

“There is no one that isn’t born and raised on a farm that can afford to go into dairy production”

Swedish dairy farmers on profitability, power and sustainability

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Abstract

This thesis contributes to the discussion on food production and sustainability by studying how political economy is experienced by Swedish dairy farmers. Many Swedish dairy farmers have reported that they struggle with poor profitability, and the number of dairy farms is decreasing quickly. However, the size of the remaining farms has increased simultaneously. The study focuses on the changes in dairy production since 2007, and seven farmers have been interviewed. The farmers identified profitability as the biggest problem for them, which is caused by global competition and Swedish policies. Poor profitability causes farms to close down and discourage the next generation of dairy farmers from entering the market. Fewer and more sparsely located farms makes it more difficult for farmers to cooperate and share machinery, and fewer farms also causes services to disappear. The farmers say that bigger and more rational farms are needed to survive on the market, but organic farming also increases profitability. The farmers feel they have little power to change the situation, other than adapting their own farm. Dairy production is considered environmentally friendly as it is part of the carbon cycle, but further actions to improve use of pesticides and fertilisers would make dairy production more environmentally friendly.

Keywords: human ecology, Sweden, milk, dairy production, dairy farmers, internal economies of scale, theory of induced innovation, profitability, power, sustainability

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1 Introduction

Milk and dairy products have long been important in the Swedish society. Part of its cultural value is the belief in the health benefits, and dairy products have historically even been recommended for medicinal use. Although dairy products are no longer recommended to cure the common cold or inflammations of the ear, dairy products are still an important part of the Swedish food culture (Jönsson, 2005, p. 31). Today, the Swedish dairy industry is the agricultural sector with the highest production value, with a share of 20 percent of the total value (Jordbruksverket, 2018A). Despite this, only 40 percent of Swedish dairy farmers report having satisfactory profitability (Gripenberg, 2017). Since the 1970s, the number of dairy farms in Sweden have halved every ten years, with only 6 percent of the farms remaining in 2017 (Jordbruksverket, n.d.A). In recent years, half of the dairy farmers report that they do not earn enough to cover the expenses and take out salaries (Gripenberg, 2017), and that they have considered discontinuing their business (Grönlund, 2016). However, although the number of farms is rapidly decreasing, the number of dairy cows only decreased by 13 percent between 2007-2017, as the remaining dairy farms are increasing in size. In 2007, 64 percent of dairy farms had fewer than 50 cows, and by 2017 the share had decreased to 39 percent, while the number of farms with more than 99 cows increased by almost 40 percent. An increasing number of dairy farmers also have combined businesses, most of which are contract works (Jordbruksverket, n.d.A). Combined businesses offer extra incomes, which could counteract poor profitability. However, it does not eliminate profitability as a problem for Swedish dairy farmers.

One reason why dairy farmers suffer from poor profitability is that the milk price is too low in relation to the costs, or as one farmer said, “We get paid less than it costs to produce the milk” (Eskilstuna Kuriren, 2016). In 2016, the milk price was equivalent to that of the 1980s (Grönlund, 2016), but it has since increased again. In 2015, the European Union (EU) abolished their milk quotas, resulting in an overproduction of milk on the world market which pushed down the milk price (Jordbruksverket, 2018A). The market began to stabilise the following year as the global production decreased, which increased the milk price (Ruderstam, 2017). The price of milk is however not the only factor affecting the farmers profitability. In Sweden, it is Jordbruksverket (the Swedish Board of Agriculture) that is responsible for distributing the funding from EU, but because of technical problems and new EU regulations, the payments have been late (Åsberg, 2017). In 2016, over 30 farmers protested outside Jordbruksverket’s head office because they had not yet received the payments for 2015 (Djärf, 2016). This had little effect, and the following year there were still farmers who had not been compensated for 2015, which made LRF (the Federation of Swedish Farmers) announce that they are ready to go to court to demand that the farmers are compensated for the late payments (Åsberg, 2017).

Even though Swedish dairy farmers are in a difficult financial situation, as well as being affected by other factors that influence the structure of dairy production, there is little research on the farmers situations, the factors affecting them, but mostly on how the farmers and their businesses are affected by this.

1.1 Aim and research questions

This thesis will contribute to the discussion on food production and the potential for sustainable farming, with the specific aim to study how the political economy is experienced by Swedish dairy farmers. The focus of the study will be changes in dairy production since 2007 and how they affect farmers and their livelihoods, the power structures, and how the production affects the environment and is affected by environmental policies. The past decade is selected because the number of dairy farms in Sweden halved yet again in that period. Although the focus of the study is on the consequences of modern agricultural

development in Sweden, the findings will be discussed in relation to technological innovations and agricultural policies from the 20th century onwards. From the perspective of the dairy farmers' experiences, the research questions are:

- What are the causes and consequences of poor profitability?
- How do the dairy farmers perceive their own power and ability to improve their situation?
- What are the environmental consequences of dairy production, and how can these be mitigated?

1.2 Thesis outline

Following the introduction is a brief historical development of agriculture in general and the Swedish dairy production in particular, with a focus on technological developments. The analytical and theoretical frameworks are presented in chapter 3, and the method in chapter 4. The experiences of the farmers are presented in chapter 5, which has been divided into four sections, dealing with profitability, competition, environment, and power. The findings are discussed in chapter 6, which is divided into two sections. First, a discussion of internal economies of scales, which is a common denominator of the findings. Second, a discussion of theory of induced innovation and technological development in dairy production. Lastly, the conclusions are presented in chapter 7.

2 Development of modern Swedish dairy production

During the past centuries, the agricultural sector in Europe has undergone major transformations that have substantially increased the yields and enabled the land to feed more people. One such change is the agricultural revolution that started in the United Kingdom and the Netherlands in the 18th century, and then spread throughout Europe (Cserhalmi, 1999, p. 131). In the United Kingdom, the introduction of four-field rotation system contributed to larger yields and more fertile soil (Sinclair & Sinclair, 2010, p. 146). The switch in muscle power from oxen to horses meant the fields could be worked quicker, and fewer people were needed in agriculture. Increased yields not only contributed to more food for humans, but also increased fodder for farm animals. Before, animals had to be slaughtered in the autumn, but could with the increased fodder be kept during the winter which distributed the meat supply more evenly over the year (ibid., p. 147).

In Sweden, the agricultural revolution began in the 19th century with *laga skifte*, a redistribution of farmland with the purpose of providing every farmer with ideally one plot of land, unlike the previous system of several small farm plots per farmer (Cserhalmi, 1999, pp. 131-132). With larger individual farmlands, rotation systems and ley were introduced. Before ley, farm animals were fed plants from meadows, and the manure was used to fertilise the farmland, leaving the meadows depleted from nutrients. After *laga skifte*, the fertile farmland was used for growing food both for humans and their animals, which increased the fodder. Other important changes in the 19th century was the opening of factories that produced farm tools such as ploughs, and animal breeding to replace small animals with bigger and stronger animals. There are however some advantages with small animals, for example that they consume less feed, produce fattier milk, are more resistant to starvation, and have smaller calves which is safer for the cows. However, as there was a shift from subsistence dairy farming in the 19th century towards more intensive farming, the yield per cow became more important, and the purpose of the animal breeding was to find the cow breeds best suitable for dairy production (ibid., p. 136-137).

All food production began as subsistence farming, with the purpose of feeding the family, but while food production became more and more intensified and commercialised, the dairy production in Sweden

remained small-scaled (Martiin, 2017, pp. 13-16). Dairy cows were mainly a source of food, manure and draught power. In the 1920s, almost every farm in Sweden had dairy cows, but only 41 percent of the dairy farmers supplied their milk to dairy plants, and almost a third of all farms with dairy cows had only 1-3 cows. However, in the 20th century things began to change. The number of dairy farmers peaked in the 1940s when dairy cows could be found at almost every farm in Sweden, and by the 1990s only every fourth farm in Sweden had dairy cows. To some extent, this development is a result of the politics from the 1940s onwards. Tage Erlander, the Swedish Prime Minister 1946-1969, promoted the use of technology, and the agricultural programme from 1947 stated “that technical progress should always be welcomed, even when contributing to increased problems with overproduction” (ibid. p. 20). As a result, rationalization of dairy production was encouraged, with bigger and more technologically advanced farms, even though that contributed to fewer dairy farms in Sweden. However, there were necessary gains from fewer farmers in Sweden.

In the 20th century, the wages in the industries grew in Sweden, and labourers earned more in the towns than they did on the countryside working in agriculture (Cserhalmi, 1999, p. 149). As the labour force moved to the cities, the farmers were forced to rationalise their production, and as machinery such as tractors became affordable after the second world war, human labour could be replaced by machinery. After the war there was also a great need for labour in the industries, and therefore the government encouraged small-scale farmers to close their farms and instead move to the cities and work in manufacturing. In the 1950s, half the Swedish population lived in cities, and by the 1990s more than 80 percent lived in cities. The urbanisation combined with politics resulted in major rationalisations in the Swedish agriculture (ibid.).

After the second world war, the number of dairy farms decreased, but the decrease in dairy cows was partly counteracted by a concurrent increase in herd sizes (Martiin, 2017, p. 19). At the same time as the number of cows decreased, the yield per cow increased which contributed to further reduction in the number of dairy cows as fewer cows were needed to maintain the production levels. In the 1920s, the average dairy cow produced 2,000 kg per year, and by the 1990s it had almost tripled to 6,100 kg, however most of the increase occurred in the 1970s and 1980s. There are several reasons for the increased yield per cow. Low-yielding breeds have been phased out in favour of breeds that can produce higher yields. Artificial insemination improved the farmers' abilities to be selective in breeding, and during the latter half of the 20th century, the use of artificial insemination increased continuously. Another measure to increase the yields is to feed dairy cows more often, but the cows are also fed more protein and energy rich food. Since the 1950s, the recommended rations of feed concentrate have increased, even when the cows are grazing as the grass is not considered to be sufficiently nutrient rich (ibid., pp. 19-22).

In 1957, the European Union started what would become the Common Agriculture Policy (CAP) (Jordbruksverket, 2017). Sweden became a member of the EU in 1995, and adopted the common policies. CAP has five goals: First, to make agriculture more efficient. Second, to ensure a reasonable standard of living for the farmers. Third, stabilising the market of agricultural products. Fourth, to ensure food security for the population. Fifth, to ensure that the consumers can buy agricultural products at reasonable prices. To achieve these goals the EU has three principles: common prices on products, community preferences (favouring European products), and common funding. The EU's agricultural policies stem from the 1950s, and the rationing around the second world war highlighted the importance of viable European food production and self-sufficiency. The efforts were successful, even too successful as there was a surplus of some products in the 1980s. The consequences of the over-production made the EU reform their policies

to prevent future surplus production. One measure was to introduce milk quotas, with a penalty if the quota was exceeded, but the quotas were abolished in 2015. A reform in 2003 introduced the Single Payment Scheme but also requirements that should be fulfilled before the farmers receive the support. In 2008 it was decided that the regulations should be fewer, the Single Payment Scheme should be smaller, and there was increased focus on the environment (ibid.).

