MALMÖ UNIVERSITY

Transitioning towards Sustainable Agriculture in the European Union through Change Management and Transformational Leadership

Miguel García Sánchez

Maarten Warnshuis

Leadership and Organisation
Degree of Master of Arts (60 ECTS) with a Major in Leadership and Organisation
Master Thesis with a Focus on Leadership and Sustainability (OL646E), 15 Credits
Spring 2021

Supervisor: Jonas Lundsten

Title:	**Transitioning towards Sustainable Agriculture in the European Union through Change Management and Transformational Leadership**
Authors:	Miguel García Sánchez Maarten Warnshuis
University:	Malmö University
Main field of study:	Leadership and Organisation
Type of Degree:	Degree of Master of Arts (60 Credits) with a Major in Leadership and Organisation
Subject:	Master Thesis with a focus on Leadership and Organisation for Sustainability (OL646E), 15 Credits
Period:	Spring 2021
Supervisor:	Jonas Lundsten

Abstract

This paper examined how Change Management and Transformational Leadership can be effective tools in transitioning towards sustainable agriculture in Europe. This paper starts with providing empirical evidence for climate change and shows that Northern and Southern Europe are impacted differently by climate change. Then this paper examined how climate change affects farmers in the different parts of Europe and what Societal, Environmental, Leadership and Organisational changes have to be made to transition towards sustainable agriculture in Europe. The qualitative analysis shows that, according to farmer associations, there is a need for a variety of options, a lack of communication and insufficient involvement of farmers on a policy making level. This paper ends with explaining how Change Management and Transformational Leadership can be used as tools to improve communication between stakeholders and improve the involvement of farmers in the co-creation process. Therefore, this paper concludes that Change Management and Transformational leadership will help the European Union in realising sustainable agriculture in Europe.

Keywords: Change Management, Transformational Leadership, Sustainable Agriculture, Sustainable Change, Transition, Hydroponic Farming, Gene-editing, Policy-making

Acknowledgements

This thesis has been possible by the participation of multiple farmer associations in Europe and the cooperation of the European Commission. The authors of this thesis would like to pay special thanks to Jonas Lundsten for his supervision and attentive feedback in every step of the process.

Table of Contents

Table of Figures

Table of Tables

Abbreviations

CAP: Common Agricultural Practices
Co-Op: Co-Operative
CRISPR: Clustered Regularly Interspaced Short Palindromic Repeats
EC: European Commission
EU: European Union
GMOs: Genetically Modified Organisms
HDFE: High Dimensional Fixed Effect
JRC MARS: Joint Research Centre, Monitoring Agricultural ResourceS
OLS: Ordinary Least Squares
PPML: Poisson Pseudo Maximum Likelihood

1. Introduction

1.1. Background

Recently there has been an increasing emphasis on climate change and the impact of climate change on society, which is shown by the Green Deal and Paris Agreement. Climate change has a severe impact on the agricultural sector and creates organisational and leadership challenges in the transition towards sustainable agriculture. Change Management and Transformational leadership are tools that can be used to overcome the challenges that originated from climate change. This paper found that most farmers have a willingness to change. However, there is a potential lack of leadership in realising the change, this paper will explore how the application of Transformational Leadership can help in realising the change. The EC states in the EU Agricultural Outlook for 2020-2030 that "*The total EU agricultural area is projected to reduce slightly, mainly driven by reduced cereals and oilseed acreage"* (European Commission, 2020). There are increasing effects from climate change that affect different regions in Europe differently, which is shown in the statistical analysis of this paper, which indicate that growing seasons are disrupted by extreme weather events such as frosts and decreasing the amount of rainfall in certain areas of South Europe. The trends of increasing population, climate change and diminishing water supply are imposing risks that should be addressed by European governments and organisations (Lorenzoni and Pidgeon, 2006). The European population growth seems to slightly differ from the global population growth, since the population in Europe is expected to decrease by 1% in 2050, compared to 2019 (Eurostat, 2019). The EC plays an important role in the development of the agriculture sector and has to deal with increasing societal challenges in regards to the food supply. Therefore, the EC has been working and planning the new Farm-to-Fork and Biodiversity strategies which are aimed to target and reduce phytosanitary products such as chemical fertilisers, pesticides, antimicrobial products and as well targeting the taxation of agricultural land to promote sustainable or ecological farming (European Commission, 2021). Furthermore, the new Common Agricultural Policy (CAP) proposal for 2021 is being finalised, which means that a new set of policies specifically targeted to the agriculture sector will soon come into place. The EC trade policies are created by policymakers to promote a sustainable transition to ensure the stability of the agri-food system. In order to explore the impact and implications of these EU policies, this paper conducted qualitative interviews with European farmer associations and EC authorities from the agricultural department. Some of the findings derived from the qualitative analysis indicate that the implementation of the new EU measures in regards to input reduction strategies could affect farmers' livelihood and thus, reduce agricultural production by 7 to 12 percent and also affect the European farmers' competitiveness in both internal and external markets (Beckman et al., 2020). The intentions of European policymakers seem to be in favour of pushing the sustainable agenda through the agriculture sector, however, the views from the European farmers seem to be in disagreement with the EU sustainable policy plan. The new CAP policies are imposing new challenges to farmers to adapt to new production methods and to fulfil the requirements for the new expected reduction of pesticides and hazardous substances along the food chain in the EU. Together with the Biodiversity strategy and Bio-farming trend that requires more land focused on sustainable agriculture, it is believed to generate less production for the individual farmer. This paper will explore the organisational and leadership challenges that the EU and EC will undergo in the near future.

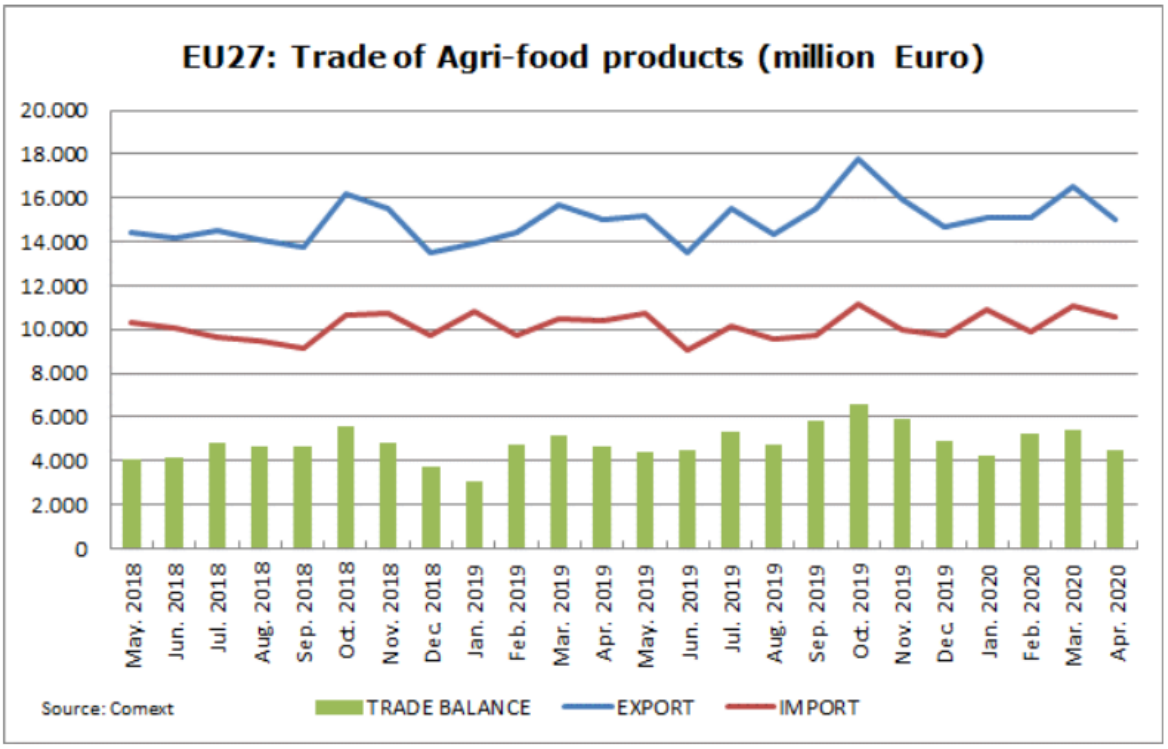

Figure 1:Trade Balance of Agri-food products 2018-2020; Source: Comext (2020)

As can be observed from figure 1, the EU exports structurally exceed the imports for agricultural products in their trade balance. Thus, the EU has a surplus on the trade balance, making the EU a Net Exporter. The fact that the EU is a Net Exporter of agri-food products means that the EU produces more food than it consumes. Having a surplus guarantees that there is still enough food produced in the EU when there is a bad harvest year in certain parts of Europe. Having a food surplus also means that the EU is not dependent on outside suppliers that might be less willing to supply food during a political conflict or a bad harvest year. However, the effects of climate change and the changes in EU policies will decrease the surplus of the EU, making the EU more dependent on external food production, especially in bad harvest years. This paper explores how Change Management and Transformational Leadership can help in keeping the current surplus and preventing dependency on outside suppliers.

Moës and Bruegel (2018) show the allocation of the budget of the EU for the period 2014 to 2020. Figure 2 shows how the budget has been allocated, this figure shows that the CAP took up the largest piece of the pie.

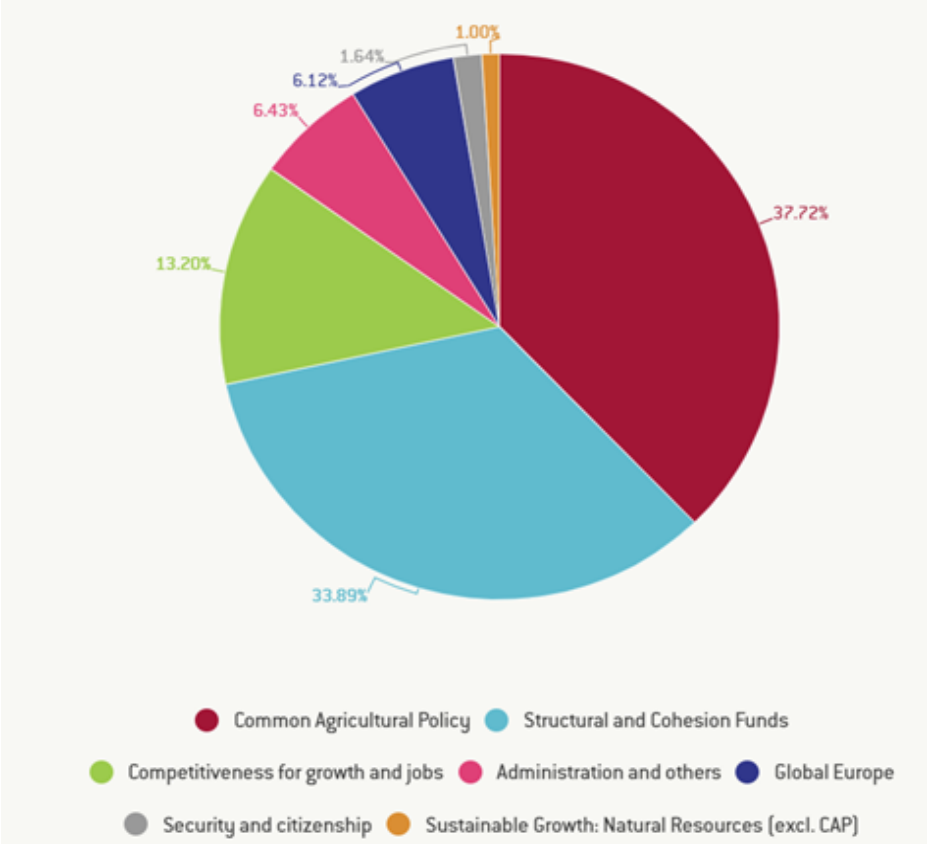

Figure 2: EU budget allocation; source: Moës & Bruegel, 2018

The European Commission (2021) shows the allocation of the budget that is allocated to CAP by the EU. Figure 3 shows that the majority of the money that is allocated to CAP is used to support farmers' income. Supporting the income of farmers guarantees affordable high-quality food in Europe, by keeping the prices of food low.

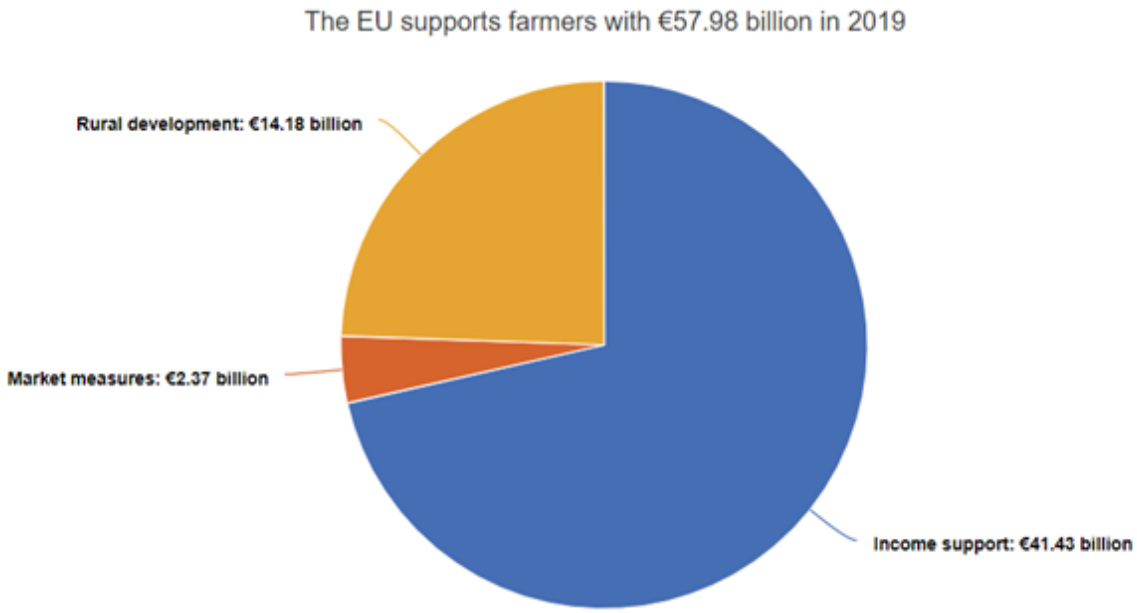

Figure 3: CAP budget allocation; source European Commission, 2021

The European Commission (2021) states that the share of the EU budget that has gone to farming has decreased over time. In 1985, 70% of the total budget was spent on the agricultural industry. In 2018 this has decreased to 38% and the European Commission proposed to decrease this share to 30% for the years 2021 to 2027. This relatively large share of the budget that goes to the agricultural sector can be explained by looking at the national expenditures, almost all the money this sector receives from the EU. The EC wants to increase funding for green farming. Knowledge and innovation are essential for a sustainable agricultural sector, therefore, the CAP wants to invest in research and innovation (European Commission, 2021). Here the financials lead to more organisational and leadership challenges because the EU wants to do more but has less budget to do so. Increasing efficiency would make it possible to do more with less, this is where Change Management and Transformational Leadership become important. These theories will improve communication, which helps in improving the efficiency of solutions, and the commitment of the farmers to the transitions towards sustainable agriculture. The European Commission (2021) shows that the budget of CAP for the period of 2021 to 2027 is 387 billion euro of which 95.5 billion will be used for rural development. Thus the EU is gradually decreasing the share of the EU budget that is spent on the agricultural sector. Furthermore, the money that is spent on the agricultural sector will be spent differently with the increasing focus on green farming, research and development (European Commission, 2021).

There are farming alternatives that together with the use of technology could help increase production productivity and at the same time decrease the environmental footprint, compared to conventional farming (Benke & Tomkins., 2017). Taking into consideration the latest climate change data that is found in the statistical analysis of this paper, this paper will explore the reasons why farmers and the food supply would need to adapt and change their production practices. As well as reconsider the organisational structures to meet new EU policies and harsh weather conditions due to climate change. There is currently not much research available on the combination of Transformational Leadership, Change Management and sustainable farming methods. Therefore, there is a gap in the existing literature. This paper will explore this research gap and investigate how Change Management and Transformational Leadership can be valuable in transitioning to sustainable farming methods.

By 2050 the growing season will have higher temperatures than the hottest current growing seasons, accompanied by increasingly variable rainfall (Battisti & Naylor, 2009). Climate change is expected to cause water shortages, droughts and crop diseases. This will cause losses in productivity through reductions in crop yields (Rosenzweig et al., 2002). Reduction in precipitation will increase groundwater usage by the agricultural sector. The groundwater usage will also be increased due to more evaporation that comes with higher temperatures (Hillel, 1988). Thus change for the farmers is inevitable, if the EU policymakers use Transformational Leadership and Change Management, then they can align the changes that the farmers need to make with the long-term EU strategy. This will help farmers in realising the required changes and helps the EU in achieving their long-term goals.

The global population has a demand for food, which is supplied by the farmers and agri-business. As long as the output of the supply meets the demand of food there will be enough for everyone. However, when the demand for food keeps increasing and the supply does not increase at the same pace, then there could be food shortages, as is visualised in the example in figure 5. Climate Change literature states that if no adaptations are urgently adopted and policy-making is updated, then the crop yield per acre will decrease, thus the supply of food will decrease (Guarino & Lobell, 2011). Figure 4 shows a visualisation of today's status. The supply and demand curve meet at point A leading to Qe as the quantity of food that is produced and sold at Pe. This paper will look at the social aspect of food supply and demand and therefore for simplicity assume complete price rigidities. Figure 5 shows a possible future situation. If crop yields and thus the supply of food decreases, then the supply curve moves from S to S.new. The future supply curve meets the price curve in point B, leading to Q.s as the amount of food that is produced by the farmers. If in the future the demand for food increases due to population growth, then the demand curve will shift from D to D.new. The future demand curve meets the price curve at point C, leading to Q.D as the quantity of food that is required by the global population. Here the difference between Q.D and Q.S is the quantity of food that demand exceeds supply.

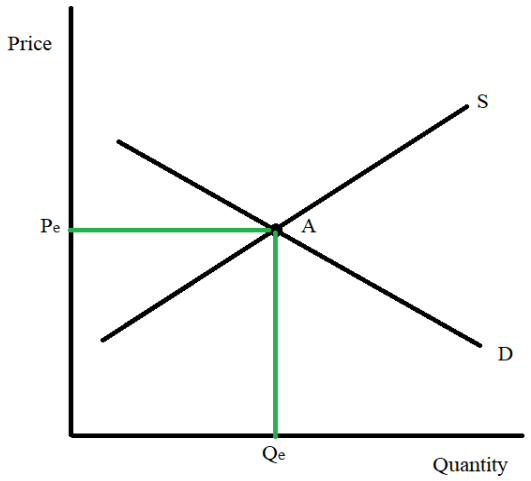

Figure 4: Current Supply and Demand of Food

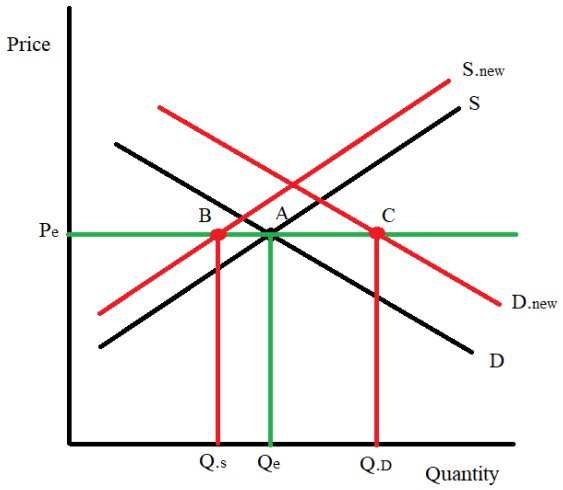

Figure 5: Future Supply and Demand of Food

If the world would end up in figure 5, then there won't be enough food to feed everyone, even if today's obstacles are overcome. These figures are an visualisation of the global supply and demand equilibrium, due to the surplus in the EU, it would take longer for the partial equilibrium of the EU to look like figure 5. However, it would only take longer to reach this state. Without change, the state in figure 5 is not preventable, not even in the EU with their current surplus. Therefore, this paper states that there is a need for change in the agricultural sector, the combination of the effects of climate change and EU policies creates leadership and organisational challenges in transitioning towards sustainable agriculture. This paper looks at the gap between demand for food and supply of food by focusing on the supply side of food. The food production has to be stable with the increasing effects of climate change and preferably has options for increasing food production to deal with possible population growth. When both criteria are met, then a decrease in food production is prevented and a first step towards preventing starvation in the future is set.

The qualitative analysis of this paper shows that one of the main challenges towards sustainable agriculture in Europe is the gap between EU policymakers and the farmers, which is based on the lack of communication between the different stakeholders. The qualitative analysis pointed out that there is currently a top-down approach in combination with transactional leadership. By combining Change Management and Transformational leadership, communication can improve and the gap between EU policymakers and farmers will decrease (Gill, 2002; Spicker, 2012). Furthermore, the qualitative analysis in this paper points out that the farmer associations are an important stakeholder, they can act as a mediator between the policymakers and the farmers. This will improve the co-creation process and the communication between stakeholders (Caldwell et al., 2004). Thus Change Management and Transformational Leadership can be an effective tool in overcoming the leadership and organisational challenges that come from a combination of climate change and new EU policies.

1.1.1. Sustainable Agriculture in Europe

The decision was made to explore sustainable agriculture in Europe, because of the CAP, Paris Agreement and Green Deal. Because these policies and agreements create additional leadership and organisational challenges in transitioning towards sustainable agriculture.

1.1.1.1. Common Agriculture Policies (CAP)

The Common Agricultural Policies (CAP) from the EU aim to create a standard framework for the agriculture sector; these policies are managed and funded from the resources of the EU's annual budget. Farming unlike other conventional businesses requires specific considerations in order to maintain productivity in the agriculture sector. Despite the importance of food production, farmers' income is to

this day around 40% lower compared to non-agricultural incomes in other business sectors across Europe (European Commission, 2021). Moreover, the agriculture sector is more dependent than other business sectors on the weather and climate conditions for the production of their crops. But in order to provide and grow enough food leads some farmers exhaust the soil and conduct irregular farming practices to produce more quantity to keep up with the demand. This issue imposes environmental risks for the soil and biodiversity of the arable farming land in Europe (Shucksmith et al., 2005). Therefore, farmers should aim to be cost-effective whilst maintaining good standards and working towards sustainable farming practices (European Commission, 2021). Here Transformational leadership from the EU can help to get farmers committed to the policy changes in addition to the changes the farmers make to deal with climate change. Furthermore, Change Management will improve the co-creation of a long-term strategy.

1.1.1.2. Paris Agreement

The Paris Agreement was the first-ever created universal, legally binding global climate change agreement, adopted at the Paris climate conference in December of 2015. *"The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. It also aims to strengthen countries' ability to deal with the impacts of climate change and support them in their efforts"* (European Commission, 2019). The cited agreement works toward the mitigation of CO2 emissions, by reducing them from active emitters in the global industry (Bodansky, 2016). Using Transformational Leadership instead of Transactional Leadership will help in getting the farmers committed to the changes instead of being told to change. This commitment would help in managing the changes and long-term strategy.

1.1.1.3. Green Deal

The European Commission aims to create a new growth strategy that aims to transform the EU into a fair and more prosperous society, with a modern, resource-efficient and competitive economy. The intention behind such measures is to adopt newer methods to reduce net emissions of greenhouse gases in 2050 (European Commission, 2021). There is a need to make a transition just and inclusive for all European citizens and different business sectors (Claeys et al., 2019). Reducing emissions while keeping the food supply equal means that farming methods have to develop and intensify. Here Change Management would be useful in managing the changes by continuously reviewing the situation, structure and goals of the EC.

1.2. Research Problem

When exploring the option of intensified production it is important to consider climate change and other environmental factors. In addition to the effects of population growth and climate change, the vision of the EU has to be considered. Considering all these different aspects means that there are significant leadership and organisational challenges. The Green deal, Paris Agreement and CAP limit the options for increasing food production. In order to meet all the requirements, food will have to be produced while using fewer finite resources and at the same time produce fewer pollutant emissions. Producing food with fewer resources whilst maintaining fewer emissions requires significant changes in the agricultural sector. The agriculture sector is a traditional and well-established community, often perceived as conservative during times of change, creating another leadership and organisational challenge. Thus, this increasing need for transition and adapting to new technologies imposes challenges on the rate of adoption to new EU sustainable policies. This leads to organisational and leadership challenges while implementing the adoption of new changes, which are not automatically embraced by individual farmers but are critical to prevent food scarcity and ensure a steady supply of food.

1.3. Purpose

The purpose is to explore what effects climate change and population growth have on society, particularly in the agriculture sector in the EU and what organisational challenges the agriculture sector in Europe is currently facing. The paper focuses on combining the theories of *Transformational Leadership and Change Management,* to understand which barriers there are in the transition for farmers and agri-business in achieving food security and more sustainable ways of growing the food necessary to feed the European population. The aim is to provide a critical view of which organisational and leadership barriers there are in adapting and transitioning towards a more sustainable method for food production in Europe.

RQ: What environmental, societal, leadership and organisational challenges do European countries face while transitioning to a sustainable production method for the agriculture sector?

1.4. Literature Review

1.4.1. Climate Change

The authors Howden et al (2007), argue that "*agriculture is the major land use across the globe. Currently, 1.2 - 1.5 billion hectares are under crops, with another 3.5 billion hectares to be grazed. Another 4 billion hectares of forest are used by humans to different degrees*". Agriculture is fundamental in human welfare, recent trends of climate change have organisations worried about the effects of climate change on agricultural productivity. Furthermore, in order to meet the projected growth in human population and per capita food demand, there will need to be a historical increase in agriculture production to eventually double our food capacity (Howden et al., 2007). The agricultural sector is partly responsible for climate change. Approximately 20% of the greenhouse gas emissions come from the agricultural sector (Freibauer, 2003). Some of the main sources are fertilisers, land conversion and soil management. The amount of greenhouse gas emission up to this day has already contributed to warming ≈0.1 ºC during the last decade and the current industrialization trend indicates that CO_2 emissions will continue increasing, affecting the concentrations of gases in our atmosphere, resulting in potential climatic alterations (Howden et al., 2007). Models show that yields are expected to decrease by 6-10% for each 1°C increase in average temperature (Guarino & Lobell, 2011). Thus climate change could lead to a significant decrease in future production. Since the agricultural land expansion is not a viable option in most parts of Europe, increasing yields through sustainable intensification is an important solution (Garnett et al., 2013). Adaptation of the agricultural sector to the increasingly complex environmental conditions will be crucial (Dempewolf et al., 2014). The greenhouse gases emissions from the agricultural sector decreased by 20% in 2015 compared to 1990. The majority of this decrease in greenhouse gases emission was due to the reduced use of nitrogenous fertilisers. In 2015 roughly 10% of the EU's greenhouse gases were produced by the agricultural sector (Eurostat, 2020). This was caused by the introduction of new policies from the EC in regards to the regulation and use of chemical substances such as pesticides and fertilizers.

1.4.2. Sustainable Farming

Sustainable farming has been one of the latest additions to the CAP, the authors Hansen and Jones (1996) define sustainable agriculture as "*the ability of farming systems to continue into the future*". Other authors like Marsh (1997) believe that sustainable agriculture would allow the preservation of the ability to produce food for the future, without compromising the options available for future generations. Other authors consider sustainable farming as the *"maintenance of the adaptive capacity of farming systems"* (Park & Seaton, 1996). Although previous literature showed that there has not been consensus on the meaning of sustainable agriculture there is an aspect that has been pointed out, that its multiple-dimensional characteristics include economic, environmental and social aspects (Conway, 1994; Legg, 1999). The European Commission states on its website that it aims to push for sustainability

in agriculture and rural areas across the EU, by implementing the policies from the CAP (European Commission, 2021).

1.5. Structure

In the theory section, this paper will discuss transformational leadership and change management as possible tools to analyse the organisational problems of the EU in regards to the sustainable transition of the agriculture sector. These two theories will be analysed through the existing literature and then contrasted with the findings obtained from the interviews. This will first be done as an overview to understand the theories, and then the following literature combining the theories to the agricultural sector. The theory section will be followed by a Data section. Here the data collection of the quantitative and qualitative data will be described. The quantitative data will be used to analyse climate change in North and South Europe and give an indication of the magnitude of climate change. The qualitative data is gathered through interviews with farmer associations and it will be divided into themes and sub-themes in order to interpret and understand how farmer associations and agricultural organisations plan to deal with climate change. The Methodology section will describe how the collected data will be possible, to be analysed afterwards, by specifying regressions for the quantitative data analysis and by specifying how the data from the interviews will be used for the qualitative data analysis. The Analysis part will start with a Results section with the descriptive statistics and regression output from the quantitative analysis. Then the Analysis section will continue by linking the qualitative data to the selected theories and quantitative results to explore whether farmer associations are likely to succeed in adapting to climate change according to the EU policies and industry context. This will be followed by the Discussion in which a possible solution to the research problem is explored. The Discussion section will also include a section on the limitations of the research and what this means for the outcome of the research, followed by the Conclusion in which potential answers to the research question will be provided, as well as recommendations targeting the future sustainable transition of the agriculture sector in Europe.

2. Theories

2.1. Transformational Leadership

In the current dynamic world learning is the only sustainable competitive advantage (De Geus 1988), thus organisations that are better at learning than their competitors are more successful. Garcia-Morales et al. (2006) state that organisational learning is a dynamic process of acquisition and creation of knowledge, sharing of knowledge and the application of knowledge. Organisational learning is a social process that is affected by participatory leadership, shared vision and system thinking (Nevis et al., 1995). Transformational leadership is important for organisational learning (Abbasi & Zamani-Miandashti, 2013). Transformational leadership focuses on influencing individuals and groups to change a current situation (Bass, 1997). Transformational leaders affect the entire organisation and encourage individuals to think beyond personal benefits. A transformational leader creates a shared vision, encourages innovation, inspires learning and engages people in system thinking (Marquardt, 1996). Transformational leaders are able to adjust organisational cultures by being aware of the current culture and rearranging the culture with new visions, values and norms (Bass & Avolio, 1994). A transformational leader has a comprehensive, influential and transparent view towards culture and its changes and manages it consciously (Wellman, 2009). According to Schein (2004) being able to understand and work with organisational culture is a key talent of a transformational leader. Transformational leadership expands transactional leadership, but it does not replace it (Bass, 1996; Northouse, 2016). Transactional leadership focuses on specific goals and how to achieve them, while transformational leadership tends to be more abstract and emphasises vision over goals. Transformational leaders tend to be idealised and open to change by envisioning new alternatives and empowering colleagues (Connor, 2004). Transformational leadership stimulates knowledge and innovation to gain advantages for organisational performance (Howell & Avolio, 1993). Transformational leaders encourage good communication networks and trust, enabling sharing of knowledge (Senge, 2006; Slater & Naver, 1995).

There have been multiple studies on the mediating effects of Transformational Leadership in relation to organisational performance and employee self-perception and individual performance (Eisenbeiß & Boerner, 2013). Furthermore, studies on the mediating effect of organisational identification or collective identification have been researched in relation to Transformational Leadership and contextual performance (Kark et al., 2003). However, these studies have been carried out in different sectors across the industry, but have not been studied applied to the agriculture sector. This lack of research imposes a barrier and possible gap, which leads this thesis to investigate the relationship of transformational leadership within agriculture.

