)	Herd size	Yield	Productivity	N
DK	79	3	203,7	259,9	2543,2	9,8	82
UK	83	117	183,7	237,6	1855,7	7,8	200
FR	84	16	98,5	70,9	524	7,4	100
GR	25	125	16,3	182,9 ⁱ²	31,9	0,2	150
LV	65	77	303,2	102,8	709	6,9	142

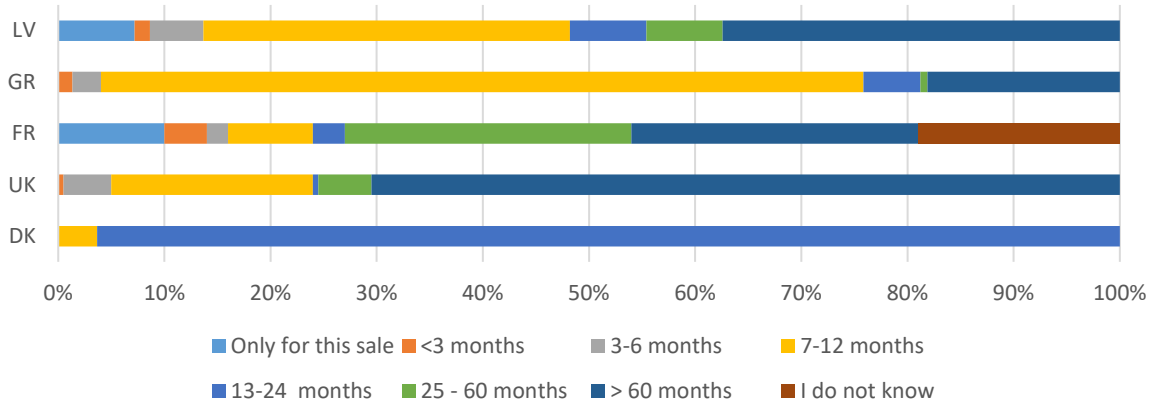


Figure 4: Contract duration. Replies to the question: “What is the duration of this sale agreement or membership in a collective organization? “

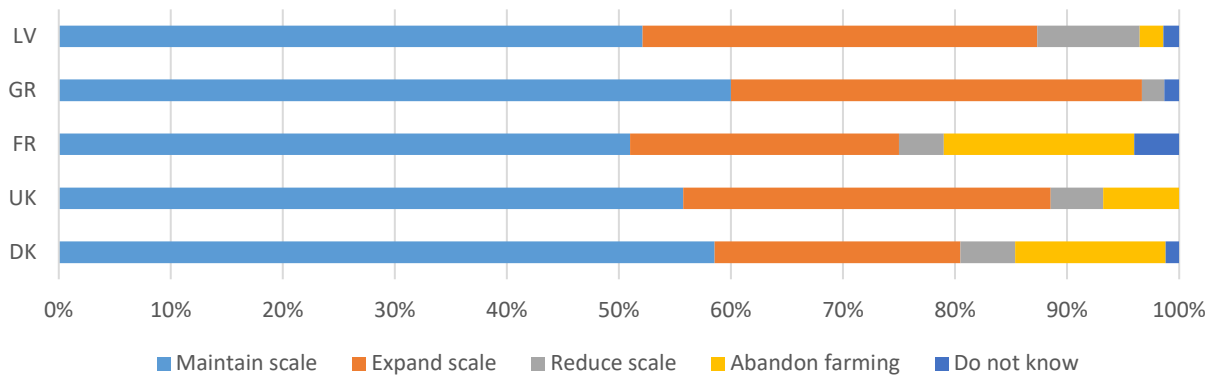


Figure 5: Strategies. Replies to the question: „What are your strategies for the development of dairy farming within the context of your farm business in the coming 5 years? “