Intensive farming has many negative effects on the environment. The agricultural sector contributes to about 10 percent of total emissions of greenhouse gases, which contributes to global warming, and globally about 50 percent of the nitrogen from fertilisers added to the soil is lost to the surrounding environment, which contributes to eutrophication (Ramanjaneyulu, 2012, p. 116). Global warming can also in turn affect agriculture as the climate and precipitation patterns change (Mann & Toles, 2016, p. 33). The negative effects of climate change on farm lands affect poor farmers the most, since they may not have the financial means to purchase solutions to the problems (cf. Malm & Esmailian, 2012). On top of that, industrial farming also affects soil quality and creates a dependence of industrial inputs such as fertilisers, and negatively affects the biodiversity as pesticides not only kill pests but their natural enemies and other insects such as pollinators (Ponisio & Ehrlich, 2016). In Sweden, the initiative Greppa Näringen (Focus on Nutrients) give guidance to farmers, with the aims of decreasing greenhouse gas emissions, decrease eutrophication, and safely use plant protectants (Gustafsson, 2016). Greppa Näringen is a cooperation between Jordbruksverket (the Swedish Board of Agriculture), LRF (the Federation of Swedish Farmers), and the county administrative boards. Jordbruksverket has the main responsibility for the project and are also responsible for the financing. The farmers are informed on how to use their resources more efficiently to decrease costs and increase profitability, while being more environmentally friendly (Gustafsson, 2016).

3 Analytical and theoretical frameworks

In the past century, the Swedish dairy production has changed significantly, and two factors that can help explain the changes are the increases in herd size and technological developments. Since the 1970s, the number of dairy farms in Sweden have halved every ten years, but the number of dairy cows has not decreased at the same pace (Jordbruksverket, n.d.A). This suggests that it is more economical to have a larger herd size, and that the farmers benefit from economies of scale. Dairy production has also become more efficient, largely because of technological and scientific developments. Therefore, to better understand the context of the findings, they will be discussed in relation to internal economies of scale and theory of induced innovation.

3.1 Economies of scale

A general definition of economies of scale is that the cost decreases as the production increases, hence the scaling up of production lowers the average cost per unit of output. However, the concept is wide and can be used in different ways. For example, Wilk & Cliggett (2007, pp. 66-67) use economies of scale to explain how increase in labour can increase the efficiency of production. Parr (2002) presents several types of cost savings which can be either internal or external. Internal economies can be divided into internal economies of scale (increasing production) and internal economies of scope (increasing diversity of production). External economies can be divided into external economies of scale (cost savings from scale of the industry) and external economies of scope (cost savings from existence of firms in other industries). In this thesis, the focus will be on internal economies of scale since Swedish dairy farms are increasing their herd sizes, and thus increase the production.

3.2 Theory of induced innovation

The theoretical framework is based on the article *Strategies for agricultural development* by Ruttan & Hayami (1972). In every society there are both scarce and abundant resources. Scarce resources are more expensive, and therefore function as a constraint, but technological innovations can to some extent replace scarce factors or use them more efficiently. The two basic factors in agriculture that can vary in abundance are arable land and labour. When there is a lack of arable land, the land available must be farmed more intensively to increase production, and the yields can be increased through technological innovations such as the development of new crop varieties, or industrial inputs. When there is a lack of labour, it may not be possible to farm all available land using only human or animal power, and technological innovation such as machinery can increase the amount of land one person can cultivate. If the demand of agricultural products increases, for example due to increase in population, the relative price of the scarce factors (that cannot increase at the same pace as more abundant factors) will increase more than the price of more abundant factors. Technological innovations that reduce the need for scarce factors may therefore be a cost-saving measure for farmers, that enables a profitable increase in production. For example, if there is a lack of arable land, increasing the production by buying more land may be too expensive for the farmer, but increasing the yield on the existing land by changing to a crop with a higher yield or using fertilisers could be less expensive. The latter alternative is likely to be the result of technological innovations that created new crop varieties or developed synthetic fertilisers. Changes in prices of agricultural factors induce farmers to look for technological alternatives that offer more profitable solutions.

When the price of factors increase, farmers may not only look for substitutes, but they may also request development of new substitutes. If there is a need for new innovations in agriculture, there is added pressure on public research institutions to develop new technology that can solve the problems, but also on agricultural supply firms to supply the technological alternatives that can help the farmers to reduce their costs and increase their production. Receptive scientists listen to the needs and offer solutions such as new technology and new inputs. The interaction between farmers and researchers is likely to be most efficient when farmers are organised and can present their problems and needs as a group. Competition is another factor that affects the extent of the researchers' perceptiveness, as national policymakers invest in agricultural research if they consider it an important measure for the country's competitive position on the world market. Scientists may also be more likely to respond to the needs of the farmers if they are rewarded, either materially or by prestige, as scientists may not respond to problems in the society but be driven by professional achievements and recognition. However, technological changes in agriculture are not only the result of demand from farmers or policymakers, but they are also the result of supply. As the general science develops, technological innovations become cheaper or easier to produce, and improvements in agricultural technology may therefore occur unrelated to changes in factor prices or product demands.

There are some similarities between theory of induced innovation and Marxism, such as the "causal link between prevailing economic environments and scientific innovation" (Palladino, 1987, p. 55). However, Ruttan & Hayami's theory of induced innovation is an alternative to Marxist theories, and arguments against Marxism are the lack of historical evidence and its determinism. Ruttan & Hayami have avoided deterministic language in their theory and argues for what may be rather than what will be. While Marx described a process that "would culminate in the creation of an agricultural proletariat completely

alienated from the means of production”, the theory of induced innovation describes interactions that “make certain innovations in the modes of production more likely than others” (ibid., p. 55).

4 Method

Generally speaking, there appears to be little research on how farmers are affected by the development in dairy production, which is one reason why this study is important. The limited knowledge affected how I could approach the study, but as semi-structured interviews allow for the interviewees to expand beyond the specific questions asked (Magnusson & Marecek, 2015, p. 54), it allowed for me to adapt to what the interviewees were saying, and ask further questions about topics relevant to the study but not included in the interview guide. This quality is also found in unstructured interviews, but as there were some specific themes I wanted to include in the interviews, a semi-structured form was more suitable. Another reason for choosing qualitative interviews is that it is the experiences of Swedish dairy farmers that is of interest in this study.

4.1 Qualitative interviews

I conducted seven semi-structured interviews with Swedish dairy farmers in March 2018. The length of the interviews ranged from 30-75 minutes, but the average was about an hour, and the interviews were conducted in Swedish. Because of geographical limitations, the interviews could not be held in person, and the preferred alternative was interviews via Skype. However, only one of the interviewees had access to Skype, and most interviews were therefore phone interviews. The advantage of Skype is that it allows the interviewer and interviewee to see each other during the interview, which to some extent compensates for not meeting in person. However, I did not detect any differences between the Skype interview and phone interviews, such as the interviewees being more or less willing to talk about personal feelings and experiences.

The interviews were, after the interviewees’ approval, recorded, but I also took notes during the interviews to more easily remember things I wanted the interviewees to expand upon. The recordings were transcribed, but during the transcription I corrected dialectal grammar (compare writing “what” instead of “wha”) and excluded empty words (e.g. when the interviewees stammer, or say one word and then immediately rephrase). This to make the transcribed text easier to read. When quoting the interviewees, I aimed to make the translations as close as possible to the original quote. However, on some instances the direct translations were not satisfactory, as some words or phrasings do not exist in both languages, and then the quotes were slightly altered to better capture what was said.

4.1.1 Participants

The participants in this study are seven dairy farmers that supply milk to three different dairy companies: four supply to Arla, one supplies to Falköpings Mejeri, and two supply to Norrmejerier. Since there is a focus in this study on developments in the past ten years, a requirement for the interviewees was for them to have had dairy farming as their main profession since 2007 or earlier. All the interviewees have been dairy farmers since the late 20th century, and are between 48-70 years of age. Five of the participants live in the county Västra Götaland and the remaining two live in Norrbotten. Västra Götaland was in 2017 home to 18 percent of Sweden’s dairy farmers, while Norrbotten was home to only 2 percent (Jordbruksverket, n.d.A). The sizes of the participants’ farms vary, and range between 60 and 500 cows. However, herd sizes are based on the numbers the interviewees reported, and some explicitly excluded cows that are not currently being milked. The number of cows may not therefore fully correspond to total

number of dairy cows on each farm. One of the interviewees have an organic farm, and three of them are women. Some of the interviewees grew up on dairy farms, or with family members who owned a farm, while others started with an interest in animals and then married a dairy farmer. Only one of the interviewees did not set out to be a dairy farmer early on, but rather had different animals on a farm that later became a dairy farm in the 1980s.

4.1.2 Sampling method

Due to difficulties getting in contact with potential interviewees, I used snowball sampling. Although the preferred method would have been one long chain, to move further from the starting point as a way to ensure diversity, the time limitations required alterations. I started with two gatekeepers: one a relative of a fellow student of mine, and the other a board member of the organisation Sveriges Mjölkbönder. The organisation is by dairy farmers for dairy farmers, and their goal is to improve the conditions of dairy farmers (Sveriges Mjölkbönder, n.d.). The participants were instructed to suggest about 2-3 new dairy farmers that differ from them, for example in herd size, county, organic or conventional, etc. Although every participant suggested several new farmers, about every third farmer I contacted was interested in participating in the study. On some occasions the chain broke, and I was not able to, within the time span, interview at least one more organic farmer and one more farmer supplying to Falköpings Mejeri. Snowball sampling is unlikely to be representative on a larger population (Bryman, 2011, pp. 196-197), but I attempted to counteract this to some extent by deliberately increasing the diversity of the participants. Even so, seven participants are not sufficient for a study to be generalisable, but the aim of the study is not to generalise but to exemplify. The strength of this study is to hint at larger trends and tendencies through deep-interviews with few farmers, which can then be used as a basis for future studies of more generalisable characters.