2.2. Change Management

Moran and Brightman (2001) define change management as *"the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers"*. Organisational change is linked to organisational strategy and is fundamental in realising long-term goals (Burnes, 2004; Rieley & Clarkson, 2001). Due to the unpredictability of the need for change, change tends to be ad hoc, discontinuous and reactive (Burnes, 2004; De Wit & Meyer, 2010; Luecke, 2003; Nelson, 2003). Discontinues change is cost-effective since it is an ending process and it creates less unrest than continuous change (Guimaraes & Armstrong, 1998). However, the benefits from discontinuous change do not last (Bond, 1999; Love et al., 1998; Taylor & Hirst, 2001). Luecke (2003) states that discontinuous change creates situations that require frequent reforms and that instead of discontinuous change organisations should use continuous change. The continuous change focuses on the ability to change continuously in a fundamental way in order to keep up with the pace of change (Burnes, 2004; Luecke, 2003). According to Lewin (1952), successful change works through three steps, unfreezing the present level, moving towards the new level and then refreezing the new level. This model is based on the need to discard old structures, processes and behaviour in order to be open to adopting new approaches (Bamford & Forrester, 2003). Bullock and Batten (1985) developed

an applicable model for planned change that describes the methods necessary to move an organisation from one state to another state and achieve successful change implementation. However, this model is based on the assumption of constant conditions, which is a discussable assumption in today's fast-changing environment (Burnes, 1996, 2004). Furthermore, Burnes (1996, 2004) suggests that organisational change is a continuous process instead of discrete and self-contained events. Additionally planned change assumes that all the stakeholders are willing to implement the change and thus ignore possible conflicts (Bamford & Forrester, 2003; Burnes, 1996, 2004). Effective leadership is necessary for change to be successful, leadership makes the difference between successful and unsuccessful change. Bad communication leads to misunderstanding of the process and aims of change and decreases the commitment to change. Communicating the benefits of change improves the commitment to the change (Gill, 2010). DuBrin (2015) states that it is the task of a transformational leader to help group members understand the need for change.

2.2.1. Change Management in Agriculture

The Authors Dentoni et al. (2017), argue that significant transformation is needed to achieve sustainability in the global food and agricultural system if the world's population needs to be supplied with healthy and abundant sources of food. Furthermore, Transitions management (TM) is described as *"radical structural changes of societal subsystems, the theory assumes that sustainability problems change over time, entail multiple dimensions and involve multiple actors in society"* (Dentoni et al., 2017). It is pointed out in the literature that a transformative turn in the European agriculture sector requires institutional and well-thought-through reforms (North, 1990). Other academics argue that a progressive shift in the rules governing sustainable development is also required (Scharmer & Kaufer, 2013). Moreover, deep-rethinking of the operational aspects of agriculture needs to also be taken into consideration whilst requiring a flexible method approach with multiple stakeholders and pathways (Burns, 2014).

2.3. Change Management combined with Transformational Leadership

Transformational leadership focuses on problems around the process of change (Bass & Riggio, 2006). Leadership style approaches assume certain types of leaders will handle change situations, while organisational change management assumes that behaviours that are related to change can be specified (Herold et al., 2008). An important aspect of change is the commitment to the change by the followers (Fedor et al., 2006; Herscovitch & Meyer, 2002). Employee commitment has been linked to transformational leadership and is therefore important in realising change (Bass & Riggio, 2006). Research has shown a positive relationship between transformational leadership and employees' commitment to the leader and the organisation (Bass & Riggio, 2006; Kark & Shamir, 2013; Koh et al., 1995). Evidence has shown that leaders and leadership styles affect organisational performance and organisational change in particular (Burke, 2017; Groves, 2005).

Planned change occurs through a process in which goals are set and objectives are formulated in advance. An organisation has to go through different stages in order to successfully realise change and reach the desired future stage (Burnes, 1996, 2004). One of the key drivers of organisational change is leadership (Herold et al., 2008; Higgs & Rowland, 2005, 2010, 2011; Liu, 2009). Change management looks at the process of change and leadership looks at the influence and motivation of employees (Gill, 2002; Spicker, 2012). Transformational leadership is the main leadership theory that emphasizes organisational change (Bass, 1985, 1999). Transformational leaders contribute to organisational change by stimulating new ways of thinking and by setting challenging objectives (Eisenbach et al., 1999). This stimulating of employees and setting of challenging objectives that are done by transformational leaders is particularly effective in the planned process of change (Eisenbach et al., 1999; Higgs & Rowland, 2011).

Organisations are human systems and therefore successful change of the organisation depends on the employees who are tasked with implementing the changes. An important element of change is the

process and how the process is managed. Caldwell et al. (2004) find that employees respond more favourable to organisational change when they perceive the implementation to be fair. This perception is based on the leader's ability to supply accurate information, demonstrating that they are committed, engagement with employees and providing the resources that are needed to implement the change.

3. Methods

This paper uses an embedded research design in which the qualitative is the primary and main body of data collection and the quantitative is used as a complementary analysis to contrast findings. The qualitative analysis uses primary data and is the main data that is used to answer the research question, the complementary quantitative analysis uses secondary data. The quantitative data collected from the weather stations will be used as a supplement to the qualitative analysis. Therefore, the quantitative analysis provides empirical evidence of recurring extreme weather events and the magnitude of climate change. The qualitative data will then be used to analyse what factors influence leadership and change management in the agriculture sector at the European level.

Furthermore, the linkage of the weather statistical analysis together with the results from the interviews will be then used in combination (interpretation of embedded results). This is done to contrast the impact of climate change on current agricultural problems from European farmers. Partly, the intention for connecting both analyses is to establish a possible correlation between extreme weather events affecting European farmers' crops with increasing obstacles or problems for the sustainable production of agricultural products, and the adoption of the CAP policies. Thus, the results from merging and analysing both sets of data can provide a well-contrasted overview of phenomenological climatic events in relation to the interactions of humans with agriculture. This is intended with the sole purpose of observing the alterations and interactions between both variables, is to understand environmental and societal issues to learn how to cope with climate change in the agriculture sector across European countries.

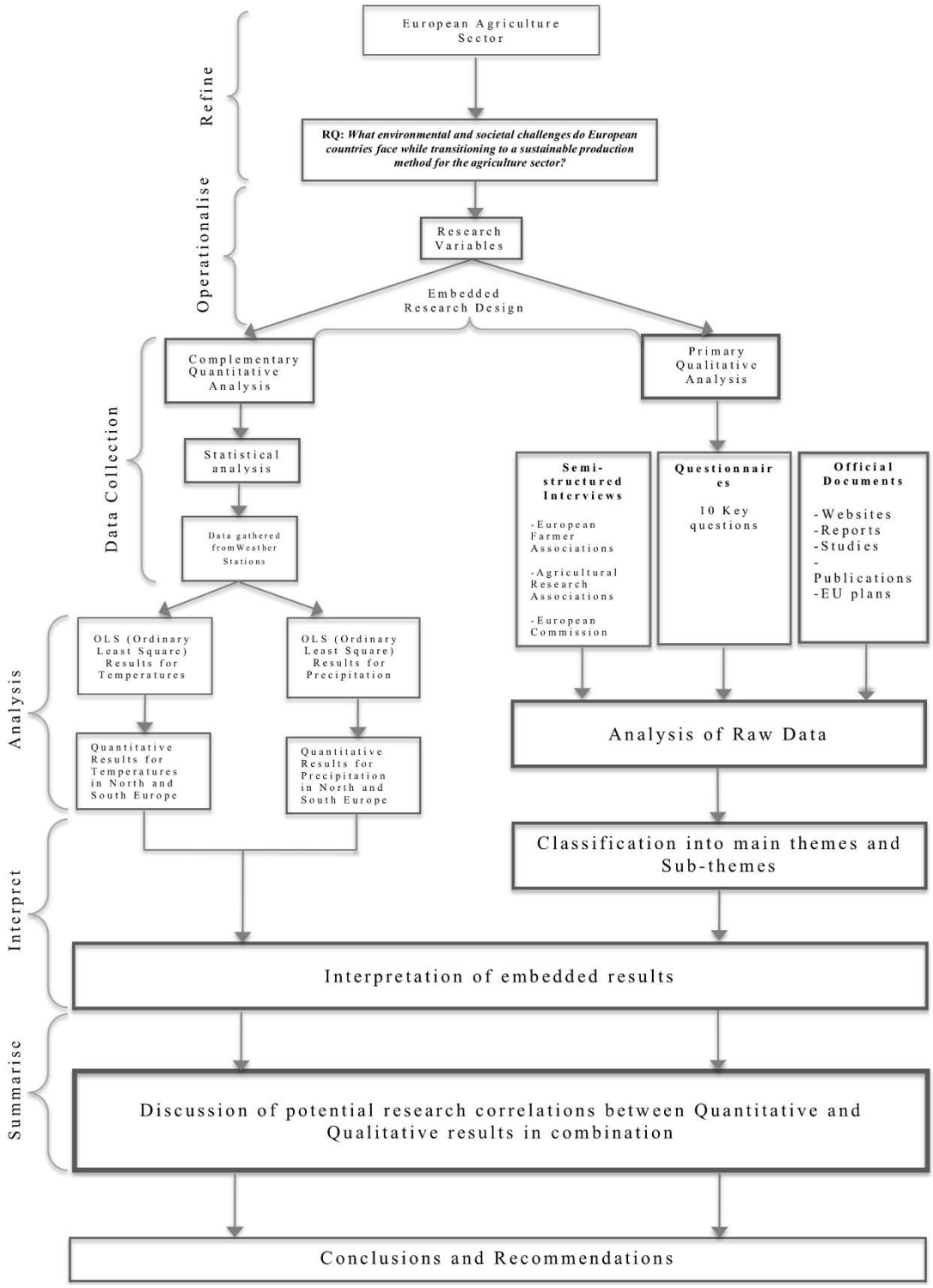

Figure 6: Embedded Research Design

3.1.1. Qualitative

For this research 8 interviews and 5 questionnaires were carried out to European Commission authorities, individual farmers, Co-operative and farmer associations across Europe and other research institutions that work within the agricultural sector. The interview to Belgium was carried out to an association of Crop Protection which works on research and developing diverse solutions to aid farmers. The interview to Bulgaria was with a National Grain Association that represents a large majority of

cereal and grain farmers. The participation from the North Spanish grain association also provided valuable insights for the qualitative analysis. Moreover, the interview with Denmark and Sweden contributed with insights from north european farmers. The interview with Scotland was the only Co-operative association that was interviewed, this Co-op works in synergy with multiple farmers and agriculture entities across the Scotish farming industry. Furthermore, the only interview carried out to individual farmers was done to a third generation farmer's son in North Germany. The Netherlands and Czech Republic supported with official documents that had valid information, which has been contrasted with the interviews' findings. The interview to the European Commission was possible by the participation of the Director-general for Agriculture and Rural Development in charge of the strategy, simplification and policy analysis. The participation of the EC has been a key part of the qualitative analysis, as it provided this research with a European institutional perspective to contrast the results from the IPA (Interpretative Phenomenological Analysis). The interviews followed a semi-structured scheme, with open-end answers allowing the interviewee to elaborate on their thoughts and answers, and in some instances, there were follow-up questions to clarify or dig deeper into certain areas of interest. Thus, part of the data collection was possible by questionnaires, emailing 10 main questions to all the organisations, and some of these chose to conduct an interview via the phone. The current circumstances regarding the Covid-19 pandemic have influenced this research forcing it to find new ways and alternatives to collect primary data reliably and without compromising or putting at risk the interviewees' health (Burke & Miller, 2001). Thus, telephone, Skype and Zoom calls were used as substitution from traditional face-to-face interviews. The validity of the data collection via phone call has been researched and demonstrated, which provides a resourceful way to conduct qualitative research (Farooq & Villiers, 2017). The findings from the interviews show that the farmer associations and institutions that chose to do the interview online were more engaged and contributed more information to the research problem, compared to the results obtained from questionnaires. Furthermore, the reliability of the data has been measured by the consistency of the respondent's answers to the interviews and questionnaires. Thus, raw data from the qualitative research will be triangulated, by contrasting multiple sources of information from the quantitative analysis and other qualitative documents supported by agriculture associations (Carter et al., 2014). This data triangulation will enable qualitative research to validate the information through cross verification from more than two independent information sources (Leech & Onwuegbuzie, 2007). The data triangulation will also help to test the consistency of the findings, obtained through different qualitative research techniques. The outcome of triangulating data should increase the chances to assess some of the potential threats and/or multiple organisational and leadership issues influencing the thesis research problem. More so, the interviews targeted to EU authorities within the department of agriculture at the European Commission were relevant to have institutional insights and evaluate their organisational perspective on the transition to achieve sustainable farming in Europe. The results from the interviews from farmer associations are intended to be used in order to contrast farmers' opinions, leadership skills, recurring problems, working habits and behavioural patterns with the increasing need for a sustainable transition for the agriculture sector in Europe. The findings should also contribute to understanding how farmers in Europe perceive the future of their practices and the relation to climate change, leadership and sustainability. Thus, allowing this research to investigate and provide potential solutions and recommendations based on the results from the qualitative data. The investigation of the raw data will be studied by applying the Interpretative Phenomenological Analysis (IPA), which will allow the research to conduct a detailed examination of the lived experiences of individual farmers and agricultural associations (Eatough & Smith, 2008). Therefore, by applying IPA to the study of farmer associations can provide an experiential perspective to understand what challenges and problems they are facing in relation to CAP policy implementation (organisational barriers), adoption of new technology and leadership deficiencies. The results from the interviews are analysed using a colour code matrix, in which the relevant topics of themes are highlighted to later be processed together with the rest of the interviews. The selection of the themes using colours is useful to spot common lines of argumentation as well as finding regular recurring patterns of thought, by helping visualize with specific colour codes each topic or theme. Thus, some of these themes are in some instances divided into sub-themes, to further pin down the area of study. The different topics or areas of interests cover themes such Climate Change, Agriculture, Sustainability, EU policy, Financials, Transition, and Technology. Then, once the in-depth insights have been gathered, the IPA helps to look into patterns of convergence and divergence across different

associations in different EU countries together with the answers from the European Commission (Estrada et al., 2013). Therefore, the qualitative analysis organises the results from the different interviews into table 14 in which the different answers are grouped up into the specific themes, to see the commonalities and points of disparity between the interviewees' answers. To be precise, the selection of the categories for the themes has been taken in a value-free way, in which the selection of the themes has been the result of multiple word recurrences among all the interviews combined. Thus, allowing this research to understand and formulate backed-up arguments from the findings obtained during the interviews conducted with agriculture professionals and European authorities (Smith & Shinebourne, 2012).

3.1.2 Quantitative

3.1.2.1 Data Adjustments

The dataset used for the quantitative analysis consisted of daily weather observations. The original dataset had over 170 million points of observations and did not control for outliers. Therefore the daily data has been aggregated to monthly and yearly data in the program STATA, by taking the weighted average means of the daily observations. To control for monthly trends, dummy variables have been created for each month. The monthly data of temperature averages and precipitation will be the main data for the quantitative analysis.

3.1.2.2 Methodology

This paper will focus on the monthly temperature averages data and how these change over time on a yearly basis. Additionally, this paper will focus on the precipitation and how this changes over time. Because Northern and Southern Europe have different challenges when facing climate change the decision is made to split up the sample. The sample is split at a latitude of 49, which is just north of Paris. This paper uses the same regressions for the period 2000-2020, 2000-2005, 2006-2010, 2011-2015 and 2016-2020 to be able to analyse the changes in trends. Multiple estimation models are used to estimate the effects of interest. For the changes in temperature averages linear regression models are used. A baseline has been established by using an Ordinary Least Square (OLS) estimation. The Hausman test had a Chi-square of .0018 for the average temperature regression, see Appendix A for explanation of Hausman test and White test. Therefore a regression with High Dimensional Fixed Effects (HDFE) has been used to estimate the changes in temperature averages over time. The changes in precipitation have been analysed with the OLS estimator to establish a baseline. The Hausman test for this data Chi-square of .2930. However, because a fixed effects model allows control for measurement error at the weather station level, the fixed effects model has been added as an additional model. Finally a White test has been performed. The White test has a Chi-square of .0000 for the precipitation data. Therefore a Maximum Likelihood estimator has been used. This paper uses the Poisson Pseudo Maximum Likelihood (PPML) estimator to analyse the changes of monthly precipitation.

OLS

The OLS regression is run for both Northern Europe and Southern Europe. These regressions are run for the different time periods to see whether the impact of the time trend changes across the periods. The OLS regression that is used for temperature changes is:

$$TemperatureAverage_{gt} = \beta_0 + \beta_1 Year_t + \varepsilon$$

In this regression TemperatureAverage is the average temperature in Celsius in group g (North or South Europe) in period t. Beta zero is the constant and Beta one is the coefficient of the average yearly effects in period t on average temperatures. The epsilon is the error term of the regression. Additionally the

following OLS regression has been used to examine how the monthly temperatures change within the different months:

$$TemperatureAverage_{gt} = \beta_0 + \beta_1 Feb + \beta_2 Mar + \beta_3 Apr + \beta_4 May + \beta_5 Jun + \beta_6 Jul + \beta_7 Aug + \beta_8 Sep + \beta_9 Oct + \beta_{10} Nov + \beta_{11} Dec + \varepsilon$$

Here the Betas capture the coefficients for the specific months. January is not added because this would lead to collinearity. The other months are dummies that take the value 1 when the observations are in this month. The constant will capture the monthly temperatures of January and the Betas will show the difference between the other months and January. This helps to examine in which months the temperature changes when the yearly averages change.

To check for the effect of changing temperatures on precipitation the following OLS regression has been used:

$$Precipitaton_{gt} = \beta_0 + \beta_1 TemperatureAverage_{gt} + \beta_2 Year + \varepsilon$$

The dependent variable Precipitation captures the amount of precipitation in mm in group g in time period t. To analyse in which months the precipitation changes the following regression has been used:

$$Precipitation_{gt} = \beta_0 + \beta_1 Feb + \beta_2 Mar + \beta_3 Apr + \beta_4 May + \beta_5 Jun + \beta_6 Jul + \beta_7 Aug + \beta_8 Sep + \beta_9 Oct + \beta_{10} Nov + \beta_{11} Dec + \varepsilon$$

Here the independent variables capture the monthly effects of changes in precipitation, similar to the regression of the average temperature changes that was specified for the different months.

Fixed Effects

This paper uses a regression with High Dimensional Fixed Effects to control for effects at the weather station level, this includes local measurement errors and missing weather station data. The following High Dimensional Fixed Effects regression has been used:

$$TemperatureAverage_{gt} = \beta_0 + \beta_1 Year + \beta_2 \gamma + \varepsilon$$

In this fixed effects model the variables that are used in the OLS have the same meaning in the fixed effects model. The additional variable gamma captures all fixed effects at the weather station level. Here the monthly changes are investigated with the following regression:

$$TemperatureAverage_{gt} = \beta_0 + \beta_1 Feb + \beta_2 Mar + \beta_3 Apr + \beta_4 May + \beta_5 Jun + \beta_6 Jul + \beta_7 Aug + \beta_8 Sep + \beta_9 Oct + \beta_{10} Nov + \beta_{11} Dec + \beta_{12} \gamma + \varepsilon$$

The precipitation has been examined with the following fixed effects regression:

$$Precipitation_{gt} = \beta_0 + \beta_1 TemperatureAverage_{gt} + \beta_2 Year + \beta_3 \gamma + \varepsilon$$

Here the variables have the same meaning as in the OLS regression, with the addition of the weather station and monthly level fixed effects. The monthly changes are examined through the following regression:

$$Precipitation_{gt} = \beta_0 + \beta_1 Feb + \beta_2 Mar + \beta_3 Apr + \beta_4 May + \beta_5 Jun + \beta_6 Jul + \beta_7 Aug + \beta_8 Sep + \beta_9 Oct + \beta_{10} Nov + \beta_{11} Dec + \beta_{12} \gamma + \varepsilon$$

Both the OLS and Fixed Effects models are linear regression models that assume homoskedasticity of the error term. However, error terms are often heteroskedastic and this violates the first assumption of linear regression models. Therefore this paper uses a White test as an indicator to check whether the error term is homoskedastic or heteroskedastic. The White test shows that the assumption of homoskedasticity is violated. Therefore, this paper uses a Poisson Pseudo Maximum Likelihood with High Dimensional Fixed Effects to relax the assumption of homoskedasticity.

Poisson

The Poisson estimator is a maximum likelihood estimator that is consistent when fixed effects are present (Shepherd, 2013). Additionally, a Poisson estimator includes observations that take the value zero. Linear regression models drop the zero value observations and do not include them in the regression (Haveman & Hummels, 2004). Therefore using a Poisson estimator reduces the possibility of sample selection bias. The Poisson Pseudo Maximum Likelihood with High Dimensional Fixed Effects that this paper uses is:

$$Precipitation_{gt} = \beta_0 + \beta_1 TemperatureAverage_{gt} + \beta_2 Year + \beta_3 \gamma + \varepsilon$$

These are the same variables as in the fixed effects model, but run by the nonlinear Poisson estimator. Because Poisson estimators require the dependent variable to take a positive value the Poisson estimator is only used for the Precipitation and not for the TemperatureAverage estimation.

3.2 Limitations

3.2.1 *Qualitative*

The data collected from the interviews also faced communication problems caused by the lack of English communication skills by some of these farmer associations, making it difficult some instances to communicate with them (in particular France and Spain). The effects of Covid-19 and the social restrictions also contributed to make data collection more difficult, as fewer people were available at their office. Parallelly, the bureaucracy of the European Commission slowed down the data collection, this was evident by the auto-response email received: " *This web form is for the use of any member of the public having a question about the European institutions and their policies. We expect to be able to reply within two working days. For more complex or specific queries, responses may take longer."* (European Commission, 2021). Although the EU states that most questions are answered within 2 working days, the reality is that complex questions concerning the agriculture sector and the interrelation with climate change and the environment might take longer to answer. As this research was expecting the long waiting to get answers from the EC, this was not fitting with the thesis time frame, thus a phone call or extra email was oftentimes necessary to pitch the contribution of the research, and highlight the urgency to collect qualitative data.

3.2.2 Quantitative

The main limitation of the quantitative data is the lack of control variables. The low amount of independent variables lead to low adjusted R-squared values and thus low predictive power. To check for robustness the control variable wind speed is added, but that is one of the few available control variables. The reason for adding the control variable will be explained at the robustness section. Another limitation is that the dataset includes over 22.000 weather stations in Europe and neighbouring countries. The weather stations in neighbouring countries are not the weather stations of interest, but can impact the results. This could lead to overestimation or underestimation. Especially the weather stations that are located in neighbouring countries on the south side of Europe. Additionally, the lack of variables means that it is not possible to have many fixed effects. In the regressions there are only weather station fixed effects, ideally more fixed effects would have been used. Lastly the dependent variables are used as proxies. The temperature variable is used as a proxy of climate change, even though it is one of the main measures of climate change, it is not the only measure and one could argue that it does not capture the full effect of climate change. The precipitation variable is used as a proxy for droughts. However, ground water also impacts droughts and this paper does not correct for changes in ground water. Thus this proxy is also not perfect.

3.3 Data Description

This paper uses quantitative data as a supplement to the qualitative data. The quantitative data comes from the Agri4Cast Research Portal, which is a joint research centre of the European Commission. The specific data that is used is the JRC MARS Meteorological Database. This database uses observations from weather stations for the EU and neighbouring countries, the observations are interpolated on a 25x25 km grid. All observations in the database are daily observations. This paper uses the daily observations starting on January first 2000 and ending the last day of December 2020, thus the full quantitative data consists of 21 years of daily observations.

The dataset will be used to provide empirical evidence of climate change in both Northern and Southern Europe and droughts in the Southern part of Europe. Due to the daily observations at a large quantity of weather stations and the publication of the data by the European Commission, this dataset is assumed to be reliable. Climate change is often measured in temperature changes and changes in precipitation, therefore, this dataset is valid in assessing climate change. Additionally, robustness checks are done to check for structural validity. Figure 7 shows how the yearly average temperature and the yearly precipitation of the full dataset changed over time. The years are displayed on the x-axis, the average temperature is displayed on the left y-axis and the yearly average precipitation is displayed on the right y-axis. Both the yearly average temperature and yearly average precipitation fluctuate over time, but both show an upward trend.

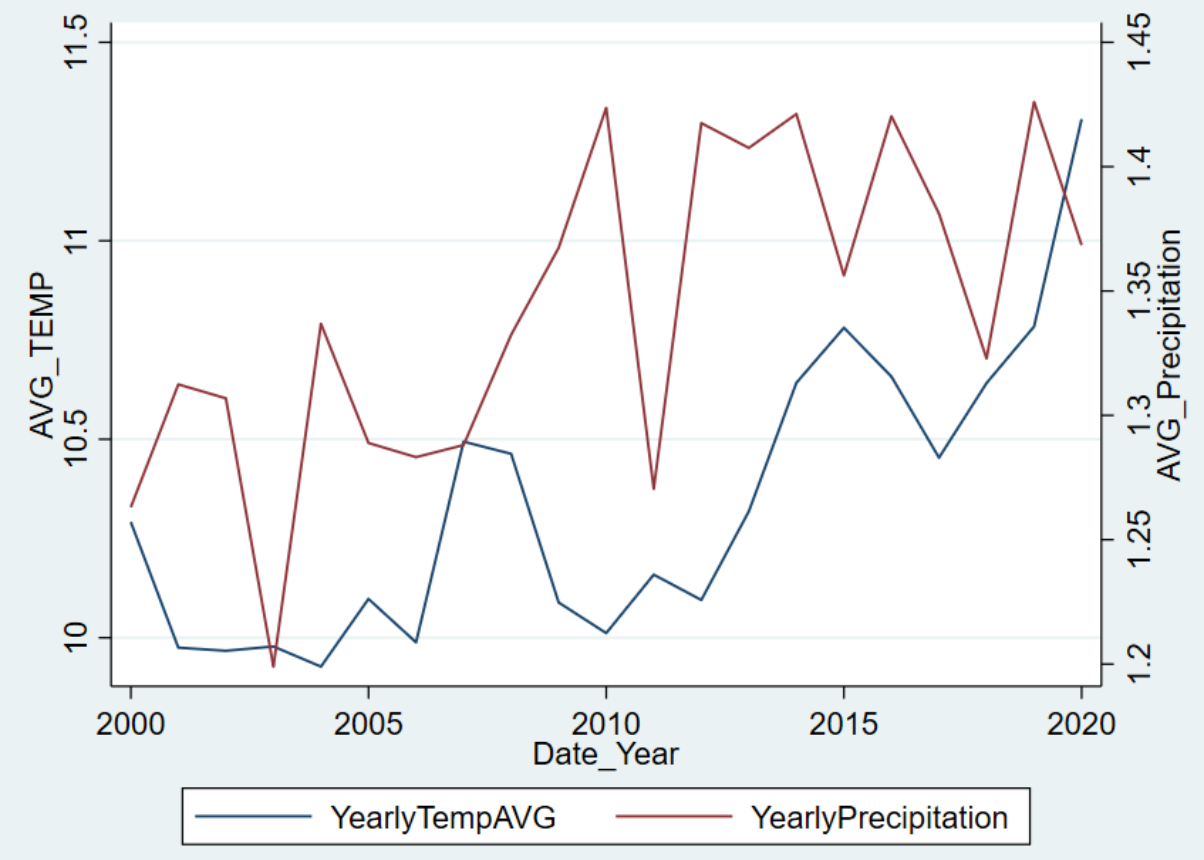

Figure 7: Yearly Temperature and Yearly Precipitation

To compare Northern and Southern Europe and to be able to examine how the changes differ across the groups, the sample has been split into two groups. The two groups have similar sample sizes. Figure 8 shows the structural difference of the yearly average temperatures in Northern and Southern Europe, which were expected, and shows that for both groups there is an increasing trend. Figure 9 shows the yearly precipitation in Northern and Southern Europe, here again there is an increasing trend for both groups.

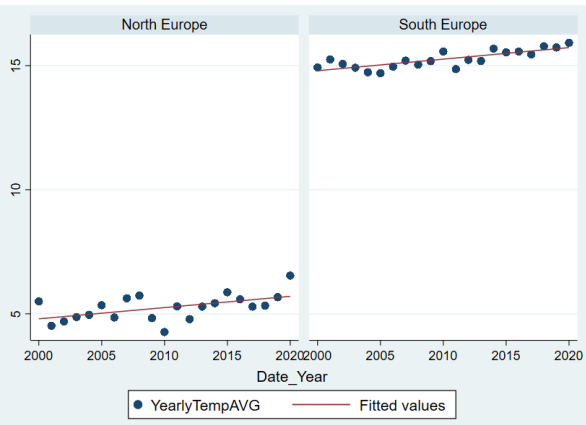

Figure 8: Yearly Temperatures

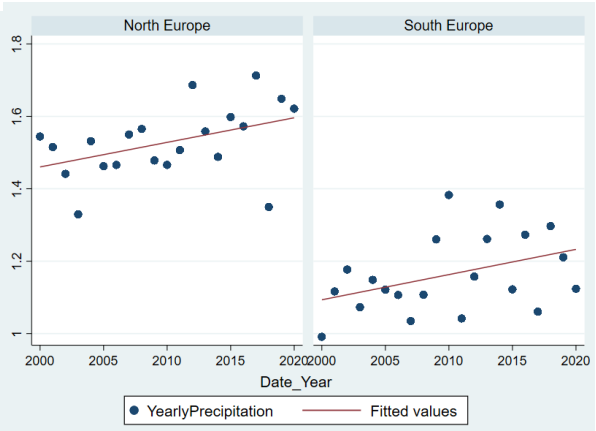

Figure 9: Yearly Precipitation

The yearly data gives an indication of the trend. Appendix A figure 10 shows the monthly average temperature and figure 11 shows the precipitation and how these change over time.

Table 1 shows the descriptive statistics of the complete dataset and the North and South Europe samples with the number of observations. The descriptive statistics show differences between Northern and

Southern Europe as was expected due to the graphs shown earlier in this section. The mean Precipitation is higher in Northern Europe and the mean Temperatures is higher in Southern Europe.

Table 1: Descriptive Statistics (N=5,645,906)

Variables	Mean	SD	Minimum	Maximum
Monthly Temperature Average (Celsius)	10.33919	10.6533	-33.69335	39.99032
Monthly Precipitation (mm)	1.342536	1.253784	0	32.5
Yearly Temperature Average (Celsius)	10.33919	5.021988	4.267413	15.91782
Yearly Precipitation (mm)	1.342536	.2080878	.9911516	1.712593
Northern Europe (N = 2,775,780)				
Monthly Temperature Average (Celsius)	5.251792	9.878967	-33.69355	29.69677
Monthly Precipitation (mm)	1.528173	1.110268	0	21.71333
Yearly Temperature Average (Celsius)	5.251792	.5075738	4.267413	6.539178
Yearly Precipitation (mm)	1.528173	.0945644	1.329553	1.712593
Southern Europe (N = 2,870,126)				
Monthly Temperature Average (Celsius)	15.25936	8.923568	-20.96774	39.99032
Monthly Precipitation (mm)	1.163001	1.354451	0	32.5
Yearly Temperature Average (Celsius)	15.25936	.3516481	14.69354	15.91782
Yearly Precipitation (mm)	1.163001	.1047277	.9911516	1.382805

4 Regression Results

The graphs describing the data show significant differences between North and South Europe, which is confirmed by the descriptive statistics. Therefore the results will be split in North Europe and South Europe for both the changes in temperature and precipitation.