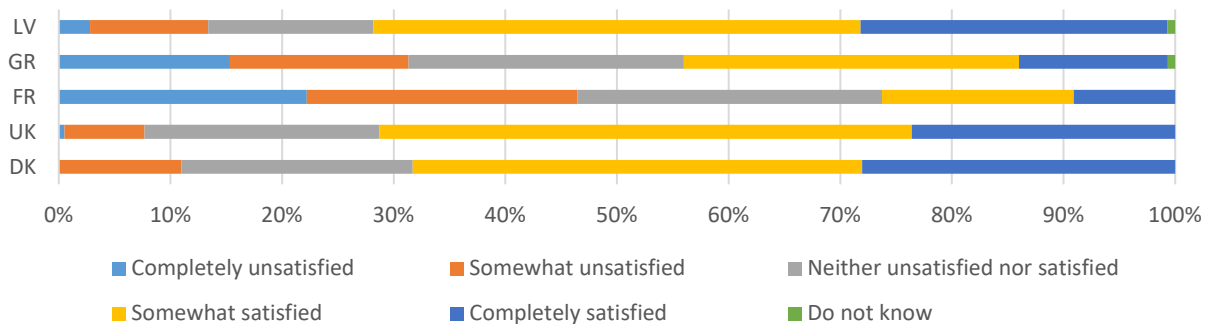


Figure 6: Perception of sales contract: Replies to the question: „How satisfied are you with this sale agreement? “

² Note: the case study for GR explored sheep and goat milk production

Concluding remarks

As documented in this paper the market liberalization and the quota abolition have had a significant impact on the conditions for dairy producers in Europe. In the following, we will discuss the responses of the European dairy farming systems in the recent milk price crisis and discuss the implications of this development and the efficiency of the current policy response to promote resiliency of the dairy sector, the “Milk package”.

Systemic implications of liberalization and quota abolition

Even though the farming systems are managed by the same regulatory framework and influenced by the same world market prices, farming systems across Europe respond quite differently to the current challenges in the dairy market. The abolition of milk quota was not a change that was observed for most of the dairy producing countries (except for Denmark), as production has not been limited by quotas for several years due to the significant decline in dairy farm numbers and the quota increase in the years preceding the abolition. However, as documented in this paper all farmers are influenced by the dairy market policy as it has an impact on the dairy supply and thus indirectly all farmers

The increasingly volatile market conditions constitute a challenge to all of the different production systems, but the challenge is not similar for all production systems. In areas like GR, LV, UK and FR, much of the dairy production take place in relatively old production facilities, with a high degree of self-sufficiency and farms have little debt that need to be paid off. Hence, when prices are low they are able either to abandon dairy farming altogether or to accept a period of low or negative wages. In a country like DK where dairy production largely takes place in modern high-tech production facilities the challenge is different. These production facilities require large investments, implying a high share of fixed costs that are difficult to meet when it is impossible to up and downscale production. This require production at full capacity until the farms can be decommissioned, which often also involve a number of hired workers. Hence, when prices are fluctuating these facilities will run with a deficit in some periods (and in some cases quite a large one). Hence, to stay afloat the different farming systems have adopted different strategies to manage the volatility. Danish farmers have expanded production to produce at full capacity and reduce marginal costs pr. unit of production, French farmers are restricted by a voluntary quota systems coordinated in the value chain and in the UK production contracts dominates.

Hence, one effect we have seen of the market liberalization is an increasing production in the EU in spite of low or insecure prices. Hence, there is a discrepancy between the rationality of individual farmers and the systems rationality. For the single farmer this response is entirely rational, due to the need for an increasing turnover to make ends meet, but for the European dairy sector as a whole, it is problematic because an increasing production further challenges the milk price. Furthermore, the changing conditions have accelerated the competition between the dairy producers in Europe as production, particularly in Northwestern Europe is increasing while it decreases in other parts as these production systems apparently are unable to produce under these market conditions.

Another notable effect feature in the dairy market is a decoupling between the organic and conventional dairy market, and the difference market price between organic and conventional milk has increased quite a lot. This can be attributed to an expanding regional organic market, particularly in Germany and therefore a higher local demand for organic milk. Hence, the market scale for conventional and organic milk is not the same and that produce some very different market conditions for the two types of milk.