4.1.3 Interview guide

The interviews were semi-structured, as this would enable the interviews to be adapted to the individual interviews and the findings. After two interviews, the interview guide was revised and altered. Some questions then deemed redundant were removed, and other questions were added to capture themes brought up in the two interviews that were not included in the interview guide. The interview guide is divided into three sections: social, power, and environment (see appendix). Within each theme the aim was to have a natural flow between the questions, but since the interviews were semi-structured, the order of the questions differed slightly between the interviews. I also aimed to make clear that it was the participants' own opinions and experiences I was interested in.

The first section of the interview focuses on the changes in dairy production since 2007, both in dairy production at large and at their own farms, but I also asked them specifically about profitability. The second section focuses on the farmers' perceived power, both in relation to their dairy company and Jordbruksverket, but also what farmers can do to influence actors around them. The third section focuses on the environment, both on the farmers' view of their environmental impact, but also about environmental policies and ways to decrease their environmental impact.

4.1.4 Analysis

The data was analysed thematically in two stages. In stage one, the transcribed interviews were summarized in general themes found in them, such as profitability, demands, environment. In stage two, the data in each theme was coded, 23 codes in total, and the data were divided accordingly. For example, the theme environment was given three different codes: environmental impacts, environmental policies,

and environmentally friendly solutions. In the analysis, much focus was given to interconnections, and how different factors found in the data are relating and affecting one another.

4.2 Ethical considerations

Before the interviews, the participants were sent information via email about the study and the upcoming interview. Although they were informed on the general purpose of the study, they were not informed of the specific research questions as that could influence how they responded to my questions. Some of the interviewees had questions about the study after the interview and were then given full information. They had at that time already suggested other dairy farmers to contact, and the information could therefore not influence their suggestions. The participants were also informed that the interviews would be recorded, and that their participation would be anonymous apart from revealing some information such as which dairy company they supply to. At the start of every interview, the participants were again informed of this, and asked if they approved the recording of the interview.

4.3 Limitations

One limitation of this study is the generalisability, as qualitative studies cannot be generalised to larger populations (Bryman, 2011, p. 369). That is however not the purpose of this study, as the focus is on experiences, which in itself is highly subjective. The subjective nature also negatively affects the possibility of replicating the study with similar results. Furthermore, all interviews brought up new perspectives, and I was not able to reach theoretical saturation within the scope of this study. Future studies of a similar nature as this one are therefore likely to discover new findings. Although, since I could not find a study that resembles this one, I do not regard this as a weakness. Instead, the strength of this study is that it suggests trends and areas for further research (see end of chapter 7).

The scope of this study not only limits the number of participants, but also to what extent I have to rely on the statement given by the participants. Because of time limitations, I have not been able to investigate many statements, such as Swedish farmers having more demands than other European farmers. Ideally, this would have been investigated further, but it would require a deep dive into agricultural policies in every member state of the EU.

Relating to the low number of participants in this study is the geographical spread of the participants. There are 21 counties in Sweden, and since the participants live in only two of them, most counties are not included in this study. However, the differences between the two counties studied are mostly geographical, in that Norrbotten, the most northern county in Sweden, is colder than Västra Götaland. Problems such as not being able to choose which dairy company to supply to as only one is available in the area were found in both counties.

Another limitation is my personal knowledge of dairy production and the dairy industry. Before the thesis I had no previous experience of dairy farming, or farming in general. The knowledge I could gather beforehand from literature and news articles shaped how I approached the study, but my awareness of this limitation made me open and receptive to new knowledge and new perspectives brought up by the interviewees. In my interviews I therefore asked some follow-up questions that did not necessarily contribute to the thesis itself, but that contributed to my overall understanding of dairy production.

5 On the experiences of Swedish dairy farmers

For the past four decades the number of dairy farms in Sweden have decreased by 94 percent, but in the same four decades the number of dairy cows only decreased by 50 percent. This means that 6 percent of the farms hold 50 percent of the cows, with an average herd size of 89 cows. From 2013 to 2017, the number of farms with more than 199 cows increased in actual numbers (i.e. not just a percental increase) while the total number of farms decreased (Jordbruksverket, n.d.A). In other words, the dairy farms are becoming both fewer and bigger, which to some extent counteracts the closing down of dairy farms. It cannot be said from this data whether the farms are increasing their size because there is a possibility to grow or whether it is a necessary measure to remain competitive on the market, but since farms continue to increase their size and production it suggests that it is a cost-reducing measure, also referred to as internal economies of scale. Parr (2002, p. 718) defines internal economies of scales as “the fact that the unit cost of a production (beyond some minimum scale) is a decreasing function of output.” This was confirmed in some of the interviews, on top of most of the interviewees themselves having increased the size of their farm in the past ten years, and one of the farmers says that one measure to solve poor profitability is to have larger and more rational units. Another farmer comments that:

You have to become more efficient all the time, that’s the case with everything, and if you’re not then you don’t earn any money in the end, and that’s when the small farms close down. Well, even large [farms] close down, but it’s mostly the small ones that aren’t rational (Interviewee 5, Arla).

For some of the farmers, the closing down of dairy farms is seen as a natural development and not a problem that requires a solution, and part of the reason is that dairy farms have halved every ten years for several decades already. One farmer explains why some farms close down with the transformation of how a dairy farm is viewed:

Back in the days when I grew up there was a lot of family farming. You had some cows and it was enough for a good life, while today that’s not possible, instead you have to view it as purely a business. (...) [T]he businesses have developed so much that there are some [farmers] that haven’t been prepared for it (Interviewee 2, Arla).

In order to make profit as a dairy farmer today, one must view the farm as a business and make strategical decisions based on what is best for the business. In the current business environment you go big or go away, in crude terms, which is also problematic for the next generation of dairy farmers. Before, when it was possible to live well off of small-scale farming, starting a new farm required less finances and less risks.

There is no one that isn’t born and raised on a farm that can afford to go into dairy production. Buy a farm and buy cows and buy machinery (...). [Y]ou can’t start with 25 cows, you could do that before and then expands little by little, but heavens, [now] you would have to work outside of the farm to make profit and manage your loans and such. (Interviewee 6, Arla)

Dairy farming is not profitable enough to allow small businesses to grow, but rather the lack of profitability demands it from them. And that is really the key: profit. It has been the connecting thread throughout the interviews, if so indirectly at times, and it is the key for explaining the situation for Swedish dairy farmers. Therefore, the following section is dedicated to the causes for poor profitability, price on milk, and the consequences of poor profitability.

5.1 On the causes and consequences of poor profitability

When asked about what the biggest problem is for dairy farmers six of the seven interviewees answered “profitability”. The remaining interviewee answered “knowledge”, but the knowledge describe was still related partly to profitability. During the past few years there have been several news articles published about the low price that farmers are paid by the dairy company for the milk they supply, and it is the dairy company Arla that has been most in focus (cf. Eskilstuna Kuriren, 2016). The reasons behind the low price on milk are several, but many of them are in some way related to the Swedish dairy industry being part of a global market. Being part of a global market affects price setting, competition, but also funding. One of the farmers explains how the Swedish government had a policy in the 1990s to remove all funding to the dairy farms, which they also did gradually. The interviewee prefers the period without state funding, but it was short-lived as Sweden joined the EU in 1995.

I suppose we were many that wanted to join the EU because we believed that we would get competition on equal terms, but we didn't. Sweden kept some conditions to themselves [i.e. have more conditions than other EU countries], and the Swedish government negotiated poorly on the behalf of farmers in the EU. They thought we did so well that we didn't need that much. (...) [I]t is the most important [factor] financially since the EU funding today accounts for almost 30 percent of our incomes. (Interviewee 4, Norrmejerier)

When Sweden joined the EU, Swedish dairy farmers became part of a bigger market, but they did not and do not have the same conditions as other actors on the European market. The conditions, however, will be discussed more in the following section, as it is the funding that is of interest here. The funding given to the farmers by the EU is an important part of their income, but their businesses are not only affected when the payments are overdue. With each funding there are requirements that must be fulfilled for the farmers to be eligible, and therefore, the dependence on EU funding can influence how the farmers conduct their businesses. In order to increase profitability, the production can be shifted and adapted to better suit the requirements of the EU funding, even when the farmers perhaps would have preferred to farm differently.

Well, the whole deal with the EU membership is that, well to receive these supports that you're actually dependent on, otherwise it's not possible to have any profitability, your production is controlled in a way that you don't want from a farming perspective. You kind of have to optimise around the supports, you may have to grow something other than you actually wanted, or you can't tread a field in the most efficient way for the business. You always have to think about oh oh, what happens to the support now? (Interviewee 7, Norrmejerier)

In Sweden it is Jordbruksverket (the Swedish Board of Agriculture) that is responsible for handing out the funding from EU to the farmers, something they have not been doing successfully since 2015. The funding has been paid out late or not at all, as some farmers, including some of the interviewees, are still waiting for their funding for 2015. In some cases, the Swedish government owe farmers, among them some of the interviewees, several hundreds of thousands Swedish kronor¹. Unsurprisingly this causes frustrations among dairy farmers, and in 2016 more than 30 farmers protested outside Jordbruksverket because they had not yet received their funding (Djärf, 2016), and in 2017 it was reported that LRF (the Federation of Swedish Farmers) was preparing to go to court to demand compensations for the late funding. According

¹ 1,000 Swedish kronor is approximately 115 US dollars, or 97 euros.

to Jordbruksverket the late payments are due to changes in EU regulations and technical difficulties (Åsberg, 2017), which one of the interviewees comments on with noticeable frustration:

Well, they claim to have difficulties with the computer system and that it's such a complicated system, and I think that's qualified bullshit. There's no will. (...) [W]e're supposed to be quite good at computer systems in Sweden, so that they can't solve a computer system at Jordbruksverket in three years, there's no bloody way that's the case if they want to fix it. So either there's not enough money to spend on it, or there's not enough money given from the government and the government is deliberately delaying it. Don't know which is correct, but one of them is, that I'm sure of. (Interviewee 1, Arla)

Two of the farmers talk about how it is unfair that Jordbruksverket can blame late payments on a faulty computer system when they cannot use the same argument without consequences. However, the payments are not only delayed due to problems within Jordbruksverket, as they in some cases are late when there is a problem with the application for funding or something is found during a control of the farm that is not up to standard. Another farmer says that Jordbruksverket does not fully understand how problematic it is for the farmers not to receive their funding on time, and one of the previously mentioned farmers explains:

We can't, it can't be the case that we hang ourselves or survive based on whether we get our funding or not, that it's about survival, that we go down if we don't get our funding on time. This situation is horrible, [and] it's not really support, and that's also something, it's actually a compensation because we do something (...) but you call it support, but maybe you should use EU compensations instead. (Interviewee 6, Arla)

There are two important things in this quote: First, EU funding is only given to farmers that meet the conditions for the specific funding they have applied for, and thus calling it support makes it sound like a service given to the farmers rather than the other way around. Second, poor profitability has real and harsh impacts on Swedish dairy farmers and their mental health. In 2017 it was reported that only half of the Swedish dairy farmers earned enough money to cover both their expenses and pay out salaries (Gripenberg, 2017). Some of the interviewees describe how periods of poor profitability mean they have to select which bills to pay and save in on their own salaries by not taking more money from the business than necessary. On the farm, poor profitability means not being able to afford investments such as machinery, and not being able to keep up the maintenance of the farm.