4.1 Temperature

Table 2 shows the output of the regressions for Northern Europe with average temperature as a dependent variable. The coefficients of all six regressions are statistically significant at the 1 percent level. Column 1 shows the output of the OLS regression for the full dataset of Northern Europe, thus this is based on all 21 years of data that has been used in this paper. The second column shows the result of the same data but by using the regression with High Dimensional Fixed Effects. Both regressions have a coefficient of 0.045, this means that the average yearly temperature increases with 0.045 degrees. This means that the average temperatures have increased by 21*0.045 = 0.945 degrees over the entire period. Columns 3 to 6 look at smaller periods within the entire dataset, to examine how this trend has changed over time. The results of the smaller periods are discussed in Appendix A. When looking at the different time periods it becomes clear that there are colder years, but also that the magnitude of the increasing trend is increasing over time. Temperatures seem to keep increasing faster in the latest periods and if this trend continues then temperatures will increase even faster in the future.

Table 2: Yearly Temperatures in Northern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Yearly Trend	.045***	.045***	.021***	-.197***	.177***	.229***
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	2,775,780	2,775,780	793,080	660,900	660,900	660,900
Adjusted R-Squared	**X**	**.1368**	**.13**	**.1213**	**.1206**	**.1360**

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Appendix A table 3 shows the monthly results of changes in temperatures in Northern Europe. The table shows dummy variables for the months, except for January which has been captured by the constant, adding January would lead to collinearity. The dummy months take the value 1 when the observations are in that month. The coefficient is then added to the constant to get the temperature in the other months. These monthly results are discussed in Appendix A.

The same regressions have been run for the data based on the Southern part of Europe, which are displayed in table 4. Here column 1 is again the OLS regression for the full data of Southern Europe and column 2 the regression with fixed effects of the full data of Southern Europe. Here the coefficients of the first and second column are the same. Both models show that temperatures in Southern Europe have increase by 21*0.047 = 0.987 degrees Celsius in the period of 2000 to 2020. Column 3 shows that in the period 2000 to 2005 the temperatures have decreased in Southern Europe, however, this is the only period with a negative coefficient. Column 4 shows that in the period 2006 to 2010 temperatures have increased by 0.12 degrees a year. In this period Northern Europe experienced a decrease in temperatures, while they increased in Southern Europe in this period and vice versa in column 3. This shows that colder periods do not always happen during the same period in both Northern and Southern Europe. The remaining results of the columns 3 to 6 are explained in Appendix A. Comparing the adjusted R-Squared of column 2 in the tables for temperature changes in Northern and Southern Europe

shows that the predictive power of the model for Southern Europe is higher. An explanation of the adjusted R-square is given in Appendix A.

Table 4: Yearly Temperatures in Southern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Yearly Trend	.047***	.047***	-.081***	.12***	.181***	.098***
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	2,870,126	2,870,126	820,286	683,280	683,280	683,280
Adjusted R-Squared	**X**	**.3122**	**.3163**	**.3061**	**.2962**	**.2973**

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

The monthly data for Southern Europe has been displayed in Appendix A table 5. For Southern Europe the monthly data shows that, similar to the monthly data for Northern Europe, January is the coldest month. The temperatures of January do not seem to structurally increase and thus cold months keep occurring in Southern Europe.

4.2 Precipitation

The changes in precipitation in Northern Europe are displayed in table 6. Here columns 1 to 3 show the coefficients of the different regressions for the full dataset and columns 4 to 7 show the different periods for the regression of choice. Column 1 shows the results of the OLS regression. Column 2 shows the results of the regression with High Dimensional Fixed Effects (HDFE). Column 3 shows the Poisson Pseudo Maximum Likelihood (PPML) regression for the full time period. The explanation of how to interpret PPML coefficients is given in Appendix A. Combining the mechanisms that impacted precipitation shows that the precipitation has increased with 10% in the full time period. The first 3 columns also show the importance of using an appropriate model, because the OLS model estimated the combined effect on a 15.2% increase in precipitation which is significantly higher than the 10% that is estimated by the appropriate PPML model. In columns 4 to 7 the yearly trend is omitted, this due to collinearity with the fixed effects. An explanation of omitted variables is given in Appendix A. The effect that the yearly trend captures in the columns 1 to 3 is therefore likely the effect of a different variable that is correlated with the yearly trend and is captured by the yearly trend in this setting. However, the result is statistically significant and the increase in precipitation is in line with the results in the graph in the data section. The columns 4 to 7 show that there are no significant differences in the effect of temperature changes on precipitation across the different time periods.

Table 6: Yearly Precipitation in Northern Europe

Precipitation Average	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temperature Average	.026***	.021***	.016***	.017***	.016***	.019***	.012 ***
Weighted Yearly Trend	.006***	.006***	.004***		(omitted)		
WS Fixed Effects	NO	YES	YES	YES	YES	YES	YES
Observations (n)	2,775,780	2,775,780	2,775,780	793,080	660,900	660,900	660,900
Pseudo R-Squared	X	X	.0778	.0751	.0797	.0906	.0780

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Table 7 in Appendix A shows the monthly precipitation in Northern Europe in absolute values. The table shows that the amount of precipitation in January structurally increases and that the majority of the months increase in the same trend according to columns 3 to 6.

Table 8 shows the changes in precipitation for Southern Europe. Columns 1 to 3 again give the results of the entire time period while columns 4 to 7 give the results of the PPML regressions for the different time periods. Column 1 shows the results of the OLS regression, which shows that precipitation decreases in Southern Europe when temperatures increase and that precipitation increases over time. That precipitation increases over time is in line with the graph in the data section. Column 2 shows the results of the HDFE model which reports the changes in absolute values, like the OLS regression from column 1 does. The third column shows the effects estimated by the PPML model, which is also the model that is used for columns 4 to 7. The temperature table for Southern Europe showed an increase of roughly 1 degree Celsius for the entire time period. This means that precipitation has increased by 100*(-.021*) + 100*(21*.007) = 12.6%.

Table 8: Yearly Precipitation in Southern Europe

Precipitation Average	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temperature Average	-.052***	-.024***	-.021***	-.019***	-.022***	-.018***	-.026 ***
Weighted Yearly Trend	.009***	.008***	.007***		(omitted)		
WS Fixed Effects	NO	YES	YES	YES	YES	YES	YES
Observations (n)	2,870,126	2,870,126	2,870,126	820,286	683,280	683,280	683,280
Pseudo R-Squared	X	X	.2455	.2443	.2486	.2431	.2577

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Table 9 in Appendix A shows the precipitation of Southern Europe on a monthly basis. Here precipitation in January seems to stay stable over time according to columns 3 to 6, which show the OLS results for the different time periods. A detailed explanation of the interpretation is given in Appendix A.

The quantitative analysis results show that in both Northern and Southern Europe the temperatures are increasing over time. Especially in Northern Europe the temperature increases have been going fastest in the most recent years. Furthermore, the quantitative analysis showed that increasing temperatures have different impacts on precipitation in Northern and Southern Europe. When average temperatures increase, the precipitation in Northern Europe increases too. However, the increasing temperatures lead to a decrease in precipitation in Southern Europe. Thus climate change impacts the different regions differently.

4.3 Robustness

Robustness of the regression results leads to structural validity of the results. Therefore, multiple robustness checks have been performed. The first robustness check that has been performed is the different time periods. The different time periods generally show similar results in sign as the results from the entire time period, suggesting that the results are robust. Additionally, the control variable Windspeed has been added to the regressions displayed in the result section, see Appendix A, tables 10 to 13. Adding this control variable shows the importance of choosing the OLS or HDFE model, because the coefficients are no longer equal. With the addition of the control variable the coefficients of the proper models stay similar. Furthermore, the signs of the coefficients do not change when adding this control variable and the Adjusted R-Squared and Pseudo R-Squared stay similar to the values in the previous tables.

5 Object of Study

Sustainable Agriculture and EU policy-making

The direct involvement of climate change and the imminent need for adaptation of the agriculture sector can become a global problem, which could potentially affect the stability and food security of the EU. The study of public policy can help inform farmers, universities, agri-business, agricultural associations, food industries, institutions and policymakers about the implications of adapting the agriculture sector in Europe, over a wide variety of timeframes from short-term "hands-on" approaches, to long-term strategic plans (Howden et al., 2007). The current focus of European policies within the agriculture sector are implemented in isolation to other interconnected issues, which also contribute to climate change and affect society. The authors Howden et al. (2007) argue that systemic issues like climate change need to be addressed with a broader set of policies. The existing policies on climate risks can become inefficient and poorly targeted, if the policies are not updated and aligned with current societal needs (European Commission, 2021). The purpose of the common agricultural policy (CAP) aims to create suitable conditions for farmers to develop a sustainable system for growing crops. These policies can be a combination of social, economical and environmental approaches. Therefore, farmers and farmer associations constitute key roles in contributing to the EU's sustainable future (Jankelova et al., 2020). Policy making within the European countries is a fundamental pillar for sustainable change towards sustainable agriculture. The EU policies will create incentives for farmers to change. The European commission could use transformational leadership in managing the change, by getting farmers committed to the changes and long term goals of the European Commission.

6 Qualitative Analysis

This section has seven themes, each with multiple sub-themes, that are used to structure the qualitative analysis. The different sub-themes will be linked to the results of the quantitative analysis and the theories of Change Management and Transformational Leadership.

Table 14: IPA Themes and Sub-themes

Main themes	**Climate Change**	**Agriculture**	**Sustainability**	**EU Policy**	**Financials**	**Transition**	**Technology**
Sub -theme 1	Temperature	Personal Benefits	Fertilisers-Pesticides	Farm-to-Fork Strategy	Land Prices	Variability	Hydroponic Farming
Sub-theme 2	Precipitation	Agricultural Options	Finite Resources	Organisational Trust	Investments	Research	Genetics
Sub-theme 3	Performance	Farmers Quit	Feasibility	Carbon Footprint	Supply Chain	Technology	
Sub-theme 4	Partnerships	Experience	Biodiversity	Market-Based	Financial Sustainability	Farmer Associations	
Sub-theme 5			Agricultural Sustainability	Future of CAP	Taxonomy	EU Policies	

The Qualitative analysis starts with a theme on climate change and links the findings of the interviews with the quantitative analysis. This is followed by how this impacts agriculture and some specifics on agriculture in Europe. The qualitative analysis will then continue with sustainability and how this impacts agriculture in Europe. Followed by EU policy which is used to reach sustainable agriculture in Europe. Then the theme on financials will explain how the EU uses financial incentives to reach sustainable agriculture. In the transition theme, the qualitative analysis looks into what is required for the transition towards sustainable agriculture in Europe. To end with the technology theme in which two possible solutions are discussed that could be partial solutions in reaching sustainable agriculture in Europe.

6.1 Climate Change

Different aspects of the effects of climate change have been mentioned in different interviews and therefore the theme has been divided into four sub-themes. The sub-themes highlight the main effects of climate change that are experienced by the different farmer associations. These sub-themes are then linked to quantitative analysis and the theories of Change Management and Transformational Leadership.

6.1.1 Temperature

The quantitative analysis provided empirical evidence for climate change in both Northern and Southern Europe. Showing that for both regions there is a structural increase in average temperatures over time. Farmer associations in Spain state that *"Climate change is causing changes of crops in certain areas, due to the increasing temperatures, and drastic precipitation changes"* (Questionnaire Spain, 2021). Thus the temperature increases in the past have already caused changes in crops. Because climate change is not stopping overnight, it is plausible to assume that temperatures will continue to increase and thus keep impacting crops. Without changing the crops that are grown in a region the yield of the crops will decrease. The theory of Change management looks to continually review a situation and is therefore valuable in the situation of the crops in Spain. Due to the changes in temperatures and precipitation the farmers have to keep evaluating what crops would grow in their region and adjust the crops that they are growing to the new temperature and precipitation levels.

6.1.2 Precipitation

The precipitation has been changing over the past 20 years in Northern and Southern Europe, as is shown in the quantitative analysis. The North of Europe has seen an increase in precipitation, while the South of Europe has seen a decrease in precipitation. However, these are general trends and do not guarantee more or less precipitation in the next year. This is experienced in Denmark where the farmer association states that "*We have had one of the most serious droughts in 30 years in Denmark. And then the year after we had one of the wettest we have had. So we have seen some extremes"* (Interview Denmark, 2021). Thus even though there is evidence for general trends in changes in precipitation, the farmers still have to be ready for years with high precipitation and low precipitation. Thus farmers have to prepare for droughts and flooding at the same time in order to protect their harvest. The experiences in Sweden are similar to the recent experiences in Sweden where the farmer association states that *"You might get a very late frost, even though on average the temperature is higher. You might get drier summers, even though on average the precipitation is higher. And that makes it very difficult for performance"* (Interview Sweden, 2021). The experience in trend for both the temperature and precipitation is in line with the results of the quantitative analysis. However, as mentioned by the Swedish farmer association, this doesn't mean that this trend occurs every year. Even when farmers adjust to the extreme and sometimes unpredictable weather events, they will still be impacted, which will be visible in the production quantities of the farmers.

6.1.3 Performance

As mentioned, the more extreme weather conditions impact the performance of the farmers. However, the weather conditions change differently in the different parts of Europe, as is shown in the quantitative analysis. The Swedish farmer association states that "*it seems like Scandinavia is one of the parts that will be least affected by climate change"* (Interview Sweden, 2021) when comparing the impact of climate change in Northern Europe with Southern Europe. However, that Scandinavia might be less affected by climate change doesn't mean that Scandinavia will not severely be affected by the effects of climate change. Furthermore, the Swedish farmer association states that there is a misconception "*the people think that it would be better here because it gets warmer. And that one of the problems with growing food in this part of the world is the cold"* (Interview Sweden, 2021). It is important to be aware that the different regions grow different crops, which have different optimal temperatures. With the structural increase in temperatures in Scandinavia it could be possible to grow different crops there in the future. Thus by adapting and changing the crops they are currently growing, there is an opportunity to grow crops they couldn't grow before. Therefore it is important that famers keep assessing the situation and change where possible and necessary to guarantee high performance in the future. Here it is important to use transformational leadership to show the opportunities to farmers, instead of telling

them to change. This will help get the farmers committed to the change and the new crops they can grow in the future.

6.1.4 Partnerships

Earlier in this theme the effects of temperature and precipitation changes were discussed and that farmers have been adjusting and will have to keep adjusting to the changing weather conditions. The farmers might be aware that change is crucial and be committed to changing their ways of farming or the crops that they are farming but they also need information on what the viable options are. Therefore, farmer associations like the Danish farmer association point out the *"strong involvement of researchers in our work"* (Interview Denmark, 2021). These researchers help investigate what is happening and what might be viable options in adapting to climate change. There is no universal solution that works in every region, because all the regions are experiencing different effects. However, there might be similarities across regions and solutions that are viable in multiple regions. Therefore the Danish farmer association states that *"our own research is done in collaboration with other researchers around the world"* (Interview Denmark, 2021).

6.2 Agriculture

One of the strongest themes that showed up from the results of the interviews is agriculture in its broadest sense. But in order to provide specific arguments the Agriculture themes have been divided into Sub-themes to pin-down the important currents of thought and trends. As broad as it can be, agriculture is represented by every country differently. As a result of the large extension of Europe, farms and farmers across the continent produce and practice different methods of agriculture. The differences in geographical and climatic conditions are the predominant reasons for the adoption of different agricultural methods.

6.2.1 Personal Benefits

The effects of climate change have been discussed in previous sections, the derivatives of weather changes on agriculture can affect farmers livelihood, as it has been shown in an interview with Belgium. Several terms such as ecological agriculture, conservation agriculture and regenerative agriculture surfaced during interviews to Bulgaria and Denmark; these initiatives are known among the farming community as sustainable practices that allow farmers to grow crops while preserving and maintaining the natural environment (Interviews Bulgaria and Denmark, 2021). Although farmers have the willingness to implement sustainability among their practices, still it is not perceived as economically viable for most farmers. In the interview with Sweden, there was an emphasis on *"several farmers are doing things just because it feels good and that's great. And that's something that we need to be very careful about, but I mean, you cannot live for so long, by just the feeling of doing something great"* (Interview Sweden, 2021). The meaning behind these statements aims to highlight the relevance and the need of farmers to be able to have a decent quality of life and earn sufficient money. The basic needs and priority from farmers must be met, in order to promote sustainable agriculture through European policies. With a similar perspective the interview to Danish farm association also indicated that *"it's a very competitive sector. You're fighting against the world market and you always need to have an edge since Denmark has some of the toughest environmental legislations already"* (Interview Denmark, 2021). As well, during the interview to Belgium, similar thoughts surfaced while discussing the impact of climate change in farmers well-being, by which the interviewee proceeded to say *"farmers are the first who's livelihood is impacted by changes, their life is being impacted by this every year"* (Interview Belgium, 2021).

6.2.2 Agricultural Options

Linking to the previous Sub-theme, several agricultural methods were discussed such as conservation agriculture, and how farmers can adopt different methods to grow food depending on their geographical

conditions . The following sub-theme arises as a result of the observations from the interviews from Bulgaria and Sweden, the perceptions that the association made was that farmers are to some degree sceptical of relying all their agricultural methods to one specific crop or agriculture technique. This is reflected in the statement "*hence farmers won't put all eggs in one basket, but rather spread their production widely"* (Interview Sweden, 2021), this could mean that farmers prefer to have multiple options and methods of growing food. In the case of Bulgarian farmers, the association mentioned that "*we will need time to convince these old school farmers that new technologies are needed and have to be applied"* (Interview Bulgaria, 2021). This could imply that there are certain regions of Europe where farmers are relatively slower at transitioning and adopting new technology and policies at the right time. Further consideration from northern European associations established the importance that different European regions have different needs. This was captured in the statement *"they have a completely different farming system than in a region that's completely flat"* (Interview Denmark, 2021). Thus, the bigger the regional agricultural differences are among member states, the more complex it gets when it comes to effective policy-making for the CAP. At the individual farmers' level, the implementation of standard agricultural policies across all EU countries is perceived with uncertainty and reluctance by some groups of farmers. As observed from the interview to Bulgarian grain farmers, "the *traditional and often conservative background of some farmers makes them less receptive to sharp changes"* (Interview Bulgaria, 2021). Leading them not to trust the recommendations from the European Commission in regards to the CAP objectives.

6.2.3 Farmers Quit

A lack of cohesiveness between the implementation of EU policies and the involvement of farmers at all levels imposes organisational issues and policy-making redundancies in regards to the correct adoption of policy measures. The agricultural alternatives and common issues were discussed in the previous sub-theme, farmers find increasing barriers that lead them to conflict and misunderstand the end objectives from the CAP. As these policies are overly ambitious, and it does not count with the back-up from farmers. Increasing bureaucracy and disconnection from policymakers is leading farmers to also consider the weather agriculture is worth their time and investment. Almost in every interview the idea of "*farmers want to quit their jobs*" was present, the increasing difficulties of working as a farmer in Europe, and the highly urbanized path of modern society, are contributing to a reduction of skilled farmers across all European countries. The first example was stated by the Swedish farmer association "*And I fear that we are losing so much knowledge and so much experience. So we'll have things in Sweden where I think we're losing one farmer every eight hours"* (Interview Sweden, 2021). In relation to, similar findings surfaced from the interview with northern German farmers, where it was stated "*I would say my parents' generation is the first generation for all families of anyone in our region who doesn't actively grow their own food to a certain extent"* (Interview Germany, 2021). Thus it could be considered a systemic issue, the fact that farmers are no longer willing to keep up with agricultural jobs could potentially affect the food supply in Europe. In conclusion, the results from the interviews in regards to the role of farmers and the job activities denote a clear lack of leadership, which could be affecting the transition of the agricultural sector towards a sustainable future.

6.2.4 Experience

The importance for society of having farmers' practical knowledge is invaluable and necessary for the correct agricultural and societal development of our communities. Thus, it is important to protect farming jobs and the agriculture sector in the EU. It provides knowledge in regards to the creation and production of essential goods, and contributes to the stability of food security from a supply chain perspective. The interview with Sweden brought up meaningful observations in regards to knowledge management within the agriculture sector. The idea was explained as "*people from other parts of the world, they could bring huge experiences of managing situations that we haven't had in Sweden in the past, but they have been able to or had to work with droughts. Which are far more often occurring in places like Syria"* (Interview Sweden, 2021). The exchange of knowledge seems to be necessary between countries, more specifically when facing increasing climate challenges that affect the world at

global scale. Here is where the experiences of farmers are vital resources of information for food production. Furthermore, the interview conducted to Bulgarian farmers association also mentioned that "*Sharp changes in their working pattern are difficult for them"*(Interview Bulgaria, 2021). The association also indicates that "*old school farmers are more likely to continue using their traditional methods of production*" (Interview Bulgaria, 2021), whereas the increasing communication challenges are making farmers less receptive to the use of new technologies. Furthermore, the Belgian crop protection association mentions that *"climate change affects every farm differently because it's changing something different in their little ecosystem"* (Interview Belgium, 2021). Thus the experiences are different across regions and thus there is a need for a variety of solutions. Here communication is important, because it helps the continuous reviewing of the situation, which is a key element of change management. Including the experiences of farmers in the process of managing the change towards sustainable agriculture improves the sustainability of the change.

6.3 Sustainability

The Green deal, CAP policies and Farm-to-Fork strategy place sustainability at the heart of the EU and the new CAP policies should be better targeted to achieve the targets established by the 17 SDGs. From all the questionnaires and interviews conducted to farmers associations and European Authorities in the field of agriculture, many of them had Sustainability at the top of their priorities, and all of the interviewees were aware of the importance of sustainable agriculture. The findings from the interviews were structured into the following sub-themes.

6.3.1 Fertilisers - Pesticides

Some of the latest policy implementations from the CAP are targeting the reduction of Phytosanitary (pest control and fertilizers) products for the growing process of agricultural products in the EU. The application of *fertilizers like nitrogen are necessary to have an abundant harvest* was stated by the Association of farmers from North Spain. In addition, they continued explaining that the current CAP policies promote a reduction of fertilizers and pesticides as harmful substances, yet the EU doesn't provide an alternative for farmers to supplement their production losses. The Spanish Association argued that the use of these chemicals are essential to prevent pests and plagues that could destroy their crops. Similar views were provided during the interview to Swedish farmer association where they stated that "the current discourse is that we don't want fertilizers because they affect the overall system, but in an increasingly volatile world, the benefits of using these wisely would provide more precision farming" (Interview Sweden, 2021). Thus, the results provided along this sub-theme lead this research to believe that there is a discrepancy between the policy objectives from the CAP and the farmers' needs.

6.3.2 Finite Resources

One of the essential key pillars of sustainability is to find ways to avoid consuming finite natural resources from this planet. Together during the interviews conducted to Sweden and Denmark there were interesting observations in regards to the use of finite resources to make the agricultural industry function more sustainably. One of the quotes that confirmed the assumption was, "It's absolutely not sustainable to continue overusing finite resources like fossil fuels" (Interview Sweden, 2021). Similar comments also appeared during other interviews such as for example the one done to Bulgarian Grain Association. As well, parallel views were shared during the interview to Sweden were they also stated that "*one of the things that I find challenging is the realization that the only sustainable way forward in any meaning of the world is exactly what I talked about before not using finite resources as part of building our economic activities on renewable ground"* (Interview Sweden, 2021). Henceforth, it is evident that the results from the interviews indicate that farmers are aware of resource management problems that the EU faces. And there seems to be willingness to change from their perspective, towards achieving more sustainable solutions like renewable energies.

6.3.3 Feasibility

Along this sub-theme the main focus was how sustainability can be difficult to achieve for certain farmers. The results from the interviews indicate that the perception about farmers is often misunderstood, in regards to their efforts to become more sustainable. The following statement confirms this, *"In the end, it was like, look at what we can do to become more sustainable, most people think that we could do much more, but with much less money, that becomes kind of tricky"* (Interview Sweden, 2021). Furthermore, farmer associations in the Czech Republic are having a different approach to ensure and protect farmers' rights, they stated that "*We are focused on defending rights and interest of private farmers, which are in general more environmentally friendly and sustainable, using various measures helping to mitigate the climate change compared to big agriculture conglomerates" (Documents Czech Republic, 2021).* Moreover, the responses from the Czech interview also provided an important observation in regards to how the implementation of sustainability can become a problem for farmers in different European regions. The statement was "*That problem is, for farmers above all, especially the intensity of sustainability and greening of agriculture, and the rate of compulsory funding for the so-called eco-scheme.* (Documents Czech Republic, 2021). Thus, the findings lead this research to believe that although the Green deal and CAP can provide opportunities to further sustainability, the responses from the interviews to northern German farmers indicate that current policies are "*not working in the sense that provides sustainable innovation to regular farmers*" (Interview Germany, 2021)

6.3.4 Biodiversity

The following sub-theme will summarize the thoughts surfaced from the interviews in regards to how the environment and agricultural practices can interplay a crucial role influencing the development of the ecosystem at European level. The Swedish association explained that the CAP measures have been implemented for 40 years in Sweden. Thus, they continued stating that "*It's not so much, or if any support for increased production, but rather for other values that are being produced with similar production, take better care of the biodiversity with similar production would use",* therefore there is a bigger focus on preserving the environment while producing the same amount of food. Furthermore, the association carried on talking about the Eutrophication of water which they stated that " it's of course a huge part of making production environmentally more sustainable" (Interview Sweden, 2021). The expected population growth will require 45% more on top of current food production to satisfy the world's needs. The farmer associations in Sweden and Bulgaria consider that the increase of food production should not be at any cost, and there should be bigger efforts to preserve the rainforest and untouched areas which should not be dedicated to farming (Interviews Sweden and Bulgaria, 2021). On the other hand, the association in North Spain considers that new changes on CAP policies will inevitably force farmers to give up some of their lands to dedicate them to protect biodiversity, and as It was explained, this was not considered fair for individual farmers as it represents economic losses for them.

6.3.5 Agricultural Sustainability

This sub-theme will discuss how farmers associations interpret and view the impact of the agricultural sector in regards to the sustainability challenges that the EU is facing. As it has been shown previously certain European countries take sustainability very seriously, Sweden highlights that "*the green sectors, we're not there yet, but that's what we are working for trying to show Europe and the rest of the world that the green sectors are the solution, not the problem.* (Interview Sweden, 2021). Furthermore, the Danish farmer association also seems to share this opinion, "*And most of our thinking is in line with, with their thinking that you need to become sustainable intensive on your existing farmable hectares"* (Interview Denmark, 2021). However, other associations as in Bulgaria, believe that sustainability could be achieved by implementing irrigation systems, in order to have a better control of water usage (Interview Bulgaria, 2021). Further suggestions were made, stating that "*conservation agriculture could be a great part of sustainability in agriculture".* Different sustainable solutions were discussed during

the interview with the Spanish association, the main argument for improving sustainability in the agriculture sector was *"We are aware that sustainable agriculture is possible, but it has to come through biotechnology"* (Interview Spain, 2021).

6.4 EU Policy

As a result from the multiple interviews conducted across European farmer associations ranging from national grain association to crop research and protection associations, the topic of EU policy and CAP were recurring statements and considerations from the interviewees. Furthermore, the theme of European Policy has been also organized into Sub-themes which derived from the interviews' findings. The division of the themes into sub-themes is aimed to provide a more detailed method of analysis to interpret the results obtained, which will provide valuable arguments for this thesis discussion. The creation of new policies in relation to climate change and imminent need for adaptation of the agriculture sector are an increasing preoccupation for EU farmers, this is caused by a miscommunication element which has not been identified, creates resistance, and obstacles the implementation of European policy-making from an organisational perspective.

6.4.1 Farm- to-Fork Strategy

Some of the new CAP policies targeted to promote sustainability in the agriculture sector are very ambitious, but often lack a realistic perspective (input) from the individual level of European farmers. The European commission states in their official website that the "Farm to Fork Strategy" is at the heart of the Green Deal, aiming to make food systems fair, healthy and environmentally friendly (European Commission, 2021). Although these policies are relatively new, farmers associations in Sweden consider that "*such policies have already been in place in Sweden for more than 30 - 40 years"* (Interview Sweden, 2021). Thus, there is an outdated view in certain countries in regard to the implementation of policies such as "farm to fork". But this view is perhaps more common in northern countries, compared to the rest of the European member states, which are still catching-up in regards to modernisations of their industries. Whereas, in southern European countries such as Bulgaria there are more things to work on and improve, as their mechanisation level is still relatively lower compared to highly industrialised western countries. Perhaps the high level of industrialisation and mechanisation of northern countries has contributed to a lack of adaptability and effective implementation of new sustainable policy objectives (Interview Denmark, 2021). Further evidence on the obsolescence of the application of certain EU policies in regards to the CAP surfaced in interviews to Germany and Belgium, in which they highlighted the conservative character of the European Commission in regards to the development of policies for the agriculture sector (Belgium, 2021). In addition, the responses from farmers in North Germany also stated that the European Commission applied a *"helicopter view"* when legislating policies for the CAP. This means that a lot of the policies have a *"Standard"* character, and are not well fitted or tailored enough, to fit the needs of specific European regions (Interview Germany, 2021).

6.4.2 Organisational Trust

As it has been stated previously a recurring communication issue arises from the farmer experiences as the objectives of the CAP policies are highly ambitious in regards to the sustainable transition. Yet, these policies have proven difficult to adopt and implement by a large number of European farmers. A fundamental communication issue arises during interviews to Belgium and Germany in particular. This issue had to do with the representation of individual farmers at all levels across European countries, meaning that their voice was not properly heard, and oftentimes ignored by the bureaucracy and policy makers in Brussels. This common communication problem and misunderstanding of farmers' needs was also present during the interview to northern Spanish farmers (Interview Spain, 2021). The interview from Belgium was important in regards to understanding the role of how the European

Commission perceives individual farmers. And highlighted that " *I often take part in conversations in Brussels about farmers, on the assumption that they don't really know a great deal, which is incredible*" (Interview Belgium, 2021). In relation to this view, farmers in northern Germany also felt frustrated because they weren't really asked about their needs (Interview Germany, 2021). Although these subsidies are completely necessary for German farmers as they need them to survive by default.