Changing the configuration of risks

An effect of the market liberalization and quota abolition has been an individualization of the market related risks. Before the liberalization of the dairy market these risks were managed collectively by the common European market via intervention purchases and production quotas, however, this has gradually phased out. This implies that these risks have become

individualized and now it is up to each individual farmer to manage risks. The survey indicate that although this challenge is similar for all groups of farmers, we observe different ways to manage this risk at farm and production system level.

Price volatility is not an issue if producers have sufficient liquid funds to ensure the financial resilience in times with low prices. However, the effects of the gradual market liberalization and quota abolition have caught some of the producers by surprise and they have failed to accumulate sufficient capital or to develop institutions that can help in times of need. Furthermore, different local conditions like overinvestments, poor loans, fluctuating soil prices also constitute a challenge for the farmers.

Traditionally banks have the role as helping farmers through times of crisis by providing overdraft. However, following the financial crisis all banks in EU must adhere to the Basel III convention (that regulates how banks assess “risk”). Hence, a notable effect of the financial crisis is an increasing price for overdraft. Therefore, paradoxically farmers are in a situation today, where they increasingly need these types of risk management tools; however, they have increasingly become inaccessible or expensive due to other policy considerations.

Organization of the processing industry

Another important point to be raised concerns the role of cooperatives in the development of the food system. Dairy farming has played an important historical role in the development of co-operatives within agriculture and there was a commitment to co-operative models, even though farmers recognised that some had now become quite large. In the different cases, farmers have very different experiences with this form of collaboration, and in some cases, there are examples of failed cooperatives and collaborations that inhibit the further advancement of collaborative solutions. Cooperatives may be a good solution to address some of the market issues that producers are facing. Furthermore, the role of the cooperatives in the value chain differ quite allot a cross the different cases, in France for instance the small cooperative dairies are pushed out of the retail sector by some of the bigger players, whereas the trend is opposite in Denmark. This point towards a very diverse organization of the dairy cooperatives in the different countries.

Temporal perspectives

The volatile market situation is particularly problematic for dairy producers because the nature of dairy farming implies relatively long time binds, hence, although the prices are very volatile production is very inelastic and it is difficult to adjust production from one month to the next. Therefore, dairy farmers need stable production conditions or a strategy to manage the volatile market conditions. In the case of dairy farming, the institutions that safeguard farmers have not been established when the quotas were abolished, and this may be an important factor in explaining the effects of the current crisis.

One of the major concerns of the farmers in the unpredictable milk market is the difficulty of making a proper budget. A budget is an important device for the strategic development of the farm, because it allows the farmer to develop a plan for the development, including technology investments, labour resource, number of livestock etc. The budget express the expectations towards the future practice and the investments that are needed to get to there. However when it is difficult to develop a proper budget, it is also difficult for farmers to act strategically as they are in a sense blindfolded.

The technologies that mitigate the environmental and climate impact of dairy production are expensive, hence, implementation presuppose that European farmers are able to have a long-term perspective in their investments. However, in a volatile commodity market long-term considerations cannot be prioritized because it is impossible to make a credible budget and thereby to raise investment capital. Furthermore, if implemented new investments require production at full capacity until investments are downpayed otherwise they are not viable. Therefore, ultimately the current dairy market fail to provide farmers and supporting industries like financial institutions with stable expectations that could enable a long-term engagement of a resilient development in the dairy sector.

Another implication of the volatile market conditions is that increasingly the timing of investments are important for the farm economy, particularly the purchasing behaviour of farmers who are not self-sufficient regarding inputs as these aspects increasingly determine the profitability of the farms. Hence, whether or not investments are actually viable no longer only depends on the farmer's skills and ability to make full use of resources, but it is increasingly a matter of timing. If investments are carried out at time when prices are in decline they are unlikely to ever be viable because the farmer initially will need a substantial overdraft.