You notice it straight away when you arrive at a farm. Do they have profitability, don't they. Is there stuff, gutters hanging down, waterspouts that don't work, is it messy in the staff room then they don't have profitability. That's affected straight away. You can say that a dairy farm, it [saves on] the maintenance, that's after only a couple of months. (Interviewee 3, Falköpings Mejeri)

Poor profitability can thus be seen on dairy farms as they struggle to keep up the same standard, but other interviewees also talk about how some farmers have to slaughter cows because they cannot afford to keep them. To make matters worse, another interviewee says that they currently have to wait 12-14 week to slaughter their cows as there are too many animals waiting to be slaughtered. A delay of 12-14 weeks means that the farmers have to feed and take care of that animal for 3 months more than desired, which also results in extra costs for the farmers. Most Swedish dairy farmers have a difficult financial situation, and while the interviewees say it is something they discuss with other farmers, it is still something that many farmers keep to themselves.

Unfortunately there are so many [farmers] that have to be so darned proud and they never experience setbacks, but rather pretend that everything is fine. There are several examples of this where they have said that everything is fine and then maybe a year later they have sold their farm. (Interviewee 4, Norrmejerier)

In some cases, hiding the truth is not done out of pride and as an attempt to keep up appearances, but is instead used as a way of protecting oneself against other farmers' assumptions that the fault is not the industry at large but rather the individual.

We're really good at not telling the truth. Incredibly good at hiding. (...) We're good at fooling ourselves. (...) It's not accepted. If you have a group of ten farmers then there will never be anyone that dares to stick their chin out and say that it's going to get bloody tough, because I don't have money for my diesel this year. You'll never hear them say that. (...) [And if I do], then they'll use it against me, then there's something wrong with me, (...) with everything else I have done on my farm. (Interviewee 3, Falköpings Mejeri)

There are many reasons for not telling the truth, and as one interviewee comments, people in general do not discuss their finances with their colleagues. However, another farmer comments that it may actually help to talk to each other, if not financially then perhaps mentally.

I think you feel better if you talk about it and realise that you're not alone than if you're quiet and keep it to yourself, and then all of a sudden do something stupid. There are several that have done that. Both that you don't take care of your animals because of mental ill-health, or that you actually hurt yourself. That's what happens when you don't know how to deal with your problems, it's probably incredibly difficult, incredibly difficult. (Interviewee 6, Arla)

Poor profitability means some farmers change their production to for example beef cattle or go bankrupt and close down their farm. Other farmers can keep their businesses but suffer from the lack of profitability as they retire. One farmer explains how their partner, who recently retired, only receive the guaranteed pension, about 7,000 Swedish kronor per month (Pensionsmyndigheten, 2018), as they have not paid enough tax to earn more pension, and invested the money they earned in their company. Poor profitability also makes dairy farming less attractive to the next generation of dairy farmers, as well as making it harder to enter the market. The previously mentioned farmer describes how their daughter is hesitant of taking over the farm when her parents retire, even though she enjoys working there. When asked if it was because dairy farming is a full-time job seven days a week, the daughter had replied that she hesitated because of the poor profitability, because when a farm is profitable, the owner can afford to employ enough people to be able to have some time off. Thus, profitability removes the constraint of always having to be on your farm. Being able to hire more people would also increase the employment levels in Sweden, but as another farmer comments:

We probably need one more employee actually, but one more employee is half a million in expenses approximately, and where are we supposed to get that kind of money from when we can't take out salaries ourselves, more or less? (Interviewee 6, Arla)

When the next generation of farmers choose other, more profitable professions, Swedish farmers as a group age and become increasingly made up by an elderly population. This phenomenon can be seen in the statistics for Swedish farmers in general (i.e. not just dairy farmers), where all age groups decrease from 2005 to 2016 apart from farmers aged 65+. The latter group increased by 36 percent in real numbers while the total number of farmers in Sweden decreased slightly (Jordbruksverket, n.d.A). The lack of new

farmers was also given as a reason for why the number of dairy farms in Sweden are decreasing, because if no one is willing to take over the farms, they close for business when the owners retire. While farms are becoming fewer and bigger, the number of farms with combined businesses have increased by almost 50 percent since 2007 (Jordbruksverket, n.d.A). Currently a third of all dairy farmers have combined businesses, and the most common is contract works such as snow ploughing, or other machinery and agriculture related jobs. A couple of the interviewees also own forest which serves as an extra income, and one of them comments that when they need money they can borrow from the forest instead of a bank. The interviewees explain that combined businesses allow them to have more secure incomes, making them more resilient to fluctuations in milk prices. Unlike the price of milk, the combined businesses are something the farmers themselves can control and thus adapt to their needs.

We're very much dependent on Arla as source of income, and therefore it affects you when the milk price goes down. We don't negotiate the milk price, we just have to accept it as it is and then earn money from something else or adapt the expenses. (Interviewee 2, Arla)

Arla is originally a Swedish dairy company that has expanded to six other countries in Europe, and of its 11,800 members approximately 2,700 are Swedish dairy farmers (Arla Foods, n.d.). This also means that more than 75 percent of Swedish dairy farmers in 2017 supplied their milk to Arla, making them an important actor on the market. The cooperative Arla pays the same price per litre to all its 11,800 farmers (although the price is also affected by factors such as organic or conventional, or other differences in dairy production), and therefore Swedish farmers are directly affected by fluctuations or changes on the European market. This has several implications: First, the milk price cannot increase only on the Swedish market without it being democratically voted through in Arla, i.e. without the farmers in the other six countries agreeing that Sweden should be a special case. Second, when the price on manufactured milk increases, the increased profit is split between all the members (farmers) in all the seven countries. Third, Swedish farmers are paid the same even when they do not have the same conditions for dairy production compared to other European countries. Some of the interviewees commented that Sweden is competing on the world market with worse conditions than most countries, and this will be the focus in the following section.

5.2 On competing with different conditions

One important factor when examining Swedish competitiveness is location. Sweden is the most northern country where Arla have owners (farmers), followed by Denmark, and this plays a major role in competitiveness. Northern latitudes mean colder weather, which in turn means Swedish farmers need stables for their cows that can withstand cold weather and heavy snow falls (in the winter of 2017/2018, the roofs of at least three cowsheds caved in under the heavy snow, killing or injuring some of the animals [Carlsson, 2018]), the growing seasons are shorter, and there are limitations to what can be grown on their fields – to name a few. These examples not only affect the farmers on the global market, but also within Sweden as farmers in different regions have different conditions, such as weather and landscape (e.g. forest). Dairy farmers living in the most northern counties in Sweden are not able to grow the same crops as the farmers in the south of Sweden, which means that they have to buy the protein rich food for their cows that they are not able to grow on their own land, such as corn. Thus, living in the north of Sweden includes extra costs, but this is to some extent compensated for with funding from the Swedish government called Norrlandsstödet. In early 2018 it was finalised after approval from the European Commission to raise the support with 100 million Swedish kronor, or 37 percent (Regeringskansliet, 2018). Norrlandsstödet gives dairy farmers in the north of Sweden a higher price per litre to compensate for

tougher conditions, in other words to level out the playing field. However, the competition most in focus for the farmers was not the national but the international, on which they feel they lack the necessary measures from the Swedish government to give Swedish dairy farmers competition on equal ground with other European dairy farmers, and therefore we return to interviewee 4:

I suppose we were many who wanted to join the EU because we believed that we would get competition on equal terms, but we didn't. Sweden kept some conditions to themselves [i.e. have more conditions than other EU countries], and the Swedish government negotiated poorly on the behalf of farmers in EU. They thought we did so well that we didn't need that much. (Interviewee 4, Norrmejerier)

Some of the farmers feel it is unfair that the Swedish government expects more from them than what is expected from their European counterparts, and the main reason is because it then becomes more difficult for Swedish farmers to compete. On the one hand simply because it is more expensive for them to produce milk when they, for example, have to pay more for stables that can withstand Swedish weather, and on the other hand because Swedish farmers have extra demands from the Swedish government that they have to fulfil, which also can make the production more expensive. One such example is the Swedish law of prevention of cruelty to animals that is one of the strictest in the world, which has consequences for farmers (cf. Strand & Renmark, 2018). The demand for pasture is a rule some of the farmers mention that they find unfair. The demand is that the cows should have access to pasture for at least six hours per day during the summer (the specific dates are location-specific), in part to ensure the cows' wellbeing (Jordbruksverket, n.d.B). However, one farmer lists the negative, from the farmers' perspective, sides to this demand: the cows need access to a regulated piece of land (approximately no more than 10 cows per hectare land); the ground between the pasture and stable may need treatment to make it safer for the cows to walk on; equipment used to monitor the cows' oestrus only work at certain distances from the cow which cannot be maintained during pasture; and the cows get less diseases when they are indoors. The farmer further explains that this law was introduced when almost all cows were tied and had restricted movement, whereas today many stables have loose housing which means that the cows are able to move around all year round, making the pasture demand obsolete.

The pasture costs money. And they don't have that abroad. It's when we have to compete with others that it becomes a problem. (Interviewee 4, Norrmejerier)

In other words, pasture is expensive, and it is yet another cost for Swedish farmers that their European competitors do not have. The farmers' objections to unequal competition should however not be interpreted as them opposing competition, quite the reverse. In 2015 the European Union abolished their milk quotas for the member states, which lead to an increase of milk produced on the European market (Jordbruksverket, 2018A). The increase of milk on the market pushed down the prices, but still most of the interviewees support the abolishment of the milk quotas. Generally, the interviewees regard competition as something positive that introduces new ideas, positive changes, and makes the farmers improve their businesses.