6.4.3 Carbon Footprint

In relation to the CAP and European Commission's plans on the reduction of the polluting emission from the agriculture industry in Europe, certain divisions were perceived from the farmers associations. This was caused by the lack of understanding and clear communication of the objectives that these new policies aimed to help transition farmers to sustainable farming. A recurring subject when talking about climate change and agriculture is carbon emissions. During the interview to Denmark the answers from the interviewee mentioned that the concept of Carbon Footprint among farmers and the European commission was not very clear. This could be a possible miscommunication element, which inhibits the proper understanding of the policies in regards to carbon reduction and controlling the emissions created by agriculture. The farmer association in Denmark proceeded to explain "*instead of using the CAP strategic plans to necessarily cope with carbon footprint, you also had the idea that you could actually put all the feasibility of a future market-based approach to carbon farming"* (Interview Denmark. 2021). In relation to the production of CO2 emissions and the carbon footprint of the agriculture sector in Europe, the Spanish farmer association discussed how the use of crops like "*Corn can be used to reduce the impact of polluting emissions"* (Interview Spain, 2021). As the association explained, corn could contribute to the absorption of emissions, so the more planted hectares the more hazardous substances that the plants can remove from the air and the soil. When mentioning the carbon emissions from agriculture the response from the Swedish farmer association was "*we should have a hundred percent … the other stuff should be gone. So we should be the only ones emitting climate disturbing substances, of course they should be as low as possible"* (Interview Sweden, 2021). However, the Swedish farmer association points out that there are many industries who are emitting carbon emissions and that they are not vital for human survival. The farmers are committed to reducing carbon emissions but, instead to certain other industries, will never be able to produce without any carbon emissions.

6.4.4 Market-Based

The results from the carbon emissions produced by the agriculture industry in Europe are a public element of discussion which often influences the markets and the perceptions of consumers in regards to certain products and the relation to direct carbon emissions. The following Sub-theme surfaced as result of the interviews conducted to Belgium, Denmark and Sweden. The implications deducted from the interviewees responses were concerned with the relation of farmers' production with the market demands. Market-Based was a recurring idea which aimed to highlight the importance of farmers producing ethically, and not just growing products if there is not a demand for them (Interview Sweden, 2021). A similar view was shared by Danish associations "*market-based, what is then remunerated by the market will always drive a better agenda, but the problem with organic production is that it is difficult to sell (high prices)"* (Interview Denmark, 2021). What this is meant to reflect is that farmers shouldn't just grow anything but should have a market-based production, following and understanding what the people want to eat. Because it makes no sense to produce Bio-food if there isn't a demand that is willing to pay higher prices for it. The Interview from Denmark also provided insights into how it is necessary to have a market view from the individual farmer level, this was shown in the following statement: "*so certainly have as a guideline that you have a keen eye on what the market is, what is the market driving?"* (Interview Denmark, 2021). While comparing these statements with the interview with Sweden, there was a similar view on how different European regions might have different demands or needs in regards to the type of products they want to consume. Therefore, there should be more flexibility for farmers and with the crops they can grow. The Danish farmers association brought up this point, stating that " *It has to be adapted to regions because we've seen various examples over the years*

where you've produced new bio-food, and they don't actually make sense everywhere. So we need some flexibility in what you're doing" (Interview Denmark, 2021). Thus, in this aspect of EU policy and the CAP the interviews provided strong references to suggest that there should be more flexibility for policies targeting the production of Bio products or Bio-farming. Because different consumers in different European regions want different foods, and this needs to be taken into consideration when choosing what to produce.

6.4.5 Future of CAP

The relation of the production of agricultural products and the influence from the market-based are observable variables that could help understanding patterns of consumption, in order to find a way to predict risks on the food supply and ensure food security in the EU. However, the future of climate change cannot be predicted with absolute certainty. Additionally, farmers will have to adapt to the continuously changing EU policies and regulations. As mentioned before, the different regions are impacted differently and therefore will need different solutions in the future. One of these solutions is conservation agriculture, of which the Bulgarian farmer association states *"I like these new principles in this agricultural system. I see that they are good, there are profits for the soil, for the climate, for the environment"* (Interview Bulgaria, 2021). Providing different options to farmers in the future will assure that there is a viable solution for every farmer in every region. When a possible solution makes sense to a farmer or when the farmer is interested in a specific solution, then this will help to commit the farmer to make the changes that are required for farmers to be able to deal with climate change and guarantee sufficient food production in the EU. In one of the questionnaires to the Czech Republic (2021), the following statement was replied when asked about what the future looks like, "*Lively rural areas with functioning family farms of various specializations".* This line of argument was observed in the interview to Spanish association, where he stated that "*It almost seems like the European Commission wants thousands of tiny small farms like 100 years ago, they are making policies to incentivise this type of small-scale production"* (Interview Spain,2021). When referring to change management during the interview to German farmers, they indicated that sustainable transition and change will start from the individual farmer. The quote was the following "*for the farmers, I would start with them because they are the most important parts in the chain because they're leading the process there"* (Interview Germany, 2021). In contrast, the findings from the interview with Bulgaria highlighted the importance of the generational factor within traditional agriculture, and how it relates to the future. The answers stated that "*It's not the old school farmers, but at least their children or the future farmers"* (Interview Bulgaria, 2021). Therefore, the importance of how the Common Agricultural Policies impact farmer associations and individual farmers was made evident during some of the interviews. Thus the farmer associations agree that the farmers should be the starting point of the policy making for future policies, because this would improve the commitment of the farmers and improve the sustainability of the changes. However, the Czech Association states on their website that *"it increasingly appears that the shape of the CAP from 2023 [2021 and 2022 will be a transitional period] will be less different from the current CAP than most of the actors from both groups [farmers and conservationists] expected"* (Documents Czech Republic, 2021). In contrast the documents supported by the Dutch association provided a different perspective on the same matter. The argument was that "*these ambitious goals can only be achieved if the preconditions regarding regulations, financing and cooperation with relevant chain parties of the Agriculture & Climate Table are met"* (Documents Netherlands, 2021). For the success of the transition towards sustainable agriculture it will be important to include the farmers and use change management to make the new policies through co-creation. Furthermore, it will be important to improve the communication between farmers, farmer associations and EU policy makers. In this setting transformational leadership would help to improve the communication, which would also help in continuously reviewing the structure and policies, and getting the farmers committed to the required changes.

6.5 Financials

There are many different ways in which the financial aspects play a crucial role in transitioning towards sustainable agriculture in the EU. This happens through the EU policies, where they try to promote certain farming methods and impose barriers on methods of agriculture that are not in line with the EU vision. Additionally there are national financial incentives that impact the financial situation of the farmers. This theme has been divided into five sub-themes, which will be linked to quantitative analysis and the theories of Change Management and Transformational Leadership.

6.5.1 Land Prices

The quantitative analysis in this paper pointed out that there are trends of increasing temperatures across Europe and that there are trends of changes in precipitation in Northern and Southern Europe. This impacts the growing conditions of the crops and therefore also impacts the value of land. Because the impacts of climate change are different across regions, the impacts on land value are too. This is confirmed by the Swedish farmer association who mentioned that *"the European environment agency had a prediction on what will happen with land prices due to climate change ... they say that for agricultural land in Sweden, they expect an increase by at least 60% in the land value. Whereas in Spain, they expect a decrease by over 80%"* (interview Sweden, 2021). This shows that the land owners of land in Southern Europe that is available for agriculture might suffer financially from climate change, apart from the effects of climate change on their production. The Swedish farmer association also pointed out something about agriculture, that *"it's very capital intensive and the more technology, the more precise"* (Interview Sweden, 2021). The combination of land prices with the capital intensity makes it difficult for new farmers to purchase a farm and the required equipment. This severely limits the entry of new farmers into the European agricultural sector. Thus changes are required to guarantee a sufficient number of farmers in the future.

6.5.2 Investments

The changing land prices, increasingly required technology and preparations to extreme weather events lead to high investment cost for both new and established farmers. This requires changes on multiple levels. When discussing the changes to more extreme weather conditions the Swedish farmer association states that *"it also makes it very costly because you would probably have to invest both in irrigation systems and an increased drainage system because you need to be able to manage both types of extremes far more often, but you only get value for your investment when that happens"* (Interview Sweden, 2021). Thus the farmer has to invest into adjusting their land to possible extreme weather conditions, which severely increases the investment cost. However, it is not possible to not make these investments, because then the occurrence of extreme weather could completely destroy the harvest. The higher investments needed to secure food production required changes from banks in addition to the changes from the farmers. The Danish farmer association looked at the changes they experienced with the willingness of banks to loan money to farmers. They state that *"since the financial crisis, there were a lot of difficulties in getting banks to lend out money"* (Interview Denmark, 2021). But they experienced that the vision of banks towards agriculture has changed in recent years. The Danish farmer association states that "they are very willing to put money into farms" (Interview Denmark, 2021). Thus not only did the farmers change their way of farming, but there was also a change in the banking world, which helped make it possible for farmers to make the required changes.

6.5.3 Supply Chain

Another issue with the investments that are done by farmers is the return on investments for farmers. The farmers produce food, which they sell to the food industry and eventually the food ends up in grocery stores or in restaurants. An important thing to notice is that in this supply chain there are severe differences in returns on investment and thus profit margins. When talking about the supply chain of food with the Danish farmer association, they pointed out *"the return on investment in primary*

production is about four, four and a half percent. When you go to the food industry it is 12 to 15%, when you go to the grocery stores it's 25%. And when you go to the restaurants it's 40%" (Interview Denmark, 2021). This points out that the big profits are made at the end of the supply chain. But the EU policies are aimed at the farmers, who are in the beginning of the supply chain, with the lowest return of investment. Thus the group with the lowest profit margin now has to make expensive investments. The theory of change management focuses on continually reviewing situations and structure, thus with this theory in mind it might be good to examine the supply chain and see how the other groups in the supply chain can be part of the change. For instance they could link transformational leadership to the returns on investment, where the return on investment of the farmers increases when they are committed to growing crops more sustainable. This is something that is already happening with grocery stores that mainly sell products from BIO farms. These stores provided financial incentives to farmers so that they could be committed to more sustainable farming practices.

6.5.4 Financial Sustainability

The investments that are required to comply with the new regulations from the EU impact the financial sustainability of the farmers. The aim of this paper is to examine how change management and transformational leadership can be used to improve the transition towards sustainable agriculture in the EU. However, sustainable agriculture is the end goal and the sustainability regulations, EU policies and financial incentives help to reach that goal, but all of this is only possible when there is financial sustainability for the farmers. When discussing financial sustainability with the Dutch farmer association they mention *"the current earning capacity of farmers and market gardeners is not sufficient to achieve the desired transition"* (Document The Netherlands, 2021). This is supported by the farmer association of the Czech Republic, in their opinion the biggest problem towards sustainable agriculture is *"lack of financial resources"* (Questionnaire Czech Republic, 2021). The Swedish farmer association added to this argument by saying *"you need something in your belly as well, and something in your wallet, otherwise it's not sustainable. And I think that's one of the challenges we are seeing currently"* (Interview Sweden, 2021). Thus the farmer associations do see the value of sustainable agriculture in Europe but are worried about what the changes mean for the income of the farmers. The farmers have to be able to live from the money they earn with farming, otherwise they will stop farming and this could eventually lead to food shortages. According to the farmer associations the majority of the farmers are committed to sustainable agriculture and not against the required changes, but the farmers have to be enabled to make the changes. Thus the changes in requirements by the EU should be followed by EU subsidies, so the farmers are enabled to make the investments that are required and help improve the transition towards sustainable agriculture in Europe.

6.5.5 Taxonomy

An important aspect of financial sustainability is enabling the farmers to make the required investments and changes in methods. The most common way to do this in Europe is by subsidising technologies and methods that are in line with the EU vision and policies. This decreases the cost for farmers to make the changes in farming methods that align with the EU policies. These subsidies are paid with tax money, ideally these taxes are put on things that the EU wants to move away from, such as carbon emissions. When the Swedish farmer association was asked about the taxonomy their response was *"if you look at the taxonomy, they are putting barriers and hinders for the agricultural sectors rather than helping them along"* (Interview Sweden, 2021). This would mean that the taxes that are gained from the 'bad' farming methods in the EU are not reinvested into the 'good' farming methods, which then impacts the financial sustainability of the farmers. The Danish farmer association agrees that the current taxonomy is not in the best interest of the farmers. A suggestion from the Danish farmer association is *"you could somehow have a crediting scheme"* (Interview Denmark, 2021). The most common example of crediting mechanisms is the carbon emissions mechanism. Here companies or farms get a certain amount of emissions that they are allowed to emit and if they emit less, then they can sell the remaining quota on a trading market to other farms or organisations. A trading scheme like the carbon emissions scheme can help motivate farmers, who don't trust the EU bureaucrats, to adjust to the policies and

goals that are set by the EU. Furthermore, during the interview with Belgium it was also highlighted the importance of the "*need to have a regulatory framework and financial framework that supports"* the EU direction (Interview Belgium, 2021). Thus regardless of the chosen financial framework that the EU uses, it is important that this framework aligns with the EU policies and creates incentives for farmers to commit to the changes.

6.6 Transition

The previous themes highlighted different aspects that should be considered in the transition towards sustainable agriculture in the EU. This theme will examine the different changes that are needed at the different levels, thus for the farmers, farmer associations, on EU policy level and even for society. This is done by linking the five sub-themes to the quantitative analysis and linking the qualitative data to the theories.

6.6.1 Variability

The quantitative analysis provided empirical evidence for climate change in Northern and Southern Europe. Furthermore, the tables with monthly changes, which are shown in Appendix A, show that the variability increases. The variability both within and between months increases. This makes it more difficult for farmers to grow their crops because there is more uncertainty about the weather and growing seasons. The challenge of increasing variability was also pointed out by the Swedish farmer association, they stated that *"the big new challenge is that the variability will increase. We will have less and will be less able to plan because there will be real uncertainty on what will happen"* (Interview Sweden, 2021). Thus the farmers will have to manage the change in weather conditions to be able to keep growing food. The increasing regulations and the decreasing subsidies add to the challenge of managing the change in weather conditions. In addition to these general issues there are regional issues, because not every solution to manage the changes in weather conditions will be applicable in all regions in Europe. Thus there is a need for variability in solutions, so that there are solutions for the different regions in the different weather events. This is in line with thoughts of the German farmer association who states that *"the transition, it takes time, it takes resources and then it's not guaranteed that the transition is successful and it is different for every region"* (Interview Germany, 2021).

6.6.2 Research

A substantial portion of the total CAP budget goes into research, which is important because research provides the different options in which a transition towards sustainable agriculture is possible. The Danish farmer association noticed that *"more funding into the climate solutions in agriculture are being prioritised"* (Interview Denmark, 2021). This shows that the EU is aware of the importance of the research and that the different partial solutions that are found in the research are important in enabling farmers with options towards sustainable agriculture. Furthermore, it is essential in getting farmers committed to changing their farming methods, which is easier when there are suitable solutions for the farmers in the different regions. The Swedish farmer association points out that just research might not be the way forward in finding partial solutions towards sustainable agriculture, they state that *"sometimes a lot of money has been spent on academia, which is great. But I think there should be some more collaboration with the actual practitioners"* (Interview Sweden, 2021). Therefore it is important to get the different stakeholders committed to being part of the research. Here it is important to use transformational leadership instead of the current transactional leadership, so that stakeholders at the different levels and regions actively participate and help find solutions to deal with climate change. When the German farmer association was explaining what kind of help the farmers needed the response was *"we require social innovation, not technological innovation"* (Interview Germany, 2021). The EU should prioritise getting the correct governance systems in place and including the different stakeholders in these governance systems so that the technical solutions can be used efficiently. The lack of communication in combination with the current transactional leadership leads to frictions and theoretical solutions that are not being used in practice. Here transformational leadership can provide a

bridge between the different stakeholders, this would help farmers getting committed to the solutions and this will also help in making sure that the solutions that are found are actually being put into practice.

6.6.3 Technology

The main results from research are technological innovations that could be used as tools in dealing with climate change. Because there are many farming methods and severe regional differences there is a need for a range of technological innovations. The Belgian crop protection farmer association states that *"key is you need to ensure that you have a pipeline of different innovative fertilisers, tractors, drones, other things, coming to market to allow farmers to use it"* (Interview Belgium, 2021). This would help provide technological innovations to a wide range of farmers, from crop farming to cattle farming. Then the farmers also have choices in what technological innovations they prefer to use. What is often forgotten in making policies is that farmers have been farming in a specific way with technologies they are used to and methods that align with their interests. Then a technological innovation could help reduce emission, but if the farmers are not used to this technique then this could lead to new problems. Therefore the Bulgarian farmer association mentioned that *"if we have to make changes in the farmers' technologies and systems, we have to do it step-by-step, very gradually, very slowly"* (Interview Bulgaria, 2021). The sustainable agriculture in Europe requires change, however, the change has to be sustainable too. If the change is not sustainable, but rather temporary, then there will be no sustainable agriculture in the EU. Therefore, it is important to align the pace of change with the capabilities and willingness to change.

6.6.4 Farmer Associations

An important group of stakeholders in the transition towards sustainable agriculture is the farmer associations, they are the bridge between national and EU policies on one side and the farmers on the other side. The Swedish farmer association agrees that they have a key role in connecting policy makers and farmers, they state that *"our job is to influence. We are trying to influence the government to spend more on agricultural research"* (Interview Sweden, 2021). This helped improve the budget for research and as stated before, research is one of the key elements in transitioning towards sustainable agriculture. The Bulgarian farmer association added to this by stating that *"we have to educate the farmers first. This will happen through organisations like our farmers organisations advisory services"* (Interview Bulgaria, 2021). Thus in managing the change in agriculture in Europe, there is a key role for farmer associations as a mediator. The European Commission agrees that the farmer associations are important, they state *"you are more likely to achieve your results"* (Interview European Commission, 2021). Farmer associations can improve the communication between farmers and policy makers and educate the farmers to improve the co-creation of solutions. Furthermore, the farmer associations can continually revise the situation and check what changes are necessary at what level to stay on track for the long-term goal of sustainable agriculture in Europe.

6.6.5 EU Policies

The EU policies are key in transitioning towards sustainable agriculture, because the policies are a roadmap on how to reach sustainable agriculture. Because the changes have to happen on multiple levels there should also be input from these multiple levels in the roadmap. The Swedish farmer association agrees that the policies should not solely be set by EU officials by saying *"I don't think that sort of trying to push sustainability down on farmers by enlightened bureaucrats will be the way forward. No, you need to build this from below. And I think there's a huge opportunity there"* (Interview Sweden, 2021). The Belgian crop protection association agrees with the Swedish farmer association, they state that *"so making sure that the farmer is empowered to make change happen, that would be the biggest block in my view"* (Interview Belgium, 2021). Thus the farmer associations agree that the farmers should have more power when it comes to managing the changes. Furthermore the German farmer association feels the policies are very focused on the farmers and not on the big picture. They state *"the*

policies are focusing on the wrong things. They want the farmers to change. The farmers can change, but for farmers to sustainably change, they need to work like a supply market and cooperate with the companies that buy and sell the food" (Interview Germany, 2021). So instead of solely directly targeting the farmers, it could be a good idea to target the total supply chain and even the end consumers and in this way indirectly target the farmers. This would mean that not just the farmers have to change, but that instead changes in society are necessary and what should be included in the EU policies. In addition to this the Bulgarian farmer association mentions the pace of change, as stated before change is easier in smaller steps and therefore they think it is best to use baby steps. The Bulgarian farmer association states that *"small steps are always the better choice. So in order to reach sustainability, you have to concentrate on these small steps and small changes"* (Interview Bulgaria, 2021). This is in line with the fact that people have habits and routines and that changing them is easier with smaller steps. However, there needs to be a balance between research and conventionality, because if the steps are too small, then sustainable agriculture will come too late. Therefore, it is important to manage the change by continually reviewing the situation and what changes can be made at what level. By co-creating the policies the different stakeholders will be more committed in achieving the set goals. The European Commission explained that in the new CAP this is taken into consideration they state *"the policy that we put in place in 2013 for agriculture has not been successful. One of the reasons it has been unsuccessful is that it is not very ambitious, but also that it is not well adjusted to local circumstances"* (Interview European Commission, 2021). To prevent this from happening again, the member states were asked to come with a strategic plan that would take the local circumstances into consideration.

6.7 Technology

The qualitative analysis already discussed how research helps the transition in finding new technological innovations. This theme will highlight two technological innovations and how they can help in the transition towards sustainable agriculture.

6.7.1 Hydroponic Farming

Hydroponic farming is a way of climate controlled, indoor farming. Hydroponic farms can produce crops all year round and substantially reduce water usage. By using hydroponic farms the amount of agricultural land increases due to building upwards, by using multiple levels a farm can have more crops with the same footprint of land (Despommier, 2010). This would mean that the crops have their own climate, which is indoors, and be less affected by climate change. Therefore, the farmers would have to transition to hydroponic farming, but when they do they do no longer have to continuously adapt to the changing weather conditions. The Swedish farmer association has the following opinion on hydroponic farming *"It's excellent. But I don't think that we should see that as the solution. It's one beautiful piece of a very integral puzzle and we should use it where it works, but we should not see it as a way that will change things entirely"* (Interview Sweden, 2021). The Belgian crop protection association adds to that by saying *"I think hydroponic farming is a fantastic example of how you can evolve"* (Interview Belgium, 2021). The Danish farmer association also sees the opportunities of hydroponic farming but points out that there are also disadvantages *"it's very energy intensive production. I think that's what you would look into in the coming years and I see some of our co-ops already doing it"* (Interview Denmark, 2021). Thus hydroponic farming is a technological innovation that can help in the transition towards sustainable agriculture in Europe. A massive advantage of this method of farming is that the farmer is less dependent on changing weather conditions and thus has more stable production. This would require a significant change for most farmers, but it would also guarantee that there won't be many other changes in the upcoming years. Thus hydroponic farming will be a long-term strategy and create sustainable change, therefore, it is important for the European Commission and the farmer associations to use transformational leadership. This will help the farmer become committed to the change and will improve the success rate of the change, furthermore, this will help the process of co-creation and communication between the different stakeholders.

6.7.2 Genetics

Hydroponic farming requires a lot of technology and computer monitoring, therefore, this might not be a suitable solution for farmers that prefer conventional farming methods. For them genetics could be a solution. The Belgian crop protection association explains how genetics work, they state *"basically GMO's [Genetically Modified Organisms] is where you take one set of traits and another set of traits from a different cultivation … it's like selective breeding"* (Interview Belgium, 2021). The Spanish farmer association explains why genetics can be useful by stating *"genetics linked to biotechnology is what could lead us to obtain plants that are more resistant and resilient to weather changes, plagues and water-scarcity"* (Interview Spain, 2021). Thus genetics could help in making the plants more able to deal with changing weather conditions, this would give farmers more time to adjust to weather changes. This would be a good option in slowing down the change for farmers and improve the sustainability of the change by making it possible to have baby steps. Therefore, this will help farmers in their commitment to the changes and will help the farmers manage the change by giving them more time to implement the change. Currently the European Commission is against genetically modifying plants, however, the Danish farmer association thinks this will change in the future. They state *"I think you would see, over the next few years, a more lean stance on certain parts of how you genetically modify plants"* (Interview Denmark, 2021). Thus there is a need for changes on EU policy making level to allow genetics to be part of the solution of transitioning towards sustainable agriculture. Genetically modifying plants would be an option for farmers that prefer conventional methods and are not willing or able to switch to hydroponic farming.

7 Discussion

The qualitative study has provided observations in regards to how climate change factors can influence the environment and the development of agricultural practices in Europe. The interview's responses highlighted the increasing organizational issues that the EC faces and the bureaucratic and leadership problems that farmers undergo whilst applying to EU subsidies for instance. Furthermore, the climatic impact of faster recurring extreme weather events can alter the food stability of the EU, by directly affecting the organisational performance, being able to compromise food supply, within the agriculture sector in Europe. These challenges, which have been documented throughout the collected data from the interviews, indicate that the policies established by the EC in order to tackle the sustainable transition are not properly aligned with European farmers' views. This could imply that the efficacy of the strategies and policies aimed to promote sustainability are not fitting with current farmers' needs. Thus, the EC as an organisation faces several challenges in regards to their communication of the objectives to farmers, promoting enough resources and support to enable a gradual transition towards sustainable farming. The complementary quantitative analysis also indicates that average temperatures are increasing over time in both Northern and Southern Europe. The quantitative analysis showed how these increasing temperatures impact the precipitation, essential for agriculture, in both Northern and Southern Europe. The European farmer associations pointed out different problems in the different regions, which aligned with the results of the quantitative analysis. This means that farmers are experiencing different effects from extreme weather and that they also require different solutions to be able to deal with climate change. The difference between solutions depends on the region and has to do with adjusting to the changing weather conditions, combined with the need of farmers to comply and adjust to the changing EU policies regularly. These EU policies are a tool to reach sustainable agriculture in the future and meet the targets from the Green Deal and Paris Agreement. However, the interviews indicate a lack of communication between the farmers, who have to follow the EU policies, and the EU policy makers. This lack of communication leads to resistance among farmers and theoretical solutions that can not be implemented in practice. Therefore, there is a need for Change Management and Transformational Leadership, to close the gap between farmers and EU policy makers. The farmer associations interpretation on the relationship between farmers and the EU indicate that is very important, and they can have a mediating role to improve the communication and commitment of the farmers and policy makers. Change Management and Transformational Leadership will help in getting the farmers committed to the required changes, but also in the co-creating process. Furthermore, these theories will improve the communication so that it will be possible to continuously review the structure of the policies and the incentives that are required. Additionally, Change Management and Transformational Leadership will help in deciding what research is required to be able to deal with climate change.

The aim was to examine what environmental and societal challenges European countries face while transitioning towards a sustainable production method for the agriculture sector. This has been done by examining the effects of climate change in both Northern and Southern Europe and how this impacts the farmers in the different regions. Additionally, this paper has examined the current role of society in the production and how society impacts the different farming methods. For example, the lack of the demand for Bio-food by society caused Bio-farmers to produce more food than they could sell. This is an example of a sustainable farming method that has to be supported by society in order to be sustainable in the long-run. Furthermore, this paper examined the EU policies that create incentives to transition towards sustainable agriculture in the EU and how these policies could be more effective. This process has led to two potential partial solutions, which would help in dealing with climate change and also in transitioning towards sustainable agriculture. These solutions are hydroponic farming and genetically modifying crops. These options have potential to contribute to the transition towards sustainable agriculture, because with these methods the farmers will be less dependent on the weather conditions. Furthermore, these methods would reduce the usage of fertilisers. However, these solutions are not a holy grail and should only be applied in situations where they have severe benefits over conventional farming methods.

The results of this paper are in line with other research. There has been a large body of literature on climate change and that weather conditions are changing. Thus this research is supportive to the general literature on climate change, but adds to it by quantifying the impact of climate change and by comparing Northern Europe with Southern Europe. The benefits of Change Management and Transformational Leadership that this paper finds are supportive to the existing literature. Because Bass and Riggio (2006) find that transformational leadership is linked to commitment and is therefore important in realising change. Additionally, Pearce and Sims (2002) find that in change management the theory of transformational leadership helps to achieve effective change.

There is not an extensive body of literature on Change Management and Transformational Leadership in the agricultural sector that links the theories to EU policy making and the effects of extreme weather events. Therefore, this paper adds to the existing literature by examining the potential benefits of a combination of Change Management and Transformational Leadership in EU policy making, in the agricultural sector. Furthermore, this paper adds to the existing literature by linking the theories and policy making to the effects of climate change of the past 20 years. Thus this paper adds knowledge on how these theories can impact EU policy making in the current dynamic setting of the agricultural sector. However, it is important to note that this paper has some limitations.

The first limitation from the research is the low predictive power of especially the Northern European countries when it comes to average temperature and precipitation changes. This was expected, due to the low amount of control variables. Now the results showed that these suspicions were correct. This means that a large part of the average temperature and precipitation changes are explained by the missing control variables. By not knowing what these control variables were it was also not possible to include questions about them in the interview questions. Including questions about these independent variables that have a significant impact on the predictive power would give more accurate results for both the quantitative and qualitative analysis.

The majority of the interviews were with countries in North West Europe. Therefore, their views are over-represented compared to other regions, which possibly biases the qualitative analysis. By including more interviews from countries in southern and eastern Europe the qualitative analysis would be more representative for Europe and not just a part of Europe. Including these interviews additionally to the used interviews would highlight more of the problems that are experienced in the other regions in Europe, which might not have been mentioned by the countries for these regions that were interviewed.

By focusing the qualitative analysis on farmers and farmer associations, the information is one-sided. The side from the EU officials has not been included. Including interviews with EU officials could shine light on why certain measures are implemented. These interviews would help paint a more general picture.

7.1 Future Research

The limitations section mentioned some limitations of the current research and how to overcome these limitations. These options would be interesting for future research to improve the accuracy of the research and contribute to providing a solution.

Additionally, the power structure of the EU could be analysed in an attempt to investigate why the current policies are implemented. This will help determine who chooses what policies get implemented and why. Furthermore, this helps to investigate the role of farmer associations in policy making on a EU level and whether this power structure is the appropriate structure to achieve the envisioned results. Because the farmers and farmer associations might not agree with some policies and yet they are still implemented. The EU probably has good reasons and reasoning for implementing the policies anyway, thus this would be an interesting addition to the current research.

Lastly, the national taxonomy would be an interesting addition to the current research. Because national taxes on green technologies and green sectors slow down the transition towards sustainable agriculture

in the EU. Then there will be conflicting policies on the national and EU level, which would create confusion for the farmers and lead to higher costs for transitioning towards sustainable agriculture. However, if the national policies are in line with the EU policies then this could provide a boost towards the transition towards sustainable agriculture in Europe. Thus the national taxonomy can either slow down the transition or speed up the transition, therefore, it would be interesting to look into this.

8 Conclusion

This paper has examined the organisational and leadership problems of the EC, farmer associations and farmers in the EU. This provides the reader with a broad set of facts and arguments which highlight the benefits of Change Management and Transformational Leadership in achieving sustainable agriculture in Europe. This is done to answer the research question: ***What environmental, societal, leadership and organisational challenges do European countries face while transitioning to a sustainable production method for the agriculture sector?*** The quantitative analysis pointed out that different regions get impacted differently by climate change. This was confirmed by the qualitative analysis, in which the farmer associations pointed out that there is a need for a variety of options in dealing with climate change. The qualitative analysis also showed that there is a lack of communication between EU policymakers and farmers, which leads to impractical solutions for farmers. Furthermore, the farmer associations state that there is a top-down structure in which the farmers feel unappreciated. Therefore, this paper concludes that Change Management and Transformational Leadership could be efficient tools in closing the gap between farmers and EU policymakers in Brussels. Change Management will assure a co-creating process in which the farmers are empowered. Furthermore, Change Management will assure continuous reviewing of the policies so that these are up-to-date and applicable by farmers. Transformational Leadership will improve the communication between the different stakeholders and get the farmers committed to the changes. This will improve the success of the changes, because the success of change depends on the individuals who implement it. Therefore, this paper concludes that Change Management and Transformational Leadership will help the EU in reaching a sustainable agriculture sector.

References

Abbasi, E., & Zamani-Miandashti, N. (2013). The role of transformational leadership, organizational culture and organizational learning in improving the performance of Iranian agricultural faculties. *Higher Education*, *66*(4), 505-519.

Bamford, D. R., & Forrester, P. L. (2003). Managing planned and emergent change within an operations management environment. *International journal of operations & production management*.

Bass, B. M., & Avolio, B. J. (1994). Transformational leadership and organizational culture. *The International Journal of Public Administration*, *17*(3-4), 541-554.

Bass, B. M., & Bass Bernard, M. (1985). Leadership and performance beyond expectations.

Bass, B. M., & Riggio, R. E. (2006). Transformational Leadership . Mahwah, NJ: L.

Bass, B. M. (1996). *New paradigm of leadership: An inquiry into transformational leadership*. US Army Research Institute for the Behavioral and Social Sciences.