Policy implications

Although, managed by the same regulatory framework and influenced by the same world market prices farming systems across Europe respond quite differently to the changing markets and the problem has been framed differently across different countries, which implies that regulatory and market interventions have different impact in the various local contexts that prevail across Europe.

At European level the strategy to support the farmers throughout the period of crisis and in the coming years is specified in the "milk package", particularly by "providing market information and transparency", "private storage aid" and by encouraging "Producer Organization" (European Commission, 2013).

Although, an improved producer organization would provide dairy producers with a more powerful negotiating position *Vis a Vis* other actors in the value chain, it will not solve the challenges that producers are facing. The paper documents that what really constitute a problem for the dairy producers is the volatile market conditions (of milk and input factors) and these are largely unaffected by the provisions in the "Milk Package". Hence, the internalization of the CAP has created some fundamental problems to the agricultural production systems and particularly a need for structural and financial adaptation. For instance, the paper document that particularly the access to loans and credit constitute a huge barrier for the long-term resiliency of the dairy sector, as it is an important factor in the decision making of the producers. Hence, addressing these factors will also have to become a part of the support mechanisms for the European dairy farmers. Furthermore, producers strategies are not only decided by the producers themselves, but are also conditioned by the strategies that are adopted by the dairies and these are often adjusted according to their considerations. Hence, improving the market power of the producers in relation to the dairies will not change much if the dairies are also in a weak position *Vis a Vis* a retail sector that is increasingly gaining market power.

Acknowledgements

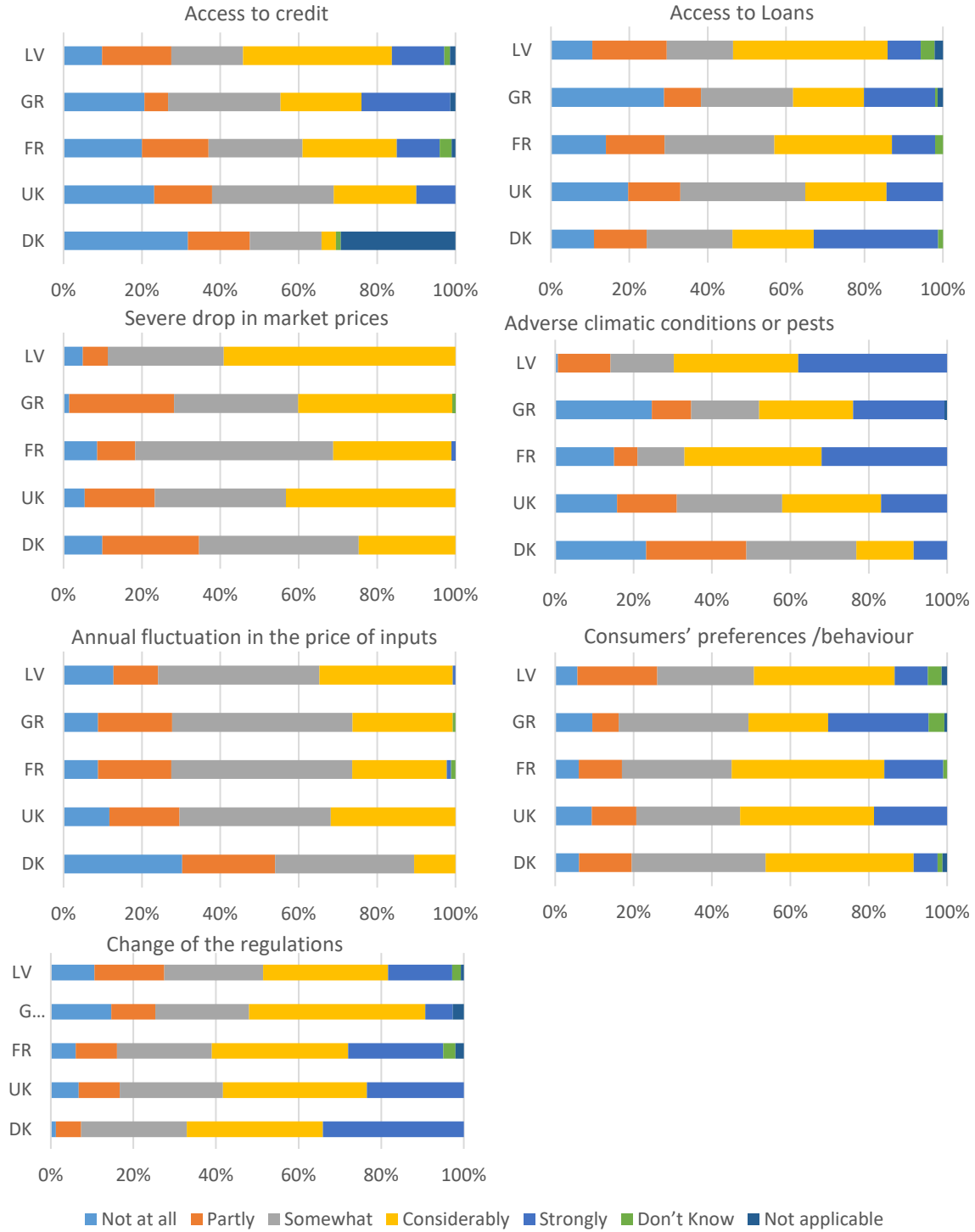
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Appendix 1