The advantages of competition are that you always have to stay sharp and improve, the disadvantages are that when we don't have competition on equal terms then the competition gets very, very tough. When you don't have the same rules in other countries compared to Sweden and we are to compete with their prices, well then the competition is really tough. (Interviewee 6, Arla)

One of the changes in the past decade that some of the farmers mentioned is the increased amount of paperwork, but also that demands gradually gets tougher. This trend is thus the opposite of levelling the playing field for the Swedish farmers. One farmer explains how the organisation Sveriges Mjölkbönder (Swedish Dairy Farmers) met with Miljöpartiet (the Swedish Green Party) to discuss the tax on diesel, but the politician showed no interest in lowering the demand for Swedish farmers, but rather said that other countries should increase their demands. Another farmer says that they feel trapped in regulations, and that one consequence of the demands is that they are not allowed to farm their land how they best see fit even though they possess the greatest knowledge of their own land. There are not only limitations to what can be done, but also when it can be done, as another farmer explains:

Basically everything is more regulated, but more specifically what has become more, well of course spreading manure has become more regulated in the law in a new way. Before you could do it whenever it was most suitable and that worked, now it has to be by the rule book. It's more complicated, it is, and more controlled. (Interviewee 5, Arla)

Although these may be rules that complicates the life of farmers, they serve a purpose. The spreading of manure and fertilizers is regulated to avoid leakage of nutrients to for example watercourses (see SJVFS 2015:21), which in turn combats environmental problems such as eutrophication. In the following section the focus will be on environmental policies, but also on the environmental impacts of dairy production and its current discourse.

5.3 On the environmental impact of dairy production

The agriculture sector is a large contributor to emissions of greenhouse gases, and the dairy sector specifically is the largest source of methane and nitrous oxide (Olesen, et al., 2006, p. 207; Weiske, et al., 2006, p. 221). It is therefore easy to view dairy farming as an environmental threat, but the interviewed farmers feel that this is a misunderstanding. Instead of viewing farming as a source of greenhouse gases, the farmers view themselves as part of a cycle, the carbon cycle, since they both have animals that release greenhouse gases and grow crops that then absorb carbon dioxide. Not only that, but the manure from the animals is used to fertilize the farmland to maintain fertile soils, grazing animals contribute to open landscapes with rich biodiversity, grazing animals eat grass from land that is not suitable for crop production, and animals that are no longer suitable for dairy production are slaughtered and become food. Some of the interviewees comment on people who complain about the environmental impacts of cattle (especially the release of methane) and then fly to Thailand for their holidays, which they find hypocritical.

Sometimes it feels like they think it's simple to blame the cow, because then they have something to blame, and then they don't have to care about flying to Thailand. If we just remove the cows, then it's okay to fly. It's a bit weird. (Interviewee 2, Arla)

Although the farmers agree that cows are good for the environment, and not bad as many try to tell them, they do acknowledge that there are things they can do to make their farms more environmentally friendly. First, dairy farming requires a lot of electricity, and one interviewee is considering installing solar cells on their farm. Second, two farmers have considered extracting methane gas from the manure to produce energy, and one of them also comments that the manure is a more efficient fertiliser after the process, but the farmers have not been able to do this since it is too expensive. Third, and most commonly, the farmers say that there is potential for improvement of their use of pesticides and industrial fertilisers, but there have already been improvements:

Back in the days you'd be out spraying [pesticides], back then you had a schedule for when to spray and that in the 3-leaf stage you'd spray with this, when it was a decimetre high [and so on], now there's nobody that does anything without first going out to check if it's really necessary. (Interviewee 6, Arla)

Besides there being a change in attitude towards industrial inputs in farming there are higher restrictions on what the farmers are allowed to do, and how it should be done. As previously mentioned there are rules regarding fertilization with the aim to keep the nutrients in the ground and prevent run-offs. On top of regulations there is a collaboration between Jordbruksverket, LRF, and the County Administrative Boards called Greppa Näringen (Focus on Nutrients). The aim of Greppa Näringen is to reduce emissions of greenhouse gases, reduce eutrophication, and improve the use of plant protectants (Gustafsson, 2016). Among other things Greppa Näringen offers guidance to farmers, and one interviewee says that their initiative has helped to improve the awareness among farmers. Being more environmentally friendly can also be more cost-efficient because farmers use less industrial inputs and diesel, which then can work as an incentive to change.

Everything that means I can save money, if you come here and present an action package that costs half a million and it turns out that we have saved two and a half million two years later, then that's interesting. But don't come here with nonsense that makes me an experimental station because someone believes in it. I don't have that kind of money. We do it all the time, we make improvement. The latest thing [we did] was [installing] LED lights partly to use less energy, driving the tractors more economically [to save diesel] (...). We work on it constantly. (Interviewee 3, Falköpings Mejeri)

The interviewees only mention cost-related incentives for decreasing their environmental impact, and that on a political level most incentives are found in the funding. However, one farmer says that on the political level they use stick more than carrot, in other words they punish more than they reward. One example mentioned was taxes on fuels that for example makes renewable options as expensive as non-renewable, which is a poor incentive to choose the more environmentally friendly option. As previously mentioned, there is a tax on diesel for which farmers to some extent are compensated for, but not as much as desired (Ostelius, 2016). A couple of the interviewees say that removing the tax on diesel is one step towards more equal terms of trade on the European market, and one of them says that a tax on diesel cannot work as an incentive for change as long as there is no other option available for the farmers. Higher tax on diesel, that farmers need to fuel their machinery and farm their land, is another factor that decreases both their profits and their competitiveness.

Another incentive to become more environmentally friendly is funding given to organic farms, but the farmers remain sceptical as to how much more environmentally friendly organic farming actually is. All of the conventional farmers have at some point considered becoming organic farmers, all of them because of profitability, but the most common reason for why they chose to stick to conventional farming was lack of land. Organic farming has lower yields, which on the one hand means the farmers need more land to grow their crops, and on the other means more driving per unit food grown. A study from 2017 confirms that organic farming increases the greenhouse gas emissions from vehicles, and that lower yields are part of the reason (Aggestam & Buick, 2017, p. 368). The only interviewee with an organic farm believes that it is more environmentally friendly as they do not use any pesticides that can leak to the surrounding nature, and a study from 2000 confirms that the reduced use of pesticides and phosphorous in organic dairy farming has environmental benefits (Cederberg & Mattson, 2000, p. 59). The interviewees also mention other negative sides of being an organic farmer, such as more work on the farm, more demands to fulfil and more paperwork. Although organic cows have lower yields than conventionally farmed cows, the

higher price per litre still increases profitability. However, there is yet another reason to remain conventional: Arla does not want more organic milk.

[Arla] can't sell more organic milk. And then (...) these consumer organisations shout that everybody must become organic and such and that [we] don't listen to [the] consumers when we don't make this happen, but well, if that's what the consumers want then they'd only buy organic, then this would've been solved quicker than hell, then everybody would've changed and become organic if that's the only thing consumers buy, but it's not. (Interviewee 6, Arla)

Two of the farmers talked about the financial advantage of niches, and one way to create a niche is to become an organic farmer. There is an understanding between producer and consumer that a niche requires certain conditions, maybe is it therefore less convenient for the producer, but they do it because they believe in something, and because of that they can demand higher prices for their products. Some consumers will be willing to pay a bit more for the service the producer is providing, in this case to the nature, others will not. The reasons for not buying organic products can be several, but it may be that the consumers do not believe in the environmental benefits, or that they regardless are not willing to pay more for an equivalent product. It is this mechanism that makes it more economical to be organic, but as the above quoted farmer commented, it is only so because it is a niche. As soon as all farmers are organic it is no longer worth paying more for. The consumers not only choose between conventional and organic milk, but some consumers choose not to buy milk at all and instead buy one of the many vegan options. The farmers see no problem with this, but some remain sceptical towards soymilk because soy is grown in conditions they consider to be very bad for the environment. However, there is one thing the farmers feel strongly about, and that is when ordinary milk is presented as worse than vegan milk.

Well, everybody is free to choose what they want to eat and drink, I don't have anything against there being [options], however the advertisement Oatly ran that was aggressive towards cow milk frustrated me a lot. I think in general that it's more sympathetically to accentuate your own product instead of denouncing the products others produce. (Interviewee 7, Norrmejerier)

In 2014 the Swedish company Oatly (that produces oat-based alternatives to dairy products) was sued for their advertisement stating that milk from cows are bad for humans, unlike their oat-based products. In 2015 the Swedish Market Court ruled in favour of the dairy industry, threatening with a penalty of 2 million Swedish kronor if Oatly presented their products as better for humans (Wisterberg, 2015). After the court ruling Oatly shifted their advertisement to stating that their products are better for the environment than ordinary milk because they require less land, energy, and have lower greenhouse gas emissions (Oatly, n.d.). The interviewees do not deny that dairy production has an environmental impact but feel that there is a lack of knowledge in the society on how dairy production affects the environment, that it is part of a cycle, that even though the cows release methane it is later absorbed by the plants they grow, and how grazing cows benefit biodiversity. Some of the interviewees say that on a political level it is only acceptable to say that cows are bad for the environment and advocate for vegan options, but also that dairy farmers are increasingly being viewed as environmental criminals, and that they increasingly feel they have to prove their innocence. One farmer was working on an environment impact assessment, and describes the experience:

There are lawyers in [city] that thinks we don't know shit about what they are talking about, they only mistrust me (...). They think we spread all the manure on only 2 hectares, yes you do you weaklings, I don't think you drive it further away. Of course we do, because otherwise the cows would die, and the soil too. I mean, there's very little understanding of what we do. (Interviewee 3, Falköpings Mejeri)

In Sweden, farming is classified as a *miljöfarlig verksamhet* (business harmful to the environment), which means farmers are obliged to apply for certain permissions and report their business (Länsstyrelsen Uppsala län, n.d.). One interviewee expresses confusion over this and wondered how food production can be considered harmful to the environment. Dairy production may affect the environment, argues the farmer, but it is not as harmful as many think. In 2017 the organisation Sveriges Mjölkbönder started pushing for a change of Miljöbalken (Environmental Code) so that farming would no longer be classified as harmful to the environment (Simonsson, 2017). One interviewee says that many politicians know that dairy production is not harmful to the environment, but another interviewee says that there is no interest among politicians to improve the situation for the dairy farmers. The farmers' power and ability to effect change will be the focus of the next section.