Bass, B. M. (1997). Does the transactional–transformational leadership paradigm transcend organizational and national boundaries?. *American psychologist*, *52*(2), 130.bodans

Bass, B. M. (1999). Two decades of research and development in transformational leadership. *European journal of work and organizational psychology*, *8*(1), 9-32.

Battisti, D. S., & Naylor, R. L. (2009). Historical warnings of future food insecurity with unprecedented seasonal heat. *Science*, *323*(5911), 240-244.

Beckman, J., Ivanic, M., Jelliffe, J. L., Baquedano, F. G., & Scott, S. G. (2020). *Economic and Food Security Impacts of Agricultural Input Reduction Under the European Union Green Deal's Farm to Fork and Biodiversity Strategies* (No. 1473-2020-1039).

Benke, K., & Tomkins, B. (2017). Future food-production systems: vertical farming and controlled-environment agriculture. *Sustainability: Science, Practice and Policy*, *13*(1), 13-26.

Bodansky, D. (2016). The legal character of the Paris Agreement. *Review of European, Comparative & International Environmental Law*, *25*(2), 142-150.

Bond, T. C. (1999). The role of performance measurement in continuous improvement. *International Journal of Operations & Production Management*.

Bullock, R. J., & Batten, D. (1985). It's just a phase we're going through: a review and synthesis of OD phase analysis. *Group & Organization Studies*, *10*(4), 383-412.

Burke, L. A., & Miller, M. K. (2001, May). Phone interviewing as a means of data collection: Lessons learned and practical recommendations. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* (Vol. 2, No. 2).

Burke, W. W. (2017). *Organization change: Theory and practice*. Sage publications.

Burnes, B. (1996). No such thing as… a “one best way” to manage organizational change. *Management decision*.

Burnes, B. (2004). Emergent change and planned change–competitors or allies?. *International Journal of Operations & Production Management*.

Burnes, B. (2004). *Managing change: A strategic approach to organisational dynamics*. Pearson Education.

Burns, D. (2014). Systemic action research: Changing system dynamics to support sustainable change. *Action Research*, *12*(1), 3-18.

Caldwell, S. D., Herold, D. M., & Fedor, D. B. (2004). Toward an understanding of the relationships among organizational change, individual differences, and changes in person-environment fit: a cross-level study. *Journal of Applied Psychology*, *89*(5), 868.

Carter, N., Bryant-Lukosius, D., Dicenso, A., Blythe, J., & Neville, A. J. (2014, September). The use of triangulation in qualitative research. In *Oncology nursing forum* (Vol. 41, No. 5, p. 545).

Claeys, G., Tagliapietra, S., & Zachmann, G. (2019). *How to make the European Green Deal work*. Bruegel.

Connor, L. J. (2004). Moving from transactional to transformational leadership in colleges of agriculture. *Nacta Journal*, *48*(2), 52-56.

Conway, G. R. (1994). Sustainability in agricultural development: trade-offs with productivity, stability and equitability.

De Geus, A. P. (1988). *Planning as learning* (pp. 70-74). Brighton, MA: Harvard Business Review.

Dempewolf, H., Eastwood, R. J., Guarino, L., Khoury, C. K., Müller, J. V., & Toll, J. (2014). Adapting agriculture to climate change: a global initiative to collect, conserve, and use crop wild relatives. *Agroecology and Sustainable Food Systems*, *38*(4), 369-377.

Dentoni, D., Waddell, S., & Waddock, S. (2017). Pathways of transformation in global food and agricultural systems: implications from a large systems change theory perspective. Current opinion in environmental sustainability, 29, 8-13.

Despommier, D. (2010). *The vertical farm: feeding the world in the 21st century*. Macmillan.

De Wit, B., & Meyer, R. J. H. (2010). Teachers guide Strategy synthesis: Resolving strategy paradoxes to create competitive advantage.

DuBrin, A. J. (2015). *Leadership: Research findings, practice, and skills*. Nelson Education.

Eatough, V., & Smith, J. A. (2008). Interpretative phenomenological analysis. *The Sage handbook of qualitative research in psychology*, *179*, 194.

Eisenbach, R., Watson, K., & Pillai, R. (1999). Transformational leadership in the context of organizational change. *Journal of organizational change management*.

Eisenbeiß, S. A., & Boerner, S. (2013). A double-edged sword: Transformational leadership and individual creativity. *British Journal of Management*, *24*(1), 54-68.

Estrada, Á., Galí, J., & López-Salido, D. (2013). Patterns of convergence and divergence in the euro area. *IMF Economic Review*, *61*(4), 601-630.

European Commission. (2019, November 15). *Paris Agreement*. Climate Action - European Commission. https://ec.europa.eu/clima/policies/international/negotiations/paris_en.

European Commission. (2020, December 16). *EU agricultural outlook 2020-30: agri-food sector shown resilience, still Covid-19 recovery to have long-term impacts*. European Commission - European Commission. https://ec.europa.eu/info/news/eu-agricultural-outlook-2020-30-agri-food-sector-shown-resilience-still-covid-19-recovery-have-long-term-impacts-2020-dec-16_en.

European Commission. (2021, April 27). *Farm to Fork Strategy*. Food Safety - European Commission. https://ec.europa.eu/food/farm2fork_en.

European Commission. (2021, February 5). *The common agricultural policy at a glance*. European Commission - European Commission. https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en#thecapinpractice.

European Commission. (2021, May 12). *A European Green Deal*. European Commission - European Commission. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en.

Eurostat. (2020). Agri-environmental indicator – greenhouse gas emissions.

Eurostat. (2019, May 20). *Population projections in the EU*. Population projections in the EU - Statistics Explained. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=People_in_the_EU_-_population_projections&oldid=497115#Population_projections.

Farooq, M. B., & De Villiers, C. (2017). Telephonic qualitative research interviews: When to consider them and how to do them. *Meditari Accountancy Research*.

Fedor, D. B., Caldwell, S., & Herold, D. M. (2006). The effects of organizational changes on employee commitment: A multilevel investigation. *Personnel Psychology*, *59*(1), 1-29.

Garcia-Morales, V. J., Lopez-Martin, F. J., & Llamas-Sanchez, R. (2006). Strategic factors and barriers for promoting educational organizational learning. *Teaching and Teacher Education*, *22*(4), 478-502.

Garnett, T., Appleby, M. C., Balmford, A., Bateman, I. J., Benton, T. G., Bloomer, P., ... & Godfray, H. C. J. (2013). Sustainable intensification in agriculture: premises and policies. *Science*, *341*(6141), 33-34.

Gill, R. (2002). Change management--or change leadership?. *Journal of change management*, *3*(4), 307-318.

Groves, K. S. (2005). Linking leader skills, follower attitudes, and contextual variables via an integrated model of charismatic leadership. *Journal of Management*, *31*(2), 255-277.

Guarino, L., & Lobell, D. B. (2011). A walk on the wild side. *Nature Climate Change*, *1*(8), 374-375.

Guimaraes, T., & Armstrong, C. (1998). Empirically testing the impact of change management effectiveness on company performance. *European Journal of Innovation Management*.

Hansen, J. W., & Jones, J. W. (1996). A systems framework for characterizing farm sustainability. *Agricultural systems*, *51*(2), 185-201.

Haveman, J., & Hummels, D. (2004). Alternative hypotheses and the volume of trade: the gravity equation and the extent of specialization. *Canadian Journal of Economics/Revue canadienne d'économique*, *37*(1), 199-218.

Herold, D. M., Fedor, D. B., Caldwell, S., & Liu, Y. (2008). The effects of transformational and change leadership on employees' commitment to a change: A multilevel study. *Journal of applied psychology*, *93*(2), 346.

Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: extension of a three-component model. *Journal of applied psychology*, *87*(3), 474.

Higgs, M., & Rowland, D. (2005). All changes great and small: Exploring approaches to change and its leadership. *Journal of change management*, *5*(2), 121-151.

Higgs, M., & Rowland, D. (2010). Emperors with clothes on: The role of self-awareness in developing effective change leadership. *Journal of Change Management*, *10*(4), 369-385.

Higgs, M., & Rowland, D. (2011). What does it take to implement change successfully? A study of the behaviors of successful change leaders. *The Journal of Applied Behavioral Science*, *47*(3), 309-335.

Hillel, D. (1988). The greenhouse effect and its implications regarding global agriculture. *Research bulletin/Massachusetts Agricultural Experiment Station (USA)*.

Howden, S. M., Soussana, J. F., Tubiello, F. N., Chhetri, N., Dunlop, M., & Meinke, H. (2007). Adapting agriculture to climate change. *Proceedings of the national academy of sciences*, *104*(50), 19691-19696.

Howell, J. M., & Avolio, B. J. (1993). Transformational leadership, transactional leadership, locus of control, and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of applied psychology*, *78*(6), 891.

Jankelová, N., Joniaková, Z., Némethová, I., & Blštáková, J. (2020). How to Support the Effect of Transformational Leadership on Performance in Agricultural Enterprises. *Sustainability*, *12*(18), 7510.

Kark, R., & Shamir, B. (2013). The dual effect of transformational leadership: Priming relational and collective selves and further effects on followers. In *Transformational and charismatic leadership: The road Ahead 10th anniversary edition*. Emerald Group Publishing Limited.

Kark, R., Shamir, B., & Chen, G. (2003). The two faces of transformational leadership: Empowerment and dependency. Journal of applied psychology, 88(2), 246.

Koh, W. L., Steers, R. M., & Terborg, J. R. (1995). The effects of transformational leadership on teacher attitudes and student performance in Singapore. *Journal of organizational behavior*, *16*(4), 319-333.

Leech, N. L., & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools: A call for data analysis triangulation. *School psychology quarterly*, *22*(4), 557.

Legg, W. (1999). Sustainable agriculture: An economic perspective. *S. Turner and D. Alford. Agriculture and the Environment: challenges and conflicts for the new millennium*, 14-16.

Lewin, K. (1952). Group decision and social change. Readings in social psychology. *Newcombe and Hartley (Eds.), Henry Holt, New York*.

Liu, Y. (2009). *When change leadership impacts commitment to change and when it doesn't: A multi-level multi-dimensional investigation* (Doctoral dissertation, Georgia Institute of Technology).

Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic change*, *77*(1), 73-95.

Love, P. E. D., Gunasekaran, A., & Li, H. (1998). Improving the competitiveness of manufacturing companies by continuous incremental change. *The TQM Magazine*.

Luecke, R. (2003). *Managing change and transition* (Vol. 3). Harvard Business Press.

Marquardt, M. J. (1996). *Building the learning organization: A systems approach to quantum improvement and global success*. McGraw-Hill Companies.

Marsh, J. S. (1997). The policy approach to sustainable farming systems in the EU. *Agriculture, ecosystems & environment*, *64*(2), 103-114.

Moës, N., & Bruegel. (2018, February 22). *EU budget, Common Agricultural Policy and Regional Policy – en route to reform?* Bruegel. https://www.bruegel.org/2018/02/eu-budget-common-agricultural-policy-and-regional-policy-en-route-to-reform/?utm_content=bufferc589a&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer%2B%28bruegel%29.

Moran, J. W., & Brightman, B. K. (2001). Leading organizational change. *Career development international*, *6*(2), 111-119.

Nelson, L. (2003). A case study in organisational change: implications for theory. *The Learning Organization*.

Nevis, E. C., DiBella, A. J., & Gould, J. M. (1995). Understanding organizations as learning systems. Sloan Management Review.

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge university press.

Northouse, P. (2016). *Leadership.* Thousand Oaks: SAGE Publications.

Park, J., & Seaton, R. A. F. (1996). Integrative research and sustainable agriculture. *Agricultural Systems*, *50*(1), 81-100.

Pearce, C. L., & Sims Jr, H. P. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group dynamics: Theory, research, and practice*, *6*(2), 172.

Rieley, J., & Clarkson, I. (2001). The impact of change on performance. *Journal of Change management*, *2*(2), 160-172.

Rosenzweig, C., Tubiello, F. N., Goldberg, R., Mills, E., & Bloomfield, J. (2002). Increased crop damage in the US from excess precipitation under climate change. *Global Environmental Change*, *12*(3), 197-202.

Scharmer, C. O., & Kaufer, K. (2013). *Leading from the emerging future: From ego-system to eco-system economies*. Berrett-Koehler Publishers.

Schein, E. (2004). Organizational culture and leadership, 3rd edn. Joddry-Bass.

Senge, P. M. (2006). *The fifth discipline: The art and practice of the learning organization*. Currency.

Shepherd, B. (2013). Gravity model of international trade: A user guide.

Shucksmith, M., Thomson, K. J., & Roberts, D. (2005). *The CAP and the regions: the territorial impact of the Common Agricultural Policy*. CABI publishing.

Slater, S. F., & Narver, J. C. (1995). Market orientation and the learning organization. *Journal of marketing*, *59*(3), 63-74.

Smith, J. A., & Shinebourne, P. (2012). *Interpretative phenomenological analysis*. American Psychological Association.

Spicker, P. (2012). “Leadership”: a perniciously vague concept. *International Journal of Public Sector Management*.

Taylor, P., & Hirst, J. (2001). Facilitating effective change and continuous improvement: The Mortgage Express way. *Journal of Change Management*, *2*(1), 67-71.

Wellman, J. (2009). *Organizational learning: How companies and institutions manage and apply knowledge*. Springer.

Appendix A

Methodology

Hausman test

A Hausman test has been used to check the appropriateness of the linear fixed effects model with the used data. The Hausman test checks whether a random effects model or a fixed effects model is more appropriate to examine the data. The Hausman test had a Chi-square of .0018 for the average temperature regression. This means that according to the Hausman test a fixed effects model would be the appropriate model to use with the used dataset.

The Hausman test for this data Chi-square of .2930 and therefore the fixed effects model would not be the model of choice.

White test

A White test has been performed to check whether a linear regression would be appropriate. A White test tests whether the data is homoskedastic. Error terms are often heteroskedastic and this violates the first assumption of linear regression models. Therefore this paper uses a White test as an indicator to check whether the error term is homoskedastic or heteroskedastic. The White test has a Chi-square of .0000 for the precipitation data. This Chi-square means that the assumption of homoskedasticity is rejected.

Data section

The first number is 1 when the sample is Northern Europe and 2 when the sample is Southern Europe, the second number is the year. In these figures the months are displayed on the x-axis and the temperature and precipitation on the y-axis. The temperature data for Northern Europe looks more volatile than the temperature data for Southern Europe. The figure for precipitation shows that there is a high level of structure in the precipitation in the Southern part of Europe, but that the precipitation of Northern Europe is less predictable.

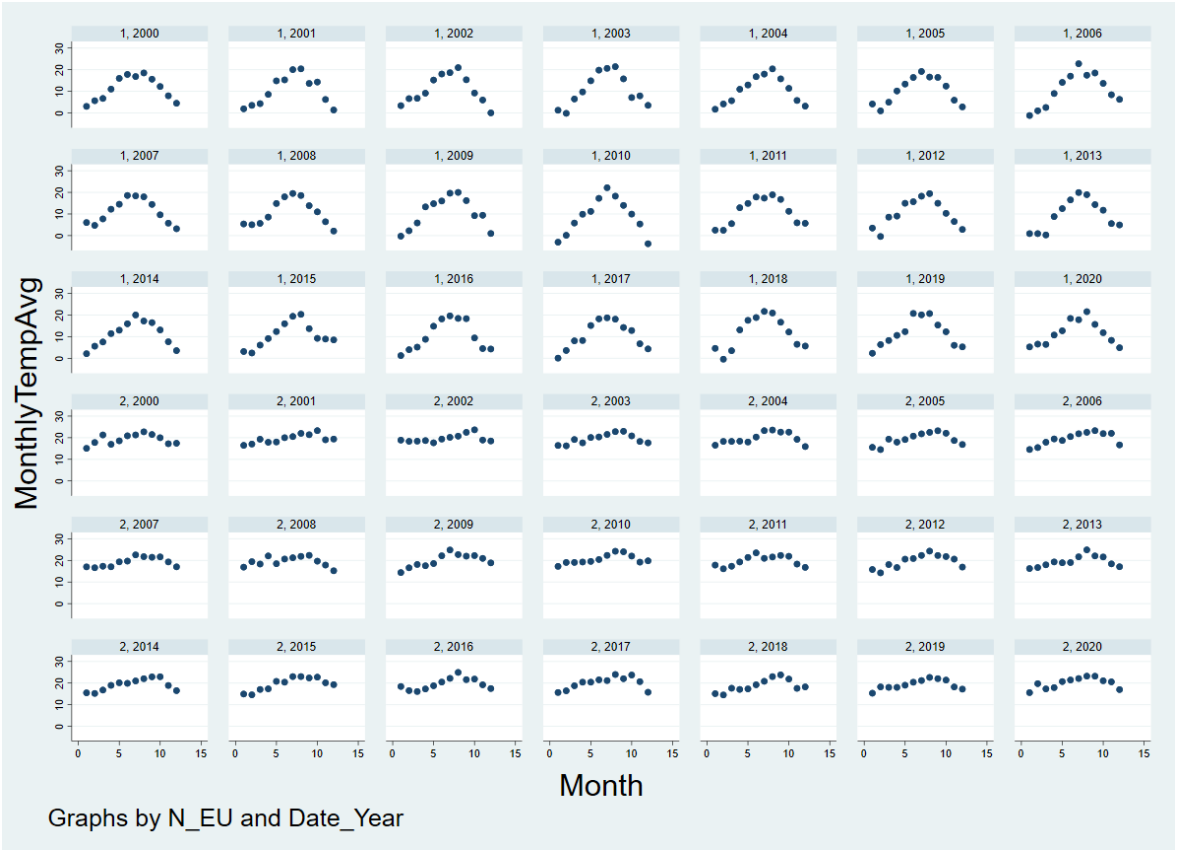

Figure 10: Monthly Temperatures

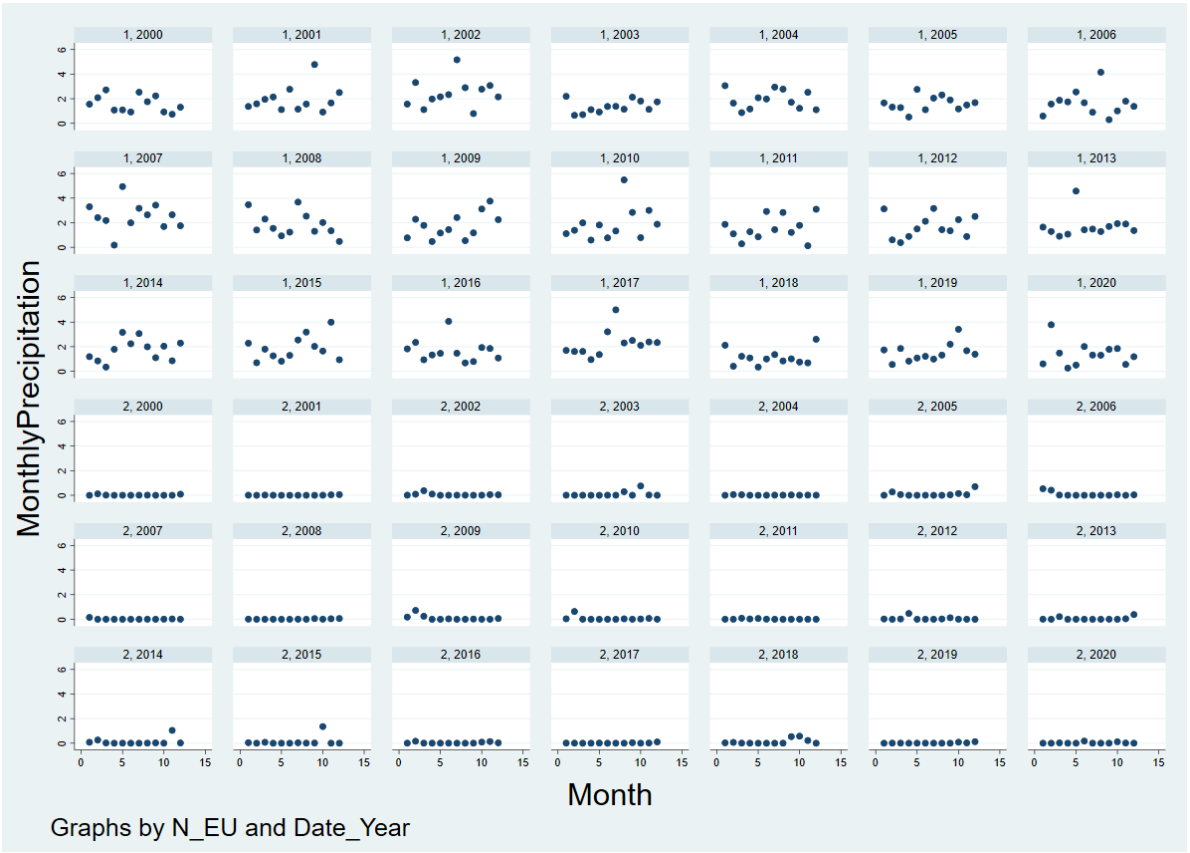

Figure 11: Monthly Precipitation

Regression Results

Temperatures

The columns 2 to 6 in table 2 use the model with fixed effects, because the Hausman test showed that this would be the appropriate linear regression model. Column 3 shows that monthly temperatures have increased 0.021 degrees a year on average for the years 2000 to 2005. Column 4 shows that the temperatures have actually decreased in the period of 2006 to 2010 and that thus even though there is a general trend of increasing temperatures, there are still periods where temperatures decrease. Column 5 shows that after a period where the temperatures have gone down that the temperatures are increasing again in the period 2011 to 2015. Finally column 6 shows that for the period 2016 to 2020 the monthly temperatures have increased by 0.229 per year on average. This means that in the period from 2015 to 2020 the average monthly temperatures have increased by 5*0.229 = 1.145 degrees Celsius.

Table 3: Monthly Temperatures in Northern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
February	.798	.798	.368	-.187	.848	2.249
March	5.217	5.217	4.093	5.871	5.669	5.459
April	11.693	11.693	11.043	12.272	12.503	11.085
May	17.562	17.562	16.640	18.113	18.840	16.838
June	21.558	21.558	20.324	22.386	22.567	21.204
July	24.493	24.493	24.171	25.225	24.826	23.814
August	23.051	23.051	22.237	23.856	23.582	22.690
September	18.421	18.421	17.480	18.967	19.241	18.182
October	12.407	12.407	11.649	13.172	12.761	12.196
November	6.831	6.831	5.901	7.409	8.184	6.016
December	2.391	2.931	.424	2.782	3.937	2.814
Constant (January)	-6.783	-6.783	-6.212	-7.427	-7.412	-6.197
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	**2,775,780**	**2,775,780**	**793,080**	**660,900**	**660,900**	**660,900**

Here column 1 is the OLS regression for the entire period and column 2 is the HDFE regression for the entire period. Columns 4 to 7 are the different time periods and here the HDFE model is used. Thus according to the HDFE model the average yearly temperatures in July in Northern Europe was -6.783 + 24.493 = 17.71 degrees Celsius on average for the entire period. The table shows that January is usually the coldest month in Northern Europe and even though the temperatures increase over time, which is shown by the table with the yearly trend above, the temperature in January stays structurally low. Thus the temperatures increase in general, but this does not mean that the coldest months structurally increase in temperature.

Column 5 of table 4 shows that Southern Europe experienced temperature increases in the period 2011 to 2015. This increase in temperatures has continued in the period 2016 to 2020. Similar to the results for Northern Europe the different time periods show higher coefficients in the last few years than the coefficient of the full data set, column 1 and 2, which would mean that temperatures in Southern Europe are increasing more in the most recent years.

The adjusted R-Squared of Northern Europe for the full time period is .1368, which means that the model can explain 13.68% of the results. The adjusted R-Squared for Southern Europe is .3122, meaning that the model explains 31.22% of the results. Thus the predictive power of the model is significantly higher for the Southern European data.

Table 5: Monthly Temperatures in Southern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
February	1.377	1.377	1.166	1.814	.16	2.411
March	4.995	4.995	5.093	5.276	4.25	5.341
April	8.95	8.95	8.612	9.223	8.791	9.242
May	13.257	13.257	13.115	13.411	13.109	13.42
June	17.345	17.345	17.158	17.666	16.815	17.779
July	19.936	19.936	19.839	20.211	19.574	20.14
August	19.835	19.835	19.653	20.099	19.515	20.108
September	15.969	15.969	15.666	15.947	15.917	16.406
October	11.216	11.216	11.258	11.338	10.84	11.417
November	5.645	5.645	5.547	6.004	5.463	5.586
December	1.452	1.452	1.079	1.742	1.182	1.882
Constant (January)	5.261	5.261	5.08	4.961	5.663	5.378
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	**2,870,126**	**2,870,126**	**820,286**	**683,280**	**683,280**	**683,280**

Column 2 shows that according to the HDFE model for the entire period the average temperature in Southern Europe in July has been 5.261 + 19.936 = 25.2 degrees Celsius. As expected this is higher than the average temperature in Northern Europe in July.

Precipitation

The coefficients of a PPML regression have to be interpreted differently, because the dependent variable is expressed in changes in percentages. Column 3 of table 6 shows that if temperatures in Northern Europe increase by 1 degrees Celsius, then Precipitation increases 100* 0.16 = 1.6%. The yearly trend

has a coefficient of 0.004 and thus the precipitation due to yearly trend increased by 100* (21*0.004) = 8.4%.

The average temperatures and precipitation are monthly values and there is only 1 monthly value for each one of them at the same period at the same weather station. This is the reason that the yearly trend is omitted. This also suggests that the yearly trend is a bad control variable in this setting.

Table 7: Monthly Precipitation in Northern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
February	-.177	-.135	-.157	-.177	-.381	.004
March	-.282	-.226	-.341	-.113	-.44	-.223
April	-.357	-.296	-.383	-.392	-.31	-.339
May	.016	.011	-.024	.167	.095	-.167
June	.342	.219	.344	.228	.504	.293
July	.508	.310	.469	.58	.469	.519
August	.42	.263	.3	.659	.449	.298
September	.289	.188	.19	.301	.341	.344
October	.411	.258	.349	.488	.387	.433
November	.266	.175	.193	.537	.216	.134
December	.142	.097	-.062	.105	.415	.151
Constant (January)	1.397	.397	1.398	1.306	1.422	1.46
WS Fixed Effects	NO	YES	NO	NO	NO	NO
Observations (n)	**2,775,780**	**2,775,780**	**793,080**	**660,900**	**660,900**	**660,900**

The least amount of precipitation occurs during spring according to columns 1 and 2, which are the OLS and PPML models. All columns except column 2 show the precipitation in absolute value for the daily weighted average in that month. Thus to get the total amount of precipitation the result has to be multiplied by the number of days in a certain month. Thus the average precipitation in Northern Europe in October is 31*(1.397+.411) = 56.05 millimetres.

Table 9: Monthly Precipitation in Southern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
February	-.095	-.074	-.157	.055	-.131	.136
March	-.11	-.087	-.146	-.039	-.219	-.03
April	-.165	-.133	.039	-.225	-.235	-.28
May	-.118	-.093	-.152	-.137	-.15	-.0.28
June	-.346	-.301	-.397	-.311	-391	-.272
July	-.576	-.568	-.412	-.599	-.67	-.656
August	-.61	-.614	-.407	-.577	-.729	-.765
September	-.297	-.253	-.182	-.183	-.341	-.507
October	.049	.036	.172	.099	.013	-.111
November	.192	.135	.344	.153	.031	.211
December	.084	.061	.256	.178	-.229	.095
Constant (January)	1.329	.589	1.398	1.311	1.442	1.4
WS Fixed Effects	NO	YES	NO	NO	NO	NO
Observations (n)	**2,870,126**	**2,870,126**	**820,286**	**683,280**	**683,280**	**683,280**

Thus these values are absolute values. Column 1 and 2 show that the majority of precipitation in Southern Europe occurs during the fall. According to column 2 August is the driest month, with 100*(exp(-.614)-1) = -45.88% precipitation compared to January. The monthly precipitation tables show that in Southern Europe the differences between the months are larger in both percentage and absolute value.

Robustness

Table 10: Yearly Temperatures in Northern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Yearly Trend	.045***	.044***	.184***	-.369***	.232***	.440***
Windspeed Average	-.895***	-3.731***	-4.511***	-4.052***	-4.649***	-5.478***
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	2,775,780	2,775,780	793,080	660,900	660,900	660,900
Adjusted R-Squared	X	.2101	.2348	.1783	.2179	.2561

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Table 11: Yearly Temperatures in Southern Europe

Temperature Average	(1)	(2)	(3)	(4)	(5)	(6)
Weighted Yearly Trend	.063***	.043***	-.083***	.126***	.185***	.110***
Windspeed Average	1.564***	-.359***	-.299***	-.334***	-.699***	-.509***
WS Fixed Effects	NO	YES	YES	YES	YES	YES
Observations (n)	2,870,126	2,870,126	820,286	683,280	683,280	683,280
Adjusted R-Squared	X	.313	.3168	.3067	.2986	.2987

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Table 12: Yearly Precipitation in Northern Europe

Precipitation Average	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temperature Average	.029***	.028***	.021***	.023***	.022***	.026***	.020***
Weighted Yearly Trend	.006***	.006***	.003***		(omitted)		
Windspeed Average	.19***	.293***	.183***	.190***	.254***	.226***	.226***
WS Fixed Effects	NO	YES	YES	YES	YES	YES	YES
Observations (n)	2,775,780	2,775,780	2,775,780	793,080	660,900	660,900	660,900
Pseudo R-Squared	X	X	.0871	.0843	.0932	.1029	.0881

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Table 13: Yearly Precipitation in Southern Europe

Precipitation Average	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Temperature Average	-.048***	-.024***	-.020***	-.018***	-.021***	-.017***	-.025 ***
Weighted Yearly Trend	.008***	.009***	.008***		(omitted)		
Windspeed Average	-.16***	.093***	.072***	.100***	.094***	.082***	.106***
WS Fixed Effects	NO	YES	YES	YES	YES	YES	YES
Observations (n)	**2,870,126**	**2,870,126**	**2,870,126**	**820,286**	**683,280**	**683,280**	**683,280**
Pseudo R-Squared	**X**	**X**	**.2464**	**.2459**	**.2497**	**.2439**	**.2590**

*** Significant at the 1 percent level
** Significant at the 5 percent level
* Significant at the 10 percent level

Appendix B

Grey - Interview Questions

Themes:

Blue - EU Policy

Dark Yellow - Production / Supply

Green - Sustainability

Red - Population Growth

Dark Green - Climate Change /Weather

Cyan Blue - Farmers / Agriculture / Agri-business problems

Yellow - Need for Change / Transition / Change Management / Leadership

Pink - Hydroponics /greenhouse cultivation

purpleish - Money/Finance

Light red - Genome editing / GMO's / genetic plant modification

The Colours show the different themes that have been found through data triangulation of the qualitative data. Most of the themes can be found in table 14 at the beginning of the qualitative analysis. For this table and the qualitative analysis the pink and light red themes have been merged into one theme. Furthermore, the dark yellow and red themes have been left out of the qualitative analysis. The red theme was left out because this theme focuses on the demand of food, while this paper aimed to focus on the supply of food. The dark yellow theme was left out because the aspects have been captured by the other themes. All themes were in relation to production of food, therefore, this theme was not additionally added to the qualitative analysis.