Drivers of farmers strategies. Replies tot he question: „To what extent might the following factors influence your decisions regarding your production and farming strategies for dairy?“

Appendix 2



Expected changes. Replies to the question: "What changes to your dairy farm business do you expect to implement in the coming 5 years?" Production related (P) and market related: (M)

Appendix 3

The response of the farming systems.

	Configuration of the production system	Strategic response of the processing industry	Strategic response of the farming systems
Denmark	Large-scale and industrialized production facilities. Milk is processed by several cooperatives (Arla is by far the largest). Historically the Danish dairy industry is very export oriented as 2/3 of production is sold outside DK.	Gradual increase in production, particularly after the quota abolition. A strategy dominated by an ambition to conquer market shares on the global market.	Crisis response has primarily been to lower production costs pr. kg milk, by locally expanding production or converting to organic production to get price premium
France	Great regional difference in production systems. Two main market channels, either cooperatives or private dairies, each of these have approximately the same size. Most milk is sold as standard milk for further processing at the dairies.	Deliberate capacity restrictions in the processing sector, to ensure a stable production in an attempt to not destroy the local market.	Two strategies are prominent among framers, either extensification via pasture based production or intensification.
Greece	Small-scale and fragmented dairy sector, with few international enterprises. Production around half of the Greek consumption of cow milk product as 60 % of the Greek dairy sector produce goat and sheep milk, hence high price of cow's milk	Producer cooperatives are a dominating organization to ensure good competition.	Lacking credit access imply difficulty to formulate a strategic response in the current situation of low prices.
Latvia	High share of farms of small farms with low productivity and uncoordinated processing system. Traditionally, milk is wholesaled at spot market, hence, no long-term contracts for farmers and they have a weak position in the value chain	Initially low milk prices and reliance on the Russian market. However, the entrance of a few large multi-national companies have increased prices and boosted production.	Emphasis on productivity improvement, implying increasing production. Initially the milk price crisis implied that farmers were forced to sell their milk below the costs of production. Several strategies are, however, available, including selling at spot markets to the highest bidder, surviving on subsidies or including new revenue streams.
UK	Fragmented dairy sector and a number of different market arrangements exist, both cooperative and private. Supermarkets dominate particularly the liquid milk market. About 65% of dairy production in the UK is sold as liquid milk, with only 25% turned into cheese and 10% into powders and butter.	Contracts have become an increasingly important feature of dairy supply chains. A range of different actors that employ different strategies dominates the milk market. Some processors have introduced an A and B pricing regime to control supply.	Low milk price is an existential concern but price stability (stable market) is also essential; farmers receive different prices based on the nature of their contract. However, the crisis have implied an increasing contractualization, diversification of revenue streams and conversion to organic production.