5.4 On the ability to improve the situation

Generally, the farmers feel there is a lack of understanding for their situation and what it is like to be a dairy farmer in Sweden, although to a varying degree, but also that politicians and organisations around them lack interest for change. The low level of understanding is among the farmers believed to derive from lack of knowledge, and the interviewees mention different reasons for why this is. One argument is that there is less understanding in cities than there is on the countryside as people in cities do not experience nature in the same way or have ever been to a farm. Another is that farmers are bad at informing what dairy production is really like, and out of fear that there are skeletons in the closet, the public is presented with imagery of cows with calves on pasture, for example in advisements for butter, even though the calves would have been separated from their mother by that age. A third is that the general public do not know what modern dairy production in Sweden is like and believe images from foreign dairy production to reflect the Swedish even though the standards are higher in Sweden. However, there is not only lack of knowledge in the Swedish society, but also among the dairy farmers. For the farmers, the lack of knowledge means they do not see opportunities they have to improve their businesses, they do not fully understand the global market and how it functions, and they struggle when communicating with white-collar workers in the dairy companies. All of these examples worsen the farmers' abilities to improve their situations and become more profitable, but there are still many ways in which the farmers do act or could act to effect change. The dairy company Arla has expanded their business, and as they grow, the interviewees feel it gets more difficult to influence and push through a change. Two interviewees say that they no longer feel that they are members of Arla, but rather that they are only supplier of milk.

I'm purely a supplier to Arla. I'm definitely not as is often said an owner, I don't think so. (...) [I]t works fine like that. They collect the milk, they pay on time. (Interviewee 1, Arla)

When it comes to Arla there is a difference between working for a change and trying to fix a mistake or similar. For example, if there is a problem with a payment it can be solved quickly, but for changes, the distance between farmers and those in charge seems to have increased. There are some disagreements among the farmers as to how easy it is to change, and while one farmer describes Arla as receptive, another farmer says that in order to influence one needs contacts higher up in the hierarchy. It is easier to influence as a group than as an individual, but the groups may not be sufficiently large as Arla grows:

Well, of course it's possible to influence, but it's a pretty big machinery because there are many stages to pass, and there are many wills. There are 12,000 members and 12,000 wills, and therefore everybody won't agree with me (...), so even if I think something's wrong there could be 10,000 that think it's right, and it's a democracy and then it will be what the others think. (Interviewee 2, Arla)

Democratic decisions allow for changes that are favourable amongst most of the members of Arla, but it could become a problem to strive for unity among an heterogeneous group. When Swedish farmers have lower competitiveness due to higher costs and demands, having to adapt to the wishes of farmers from other countries may become a problem. One interviewee says that within Arla, few make decisions for many, and that very few farmers have any right of decision, but that this is how it is in big companies. Another farmer complains that many farmers do not seem to understand that they are part of a global era where decisions cannot be made locally:

I have great trust in Arla, definitely, and it annoys me when so many Arla-farmers don't know how things work nowadays, they think it's the same as 15 years ago when the [milk] price was static. The price changes all the time, and it's set globally, and they seem to think it's Arla that doesn't want to pay, and that's something that annoys me, the ignorance among many Arla-farmers. (Interviewee 5, Arla)

The milk price for the smaller dairy companies (Falköpings mejeri and Norrmejerier) is not set on a global market, but it is still affected by the prices on the global market as they must remain competitive. Falköpings mejeri is described as easy to influence, although the interviewee feels that the company should be seen more and advertise more, but that those kinds of behavioural changes are difficult to achieve in a small company. One of the farmers from Norrmejerier says that the company listen to opinions, but do not really care about what the farmers say. The other interviewee, who was a board member until ten years ago, says that it is possible to influence, but the company do not understand that the farmers also need profitability that allows them to invest in their farms. Regardless of their opinions and how they perceive they are being treated by the dairy companies, all seven interviewees in some way or other try to influence and improve their situations, but they use different measures. Most commonly the interviewees say that if somebody wants change, then they should go to the meetings with the dairy company (or equivalent) and express their opinions. Most interviewees say that the farmers should not complain but be rational and give suggestions.

You shouldn't be stupid enough to shoot Arla in the foot when you think, if something's wrong with Arla then you go to the meetings and try to change the trustees and change that bit, not go to the media and sully like many do, it's incredibly stupid. I mean that you have to act accordingly to what the problem is (...), if LRF can pursue it, or Arla, or if there's another company then you go to the company, not to the media. (Interviewee 5, Arla)

Although most interviewees advocate calm measure, one farmer advocates more drastic actions. The farmer thinks Jordbruksverket should be given a specific date, and if they still have not paid out all the late funding by that date, farmers should take to the streets and block them as a protest action to pressure Jordbruksverket, because:

It's not acceptable to wait three years for a compensation for a service we do for the society. (Interviewee 1, Arla)

However, while one farmers advocates protest actions, another feels that protests are rarely successful, and that farmers should strive for other ways to get their opinions heard, and there is a range in actions the farmers take to effect change. Two interviewees are members of Sveriges Mjölkbönder, an organisation of dairy farmers that have contacts within other organisations and administrative authorities and also write letters to newspapers where they can get their voices heard; one is a politician, and another was visited in 2006 by Fredrik Reinfeldt (Prime Minister 2006-2014) and got the opportunity to first hand

express what changes they wished to see; two have been board member in their dairy companies; and four farmers used to be trustees. The interviewees' preferred measures to influence the dairy companies are to go to meeting, express their opinions, not complain but rather suggest changes, talk to their trustees, and so on. Generally, they want farmers to be rational, practical, but also acknowledge that everything cannot be changed, and that having an opinion about something is not the same as knowing. It may be that some of the farmers that are angry and complain lack the understanding of all the factors that need to be taken into consideration. Though, what needs to be taken into consideration is that most of the interviewees are or have been in positions of relative power (e.g. as trustees) and have combined businesses and so on that makes them more financially resilient. The farmer that wants farmers to protest if they do not receive their EU funding soon enough gave the impression of being in a less financially stable position than some of the other interviewees, which may contribute to why the farmer advocates more radical actions. There could therefore be a relationship between dairy farmers' financial situation and perceived level of power, and what actions they choose to effect change.

6 Discussion

The discussion of the findings is divided into two sections. The first will tie the findings together by using the concept internal economies of scale. The increase in production to increase profitability is on the one hand a consequence of changes in the agricultural sector, and on the other hand itself contributes to changes in Swedish dairy production. The second section will combine the findings with Ruttan & Hayami's (1972) theory of induced innovation, by discussing how technological innovations affect both dairy production and dairy farmers.

6.1 Internal economies of scale

A common denominator of the previous sections is internal economies of scale, that it is more profitable for a farm to be bigger, and the aim of this section is to highlight this interconnection and explain the implications. To start with, the dairy production has gradually become more and more efficient for several decades, and for several reasons. Dairy production was an important income for farmers in the mid-20th century, but at the same time the numbers of dairy producers began to decrease (Martiiin, 2017, pp. 15-16). When the number of farms decreased, so did the number of dairy cows, however, not unlike current time, there was also an increase in herd sizes which partly counteracted the decrease. The yield per cow also increased, especially in the late 20th century, which in combination with technology improved the efficiency in dairy production (ibid., pp. 19-20). The decrease in farms combined with increase in herd size, as well as increased efficiency, is not unique for Sweden, but rather a trend found across Europe and North America (Ferguson & Hansson, 2013, p. 415). This confirms what a couple of the interviewees say, namely that the decrease in dairy farmers in Sweden in modern times is part of an ongoing trend, however it does not exclude the possibility of there being factors that reinforce or in other ways affect this trend. This also indicates that the scaling up of production began as an opportunity, that may later have become more of a necessity for survival, as some interviewees suggest. Most interviewees did say that the main reason for why so many farms close down is the lack of profitability, which then in turn could be a consequence of the global market and unequal terms of trade, but since the same trend of internal economies of scale can be found in the rest of Europe, it cannot, from this data, be said to what extent the poor profitability contributes to farms closing down.

The closing down of farms also affects the farmers that continue their business as there is a thinning out of farms, in other words the distances between them increase. The thinning out means it is more difficult

for the farmers to cooperate, they may lose previous cooperation partners, it is more difficult to share machinery (e.g. may be too far to drive over with the threshing machine), and as the farms are thinning out, so are the services. Again, this results in farmers having to drive further to access service or machinery. All of this also affects the profitability, as longer distances to machine stations or not being able to share machinery with neighbouring farms may force the farmers to buy all the equipment they need, which is very expensive. Sharing machinery was one suggestion given by an interviewee for how to improve profitability, but longer distances between farms makes it more difficult to share. There are however also positive effects of farms closing down, since the sparser the farms, the more land is available for the farmers in the area. This then functions as an opportunity to further increase the size of the farm, which in turn could improve profitability. Some modern technology, such as automatic milking systems, also require herds of certain sizes to be profitable (Ferguson & Hansson, 2013, p. 415). Milk robots can handle about 60 cows (Nilsson, 2009, p. 114), and may therefore be too expensive for small-scale farming². A couple of the farmers mentioned that they had installed milk robots and that it had lowered the workload on the farm, but another farmer had replaced their robot with more employees as they had mostly experienced problems with their machinery. Generally, automation serves to increase efficiency, but it may also replace some human labour which can lower the expenses and thus increase profitability on a farm (Nilsson, 2009, p. 115).

Profitability is a major problem for Swedish farmers, but as the interviewees say, a large part of it has to do with the global market system, which they cannot influence. What can be done is either for the government to protect the domestic dairy production by improving the competitiveness (e.g. removing taxes or lowering demand, which may have other consequences also) or supporting Swedish farmers by compensating for the worse conditions in Sweden compared to other European countries. The other option of closing the borders to become self-sufficient in dairy seems rather unlikely. Although the interviewees mention measures for farmers to become more cost-effective, some of them would like to see changes on a political level, but do not feel there is an interest among politicians for improving their situation. Improved profitability would mean more farms could survive, they could employ more people, it would become a more attractive profession, and it would also have positive effects on the landscape. Since 2007, dairy cows in Sweden have decreased by 13 percent (Jordbruksverket, n.d.A), and as the number of cows decrease, so too are the positive effects they have on the surrounding nature. Grazing animals contribute to a richer nature as they keep more invasive plants at bay and thus allows for other plants to grow, which in turn enriches the insect and bird lives as well. The land used for pasture is usually not suitable for farming, which also enables food production on land that is not cultivable (Naturskyddsföreningen, n.d.), but dairy cows also eat concentrated fodder (e.g. made from corn) that is grown on arable land.