Interview BULGARIA

Speaker 1: time: 1:00

1. The first question is what are the farmer associations' plans to deal with increasing demand and population growth? (the population keeps increasing, there are more people in the world, so we want to know what are your plans to, to, to deal with more demand for food?)

Speaker 2: time: 2:05

Well like an organization of farmers we are following the **CAP** agricultural policy principles and all of the conditions that are involved in this common agricultural policy. So as a small organization somewhere in Europe, we are not such a big sector in order to set up policy or to make some changes in the food patterns or in the population at home. But as a farmer we are to produce more to produce sustainable, sustainable, and to produce with less outputs, which is quite, quite the big challenge. Yes, more production, less output and more sustainability. So we don't want this prediction to be at any price or for the damage of nature.

Speaker 1: time 3:30

Okay, perfect. Then the next question would be, 2. what is the farmer association, your farmer association promoting to improve productivity or promotion?. I know you said that you don't want to produce at any cost but do you have any initiative for the farmers in Bulgaria so they can become more efficient or productive, so they lose less crops?

Speaker 2: time: 4:45

Well, we have some initiatives actually, it's quite difficult now for the farmers to become more and more productive. We are trying to become more and more efficient and what I mean we, we have reached a certain level of productivity and it's very difficult to, to, to have some big changes in this productivity. I mean to, to have a bigger increase or something like this with a lot of percentage. So they increase it. It will be 10%, depending on the weather conditions, climates or so on. It's all in nature. You know, it's year by year, they are very, quite different in agriculture. You have a normal year with normal patients, the farmers have reached a certain level of productivity and they have increased furthermore above this level. So what we are trying now is to be more efficient.

Speaker 2: time 6:56

And what I mean is to produce with less money with less inputs upon some of our farmers here and not, I, I don't know what would be the next question, but somehow some of our farmers they're applying conservation agriculture, which is aiming exactly this to produce it. It's an

average level, but to have to have less inputs, for example no teal or minimal, less fuel slab, less diesel, less emissions they're trying to get or to change them with some others that are more overall pesticides, insecticides, and so,

Speaker 1: time: 7:02

Yep. Okay. then the next question would be,3. How does climate change impact the agriculture sector in Bulgaria and specifically your farmers, the farmers that belong to your association? What troubles, what problems are they facing because of climate change?

Speaker 2: time: 7:50

Yeah. Well, I'll tell you ***the 2020 was one of the worst years for the Bulgarian farmers*** probably for, for the last 20 to 30 years. It was very difficult here with a lot of drought, no rains very, no moisture in the soil. That's where the suffering of the youth was. They also were in some of the regions where **70 percent down from the average**.

Speaker 1: time 9:00

So the yield for 2020 was 70% lower than other years

Speaker 2: time:9:20

In some regions of Bulgaria. Yes. The overall overall for the whole country, there is a reduction by 30% each in example, in the corn maze is in wheat production.

Speaker 2: time 10:50

Very difficult here and we are affected of course, and according to some analysis from our scientists that are here the situation is going to become worse and we are going to face more heat waves, more droughts especially in some of the sensitization effects that regions in Bulgaria. So what we are trying to do but it's not possible everywhere. We want to have irrigated plants, but the problem here is bigger because oh we, we ruined the irrigated system after the, after there is gene here in Bulgaria changed in 1998. So it's a process and it will take a long time to, to how to say, to, to make this irrigation system work again. And there are a lot of investments that we have to put in this irrigation system, but we started step-by-step. Okay.

Speaker 1: time 13:00

The following question is related to your answer. 4. We want to know what is your association plan to deal with this climate change with the drought and the climate change? So you say that **irrigation** could be a solution to avoid drought, so the crops don't die. But in a more general term, what can your association do to deal with climate change?

Speaker 2: time 15:14

Well, I see the question is very important, but I will tell you that as a farmer, they are very different. Some of them gain more when they're younger. They want to put new technologies in their production process, but the majority of the farmers they're old school they're, they prefer the traditional methods. **They prefer conventional methods**. So it's very difficult to change the pattern and the agriculture system for these old farmers. So we are putting efforts to convince all of the farmers here, and, but it will be very difficult and it will, we will need time to convince these old school farmers, the new technologies are needed and have to be applied. For example, the **conservation agriculture** that I told you several minutes ago.

So the conservation keeps the moisture longer in the soil because of this permanent coverage of the soil, there is no bare soil. So this helps, and these minimal tillage practices they're helping to, to preserve, to present the moisture in the soil. But unfortunately very few of our farmers are involved in such practices. So we will try to to help, to involve, to involve more farmers from our organization in such practice.

Speaker 1: time 20:03

And that is one of the challenges we have as well in our research for the thesis. We find that most farmers in Europe are very traditional old school, like you say, and a bit stubborn. So the challenge we have is that if we want to transition to a more green agriculture economy and more sustainable agriculture, then we are investigating what type of leadership is necessary to convince farmers that climate change is actually happening, that it could affect their crops and that they could lose money. Of course. So we would like to not be more, what is your view on how to actually convince farmers to adapt more quickly and to not avoid closing their eyes and saying, no, we just, we will continue doing what we've been doing for 200 years. This is the question we need to find out.

Speaker 2: time 22:22

Yeah. Well, I know what is very convincing and motivating for our farmers here in Bulgaria, especially if they see the neighbor, in the neighborhoods, in the farmer who is cultivating crops sitting next to him. And if he's seeing something a good example, for example something that is effective, something that works, that gives you more money or makes you more efficient this old school farmer, he will be more easily convinced to make this change, to make the U-turn in his technology.

Speaker 1: time 24:35

So somehow is the neighbor that needs to adapt

Speaker 2: time 25:00

A good example. Yeah. But not the good example on the book and someone to tell you, but they want to see it, see it very close. Yeah. its is practical. And if he sees his neighbor, a neighbor farmer, he will be more.

Speaker 1: time 26:54

So there is maybe a bit of jealousy between farmers, if the neighbor is having more crops and then he's earning more money, maybe?

Speaker 2: time 28:00

Well, it's a competition, they're all competitors in one sector. So, so if your neighbor is more efficient and competitive than you, then you are more stimulated and more motivated to make some changes and she's in the pattern.

Speaker 1: 30:00

Okay. So the next question I would like to ask you is, if the European union could dedicate some funding, some money to help some farmers in each country to adapt new technology. And those could be like influencers, you know, like Instagram, you could be an influencer for farmers. Could something like this work in Bulgaria?

Speaker 2: 33:00

Not sure because we are, we are arranging these old school farmers, the traditional farmers, the conventional farmers, they are not so aware of the new technologies, they're not aware of Twitter alone, It's becoming more popular Facebook, but anyway very few of these farmers, they have Facebook profiles and anything but some of them, they don't have smartphones. They are the old school phones with buttons. And for example, now because of CoVid-19, It makes our general assembly and book, many things, we can buy a platform, zoom or WebEx or something like this. And we add some serious troubles, but anyway, we succeeded. But it's a very difficult process to make these people there. They're about 60 years old to people to put them in front of a computer and to, to, to, to have their attention for two hour.

Speaker 2: 35:45

It's a computer. Yeah. There is a good, is a good idea, but probably influenced by somehow, by another way, it will be more productive for these farmers, Florida, young farmers. Anyway,

they are there, they're searching in a hole or the place on the internet where they're taking part in some groups. And they're more open-minded. So probably this would be okay for them just to give them information about the latest, the newest but well, wear that. What I was telling kids, that's the difficult part will be the farmers that are above a certain age. Yeah.

Speaker 1: 37:02

Yeah. Digitization and connecting all farmers to new technology seems very difficult. And this gap is some, yeah, it's something that if it goes, yes,

Speaker 2: 38:00

It's not impossible, but it's difficult. And they have to have support. For example, if we want to make a meeting in the online platform we advise our farmers to have somebody near them to assist them, to support them. We'll take their timer on putting their microphone on and et cetera, but they're lending anyway. So we are somehow optimistic that the process is not the last, so it's not impossible, but they need support.

Speaker 1: 39:56

And following up, what do you think is the main difference between generations of farmers in Bulgaria? How much more time will it take until the new young farmers will take over and then it will be a different way to work with them or, or is it still very difficult that young people want to go to farming? And it's mostly old people keeping it alive.

Speaker 2: 41:22

Very difficult question, very difficult. I don't know how exactly it will and how long it will take to make this foundation transition in the different age stages. But anyway, I will give you an example. We have a farmer here that is their daughter and the father and the daughter. She is not. So anyways, he is 45 years old, for example, but she's more open-minded. She wants to, to imply these three implement the conservation or culture. And she had had some serious discussions in the core of debates with her father. He is an old school farmer, traditional farming because he was very stubborn. He didn't want to make the change based access with very small plots, very small percent to their lands. But it will be a successful story or know. And several years later her father told her that she was right.

Speaker 2: 44:33

And she's very grateful that they made this change, but this is several years later. And this is the good case because some of the farmers, because there is a transition period in the plan, you are trying to make a change analogy. And in this transition period, there is a possibility to have your crop reduced. And this is very stressful for the farmers, because they don't believe that this reduction will stop as we'll get a stable situation we improved after several years. So they're afraid. And when they, when they see that the first the, for the first one, two or three years now, they have reduction in youth. They are not willing to continue with certain technology, which will be how to say more sustainable to college.

Speaker 1: 45:23

What kind of support is your association currently receiving from the EU or from other groups to improve food production? Are you receiving any funding that helps you?

Speaker 2: 46:45

No funding for anything, We are funded by ourselves (members). We already have a membership fee, so we are not funded from neither the EU, nor our government here, a self funded organization.

Speaker 1: 47:39

That's very challenging, I suppose because why don't you apply for funding from the EU and the CAP? Are there available funds that you could apply to?

Speaker 2: 48:27

Well there are different instruments here but we are not, **so I'm not sure it's suitable here**, if I have to be honest, **we are not putting enough effort in this probably in the next, the program period. We will be more ambitious about this.**

Speaker 1: 49:12

Why is it that it's difficult to do it now? Is it because it's bureaucratic and there is a lot of papers you need to fill in and it's complicated. Why don't you apply now?

Speaker 2: 50:00

Well, we wanted to make a project, for example, in the partnership. We wanted to make a project here, the European innovation partnership.

Speaker 2: 52:00

Yeah. And because in this partnership and in this project, there must be involved for example, a university or research Institute and non-governmental farmers organization. **And we wanted to make a certain project especially for these conservation agriculture**. And we spoke, we spoke with advisors and how to make this project work. And we've understood that it will be very difficult for us. There are a lot of papers that we have to register a new entity, which will have some responsibilities, financial responsibilities. And, and so we, we, we refused to do this and because we are in good communication with certain university agriculture university, and we decided to make this research we found funding. It will be easier for us because otherwise it will be very how to say a lot of obligations, a lot of paperwork, a lot of uncertain, certain

Speaker 1: 53:15

Then I would like to ask you what are the most common problems that farmers have when they're working with sustainability with EU policy, from the CAP or adopting new technologies? (The main issues, the main problems, adapting to new technologies, or working with sustainability or the policies from the European union).

Speaker 2: 54:00

Well, **we have difficulties following all these new requirements** and actually somehow there are times of power farmers, especially now where, where we are trying to explain to them the new rules of the new ring deal, the new strategic plan, the new conditions that will be included. It's after listening to all these stories at the end, they're telling me, I don't want to have this subsidy. I don't want to have a green budget in my subsidy. I prefer not to abate these rules and not to have support for these because it's very burdening. And these are our concerns here in our organization that some of our farmers don't want to, to follow these conditions. And they prefer to leave this support, the EU support for green bricks, for example, and the two, and to make their conventional agriculture. So, yes, we are problems convincing the farmers the sustainability of his group. But when you are putting them, conditions are hard to fool and that

are very sharp. Sharp changes in their working pattern is difficult for them. And they're putting on stress and they, their health and safety are taking a step back, I don't know, the step forward.

Speaker 1: 55:12

It's confusing for us to understand why farmers are slow adapters, but now that we talk with more people, we start to see that, yeah, they seem a bit skeptical or afraid of these new policies. And they rather do what they've been doing in the past 50 years,

Speaker 2: 56:02

The easier one to do what they do for years. So if we have to make changes in the farmers' technologies and systems, we have to do Step-By-Step very gradually, very slowly. Otherwise they will be, how to say it, they will prefer not to have the subsidies to obey the rules and to make their agriculture, if it's possible market-oriented or something like this.

Speaker 1: 57:00

Yeah. And when you talk about gradually taking the steps, so they transition, I want to ask you what kind of changes and support they need to be able to deal with, you know, these increases of food demand, climate change, and sustainability regulations. What are these small gradual steps that your organization needs to take? For example?

Speaker 2: 58:33

Yes. Well, I will be back again on conservation agriculture. I didn't go to it because it's a team that is very announced for me. I have to say, I like these new principles in this agricultural system. I see that there are good, there are profits for the soil, for the climate, for the environment. So each we want to, if we want to involve more people in such practices that are improving the soil, or making them more sustainable or making them more resilient to the climate change we have to, to support them mostly in this transition period that **is needed to make the change**. So for example, it's two or three or four years in this year, as I told you, there is a reduction in deals. So most of the people, they will be afraid.

Speaker 2: 59:49

They will put on stress and they won't be so motivated to make this change, to, to lead it to the end. Yeah. So probably support for this in how to say transition payments, but this will make

them more efficient, but I, I won't say that this will lead to a greater productivity or to increase the productivity. It's very difficult to be sustainable to have such practices that are environmentally friendly and to have an increase in the production time. It's a house of say, it's an oxymoron. It's something very impossible for me. Probably the scientists will tell us.

Speaker 1: 61:00

I would like to ask you if because your association focuses on cereal, which is extensive agriculture. What we are discussing in our research is in Europe because the urbanization rate keeps increasing more and more people want to live in bigger cities and we build more houses. So there is less arable land to produce food. And then we wanted to look into a solution that could help farmers transition, and we investigated hydroponic farming, which is a method to grow without soil. Maybe you're familiar with hydroponic. Okay. So the question would be, what is your association's opinion on hydroponic farming? Could this be a solution? Could it help some farmers in some regions or not?

Speaker 2: 63:33

Well it's, it's something that is very far from us, and I will tell you about life because we have this regime transition probably 30 years ago. So, the land was very trapped, fragmented fragments. I would say it was not because a state was not for nobody who wanted to work to, to be a farmer. So after the after, when Bulgaria went into the European union, farmer culture became a very attractive sector and more and more people wanted to, to be involved in, in agriculture, but these new farmers they were involved with to produce with the land that was abandoned for years. So we don't have this problem here with urbanization and abandoning agriculture land and taking it for buildings and et cetera.

Speaker 2: 65:37

This is not such a big concern here because we have some other land that could be made for agricultural purposes. If you know what I mean, some more land available for agriculture. It's not a big percentage. It's probably one or two percent, not, not something we don't have for the moment. So much interest. Yes, there are some regions that are , how to say very competitive, a battle about man and price for these reasons, but they are very fertile regions. They're traditionally agricultural regions and the land price is very high. And but to any way we, we are not facing this. And so I can't be a con. I can't be very objective when I'm saying, and when I'm telling something about hydroponic or something like this, and I'm not so familiar, we don't have hydroponic here.

Speaker 1: 66:56

Yeah. Yeah. The main difference is that hydroponic it's used in the Netherlands, for example, where, where they have less space and less land to, to grow crops. So what they do is intensify and do it vertical. So they grow vertically. Yeah. And, the reason why we look at hydroponic farming as a solution is because if you grow certain crops, not all of them, for example, grains and cereals are not suitable to be grown necessarily with hydroponics. Yes. For tomatoes, lettuce, you know, spinach, things like these green leafy vegetables, it's very efficient, it consumes less water. And one of the things that we wanted to explain is that if you grow hydroponic, you suffer less from yeah. From drought or frost because it's grown in a greenhouse. So you suffer less from climate change. We could see.

Speaker 2: 68:00

Yeah. Yeah. I see. Well, probably this is for the development, vegetable and fruit sector, but not for the grain production anyway.

Speaker 1: 68:30

Exactly. And then the last question would be how does your association see the future of farming and how does it look like according to you, especially for grains, which is extensive farming, how does it look like the future?

Speaker 2: 69:00

Well, if difficult to say, well, I hope these are my hopes, of course, that we will have sustainable agriculture. And I will tell you what, because I don't want to leave to leave this bear. So I don't want to ruin our world. Well, if I have to be honest, but it's my personal opinion. So to me to make it more environmentally friendly and more protective about biodiversity. If you want to add anything here involved well, it's a personal opinion, but part of me, they have some different points of view. And probably, I don't want to, again, it's a personal opinion. I don't want, after 20 or 30 years, the food to be producing facts, stories, or, or such things. I wanted the foods to be produced under the sun, with water from the rivers and in the soil, that is, that is our soul, but we have to be very careful with all these resources in order to do this for a long time. And in order to leave our children, something good, either even better than what we, what we, we, we faced at the beginning.

Speaker 1: 71:22

That was a good answer. And then what would be necessary for these to happen, to achieve this sustainable future? What kind of partnerships or collaborations your association needs to,

to make it more sustainable and to make it more easy for you also, and for the farmers in Bulgaria to transition

Speaker 2: 72:13

Well for the farmers, I would start with them because they are the most important parts in the chain because they're leading the process there. This is where they're feeding their children with business. So we have to start from the farmers we have to to change first of all, they are their patterns. We have to, to educate them. We have to make them more flexible. It's not the old school farmers, but at least their children or the farmers that are coming to the new ones. And we have very good examples here in Bulgaria for this family transition of the farms. So a lot of our members actually are getting involved with their children in the production process. And after several probably these children will, we will be leaders of the farms in these agricultural holdings because here in Bulgaria it's not just how to say it's more, more like a business.

Speaker 2: 73:03

Yeah. Agriculture. Yes. It's at a very good level. So while our farmers, they think about their work as a business and their holdings, our business holdings. So we have to, to, we have to educate the farmers first. And probably this will become through organizations like our farmers, organizations like advisory services, or, but we have some problems here with the advisory services. Nobody likes them. And the farmers before they have their own organization and anything to happen, through their organization or my organization. They're very they're very reluctant when they had to, to make something with advisory services and consultancy services

Speaker 1:74:44

And their responsibility for this transition. Is it only on your association or should the government and other institutions take part of this responsibility? How, how does your association feel regarding their responsibility to transition to sustainability?

Speaker 2: 75:00

I believe that everyone is responsible, the ministry, the government, the EU, the European commission, everyone we're like our organization. Everyone has a certain responsibility in this process because if you are if you're counting only on or in a third branch in the chain, it's, it's impossible to make the overall picture, the overall change. Everyone should be involved with even the publicity, even the, the society.

Speaker 1: 76:14

Okay. That's really good. So now that, you know, the topic that we're writing about and the, the, the, the goal we have, can you give us some suggestions, some advice on things we could do to contribute more, to make it a more, a better result?

Speaker 2:

Well, we would give a very difficult task if I have to be honest. Yes,

Speaker 1: 76:50

Yes.

Speaker 2: 76:59

But I can't give you advice. It's, it's difficult, even for me to outline the, you know, what, how to read these results, but probably the small steps are always the better choice **(baby steps)**. ***So if you are concentrated, in order to reach sustainability, you have to concentrate on these small steps and small changes because therefore certain until become true. They're more certain to happen. The sharp changes are not advisable. And they're very risky***.

Speaker 1: 77:55

We wanted to use weather data from different weather stations across Europe, which is a data set that we can find online. So, we get measurements about temperature changes, humidity, you know, and then we obviously notice that the temperature is increasing in Europe. So there is climate change, and that's the empirical evidence that we want to use for the feces, for the research, the quantitative data. So these weather stations show information that justifies climate change that shows that there is climate change. So the question we have is how could we use all of these data to prove that climate is happening and show evidence to the farmers.?

Speaker 2: 78:23

Most farmers have their own weather stations in their fields, so they follow the weather patterns very precisely. So they are aware of climate change and temperature change. They believe in climate change and even some of them are using satellite images to track changes on the surface.

Probably is a good idea, how to reach the farmers, we talked about digitalization and being slow adaptors. The challenge is how to communicate with them using new technologies and them being engaged with the information provided. They need to see the actual benefit of connecting with other farmers and talking together as a community.

(Create an online community to use weather data to avoid frosts or drought climate extreme events to reduce crops loss.)

INTERVIEW BELGIUM

Speaker 1 (00:01):

I read clearly this is top-down.

Speaker 2 (00:05):

So that's the challenge we are facing currently. How can we actually engage with farmers? Because they are quite **traditional in many ways, a bit conservative across European countries,** we find that farmers have these common conservative values and they're a bit slow adapters when it comes to new changes, policies, technology. So we are trying to figure out why are they like that in the first place? And second, how could we work with them in a more practical level? So they implement these European changes we're promoting with the 17 SDGs and so on. Yeah. So would you like to jump directly to the questions now and then

Speaker 1 (00:54):

Introduction about CROPLIFE: So it's based on four areas of activity that crop science deals with one is conventional synthetic pesticides. One is bio pesticides. And so the more natural style has the sides that you can have on the buckets, a third area is what we call agro, agri-biotech, that's GMOs, gene editing, and other technological and phone systems. And then the last one is precision and digital agriculture. Okay. So the intent with the association is soon to cover a lot of the **solutions that farmers** use or **will use to protect crops in the future.** Okay. So that's just, and then the association is it's European association. You know, our catalog, if

you like it, is to work with the European institutions to find a way to make that happen, which very much in line with your thesis is about trying to guess, trying to marry up with climate change ambitions in a way that doesn't harm production.

Speaker 2 (02:23):

Really interesting areas, actually a bit controversial, some of them, because the general public doesn't have a broad understanding of what it's used for. And a lot of fancy words can lead to confusion sometimes, but maybe we can talk about it after but I need to focus on the first 10 questions. So I don't know if you had a chance to read through all of

Speaker 1 (02:46):

So the first question would be what crop life, what crop life's plan is to deal with an increasing demand due to population growth.

Speaker 1 (03:28):

And when you say increasing demand, increasing demand,

Speaker 3 (03:31):

Yes. We assume that, of course, if the population keeps on growing, then there will be a bigger need to supply more food. Yes,

Speaker 1 (03:39):

Yes. And then this one, this one is quite straightforward in the sense that the companies that we represent are constantly working to find new solutions to help farmers deliver more food with less land, best input and less problems. Okay. So the whole crop protection industry, the whole reason for the event is exactly that is to try and provide solutions to farmers, to, to grow more with less basically. So that's, you know, the, the plan is a commercial plan of all of the companies to innovate and find new ways of doing this.

Speaker 3 (04:24):

Okay. In your opinion what is the agriculture sector in the EU promoting to improve productivity on food production?

Speaker 1 (04:37):

Yeah, that was an interesting question because, so you have, you have lots of, I think you have lots of what's the word, ultimately, a farm on their farm is trying to manage all the tools at their disposal to increase to decrease inputs and increase outputs. So the farmer on the farm is trying to use the tools they've got within a certain budget to, to do just this, to be more productive.

And you then have a load of supplier industries, fertilizer industries, pesticide industries, mechanical industries. And we're trying to support this one coming up with new, new products, new tools, new ways of doing things to help farm as people would expect. I think you have a big sector and try to deliver this. But you come up with some barriers, they can be regulatory barriers, they can be cost barriers.

Speaker 1 (05:33):

They can be what you flagged to **suit a willingness to change barriers**. For example, in the space of, you know, digital, it's very nice to talk about digital, but I think, I can't remember what the percentage off the top of my head is, but there's a large percentage of farms that don't have any **4G network**. So there, there is an infrastructure that's missing. So I think you have a lot of, a lot of attempts to do this, but there were just quite a lot of, Oh, I need it to be a thesis in itself that just looks at those specific issues.

Speaker 2 (06:08):

Yes. It's a complex problem. And it's a combination of multiple problems

Speaker 1 (06:12):

At the same time. Yes.

Speaker 2 (06:14):

But I will get back to you with this question because I interviewed a Bulgarian grain association last week. And we got some really interesting insights about how farmers are adapting to the utilization and how they are actually very aware of climate change. They know what's happening and they even have their own weather stations to predict their own patterns for weather changes, which is very interesting. But, but yet they are very behind in terms of digitalization and new technologies. So that's kind of the concert, the economy, because to me like they have their own weather station, they want to be updated and informed yet. They're really slow adapting to other forms of,

Speaker 1 (06:57):

Yeah. I think that that can be partially down to local as need to, but it's going to cost I think don't, you know, the farm is associated. Have you spoken to COPA Cocega?

Speaker 2 (07:10):

So there's a colleague of mine used to work at Copa Cocega cause he won't be a very close proxy if you wanted a farm of yours. But for example, the farmers at the farmers association

with us, with other companies who deal with better seeds, better attractors, better that, that they don't like, is the **costs come from costs.** The licensing costs a big argument that now **farmers don't want to put themselves quite further in debt** to, in a way that is putting themselves in debt, that this is never going to be something they can get out. So, so I think that's, that really is a factor, especially when you come to countries where you have a lot of small, small holder farmers. It's just that when somebody is quite a prevalent theme that we come across mistrust of the industry cost indebtedness.

Speaker 2 (08:13):

I was talking to this green association and they actually don't apply for any EU funding. They don't get any money from the European union and they ask why, why don't you apply? It's accessible to you? And they didn't really answer, but I assume that the bureaucracy behind it is one of the main challenges as well, maybe not fulfilling all the requirements. And there was a shame because also what they told us is that farmers, as you say, they don't really want to assume costs. And when it comes to new policies and doing these changes in the methods for growing, there might be some costs that they don't necessarily want to assume.

Speaker 1 (08:52):

Yeah, I'd say so there's two, there's **two things**. One is if you're going to **apply for funds** on the common agricultural policy, **it's all about conditionality**. So if you take the money, there are a number of conditions you need to fulfill. And if you're going to go to the position, **it's going to cost you more to fulfill the conditions than it is for the money you're going to get**. So I think, you know, it's almost, if you've been in the system for a long time and you're farming it away, that you are conditioned to comply. It probably makes sense if you've not been in it, you now need to come in and be conditioned by people. It probably doesn't make much sense. Yeah.

Speaker 2 (09:29):

Why is it so hard then for farmers to jump in the system as the first step, maybe that's the issue. Maybe that's one of the barriers to get in the system.

Speaker 1 (09:38):

Yes. And as I say, it's, you know, **they might want to have access to some of the support in a specific area, but because of the breadth of the conditions, they would have to fulfill that many of them will bottles they'll they won't do it**. And then just a point on something you said, which I think is so true and is completely lost in all of this debate, farmers know better than the rest of us, about climate change. They see it every day, as every opening is closer to

climate change than a farmer. So it's not that we should assume that we're doing something to help them because they have the brand. Of course they bloody know, they know it's happening. They have been, they are being **impacted then their livelihood, their life is being impacted by this every year**. So it was an interesting point that you made did it something that often we often, I often take part in conversations in **Brussels about farmers, on an assumption that they don't really know a great deal, which is, is, is incredible**

Speaker 2 (10:41):

Like taking for granted that the farmer is on a lower level or they're unaware of, so this is an interesting point that maybe we need to revise. Like all of us, not, not just the farmers, but all the organizations governments, you, but okay. Let's, let's go to question three because it's about climate change and we link it. So how does climate change impact agriculture? What is crops life opinion or view on climate change?

Speaker 1 (11:17):

Yes. So I think it's pretty standard. **Climate change impacts every country**. But I mean, you can take the European side of it. Climate change affects every European country differently**.** Okay. It's changing the agronomic conditions in every European country, which is the angle that we've looked at that is, that is changing the growing conditions. **It's changing the growing seasons. It's maybe changing what you can grow and how you grow it**, which, which, and from our perspective means it's changing potential threats that farmers face as climate change happens. It therefore changes the past, the diseases, the phone guy that they face either new or new to that area or new to that zone. Which is why we need to constantly evolve the portfolio to support the farmers. It's not that you've always farmed wheat in Romania in that area. Always will you probably won't. So, yeah, I mean, nothing particularly different in our position on climate change and agriculture to, to, I think the mainstream

Speaker 2 (12:30):

And I don't want to talk a lot about the mainstream opinion on climate change because it's sort of a copy paste in most organizations. And I feel that when we communicate like how relevant climate change is for the company or for the association, we need to sort of discover our own storytelling, our own method of maybe telling the same data, but with our own approach, with your own pitch. And this is a challenge because the more associations I interview, the more companies I interview, it's kind of the same. I don't see any differentiation factors, you know?

Speaker 1 (13:07):

I think climate change has just entered and certainly in Brussels, it's just entered the copy discourse. It's, it's accepted, it's done it's that it means different things for different people. And that's a little bit of the story they tell the story that we tell, which is important to us is that, you know **climate change affects every farm differently because it's changing something different in their little ecosystem.** It's not you know, it's not a case of climate change impact on growing wheat or barley. It's not about remaining. It's about farms at an individual level, the change to that ecosystem, which is something that a farmer, you know, in this, in this world of trying to increase their productivity, etcetera, this is something that has to be managed. So we try to take the story right down to the ground basically, which is, which is, you know, we're not unique,

Speaker 2 (14:06):

But it's important what you're bringing up here, because recently I just saw this news about French farmers suffering a big frost. They lost a lot of crops and they had to apply for compensation. And here is where I'm going, extreme weather events in relations to climate change. So obviously we don't fully understand climate change or at least that's how I see it. We have very strong data and we are actually using it for our feces. We are using data from a lot of different weather stations across Europe, and we're collecting measurements about precipitation temperature. So what we are observing from the data is that there is increasing path of temperature and decreasing of precipitation in Southern countries in Europe, especially,

Speaker 1 (14:58):

Yes, you, what, this is the, so there were solutions for this. They're not particularly popular in Europe GMOs, if you have gene edited seeds or depends, you can talk about any particular product. You know, you might get an analogy between Spain and Portugal and lack of precipitation though, different to New Mexico and California in the US that could have crops growing year round because they are genetic and can be modified to be able to grow in conditions with less precipitation. So at the moment as that trend continues, that's something that's going to be denied to grow as in Spain and Portugal. Although, I don't know if you noticed yesterday, the European commission put out a report about what's called genome editing. So in breeding techniques. Yeah. When the European commission has opened the door to the possibility of allowing genome editing techniques. So basically GMOs is where you take one one sets of traits and another sets of traits from a different cultivation. Okay. So something that you like in your banana and you put it across into your peach. Okay. Yeah. Whereas genomic it's like selective breeding, so basically taken from a weak family. Okay. So you take the best

of every, everything you can find to make the perfect thing for you locally. So, yes, just, just as a point on the, on the, on these, on these climatic changes, there are some solutions available.