Imported dairy products and fewer grazing animals reduce the environmental benefits of dairy production in Sweden, but more cattle is not necessarily the solution. One option is to let the Swedish cows graze more, and to be strategic when selecting locations for pasture (Naturskyddsföreningen, n.d.). Another measure to improve profitability as well as being more environmentally friendly is to become an organic farmer, as the milk price is higher, and also high enough to compensate for lower yields. Because organic farms have lower yields, more cows would be needed to support the demand for milk if all farms were organic. That would be positive for biological diversity, but less so for greenhouse gas emissions as more

² For the purpose of this study, farms with fewer than 50 cows are considered small-scale. The herd size on most Swedish dairy farms was under 50 cows until 2013 (Jordbruksverket, n.d.A).

fuel is used per unit crop when there are lower yields (Aggestam & Buick, 2017, p. 368). More available land as farms close down could enable more farmers to become organic farmers without decreasing their yields substantially but may negatively affect the possibility to be more or less self-sufficient in dairy production in Sweden (unless consumption decreases). Although organic farming is more profitable today, it may not be so for long if all, or too many, of the current conventional farmers switch to organic farming. One interviewee points out that organic farming is more profitable because consumers are prepared to pay more for a specific farming method, a niche in production, but that this may be watered down as more become organic farmers.

Two interviewees say that dairy farmers are considered to be environmental criminals, which is contradictive to the farmers' view of themselves as part of a cycle. The farmers generally feel that they are misunderstood by the public and politicians, or that there is some understanding lacking. One farmer talks about how consumers expect dairy production to be idyllic and small-scaled, while few modern farms are small-scaled, and in fact farms with fewer than 50 cows have decreased faster than the national average for dairy farms since 2007 (Jordbruksverket, n.d.A). Another farmer says that the public often lacks knowledge on modern dairy production, and a third says that more rational and bigger farms are needed to remain profitable. The interviewees mention several reasons for lack of knowledge, such as the division between city and countryside that means many Swedes have never been to a farm, that the public are shown images from foreign dairy production and assume the Swedish to be the same, and also that farmers are not open enough and share what it is really like on a modern dairy farm. One way to increase the competitiveness of Swedish dairy production on the Swedish market, as some farmers suggest, is to emphasise the importance of the local dairy production and the positive effects it has. On the one hand there are environmental benefits from dairy production, and on the other hand there are certain benefits that follows the higher demands given by the Swedish government. By emphasising the positive side, consumers may be willing to pay more for Swedish products, which then gives them a competitive advantage to the imported products, which in turn increases profitability. Internal economies of scale is not a negative development, but when consumers expect dairy production to be small-scale it can be perceived as something negative. However, as some interviewees say, more knowledge could change that.

There are some factors that do not seem to be affected by internal economics of scales, but rather affect in that they may contribute to farmers growing their business to increase their profitability. Although the farmers are active and try to influence in order to improve the conditions for dairy farmers in Sweden, especially the Arla farmers feel that they are less able to influence now than they were ten years ago, and the main reason for that is the size of the company. When Arla expands, and there are more members which opinions need to be taken into consideration, it is less likely that a small group of farmers somewhere in Sweden can affect the change they deem necessary. As has been said, Arla is a democracy, and the more heterogenous the members (farmers) become, the more difficult it becomes to find solutions that satisfies most farmers. This means that as Arla grows, the power of the individual farmer decreases, and the less power the farmers have the harder it becomes to improve the conditions. The main problem for dairy farmers identified by the interviewees is the poor profitability, and when they have less possibility to improve their situation, they need to find solutions on their own farm in order to increase profitability, and the option then is to make the farm bigger, more effective, but also more cost-effective, which both increases the profits and decreases the expenses. Lack of power does not directly result in internal economies of scale, but if the farmers cannot effect the necessary changes to make small-scale farming profitable, they either have to adapt to the situation (grow) or close their farm. Working under

conditions of financial stress can however make it difficult for the farmer to see how to improve the situation or they may not be able to afford the necessary improvements such as new machinery or renovating their stable.

Internal economies of scale is an opportunity for profitable farms to increase their revenue, but also a necessity for farms with poor profitability. Many Swedish dairy farms have poor profitability and the farmers struggle to make ends meet, which is partly due to competition. On the one hand Swedish farmers compete with each other as higher efficiency on a farm means they can produce more at lower costs which makes the farms more resilient to fluctuating milk prices, and on the other hand Swedish farmers compete with European farmers that have better conditions for farming, and sometimes lower demands. Because of this, it becomes more difficult for Swedish farmers to remain competitive with small farms, or farms with lower yields, resulting in the smaller farms either growing or closing. When it is no longer competitive to practise small-scale farming with low yields, it becomes more difficult to be sustainable as high yielding cows require high amounts of food, as well as protein-rich food. Farmers in the north of Sweden cannot grow their own protein-rich food (e.g. corn), but have to buy that food, and the most commonly imported protein-rich food is made from soybeans (Nilsson, 2009, p. 63), which the interviewees regard as bad for the environment. Without the concentrated fodder, the cows would only produce 15-20 litres of milk per day (Nilsson, 2009, p. 57), while a high producing cow can have a yield of two to three times as much. Therefore, more intensive dairy production increases the profitability, although organic farms have a higher milk price, which allows them to produce less milk while maintaining profitability. With organic farming follows local environmental benefits, such as reduced nutrients leaks preventing eutrophication, but there may be some global environmental disadvantages as more fuel is used per unit crop produced. The farmers themselves do not possess the power to make Swedish dairy production profitable for smaller farms or for farms that only feed their animals ley when they are not grazing. Ley is made up of different plant, some of which are legumes (Nilsson, 2009, p. 58) which have nitrogen-fixing properties that increase the fertility of the soil. Although it is beyond the scope of this thesis, there are some indications that small-scale farming would be more environmentally friendly, but it is not competitive and therefore not profitable to pursue (however, slightly more so as an organic farmer). The intensification of the dairy production was made possible by technological improvements and science during the 20th century, and striving for ever increasing efficiency to improve profitability makes it difficult to survive on the market as a small-scale farmer, or even for the next generation to enter the market.

6.2 Technological innovation and the development of dairy production

For several decades, dairy farms in Sweden have decreased in numbers and increased in size (Jordbruksverket, n.d.A). The previous sections have mainly focused on the consequences and how they are perceived by Swedish dairy farmers, but this section will focus on combining that with some of the causes behind this development. In the 1940s, the Swedish agricultural policies welcomed technological development, even if it resulted in overproduction, and both fewer and bigger, more rational, farms were encouraged (Martiin, 2017, p. 20). The promotion of technology described by Martiin does not stem from necessity, a need to increase production to combat lack of food, but rather as part of the “technology friendly atmosphere” (ibid., p. 20) of the mid-20th century. Ruttan & Hayami (1972) explain in their theory of induced innovation, that policymakers play a part in the development of agricultural technology, as they control investments in public research. Although it cannot be clearly stated why the Swedish government of the mid-20th century promoted agricultural technology, there was on a European level measures taken as a direct result of the food rationing around the second world war. Two of the goals in the Common

Agriculture Policy (which was not Swedish policy at that time) are to ensure food security, and to make agriculture more efficient. It is reasonable to assume that the intensification of the Swedish agriculture through technological development at that time was not initiated by the farmers themselves, but by the government. The number of dairy farms in Sweden peaked in 1946 and have been decreasing ever since (Martiin, 2017, pp. 15-16) which coincides with the agricultural policies of more rational production.

Agricultural technology such as tractors became increasingly common after the first world war, but they were expensive and were mostly found on bigger farms. It was not until after the second world war that smaller farms could afford tractors (Cserhalmi, 1999, p. 151). Artificial insemination, which is today used by most dairy farmers, became available in the 1940s (Nilsson, 2009, p. 128), and especially in the 1970s and 1980s the average yield per cow increase significantly (Martiin, 2017, p. 19). These are all technological innovation, along with high-yielding crop varieties and industrial inputs, that have shaped the agricultural sector of today. In the mid-20th century, Swedish agricultural policy welcomed technological innovation, and after joining the EU in 1995, the common policy of increased efficiency also became Swedish policy. Although it cannot be stated to what extent, the government have encouraged technological development and rationalisation of agriculture, which in turn have resulted in internal economies of scale. It may have started out as a vision, but increased efficiency and competition have pushed the farmers to the limit where they struggle to produce at the lowest possible costs to remain competitive.

The problem for Swedish dairy farmers is not so much scarce resources that are too expensive, but rather that the production at large often is too expensive in relation to what the farmers earn from their businesses. Even so, the argument put forward by Ruttan & Hayami (1972) is still applicable, namely that when resources are too expensive, farmers seek technology that can reduce those costs, and also demand new innovations if what they seek is not already available. There is a great deal of technology available for farmers today, but the poor profitability limits their use of it as some cannot afford the machinery. Sharing machinery with surrounding farms was one cost-reducing measure presented by one interviewee, but that too may not be a feasible option. When dairy farms close down, as they have been doing at a high rate for the past decades, they are more sparsely located, which negatively affects the farmers' opportunities to cooperate. Without neighbouring farms within reasonable distances, the farmers cannot share machinery as they perhaps used to, and if they cannot afford to pay the full cost of the machinery, cost-reducing technology is no longer available to them. With regards to machinery, the interviewees do not mention a need for new developments, but rather comment on machinery being expensive or specifically mention technology they want but cannot afford. For example, two of the interviewees want to extract methane gas from the manure but have not been able to as they cannot afford the equipment.

There are indications that the development of dairy production in Sweden began as an opportunity, a possibility to produce more efficiently, at bigger and more technologically advance farms that suited the technology-friendly government. However, to what extent researchers responded to government investment in relation to problems identified by the farmers themselves cannot be stated. Regardless, the government sought technological development, and the farmers seized the opportunity to increase production, profitability and their competitiveness. Unfortunately, a presumably unintended consequence was the move beyond opportunity towards necessity.

Agricultural technology helps farmers save on scarce factors, but constant competition has pushed the efficiency to the limits. When farmers cannot be competitive without being as rational as possible, technology and rationalisation is no longer an opportunity for higher profitability, but a necessity to survive

on the market. The strive for technological development and more efficient farming then limits actors on the market, as small-scale and new farmers struggle to compete with larger farms that can afford more machinery or other cost-saving measures. The interviewees say that they cannot affect the price of the milk they supply, and the remaining measure to increase profitability is to lower the costs. This is when Ruttan & Hayami (1972) argue that the farmers seek out cost-saving technology, but as previously mentioned it may be too expensive to invest in new technology for the farmers, even if it will be cost-reducing in the future. On the other hand, this could also be the social problem that scientists respond to by developing new and cheaper innovations that help farmers reduce their costs. Jordbruksverket had a competition for how to build stables, and one of the stables awarded could offer profitability for a milk price of 2.40 Swedish kronor (Jordbruksverket, 2018B), about 1 kronor lower than the current price of conventionally produced milk. The winning stable was developed by Växa Sverige, an organisation that offers guidance and services to farmers (Växa Sverige, n.d.). This initiative could then be seen to respond to a need among dairy farmers, as they struggle with profitability, but one interviewee says that this stable is not an option in the colder north of Sweden. However, this stable, and the competition arranged by Jordbruksverket, is an example of how development and new ideas are responding to real needs among dairy farmers. Although it can also be argued that technology is reinforcing the difficult situation by not allowing other alternatives than further technological development.