Speaker 2 (16:34):

Yes. And I think it's really interesting. Maybe we are opening the Pandora door too with this GMO topic because I've, I'm not an expert. Okay. On modifying plans. I have grown my own. I'm interested in hydroponics in different phenotypes, different plants. The question I have is, okay we're talking about making plants more resilient to drought or perhaps salinity. There is higher salinity in the soil, and maybe we can develop a plan that is able to thrive. Okay. That will be advantageous to have that type of crop and make it commercial. Let's say then there are some, in my opinion, there are some ethical questions if we pursue these paths and those have to do with, okay, then who controls the seeds that are resilient that have been improved? Is it a monopoly? Is it available for the single farmer? That's one of the questions, you know, and then the second question would be okay if we start genetically modifying crops, are we fully aware in the long-term whether the nutritional values, for example, of that crop are going to be affected, you know, after several generations, you know, and it's

Speaker 1 (17:50):

It's, as you noted, this is a hot topic. So I wouldn't drop. So it's a hotly contested area, so not ongoing, but I'm going to sign the system, even if it was a scientist. I understand that could be a scientist on one side or the other side of this. So just because it was a scientist with a language difference, I wouldn't draw a big line though, by the way, between a Jibo genome. And it's so selective breeding space is completely different to genome editing. So I love, I would, I would really separate the two hours. And then on NGO, say, I'm not an expert for everything I would say to you now, someone else I can give you my personal opinion is I didn't have any problems with GMOs. There's been 25 years of science and there's never been any perceived problems of any nature. You always talk about potential problems and potential issues. And for me, to some extent, the direction of travel with climate change suggests that at some point, these things become quite necessary. So maybe I'm a bit more pragmatic. Maybe I'm a little bit more risk averse. I don't know, but that's my personal opinion, but then you talked to five other. [inaudible]

Speaker 2 (19:04):

Very interesting. Yes. the question then would be, is it inevitable to, to, well, we will need to adapt to any way farmers have to adapt. We, as a society, need to adapt to climate change. Then the question is then that would be translated into seeds as well, crops as well. Yeah.

Speaker 1 (19:22):

So just, just to give you, just to give you an interesting fact, so GMO cultivation is not allowed to be okay, so there's no GMOs. They used to be GMOs used to be cultivated mostly in Spain. But then that kind of died under public pressure. Okay. When, in the end, when we want to feed animals. Okay. So when farmers feed animals, 80% of that is important. It's okay. We don't grow enough protein in the EU to feed farm animals. What is it, corn, or was it actually sewing? And you know, something 80% of the 80% of the soil that's imported is GMO soy. So we're already a huge theme to the tune of billions of dollars reliance on GMO products.

Speaker 2 (20:13):

It's very hypocritical in many ways that we don't allow it here in Europe and we import it and pay for it. But yeah,

Speaker 1 (20:19):

Exactly. So, yeah. So just, you know, just as a sort of interesting fact on that one. Yeah.

Speaker 2 (20:26):

I'm writing it down actually to feed cattle, I supposed to feed

Speaker 1 (20:31):

I got to feed all the livestock. If they stopped that GMO import,

Speaker 2 (20:38):

It will be sufficient. Yeah. We would be in trouble.

Speaker 1 (20:42):

Yes. Off the livestock sector in Europe would be done.

What are the crop life's plans to help fight climate change? We've been talking about climate change and all the challenges we're facing, but particularly do you have any strategies that are aimed to tackle climate change?

Speaker 1 (21:58):

So again, it's, it's down to the products that our companies and the innovation. So basically we, the companies, have a commitment to dedicate 10 billion euros worth of funds to, to research and innovation to basically do what I said before. So it's, you know, the contribution to climate change would be three different things would be buying, developing drones that use less pesticide and developing, you know, more of the hydroponics that you were talking about that will require inputs that have a different impact on the climate. Let's speak to that hydroponics

thing, how it impacts on the climate. It's just a different one. So it's, it's by creating the innovative products, submissions,

Speaker 2 (22:43):

Research, and innovation. We could say that you are the boss, the muscle to innovate. Okay. That's the answer. Okay, perfect. So then how could the agriculture sector become more sustainable as we have the situation now, even considering a COVID pandemic, let's just take the context as it is now. What does it need to happen to become more sustainable?

Speaker 1 (23:10):

That's a huge question. If I had, if I had an answer to it, I'd like to think I would be sitting on a beach in Southeast Asia right now. Yeah. Yes. Okay.

Speaker 2 (23:25):

I'm not looking for a perfect answer because he's obviously very complicated to answer it, but more like your thoughts, your opinion.

Speaker 1 (23:32):

I think there are many, I think this is where the discussion in the EU right now is everybody agrees. That needs to be more sustainable. Nobody everybody's back against the green deal, the farm to fork of these different initiatives. I guess, where it gets interesting is the devil is in the detail is, is how exactly do you do that? So, you know, is it, is it, I guess what I would say here is there's some things that I, I think that was a sector. And then also to be honest with you, posts, I would object to it is the way to be more sustainable has to, and they would come back to the basics erection the way it's made to be more sustainable. It's going to happen at the farm. Okay. So the way we're going to be more sustainable as we have to get farmers though, could be, they have to quit every farm differently.

Speaker 1 (24:30):

Can't have blankets, evictions it's the farm that's going to deliver sustainability. Okay. And I think that that's something that I think is, you know, for example, in the EU, they, they, they want to make 30% of the agricultural land organic. I understand why they do that, but I'm not sure imposing an agricultural system is the right way to go. It's to me, it's more about making sure that the farmers candidate with sustainability, because we can come up with as many balls and as many breaking nations and as many intentions as we bones farmers have to be able to put that into practice on the ground. In a way that doesn't endanger their lives, that it tends to fall. So I think, you know, it's, it's, it's a complex question, but for me at the end of it, it goes

down. So making sure that the **farmer is empowered** to make this happen, that would be the biggest block in my view. Anyway. Yeah.

Speaker 3 (25:30):

That's interesting. Then the question that comes up to my mind is then is it a combination of European policies that need to be placed or how, because if we want to empower farmers, somehow, I also think that we need to educate them. I know, again, this is the contradiction that we think that they are not aware of climate change, that they are not sufficiently, they don't have enough knowledge, but this is not the case. And we are proving this through the interviews, but then if we need to empower the individual farmer to commit, to, to do sustainable change, then I assume that there has to be some policy or,

Speaker 1 (26:10):

And it just, but just the average, let me just stop for one second farmers already trying to deliver sustainability. It's not, it's not this isn't new. It's not that they're doing, you know, they have set aside land. They're conscious of this making, managing their land effectively because of their livelihood. So it's not that they're not doing it. **We're just asking them to do more of it.** So it's, and that, that, that you then coming to the complexities that we started to touch on the complexities of the perversities of the CAP system, it to agriculture in Europe, you have this huge ginormous historic subsidy system that is, as you probably know, that currently in the acute setting, the new cap for a work right now with trying to finalize it in the next four or five weeks, which is it's about trying to make sure that the cap of the bunny just cafes bunny is actually promoted the right things, but that's, that is a monster to check **bureaucratically direction** or the, so I think what you need to do, because you know, the ambition, I don't think farmers are going to agree with disagree with you on the ambition.

Speaker 1 (27:18):

You then need to have a regulatory framework and a financial framework that supports that direction. And then the last bit, which is key is you need to ensure that you have a pipeline of different innovative fertilizers, tractors, drones, other things, coming to market to allow farmers to do it. And the point is it's there isn't one solution to this. That's why I think organic for me is a bit, I have a bit of an issue it's not done. I don't like it when it breaks your legs or imposes what I would call something that maybe other, maybe I'm showing my free market colors. I'm not a great state interventionist. I'm a great believer in that in a pocket of power and people to do it and then see where the market gets. But what you see with farm to fork is what the European commission has decided, which is probably correct, is because these, the other side

of this that we haven't discussed, that we have down at the farm that's that's, that's one of the drivers at the other end of the driver was if you change consumption, if you force people to eat organic, if you force people not to eat meat.

Speaker 1 (28:29):

So yes, which is why you **have farm to fork** in essence, because they're trying to tap, attack it at the same time, both sides.

Speaker 3 (28:38):

Hmm. That's really interesting because I mean, obviously this sustainable trends now with the younger generations of consumers, they start to show that they are more aware and they buy more sustainable products if they can afford them, because that's the other challenge they're quite expensive or more expensive.

Speaker 1 (28:55):

Yeah. I think what you see, what you see and what the commission is recognizing is that trend isn't happening fast enough. So organic has been growing, but we're talking, you know, it did all the percentage 0.3% is organic and potent because people don't have enough money to pay the premium. So suddenly you're going to have 30% of Polish farm that has to be organic. Okay, how's that going to work? Who's going to buy it. How does this fit it?

Speaker 3 (29:23):

That is such an excellent question. I mean, why should we be even more organic, more sustainable if there is not a demand for it because it's too expensive in most cases.

Speaker 1 (29:34):

Maybe this has to be subsidized. So what I'm saying, you get into all sorts of different questions about, **about the systemic changes**. But basically the essence of it is farmers dealing with sustainability and consumers, we're turning to more sustainable choices. Yes, yes. Both. Both have been happening. The realization is it is not happening fast enough. So the commission is, therefore it becomes very interventionist. You can't leave this to the market because it's not happening fast enough. So you need to intervene. You need to speed this up. And that's either by promoting certain things or just forcing certain things, which is where we are from labeling to consumer trends, consumer education. Yes. It's happening from both sides, which is, yeah. So it's very difficult to know what the impact that's going to be. Clearly things are going to change, but quite how it's going to be interesting to see.

Speaker 3 (30:36):

Wow, that's really interesting. You're bringing up a lot of good things that I will need to discuss with my, with my thesis partner. But what the consumer trends and the sustainability trends is a whole thesis in itself, I would say. And

Speaker 1 (30:54):

I think it is, but I think it's something that obviously I wouldn't suggest you go down that rabbit hole of trying to talk about that. But I think you should, you need to, you need to be aware of it. The European commission is tackling this holistically. They don't just put the burden on one end of the chain. They are looking at the touch points. They are talking to producers, distributors, companies that market, the product, supermarkets, everything, the whole chain down to the consumer, down to educating consumers, talking to restaurants about, you know, just give you a, give you one example. This big one today is there are lots of supermarkets that are deemed listing resilient.

Speaker 1 (31:37):

They will not sell Brazilian because it can cause deforestation in Brazil. Fair enough. Okay. That's, that's kind of like supermarkets then trying to have this, you know, we talked about, you know, how, how would you show sustainability at a supermarket and say, we show sustainability, but I'm not selling products that are bad to the forest station. Yes. So you can imagine this is the, so this is the other end of the chain, right? So the supermarket stopped selling Brazilian beef. There was less demand for Brazilian thinkers. The theory would be that to go backwards you need less land and less deforestation. So it just, I think you need to be aware that they send up the chain is going to have a big impact

Speaker 3 (32:26):

Or for external countries. We are talking about outside the EU.

Speaker 1 (32:30):

No. And, and in the, as part of these commission things, they're trying to drive people to eat protein based products. You can't call them based beats cause that's subject to a legal discussion at the moment, but they basically, they started to go on an anti meat drive. If people eat less meat, there are less animals. There's less feed that frees up land specifically. So what I'm saying, it's just, it's not something that you're gonna be able to look into. And I think your, your focus is, and I think you maybe need to state up front of people. In Europe right now, this has been tackled to the domestic league that we're going to have impacts that come from the school and

off the farm to fork, we deal with space, but we are most interested in the farm. And if this book, we, you know, we know this, but with focus moments.

Speaker 3 (33:21):

Wow. Really interesting. I'm very interested in forestation in Brazil as well. But again, that's a topic for, for another interview, but Yes, but I can't manage all of them. I have to choose what I want to do with my life,

Speaker 1 (33:38):

But I'll tell you one small thing. And then we need to get into your questions. What's left is when, in the first year of my PhD, I went to talk to my PhD supervisor. And as soon as we sat down, he said, I would like to congratulate you. And I said, why? And he said, you are doing a fantastic job of writing eight different thesis at the same time. And I said, okay. I said, I'm assuming that's not a good thing. It was like, Oh, for your health. It's not, no, I guess I can sympathize.

Speaker 3 (34:12):

Yeah. It's the ambition to want to provide answers, you know, to big problems, but they are so big. And so interconnected, you know, systemic issues that it's difficult to target specifically how to get that solution. You know,

Speaker 1 (34:26):

It can be painful to be focused, but also, but what you will discover is when you do focus, it's much more rewarding.

Speaker 3 (34:32):

I want to believe that. Honestly, let's hope so.

Speaker 1 (34:35):

No, no, no. Honestly, it is much more rewarding because you go into something in such detail, you gather expertise. Now you might have wanted to do 10 different things, but you'll discover that if you do, if you do 10 things at this level, it actually becomes quite frustrating. The guilt, because there's no answers, there's just circular discussions. Only when you go down vertically, do you, do you get to something more concrete? But anyway, let me, let me get into your questions. We go to the ones I'm going to leave. You are frustrated with five questions announced.

Speaker 3 (35:05):

Well, we've been talking about some of them already. I think that the number six, for example, how to, what kind of support does crop life need from the EU and other funding partners, for example, to improve food production in Europe.

Speaker 1 (35:19):

So that wants to be simple. We don't. So crop life, Europe doesn't receive funding for the institutions. We don't want funding for the institution. The answer to that question for crop buys prospective busy week, but we won't be view is, is an enabling legislative framework. So we need laws that allow innovation to come to market because at the moment that the regulatory system doesn't allow drones to be used, it doesn't allow biopesticides to come to market. It doesn't allow these new genome techniques. So it's at the moment, the framework is anti innovation and what we think we need to help farmers is an innovative innovation and heartsick framework.

Speaker 3 (36:03):

He said, European Union is slowing or is slow at commercializing certain technologies to improve food production. Why, why is that?

Speaker 1 (36:15):

That one? I wouldn't be able to tell you it's, it's it's as you know probably better than I do. The EU is an incredibly conservative farming entity. it's always been fairly conservative. And when you have, and again, here I'm slipping into, by a free trade position. My observation is that the moment you have a huge support system in place, you're dis-incentivizing innovation. If you're paying everybody to do what they always did, why change? So it's, it's, it's partially conservatism among the regulators. It's partially conservatism that abhors the farmers, but then farmers are not necessarily incentivized to want to search and fight for innovation to make a difference because they get paid. Anyway,

Speaker 3 (37:06):

We do subsidize, to cover crop loss from farmers all across Europe. Why don't we subsidize the adoption of technology for farmers,

Speaker 1 (37:14):

But I think that starting now under the new cap, you're going to see a lot more measures to, to support innovation, to look at the infrastructure projects that are required, etc. So yes, that it's changing. It's bloody late, but it's changed

Speaker 3 (37:28):

There, there is willingness to change. That's a good start. Yes, exactly. Okay. Really good. Then let me ask you, let's just move on to number nine. W what is your opinion of what w what does crop life think of hydroponic farming? Want to contextualize the question? If we look at the Netherlands, it's the second biggest exporter of agricultural products in the world, they use a lot of greenhouses and how to ponies, how do these interplay hydroponics with the farming?
Speaker 1 (38:03):

So, so simple, it is absolutely one part of the solution. It is not. So this is, you know, we don't believe this problem any more than we believe there's one solution. I think hydroponic farming is a fantastic example of how, how you can evolve. You know, I mean, it started to crop three and a half months ago. And when I first discovered that the Netherlands was one of the world's biggest agricultural exports, as I thought I was reading wrong, I couldn't, I couldn't get my mind around it until, until I dug into it. And then you see all of the digits, all the greenhouses, the hydroponics. Yeah. Yeah. You know, you have, you have farms, you know, in the center of a city, in a warehouse. I just honestly it's, to me, it was, it was, it was, it was exciting. And I also, then I bought maybe like Q I bought my own little hydroponic systems at home to grow stuff. So yes, as an aside, but hydroponic is, is, is a fantastic example of what technology could do. Now there is a problem with hydroponic, obviously, because it sucks up a ginormous about electricity. So we answered the hydroponic equation is about ensuring that you have sustainable energy input into your hydroponic farm. So it is a solution. It comes on many solutions. It's not perfect, but it can be,
Speaker 3 (39:23):

It could become self-sustainable if you use renewable energy, or you could do passive hydroponic, which is to find a location demographically that has a lot of sun hours, and then you don't need to provide electricity. So,
Speaker 1 (39:38):

Yes. And then what was the other one? It's the again, you know, better than I do, I saw this when you went in the hydroponic system, you also use fishers, aquaponics, there's all sorts of new possibilities to where in that space where you could mix and match. So yes, it's an exciting part of the future.
Speaker 3 (39:58):

Yeah. And that is exactly the last question. What do you think, what does the future of farming look like according to crop life? What, what, which direction are we going in the next five to 10 years to be precise?

Speaker 1 (40:10):

So I think there's a future that we might see that might happen. I think the future that we'd like to see is, is again, so what would we like to see? And we'd like to see a future where, as I said, there is for European pharma, and then again, European pharma is, is two words that describe thousands of different economic conditions. So there is no stereotypical European fault, okay. The problems that are faced in Slovakia, Portugal, Sweden, that are all different. Okay. So what we think is the best way is to have as many different products as synthetic bio pesticides. Maybe the genetics can be modified or digital hydroponic drive data, information systems, GPS solutions, available to a farmer. So locally, those farmers can use what the best combination suits that. So clearly in that system in terms of the future, it's going to be a future that is going to involve more technology, probably in the first instance for most people, the first access it's technologies don't speak either machinery, so smart trenches, that type of stuff.

Speaker 1 (41:39):

It's going to be more the data systems that allow them to understand weather patterns and analyze every square meter of their faults, where what's happening. So I think that that's what 's going to be different. It's going to be different in different areas, according to what they need. So I think you know, that's, that's, that's the future that we'd like to see farmers having all of these possibilities, but at the moment, I'm not sure that's where we're headed at the moment. You have an imposition of a farming system, 30% organic. And I'm not quite sure how that's going to work. I'm not sure how that's going to be accepted by farms. You know, it's not something they wanted to do themselves in the first place. So, you know, that's an imposing department system,

Speaker 2 (42:23):

Is that for all the farmers in European union, or only targeted to some countries,

Speaker 1 (42:28):

Not every country in Europe will have to do that quite how every country in Europe is going to do that as an interesting question that has no answer. So yes, I think, I think at the moment where the discussion is, is in quite a delicate leg to be honest, in terms of what the future of farming looks like. So yes, there's a lot. It's all there. It's all up. It's all up in the air right now. All of it.

Speaker 2 (42:54):

Wow. Perfect. Then that's all the questions I just want to ask quickly. Yes. so I just wanted to ask you if, you know, knowing now the type of research we are doing and the specific focus

we want to solve, do you have any suggestions for us, for our thesis, or could you advise us with any

Speaker 1 (43:22):

So I really think you need to go and harass coworkers. You could find someone to talk to you. I think that would be incredibly helpful for you. The other thing that I would encourage you to try and do is, you know, you can find it on [inaudible] website. So, but many of the people that you'll see in the committees that are members of theirs are farmers. I think it would really benefit you to talk to a couple of farmers if you can. So it cuts out the [inaudible], even if you could find a farmer wherever you are now, just somewhere near Madrid, just, I think it will give you a you know, you see a lot of the.

Interview Spain

1. (1:13)-Until now there hadn't been tesions, the increment of production has been parallel to the increment on (global demand) population growth. This year, recent events have changed this situation, therefore there are upcoming tensions in relation to the world food reserves, as they are lower than previously estimated. China has started buying more than other years, there have been problems of droughts in Brazil and other places, and then the provisions have been inferior. Thus, the prices for grains have significantly gone up. The plans to increment the production for increasing demand, fundamentally this should come from the development of technology. Meaning that the utilisation of smart systems in agriculture (precise agriculture) in order to be more cost-effective. Saving money in phytosanitaires (pesticide, seeds, fertilizers) making it more precise and targeted to individual needs. And the other great pillar, is biotechnology, meaning that genetics linked to biotechnology, is what could lead us to obtain plants that are more resistant and resilient to weather changes, plagues (pests) and water-scarcity. Also making them more productive gives us higher food quality (vitamins, nutritional elements) .

(3:30)-The topic of genetic engineering is divided into 2 areas. **Genetically Modified Organisms GMOs** (the first ones made) this means the introduction of an external gene in order to make the plant more resilient to new conditions, which previously hadn't been capable of obtaining and therefore thriving/surviving. There have been rare cases in nature in which other plants and living creatures assume an external gene naturally. The other system is to utilize the gene from a plant, without modifying or altering the gene. Then, choosing the genes

that are more interesting and then “connect” or “disconnect” them. In order to make the colour of the pants more pleasant to a tomato. Which naturally exist in nature, for example there are different tomatoes that are resistant to drought. And other varieties that are not as resistant to drought but instead give more production. Therefore, sciences and biotechnology investigate how to mix both varieties to see what outcome there is, and observe the changes in the characters of genes. In conventional genetics this has been done with corn, crossing different varieties to observe which genes characteristic are interesting to withstand certain stress conditions. When it comes to genome editing you simply connect the gene that provides the resistance to drought and also connect the gene that gives plants with higher productivity ratios. Therefore, the objective is to identify which genes are good for production, and make them to work in one way or another. But this is not modifying the genetics of the plants because you are not altering the genome of the plant. Instead it is some kind of natural selection in which the humans choose the prefered plant's characteristics.

2. Climate Change: (5:00) What we observe is more variability in the climate (weather), perhaps it is more frequent to see heat waves, late and early frosts that affect the crops, droughts. But these are things that we might need to observe for longer periods of time. We would need to adapt bit by bit, this is why it is interesting the role of genetics, choosing the best genes from plants that are resistant. The relation of our association to climate change is very important as we play a vital role in the reduction of atmospheric CO2. So the more CO2 we need to reduce, the more crops we should produce, because the plants will absorb larger quantities of emissions. This is a perspective that the EU is not considering, so the more hectares of agriculture could reduce 9.000 kg of CO2 from the atmosphere. Plus the residue from the crops also contributes to improve the soil quality.
3. (6:59) Water-scarcity: water is relative to the output of the crop that you produce, this always needs to be related to the final production that has been achieved by using the water. Thus, the water is never wates while watering the crops, this water goes back to the water cycle (30% is used to water the plants/ 70% is going back the natural water cycle)
4. (7:45)Sustainability: The EU is imposing restrictions and the abandoning of arable land, 25% of the arable land to let it rest or ecological production (it is big to assume) so we

can use phytosanitary. But the production is much lower, and goes against the reduction of CO2 in the atmosphere and against the need of food in the world. Why should we abandon arable land that can produce food for the world or if we need higher production to reduce CO2. This policy means that we need to give up on land to protect biodiversity. But this doesn't have to do with climate change. If we need to give up, productive land is going to come back against us, because we will need to produce more food. For example we can't produce "energetic" crops, and on the other hand contributes to the deforestation of Brazil as needs to be produced elsewhere. Romania before entering the Eu had 2 M hectares for cultivating soy. They produced a lot and it went well, and used the same soy resistance to "liposaño" same as in Brazil. Since they entered the EU they dictated that Romania should not produce anymore, and instead it will be imported. Because they stopped producing the crop, they weren't available treatments to combat the pests from the summer season. And that crop was lost in Romanina and lost a lot of money as they were not producing for that segment of the market.

5. (9:01) Policies: the Eu has reduced the agricultural budget (opposed to china, USA , brazil with increases) there is another tendency to do ecological things, hoping to achieve a 20 % or 30% of sustainable production. But this is going to make it much more difficult to have sufficient production, as we can't use pesticides, ...fertilizers.

(10:15) The budget is reduced, the restrictions have increased and they expect us to continue producing as always. If farmers need to stop using phytosanitary, then we need to be subsidised for the reduction of our production or provide with a technology that can supplement our losses. This could be the genetic modified crops that are more resistant. But the number doesn't add up if we are not helped in one way or another.

6. (11:22) Leadership / Change : There is a misleading idea of the farmer as an individual person who has to do everything ecological at small scale. But this assumption is wrong, as the management of the arable land is much different. The prices of cereals have been the same for the last 30 years, and the salaries are not the same and demand keeps increasing. We need to adapt, making ourselves more competitive , looking for larger structures to cultivate. Thus, collecting more hectares and cultivating at a larger scale. If the CAp is aiming to promote small scale production, it is common to have 200 to 300 hectares. But small scale production is not the way in my opinion. The EU should

aim to have larger scale exploitation, as it would be easier to farm larger extensions with the same machinery.

7. (13:45) Solutions: There are countries (Switzerland) in which there is specific legislation when it comes to renting and selling of the land. That an area that needs to be improved, the problem resides in that small-scale agriculture contributes less taxes fiscally. If the exploitation of the farm is larger, then the farmer pays more taxes. Agriculture and farming needs to be managed the same way as the rest of the business in the market. It is absurd to do it differently.

8. Hydroponics: Not applicable for grainagriculture.

Spain

1. What are the farmer associations' plans to deal with increasing demand due to population growth?

The plan is to continue producing as it has been done until this day in Europe, with the highest food security and traceability while producing food. The European Union is one of the safest territories when it comes to food production, given the policies and control procedures".

2. What is the farmer association promoting to improve production productivity?

We strongly believe in science and biotechnology when it comes to improving productivity. Together with the efficient utilization of water.

3. How does climate change impact agriculture?

Climate change is causing changes of crops in certain areas, due to the increasing temperatures, and drastic precipitation (extreme weather events). Nonetheless, current agriculture has been able to **adapt seeds and products** to worsening weather conditions, without losing productivity.

4. What are the farmer associations' plans to deal with climate change?

Research and innovation are fundamentally necessary to continue producing and feeding the world with the highest food security. The production of corn, for example, in the lastest growth stages of the plant, is capable of absorbing more carbon than the entire Amazon's surface area in itself.

5. What are the farmer associations' plans to become more sustainable?

Is a similar answer to the innovation, biotechnology is very important when applied to the entire supply chain, having seeds becoming more resilient to pests, which leads to a small or decreasing use of phytosanitary products (Fertilizers,pesticides)

6. What support is the farmer association currently getting to improve food production?

There are lines of support through cooperation projects, however, there are strong environmental tendencies within the EU that reject any kind of innovation through biotechnology, such as gene editing.

7. What are the problems that farmers face while working with sustainability, EU policy, and adopting new technologies?

There is rejection when we try to improve production. We are aware that sustainable agriculture is possible, but it has to come through biotechnology. This would allow us to produce more efficiently with the highest food quality standards.

8. What kind of changes and support are needed to be able to deal with a combination of increased demand for food, climate change, and sustainability regulations?

We need to improve the communication towards society. Plants are very much like humans. If we favor research and development, this would benefit our lives making us more healthy, immune to diseases, the plant world also needs this. We can't stop using a phytosanitary product arguing that it is a chemical product, because otherwise without it the plants would suffer and be prone to pests and disease. Thus, Phytosanitary products are like the medicines for plants. A large majority of the trends in the EU don't understand that, therefore it will become increasingly difficult to produce food efficiently to feed the world, if we limit R&D in the agriculture sector.

9. What is the farmer association 's opinion on hydroponic farming?

It's another available option.

10. What does the future of farming look like according to the farmer association?

The same policies, legislation and demands are necessary to be applied in all the regions in the world, because in the EU we can't produce the safest and healthiest products, with sustainable farming methods, and countries in Africa, South America and Asia deliberately produce the same crops without any control or regulation applied to them. On the other hand, European farmers need to adopt strict control measures, and try to produce in the same conditions as external competitors. We need to be able to produce in equal market conditions. Agriculture and livestock are essential and very strategic sectors that feed the world's population.

INTERVIEW Germany

Speaker 1 (00:00):i

Not like farmers as farmers. Okay. And I think it would be an advantage for your thesis if you keep me anonymous.

Speaker 2 (00:10):

Of course, of course we are all anonymous. We are not giving names, but I'm recording now by the way, if that's okay.

Speaker 1 (00:17):

Yeah. Perfect. It's perfectly fine.

Speaker 2 (00:20):

So what does farming mean for your grandparents and you and your family? It's a small scale farm that they do, but specifically, can you describe?

Speaker 1 (00:32):

Yeah. It's like, yeah. It's like the main focus now is on vegetable farming, but you have to understand the regional context and the relation to farming. If you understand why a lot of people still grow at least partly their own vegetables. I would say my parents' generation is the first generation for all families of anyone in our region who doesn't actively grow their own food to a certain extent, because we are very fertile grounds and it's a quite poor region. So it was always necessary to grow your own stuff to an extent as a, as a supplement for the family to keep your family alive. And a lot of older people, like my grandma kept that on as not only as a hobby, but also to provide for anyone who needs some food. So she has like an over excess of food and gifts that a way to like her elderly neighbors, like who are also very old, like her, or like us sort of like in the like food growing season, which like start soon, we like always have like fresh, like real biological vegetables, not like the ones that are plastered with like bio in the supermarket, but like from her garden, [inaudible]

Speaker 2 (01:59):

This sort of contributes a bit to a local community now, because if your grandma has a surplus on vegetables, she's gonna give it away to some neighbors. It is,

Speaker 1 (02:08):

It is more community, community practice as business. Like it's, it's also not a social innovation, but it's I would say more tradition and culturally way more normal for us to grow your own vegetables. Like, because it's a very rural region as like rulers as it is in Germany and farming or growing your own. Sorry, what is the location of the farm?.

Speaker 1 (03:12):

So like and we're like, traditionally that's, it's in the name. So the **Ostrhauderfehn (North Germany)** area is like old, more that has a lot of artificial rivers that keep the water out because it's very swampy ground. But that also means that the ground is very fertile and farming was very normal. Like when I talked to my grandparents and stuff like that, like when my dad was our age, it was still normal to once a year like to slaughter a pig at home, you know, just slaughter would come and you had your pig over, I don't know, two years or something. And

then they would come and, you know, slaughter the pig and then you would like to make different products out of it to keep it and stuff like that. And obviously that is all not practice anymore. And I would say, I, I don't even know if it's still you, but that is like, that was very, very normal that it's like, that was the standard.

Speaker 1 (04:12):

And then we went to, you know, ALDI leader, those kinds of supermarket practices, which came now, and now you have a reorientation of younger generations that want to have these gardens again. Yeah. But yeah, you have a lot of community practice as farming. Like the real farmers are mostly milk farmers in my region and they grow corn, so corn and milk and then corn for feeding, feeding the cows. So they're not farming, isn't like a good business. Milk farming is no good business. Like a lot of them are closing down, but I dislike community farming. for example, my grandma's neighbor is like a man like a big field full of different apple trees. So he has like 200 different kinds of apples and anyone can just go there and pick the apples, you know, and leave a small donation.

Speaker 3 (05:13):

That's very interesting.

Speaker 2 (05:16):

Okay. So you talk a bit about this sort of tradition that has been inherited from the older generations also from the geographical location, because you are kind of tight to where you are born. You know, you have to use the soil that has the type of the different conditions now. So each farmer will grow different things or have a cuddle or milk and so on. Yeah. So the connection to our thesis is that we are investigating the transition that is necessary for farmers all across Europe. We are not linking to one country. This has to be, we have agreed that this has to be sort of a synchronized change within the EU. So this sort of traditional background and conservative aspect of farmers is what we're investigating. How can we engage with them? So they are more open to change towards sustainability, for example, how to communicate with them. They are also very different from region to region and they have very sort of stubborn mindsets. A lot of them don't want to assume costs to, to transition, for example, with a cap, with a European policies, a lot of these transitions require the adoption of new technology. And so on, this could be perceived as expensive and they don't see the benefit of implementing EU policy. You know what I mean?