7 Conclusions

The biggest problem for Swedish dairy farmers is poor profitability, and the first research questions is what the farmers think are the causes and consequences of this. The milk price is set on a global market, and although the farmers consider the milk price to be too low, the reason for it being too low is that Swedish farmers do not have the same conditions for producing milk as other European countries. It is therefore not the price itself that is the problem, but rather the price relative to the costs. On the one hand, Swedish dairy production is more expensive because Sweden is a northern country with temperate climate that limits the selection of crop varieties and shortens the growing season, as well as requiring sturdier farm buildings that can withstand heavy snowfalls. This means that Swedish farmers have to import the fodder they cannot farm themselves, as well as build more expensive building than would be necessary in warmer countries. On the other hand, Swedish agricultural policies include more demands than other European countries, such as the demand for pasture, but also include costs such as tax on diesel. The policies both directly and indirectly increase the cost of dairy production. The farmers feel there is a lack of understanding of their situation, both from the general public and from politicians, however the perceived understanding varies between the farmers. The lack of understanding becomes problematic for the farmers when policies negatively affect their businesses, but the farmers also express that politicians do not fully understand how difficult it is for them when the EU funding is late, as it has been to a varying degree since 2015.

The farmers are dependent on the support from the EU for their income, and struggle when it is late. Poor profitability makes the farmers less resilient to fluctuations in income, such as late funding or lower milk prices, but it also forces the farmers to choose which bills to pay, which in turn could lead to degrading farms. Lack of profitability is also hard on the farmers mental health, and they may become stuck and not able to see the potential solutions when they struggle to keep the business going. Although the farmers do not fully agree, most of them say that poor profitability is the main reason why so many farms close down. Some farmers are not able to continue their business, and the next generation of dairy farmers are discouraged by poor profitability which makes them choose other professions instead. When farms close

down, the remaining farms become more sparsely located. On the one hand it leaves more land for the remaining farmers, which can allow them to grow their business, but on the other hand it negatively affects cooperation and services. Sparsely located farms makes it more difficult for farmers to share machinery or in other ways cooperate and help each other, and fewer farms means it may no longer be profitable for services such as insemination and machine stations, whereupon they too close down or move. This also has a negative effect on the farmers profitability.

The second research question is how the farmers perceive their own power and ability to improve their situation. The farmers feel they have the most power to affect their own production, mainly by reducing the cost, and not so much power to change the structure. To achieve structural changes, the farmers suggest talking to those in charge and explain the improvements they like to see, and not complain. However, the farmers feel their voice is small, but acknowledge that they would have more influence as a group. The Arla farmers say that they have less power now that Arla has expanded to more countries. Some of the interviewees say that there is nothing they can do but to accept the situation and adapt to it best they can. Farmers are adapting by increasing the size of their farm, which in turn increases productivity and profitability. Scale economies have historically been encouraged by the government and agricultural policies, and it has become difficult to survive as a small-scale farmer. The scaling up of production has also been enabled by technological and scientific innovations, such as farm machinery and animal breeding. Theory of induced innovation gives two main reasons for new innovations, which are that researchers are responding to social problems (in this case to increase productivity) or that policymakers choose to invest in certain research. When the relative price of production increases, farmers seek out the cost-saving technology, but some of the farmers comment that poor profitability limits the technology available to them, which makes the farmers less competitive on the market.

One alternative for more profitable production is to become an organic farmer. Although organic farming has lower yields, the milk price is high enough to compensate for that loss. However, for the conventional farmers, improved profitability was the only benefit of being organic, as they do not consider conventional farming as bad for the environment, nor organic farming as necessarily being better. The organic farmer on the other hand says that their farming methods are more environmentally friendly as they, for example, do not use pesticides. Despite not seeing the environmental benefits of organic farming, all the conventional farmers have considered becoming an organic farmer, as it is more profitable. These views answer the third research question, namely what the farmers think are the environmental consequences of dairy production are and how these can be mitigated. Generally, the farmers view dairy production as being part of a cycle, and even though cows release methane grass, it is later absorbed by the plants they grow. Even so, the conventional farmers mention areas for improvement to make conventional farming more environmentally friendly, such as renewable energy, and use as little pesticides and industrial fertilisers as possible.

This study contributes with knowledge on the difficulties facing Swedish dairy farmers, but also that the current production is unsustainable. The farmers themselves identify profitability as the main problem for dairy farmers. The environmental impacts of dairy farming are both positive (e.g. biological diversity) and negative (e.g. eutrophication), but the farmers already see improvements and mention measures by the government to lower the environmental impact, such as rules on when to fertilise. It is the social and economic side of dairy production that the farmers feel is unsustainable, as they struggle with profitability, pressure to lower their costs, and are dependent on support from the EU. The financial stress has negative

impacts on the farmers' mental health and discourage the next generation of dairy farmers from entering the market.

The initial suggestion for future research is to conduct a similar study, but on a larger scale to include more perspectives and aspects that could not be included in this study. However, there are also findings in this study that would benefit from further research, and here are some suggestions: First, a limitation mentioned in section 4.3, namely that I could not, within the scope of this study, further investigate the agricultural policies in European countries, and to what extent different conditions and demands affect the competitiveness of the countries. Relating to this, Swedish farmers would also benefit from research on how to deal with different conditions, such as financial compensation or limited international trade to strengthen domestic production. Second, more research into the advantages and disadvantages of fewer and larger, and more rational, farms. From an agricultural policy perspective, it may be beneficial to know how this affects the individual farmer, and if the future should be, as some of the interviewees say, bigger and more rational farms, or whether it would be more beneficial to return to more and smaller farms – and adapt the policies accordingly. Third, as discussed, technological innovations are not necessary helping the farmers, but pushing them towards a great dependence on technology and efficiency. The farmers would benefit from more research on how to improve their situation, such as structural changes or new policies, preferably resulting in a system that does not leave them dependent on support. Ruttan & Hayami (1972) argue that researchers respond to the needs of the farmers, leading to new technological innovations, but perhaps the farmers would also benefit from more research in the social sciences.

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Appendix: interview guide

The following interview guide has been translated from Swedish to English.

- Why did you become a farmer?
- How long have you been a farmer?
- Do you own the farm where you work?
- How old are you?
- In which county do you live?
- How big is your farm?
 - How many cows do you have?
 - How many people work at the farm?
- To which dairy company do you supply?
 - Have you always supplied to the same dairy company?

Changes in dairy production

- What are the biggest changes that have occurred in Swedish dairy production since 2007? (politically, laws, requirements, rules about livestock keeping, removal of milk quota, change in milk price)
 - Why did these changes happen?
 - How were you as a farmer and your business affected by these changes?
- What other changes since 2007 have been important for you and/or farmers in general?
- What are the biggest changes that have occurred on your farm since 2007? (more cows, more tech, bigger farm, more/fewer employees)
- Do you have combined businesses?
 - What? Why? For how long?
- Why do you think that the number of dairy farms in Sweden have halved since 2007?
- What does it mean for the remaining dairy farmers when so many farms close down?
 - How is your business affected?
- How are Swedish dairy farmers affected by international competition?
 - What are the advantages and disadvantages with competition on the market?
 - What is the biggest problem with international competition?
 - What are the solutions?
- What do you think about the EU abolishing their milk quotas?
 - Did you want to keep them?
 - What are the advantages and disadvantages with milk quotas?
- ARLA SPECIFIC: How are you affected by Arla being an international company?
 - What are the positive and negative sides?
 - How can the negative sides be solved?

Profitability

- How much do you get paid per litre of milk?
 - How much do you think farmers should or need to get paid?
 - What do you think is needed for farmers to get paid more?
- Which other factors affect profitability?
 - Which measures are needed to improve those factors?
- How are dairy farms affected by poor profitability?
 - How are dairy farmers affected psychologically by poor profitability?
 - Do farmers talk to each other about their poor economy?
- What are the solutions to poor profitability?
 - What can the farmers themselves do to improve the profitability?

Power to improve their situation

- What is the relationship between you as a dairy farmer and your dairy company?
 - Has the relationship with the dairy company changed since 2007?
- What is the relationship between dairy farmers and Jordbruksverket?
 - Have you experienced any problems with late payments?
 - Why are the supports late?
 - What can the farmers do about the situation?
 - Whose responsibility is it to make sure the payments are on time?
 - Do you feel that Jordbruksverket listen to the farmers?
- In what way do you feel that you as a dairy farmer can influence your situation when you are dissatisfied with something?
 - Has that changed since 2007?
 - What changes would you like to see in your dairy company?
 - What would you most like to change for dairy farmers?
 - How could you effect that change?
 - Have you actively acted for a change, and what did you do?
 - What effect did it have?
- What do you think farmers should do when they are dissatisfied and want a change?
 - What should they do if they feel it does not have an effect?
 - What is the most efficient method to effect change?
- Do you feel that society and politics have an understanding of the dairy farmers' situation?
 - What could improve the understanding?
 - What political changes would you like to see?

Environment

- In what way does dairy production affect the climate and the environment? (positive and negative)
 - Has the standpoint changed since 2007?
- Do you feel that society and politics share your view of the environmental impact of dairy production?
 - How does that affect your business?
- How have you as a dairy farmer been affected by the Swedish environmental policies since 2007?
 - What are the new demands?
 - Do you think it was the right decision from the politicians?
 - What should they have done instead?
 - What are the political incentives to be more environmentally friendly?
 - Do you feel that politics view dairy farms as good or bad for the environment?
- Have you considered becoming an organic farmer?
 - Why did you think about changing your business?
 - Why did you not?

OR

- Why did you choose to be an organic farmer?
 - What does it mean for your business?
- In what way can you be environmentally friendly as a dairy farmer?
 - Which measures could you take to become more environmentally friendly?
 - Is it easier or more difficult to be environmentally friendly now than in 2007?
- In your opinion, which is the biggest environmental problem globally right now?
 - In what way is the Swedish dairy production part of that?
- What is your view of alternative dairy products, such as soy and oat milk?
 - Why do you think consumers buy these products?
 - Are the alternative products better or worse for the environment?
 - How is your business affected by the availability of alternative products on the market?
- And finally, what is the biggest problem for dairy farmers today, and what are the solutions?