Speaker 1 (06:43):

Yeah. Like I can completely understand that like friends of mine, they actually closed down their farm or sold it there because they had a cow milk farm. So most of the farmers in my region do count milk like they have fields, but to have cows running around on them, you know, and that is like very business because the discounters are dumping the prices. So for a lot of them, it's like they only survive by default with EU finance, but what they are like a lot of times very frustrated with is that they don't really get asked or anything in these conversations. And the, like, there are like, I would say on a yearly basis, demonstrations of them in like the city center or they demonstrate against Aldi's and Best business practices because they, they don't get the option or the voice that they need.

Speaker 1 (07:48):

That's like my perspective on it. And it's obvious that there could be like techniques to farm different things in my region, but these policies are very generic and they only differ roughly. And it's like foil soil conditions in original changing as well. Usually it rains a lot and now it was very dry for a few years, but a lot of rain also means that you can grow different things, but they also don't grow as much because you don't have as much sunlight. It's very stormy. And they don't really get asked or included in this conversation. And there are some approaches like together with a local university, it's the university of Oldenburg and they are planning to reintroduce the farming of green kale. My it's like a traditional part of the cuisine and north Germany, Denmark, self Sweden, and stuff like that.

Speaker 1 (08:57):

I always bring Kalea, but what people don't understand, they're actually like 200, 300 driven kinds of green kale. And there's only one kind of KL farm now. And because it's the easiest one to like, go over with a machine. And so they are planning to like to do some more there. But I think that the farmers don't really get included in the conversation. That's what drove a lot of people out of business. Like there are less and less farmers every year because it's just not, there's not that much economic benefit anymore. It's like, you're only rich on paper. You know, you have your, you're rich because you have 200 cows and every cow, a cow has a value. What do you need that value running around? And you need to feed it and the value dumping every year because milk prices are dumping at me. Prices are dumped. So that's quite complicated for them.

Speaker 2 (10:01):

Okay. So they make it back to some of the questions here, because like when we look at farmers it is true that they kind of rely a lot on subsidies from the EU. And it's not only like livestock

farmers are also all kinds of farmers, vegetable farmers, anything in France, there was a recent frost that killed like 70% of the crop. And they had to pay them, like increase the amount of money from public tax money. So while we are asking like Martina NAI is like all of these subsidies that we have to face and pay, like, are they really worth the production? You know, because like the production, you know, we're dumping prices, less farmers want to hold farmers. And so on.

Speaker 1 (10:50):

I see it as a systematic challenge that is not on the farmers. They are willing to change and adapt because the farmer has to find creative solutions to stuff all the time. Like, that's their job, essentially, because like when a tractor breaks down, you can't always call a technician. You know, it's like their job is by default involving some level of creativity and solution finding. And I think what I like from the perspective of my region that I have from people that I know who are farmers is that it's, that it's the, the system of discounters, which are dumping away to prices and global supply chains. It's like even counters. What do you mean discounters? Like Aldi and Lidl. Like they dump, they dump away the prices and they have all the power in the market. Like farmers are sometimes blocking their supply chains, like their, like their collection centers and stuff like that because they want to make their voice heard.

Speaker 1 (11:52):

But it's like commonly ignored by everyone because what people care about is how cheap is my meat and our cheapest, my food, but not about the quality. And you can even see that in biological markets, there was a, like a news article recently that farmers came to the **biological supermarket** and **gave away potatoes for free**, like that they've grown regionally because the biological supermarket wanted to sell by or potatoes from, I don't know, like, so like some, some, some other country, you know, and that's not, that is like a, **that's the controversy.** Yeah. It's like, it's this like system, it's a systematic problem. It's like, if the farmer can adopt and can change, but the system doesn't allow it, the system is made to pressure the price.

Speaker 2 (12:47):

Is it because he's pure wild capitalism that farmers don't want to be farmers because we're dumping prices. Is it because we are maximizing profit from a business perspective and therefore it's all about the price.

Speaker 1 (13:00):

Like it's like, I'm not for the farmers, surprise to farmers, ask for fair prices. They don't, they don't want to, they know they won't get billionaires with their farms, but it's like the **market power dynamic** in Germany is like Aldi and Lidl and Erica, like are there free changes? And they have like 70% of the food market it's like, and **they dictate the price**. And they say this year, 10% less for milk. And then the farmer is like, how am I supposed to do that? You know, they take EU subsidies to survive, not to get rich or something like that, you can throw as much money on the farmers as they want. It doesn't change the system of cheap prices, cheaper meat in supermarkets. And that requires societal change. And like it's a different perspective on us consumers on that. It's like, if, if a kilogram of minced beef costs less than two euros and people get excited about that, then something's wrong in the system and not worth the farmer.

Speaker 2 (14:12):

Yes. It's complex. You know, like, because we fixate prices, it's like an oligopolistic kind of thing that, you know, big, big complaints will fix prices. And then they set up the benchmarking.

Speaker 1 (14:28):

Yeah. They're their supply chain negotiations. No, no mercy. They will bleed out the farmer's market and they use subsidies until there's nothing left. And they have the same thing in the Netherlands. And the north of the Netherlands farmers got so angry, they kicked in the door off the local councils and groaning it like because the government said, yeah, and now you need to change again. And they just invested a lot in the past. And I'm like, farming is always difficult business, but that is a bit tricky for those sports lately.

Speaker 2 (15:05):

Yes. And this is a problem with our thesis that we can go many routes. It could be two thesis in itself. Really?

Speaker 1 (15:13):

Yeah. Yeah. The recommendation is to really narrow down and stress your limitations. You don't need to answer everything. This topic is so complex. . Like if you find out in theory, they could innovate, but then why do they not innovate? Then you maybe say the systematic problem that is not on the farmer. Yeah.

Speaker 2 (15:45):

Hmm. Okay. So, well, the relation that we want to make with the quantity data is that we keep sort of observing more extreme weather events that happen like a big frost or

Speaker 1 (16:03):

Drought droughts.

Speaker 2 (16:05):

Like cloudbursts in Malmo, for example. So these changes in climate changes, sort of the data keeps showing that it's increasing and obviously farmers are aware of climate change. They are not denying it. And what we realized through the interviews is that most farmers in Bulgaria, in remote rural areas, they even have their own weather stations and they have their own patterns. So that was really mind blowing.

Speaker 1 (16:36):

Yeah. it's yeah, it's the same for farmers in my region. Dare not climate change. She knows. I mean, they're the first ones who were affected two years ago. I think it was 2018 when there was a record drought in south Sweden and north Germany. It was almost two and a half months, no rain in the months where it usually rains every second day. And I think the farmers in my region lost 70% of their crop. Like it was, it was always gone. Like there was last year. Yeah. And that is a very fragile system. And they know that and they try to find new solutions because I mean, if you're a farmer you're by deep falled, somewhat like caring about other people, because I mean, you work to feed them. So like, and it's like,(farmers) they are the first ones who feel climate change.

Speaker 2 (17:36):

Yes. And that's why the interviews show as well. So we want to explore this, what you said is that they don't have enough voice. Maybe they feel this as this associated with current policies, governments are

Speaker 1 (17:51):

The policies or focusing on the wrong things. They want the farmers to change. The farmers can change, but for the farmers to sustainably change, they need to work like a supply market, you know, and cooperate with the companies that buy and then sell the food. And if those companies have a [inaudible] position, then they dictate the prices and the farmers can't innovate and can't change because they're at the brink. Hmm.

Speaker 2 (18:23):

One of the things that we got from the interview from Belgium, these companies called crop life and they told us that adoption of technology is a key thing for sustainable transition. And I agree. And the thing is that it hasn't been subsidized by the EU. For example, we subsidize crop loss when they lose, but we don't subsidize the adoption and creation of new technology and innovation. So this is starting to happen now with the new cap there will be more investment

dedicated to innovation. I assume. That's what we think. But what do you think that policies at European level need to do, what do we need to change from policy level to make more sense and to facilitate farmers as a smoother transition?

Speaker 1 (19:11):

I think that's a general problem of EU policies that I have a very helicopter view. And then they hope that they trickled down. It's almost a bit like a trickle down economics approach to policy. And that's obviously not working with most of all with most of the things. And it's, it's not working in the sense that it provides sustainable innovation to farmers. At least from my perspective in my region, like, like they, a lot of money for like, oh yeah, we're subsidizing new ways of farming come with an idea. Or like but if every farmer in the region is a, is a milk farmer. So it has cows and fields to run. They have cows to run all over the skills. That doesn't mean that those fields are fertile enough that he bought, I don't know, 20, 30 years ago those are fertile enough to suddenly grow soil on them or something like and innovating like milking a cow. You can make that more sustainable obviously by treating the cows better and stuff like that, but driving innovation. And that is, I think sometimes it's really difficult when you grow things, you can find new ways and stuff like that, but like, it's really difficult for a farmer to transition and say, yeah, I've been a milk farmer for two generations, and now I'm becoming a vegetable farmer. It's like that whole knowledge needs to be there as well, completely

Speaker 2 (20:47):

New machinery as well, very expensive,

Speaker 1 (20:49):

You know, new machinery, how to grow vegetables and stuff like that. That is like a science for itself. I mean, that is like, you can study that at university level. That's like a, and to demand someone who's like in their mid fifties and a small family company in a rural region and say like, you're a vegetable farmer now that's kind of difficult. Right.

Speaker 2 (21:10):

That is a really good point. You have there, like, we assume that farmers are capable of transitioning just like by the blink of the eye, but no, it's not, it's not possible because yeah.

Speaker 1 (21:21):

And it's also for them, like the transition process that is like, it takes time, it takes resources and then it's not guaranteed that the transition is a successful thing because like, innovation is a lot of trial and error. It's like, and it's different for every region. Like the grounds in my region are different than they are. I don't know if you drive 200 kilometers south suddenly and stuff

like that. And they have a completely different farming system than in a region that's completely flat.

Speaker 3 (21:52):

Hmm.

Speaker 2 (21:54):

Well, the key word that we keep finding from the literature is adaptation adoption. And, the thing is that the EU sees these policies. For example, there is something called bio production and they want to focus on bio products. The EU has a specific new plan that wants to reduce, for example, pesticides by 50% microbial. So they have all of these new sort of requirements that they want farmers to implement. So they reduce less fertilizers, pesticides, and so on. So the crop becomes more sustainable, but like all of these new requirements, they are not welcomed by farmers the same. What do you think? I don't know how to ask you, but because we want to connect it to somehow consumers and sustainable consumption, we can want going in- depth for the thesis too much on it, but we want to have an overview of these bioproduction strategies. What do you think? Does it make sense? First

Speaker 1 (23:08):

Of all, Dow lake biopharma is in my region and it's that a business, because if I asked for more price for your product, because it's bio, but you have to fulfill a lot of requirements to be a bio producer, like whatever. And it's also like the targets, like let's take the pesticide example. I'm not a fan of pesticides because obviously it's not good, but the farmer is like their lesson. As farmers, farmers are asked to produce more and more, you know, and a lot of food gets wasted and stuff like that. And they're like, if I use less pesticides, my like outcome will decline, you know, even if I, it will be less. And that is like, that means less business. You have families to feed with that. That is like a complex system where it's like a good target to have less pesticides, but the solution also need to be provided you. Can't just ask someone yeah. From next year on, you're not allowed to use pesticides anymore. Good luck. It's like, and at least like what I feel in my region is that the farmers don't get asked enough about what they need, what they require, what's possible for them. And it is a very individual thing per region, but you can see that farmers are unhappy everywhere.

Speaker 2 (24:37):

Like we discussed with one of the interviews that there is this sort of state interventionism that the EU tries to achieve with policies. The interview you were saying that he rather have more testing the market first and see if they would adapt it and use it and then implement it in the

policies because that's sort of the contradiction that, for example, the policies for bioproduction with pesticides, they are not very farmer friendly. We could see because they will have less crops. They will need to probably spend more money to find ways to keep the plants healthy. And as well, the consumption, the population growth keeps growing as well. So it's a bigger challenge.

Speaker 1 (25:31):

Yeah. That's like, it is like an insanely complex topic. It's I think there need to be a systematic change. It's like let's say meat prices, like, or let's use the vegetable crisis because we're in sustainability. Like, like that whole supply chain for that is insanely complex. And the Netherlands has an economy that is very big and farming. I mean, they're a really small country and the second largest food exporter in the world. So there is innovation in farming possible, but I would say a large number of farmers. They consciously like to start innovating around because they don't have the financial capabilities. And even if the EU provides money, then the discounters would just like to lower the prices again, because I mean, they can read the newspaper as well. They see farmers are getting subsidies. So Dave, it would be harder in the next negotiation.

Speaker 1 (26:29):

So I think that's a systematic challenge if you want farmers, like for, for innovation in general, from an innovation perspective, like innovation doesn't happen through for like this one idea that is like the Tetrick technological silver bullet that is like complete. We neglected that idea and innovation studies in the eighties or something it's like you, innovation happens in complex networks. All these farmers are connected. If they see that something is working and stuff like that, or someone is innovating. And like these networks are like innovation networks on regional national level, European level. And it's really complex to unpack that. And what would, you can definitely see what their main pain point is at the moment in this network is I think this is like discounter culture that their products just get dumped away. You know, there's no connection to food, like a person that lives in the city. I've never been on a farm. Like how should they understand how much effort it costs to grow one cucumber? It's like, and they just want it for 60 cents or something. It's like the better psych is a systematic problem that holds the whole sector back.

Speaker 2 (27:50):

But it's also sort of our fault because we live in this comfortable capitalistic system that allows us to, to have this, you know, to have products that cost relatively nothing compared to them. Yeah.

Speaker 1 (28:05):

It's like we require social innovation, not technological innovation. Like you can grow, like you can just build a massive greenhouse 300 meters long, like the Dutch too, and pump it full of vegetables, you know, like that is not complicated. So anyone can do that. There's like a, like but the, the systematic problem that that's, that's the main thing that is holding them back in my opinion, but what do I know? I'm no fun,

Speaker 2 (28:35):

The free trade, you know, it's just the market and that's how the market behaves, behaves and responds to consumption as well. So it's not only that the market is stating that they're following consumption. They're,

Speaker 1 (28:47):

They're following consumption, but it's like the systematic problem per like most of what's laying in the supermarket, that gets thrown away. That's like, that's not consumed. That's like and if you make that illegal, then we are at a completely different stage. You know, if you make throwing away food illegal, then prices and things like that can normalize again, we're living in a capitalistic and free market, but it's not a free market. If it was a free market price would dictate itself and theory. But like, obviously we all know that those theories are. And then the market is not free because it's two companies who dictate a price. It's like, if you don't sell to us good luck selling at all,

Speaker 2 (29:30):

We have assumed these as the free market and we live in it. And we don't really question why, you know, most people, most citizens don't go that deep,

Interview Sweden

Speaker 1 (00:01):

Okay. Um, yes. Well, especially if you aren't in a hurry, um, let's just follow the main questions. Um, then,

Speaker 2 (00:13):

Then my replies will be long. So because they're very tricky.

Speaker 1 (00:17):

Okay. Well, that's good because the idea of the thesis is to look at different farmer associations across Europe and connect them to the EU policy and see if there is a gap between what the farming associations want and need, with the current policies. And then our expectations are that there are some differences between Northern and Southern, countries

Speaker 2 (00:42):

And maybe Eastern Western as well. And then you can subdivide everything and yes, there will be differences. I'm sure.

Speaker 1 (00:49):

Yeah. So that should be interesting. Yeah. Yeah. So for the first question, um, what, uh, you and NRF, um, like plans are to deal with the increasing demand for food due to the population growth.

Speaker 2 (01:06):

Uh, we see it as one of our main tasks actually to increase our production. Because if you look at the, the, the climate predictions for the world, it seems like Scandinavia is one of the parts that will be least affected by climate change. This doesn't mean that we won't be severely effected. Uh, and I think there's a misconception there very often, the people think that it would be better here because it gets warmer. And that one of the problems with growing food in this part of the world is the cold. Uh, unfortunately that's not really the case because what we have here is adapted to that core, which is of course why it works and the big new challenges that the variability will increase. We will have less, we will be less able to plan because there will be real uncertainty on what will happen.

Speaker 2 (01:54):

You might get a very late frost, even though on average, the temperature is higher. You get, well, might get much drier summers, even on average for the precipitation is higher, so on and so forth. And that makes it very, very difficult for performance. And it also makes it very much more costly because you would probably have to invest both in irrigation systems and an increased drainage because you need to be able to manage both types of extremes far more often, but you only get value for your investment when that happens. And that might happen more seldomly, but when it happens, it's so devastating that you need some kind of tools to manage it. And the same goes for everything else. Of course, the ability to be able to control your environment will be much higher. On the other hand, we know that some of the most effective tools that we have do have some quite significant side effects.

Speaker 2 (02:48):

So we don't want to use more fertilizer. We don't want to use more planned protection. We don't want to tell more, we don't want to do those things because we know that they do affect the overall systems, but in an increasingly volatile world, the benefits of being able to use them, but use them wisely and rightly will, precision will be far higher. And we have this very challenging. I used to work in international aid before what we saw in [inaudible] Uganda was the farmers were basically just giving up instead of investing anything, because you couldn't be sure of getting everything out of your investments. People just started throwing out the seeds that they had on hand. They didn't spend any time or money or work on tilling the soil to prepare the ground or anything like that, because they wouldn't know if this rainy season will be good enough or not.

Speaker 2 (03:35):

And that's not a situation that will work for us because we know that we are part of the ones that will be able to provide food for the world. And I think even more importantly that the farming system is very close with links to the forest systems. And we are the ones using sunlight to capture carbon dioxide and convert it into fossil free social value. So to say, and we know one of the things that it's absolutely not sustainable is to continue, uh, overusing finite resources by fossil fuels. And that we know that that needs to be phased out very, very quickly. And the only thing we can use to face it, of course, we need to recycle much, much more in society, but all the new materials, all the new stuff to come seem to sort of the societal loop sort of has to come from the green sectors.

Speaker 2 (04:32):

And that of course means that we cannot just rely on producing food or we need to produce textiles. 60% of the world's clouds are made by oil that can continue. So we need to, and also of course, energy and building materials and everything else. And if you put that into perspective and knowing that, I mean, would they Ogallala aquifer almost be dry with the glaciers in India, sort of melting out and the, the, the groundwater sinking by six meters a year. And I mean, you know, the story, our responsibility would be enormous, and that's why we absolutely need to produce much, much more, not just to sort of keep up with population growth and economic growth, but also to continue sort of maintaining a decent quality of life for ourselves and for our sort of the countries around us. And maybe also wider than that. And also I think producing a surplus so that when a good it's a bad here somewhere else, we can contribute with our resources, with the hope that when we have a bad year, they will be able to help us. Uh, so something along those lines.

Speaker 1 (05:41):

Yeah. Also what produce, um, a bit more to help the struggling countries, um, that might struggle even more.

Speaker 2 (05:50):

I, I think actually we will struggle and I think our neighbors will struggle. I think, I mean, if you just look at, uh, the European environment agency had a prediction on what will happen with, uh, land prices due to climate change, and then just looked at sort of not the, the, the additional value that could be produced from the green sectors, but rather just taking into counter catastrophes and stuff like that that might happen. And they say that, uh, agricultural land in Sweden, they expect an increase by at least 60% in the land value. Whereas in Spain, they expect a decrease by over 80%. I mean, that means that that land no longer retains even 20% of it, current of its current value. And that is supposed to go to the productive capacity. There will be so low. And with that in mind, we, it's not just so that we would, I mean, it would be great if we could help everyone, but I think that we will probably have to be to helping a lot of our neighbors and also by doing that, helping ourselves, because things will, there will be some like 2008 team here as well, and winters like 2020, and that will severely affect our ability to produce.

Speaker 2 (06:59):

So, so I think that that's absolutely one of the key issues for us moving forward. Uh, and we need to adapt. I mean, we need to adapt a lot to all of us.

Speaker 1 (07:08):

Yeah. Yes. Um, so one of the other questions was, um, if you guys are doing anything in particular to, um, improve productivity, cause you said you don't want to use more fertilizers and things like that. Is there anything like an alternative where you guys are like, yes, this is a good alternative. We are promoting this alternative.

Speaker 2 (07:29):

We are looking at several and we are not ourselves it, but we are in, in collaboration. I mean, our job is more to influence. We're trying to influence the government to spend more agricultural research that I don't think we have added have ever had such big spending after Rachel institutes that I don't know, like we've had now. I mean, there's a huge push for this. And also we are then trying to be part of those research teams as reference groups so that the research is actually applicable. Cause that's one, often one of the challenges that people come up with great ideas, but then they haven't really thought out who should use this? Why should they use it? How should they use it? And what's in it for them. And I mean, sometimes the farming community is accused of being conservative. Maybe we, they are. But there's also good reasons for that because some of the bright ideas that have been in the past, weren't so good.

Speaker 2 (08:21):

So I mean, it has to work, but that's the basic thing for farmers. I mean, you could call it wherever you want. Um, conservation, agriculture, regenerative, agriculture, ecological, conventional, whatever, what matters the most farmers versus just this work for me on my farm. Can I, can I use this? Is it getting better? Do I feel better? Do I get more money for it, whatever, whatever. And that's sort of the, as I say, in English to the, the, the proof of the pudding is in the eating and the proof of the, the, the concepts that are being developed. And that's, we think that we used to have to have a wide variety because one of the things that we

do not know is what the future will look like different from today. And hence we won't put all our eggs in one basket, but rather spread them down sort of very widely.

Speaker 1 (09:12):

Yeah. Yeah. That makes sense.

Speaker 2 (09:14):

Uh, another thing maybe also too, that we're actually trying to look at more carefully is that what types of side streams resource streams, uh, so-called waste that we produce are actually things that could be good for somebody else. And also the other way around what type of societal waste, which is just materials in the wrong place could we make use of, and how can we together find that? Because I think the key question in all of this was when it comes to climate change is that we should not solve our problems. We are a huge part of solving society's problems, but in order to be able to do that, society has to, how has to help us solve sort of the parts that are our problems. Uh, and much of the, if, I mean, if you environmentally, we are doing very, very well on most issues, financially, many farmers and foresters are struggling and socially, there's also a huge challenge there. So I think that those things have to work in tandem, or it's not tandem, it's a street, but that's cool.

Speaker 1 (10:17):

Yes, yes. Uh, yeah, I give in, I get a point, um, and there's a lot to do about, uh, the financing of the agricultural sector, um, because there's a lot of subsidizing. Um, but at the same time, it's not that the farmers, uh, getting are getting really rich from all the subsidizing, um,

Speaker 2 (10:39):

In Sweden. I don't know if you know, but, but, uh, you do snack it. They, they make no sense, but I haven't seen the latest one. I think it's probably changed, but the last year's one, they saw that, uh, the return on investment in primary production is about four, four and a half percent. When you go to the, the, the food industry, it's 12, 15% when you go to the grocery stores, it's 25%. And when you go to the restaurants, it's 40%. So I mean, the return on investment, uh, you see the closest you are to the consumer. Now, I think we've grown the properties, the restaurants are doing quite badly and the, the, the grocery stores I'm doing much better, but that, of course, it's a huge challenge that, that these subsidies don't mean that farmers are well

off, but rather they are then use as an argument for reducing the prices. So, so the closer you are to the consumer where the money lies, of course, the bigger part of the share you take the challenging part here, of course, is that when these people, in that end, it was like, look at what can we do to become a more sustainable, they, all of us like, oh yeah, you farmers should do much more, but with much less money, that becomes kind of tricky.

Speaker 1 (11:49):

Yeah. And that's one of the other questions., like what support are the farmers getting like from the EU to improve food production? Because the EU has a lot of new guidelines, um, and innovation, um, where the agriculture sector should align with the Paris agreement, the Green Deal, all those things. And are they also providing some sort of support or are they just setting goals at this point?

Speaker 2 (12:21):

Well, first of all, the trial is ongoing, so on CAP. So we don't really know what that would be when it comes out. Uh, one of the things there of course is that there's, it's not really, I mean, it has changed. It's not so much, or if any support for increased production, but rather for other values that are being produced with similar production, take better care of the biodiversity will similar production would use, uh, it's eutrophication of water it's so, so, so it's, it's of course a huge part of making the production environmentally more sustainable. I wouldn't say it's a challenge there, but if we look at, from our Swedish perspective on Europe, if you take the green deal and the farm to fork, the things that were presented there, that the European farmers should be doing, those are things that we have been working on in Sweden, actually in a sentence, written the textbooks on from Swedish work for the past 40 or 30 years.

Speaker 2 (13:18):

And that means that, of course, it's great that all the others have understood that this is a road we're taking. Uh, the challenge for us is that it doesn't really help us because we will redundant. I mean, we are so far ahead in terms of reducing use of antibiotics or different types of things that makes it. And some members are complained that what happened now is that we took huge costs 40 years ago. It's developed these methods and I've done sober time. And now money that could have been spent on helping us continue developing them, or instead spend some, helping the others to catch up. So we won't even get the benefit of being better so that we could

get more for the product that we sell, but rather the others are being pushed to, to catch up with us. And then of course that means that these farms are then saying that I will not be in the Vanguard next time around.

Speaker 2 (14:13):

I will not be the one stepping forward. I will not be the one trying to innovate. I will not be the one because I don't get anything for it. I guess a lot of hard work, I lose, uh, market shares and all those things. And in the end I don't get anything. So I think that's a huge, challenging part of this that we of course want to do this. Then several farmers are doing things just because it feels good and that's great. And that's something that we need to be very careful about, but I mean, you cannot live for so long, just so the feeling of, of doing something great. You need something in your belly as well, and something in your wallet, otherwise it's not sustainable. And I think that's one of the challenges that we're seeing currently.

Speaker 1 (14:50):

Yeah. So at the moment, it's more, if you do good, you get like a pat on the shoulder, um,

Speaker 2 (14:56):

At best sometimes even don't don't get that.

Speaker 1 (15:00):

Yeah. Yeah. So it would, European would be better to take some of the budget that they now use to make some countries catch up and use it for innovation. It's that sort of farmers can keep innovating and developing.

Speaker 2 (15:14):

Yeah. And I, I think that there's different ways that could have been done as well, because what we see sometimes is a lot of money has been spent on, uh, academia, which is great. Academia should be free to do all things, but I think there should be also some more collaboration with the actual practitioners, because many times the ideas, I mean, I have so many sources from, from my work in Petrel aid where sort of, uh, bright European scientists, I've gone down to Africa and then show them how to do things. And then it turns out, oh, they already knew that. And they have great, great reasons for not doing the things that we thought would be brilliant

and so on and so forth. And I think that that interaction between the green sectors and the scientific part is the most important and understanding what might seem like a strange traditions that have say does often have very rational reasons for it. And then of course, sometimes it doesn't, but knowing these differences and actually being more sort of attuned to that, I think it's hugely important when we're looking at that. So, but absolutely we will need so much more knowledge to manage a very different future ahead of us. So, so I, I think absolutely, and finding smart ways of doing what we do better, uh, will be key. I mean, not just for, for, for, for farming, but for society as a whole and for, for global wellbeing.

Speaker 1 (16:43):

Yep. Yeah. And also like mainly by setting up the communication better with sectors and groups, um, we can prevent doing a lot of work that we won't benefit from anyway.

Speaker 2 (16:58):

Yeah, no. And I also think that that sometimes, uh, the research community sees agriculture and other parts as mainly natural science challenges. And me being from the natural sciences myself, I'm very much attuned to that, but it's not often not technical problems. It's rather finding the right, uh, governance systems so that these innovation technical innovations can be put to use. But then of course you have to have the right incentives and looking at sort of economics, legal systems and stuff like that as well, because those are often a hindrance. So I think a broader look at this and sort of how do we, and I guess basically actually the bigger realization I'm working lot with the taxonomy and also with the green deal and stuff. And one of the things that I find challenging is the realization that the only sustainable way forward in any meaning of the world is exactly what I talked about before not using finite resources as part of building our economic activities on renewable ground.

Speaker 2 (18:15):

Absolutely. We need wind solar, hydro, all of those things, furniture, parts. But apart from that, I mean, we're still building all of our houses in cement and iron. It won't work. We need to do something else. And if we build them in, in timber, it's actually, uh, inhabitable, carbon storage, as soon as the Fort, let me with that mindset has to change. And that means actually pointing very, very clearly that this is the future we want. I feel that the, uh, lots of, of the EU still holding so tightly to the, the, the, the, the, I don't know if you know the words to the sniff, the

field, but sort of little cuddly bear of being able to use fossil fuels. And we cannot let go that we don't understand what that future would look like that we have to, we have to say that this is not, we need to move on and then saying, this is where we should actually do whatever we can. But if you look at taxonomy, there are, there are putting barriers and hinders and all stuff for the green sectors rather than helping them along. And I think that's that mind shift needs to happen. It can't happen soon enough.

Speaker 1 (19:23):

Yeah. So change the taxonomy, like tax on the fossil fuels, um, and use those taxes to invest in green technology. Yeah. Okay. Yeah. Yeah. Personally, I think it has to do a bit with, uh, the people in the EU. Um, they seem to be mainly older people, um, and they are less open to change.

Speaker 2 (19:47):

I'm quite old myself. So, I mean, does that, that's a bad excuse if that, if that's their experience, they need to change. No. I also think another challenge is actually, and maybe, you know, better than me, but I sometimes feel when I'm talking to people from the EU, that they are very much looking on the world, the way it looks from their windows, sitting around Brussels, meaning that they see the form that they have in their heads as the farming that happens around, I don't know, or something like that. And the forest, they think of all the few forest remain in that region. And then of course, it doesn't make sense at all, that you would cut anything, any of this down, but then they apply that on Sweden where 80% of our land, as far as, and we actually manage them quite well. And we do get derived a lot of benefits out of them.

Speaker 2 (20:33):

But I think that that is also one of the tricky parts of this that we're not able to, uh, present our stories in a way that they believe in because they just feel the owner or you're trying to trick us because, and also, I mean, the so-called environmental movement, I feel I'm very much part of the regular environmental movements, but, but the ones that talk more than they do, uh, they are also often sort of sometimes muddling the waters for not helping. And I think it's often a case of making the best, the enemy of the good, and that's also something that we cannot afford. I mean, in order to move forward, we need to do what we can now. And knowing that we probably would need to change a lot in the future. Nobody knows what the world, without

fossil fuels in sort of the era of climate change could look like. So let's do whatever we can, but let's at least get rid of what we know is bad and start on something new. And then we need to work on that and use science, whatever we can to make is that possible. But, but not saying that, unless we reach here, it's not worth doing anything, uh, then it's very motivational for people to try to do something about their situation. Sorry, I keep too much. Yeah, no, it's good, man. It's baby

Speaker 1 (21:47):

Steps, but yeah, it's also one of the things we heard. Um, and we also had an interview with a farming association in Bulgaria and they already had the same issue, um, because they're, they actually have a lot of farmers that do not apply, um, for subsidizing the ski, anything, because they have to follow some specific regulations and they say those might be good somewhere else, but not here in Bulgaria. Um, cause we were willing to change, but for us it's just not going to work. Yeah,

Speaker 2 (22:15):

No, and that's not the same thing that, that, and I mean the, the, the taxonomy is clearly, so, I mean, you have try, you're trying to come up with global standards that would be applicable, not just from sort of Q and a to Malta, but actually to Manaus as well. And then of course that type of system might work for factories. I mean, I guess industries look kind of the same, I mean, inside those four walls and that roof it's roughly the same stuff inside. I mean, of course there are huge differences, but still it's, but with biological systems out in the open exposed to climate change, no, you cannot, you have to find smarter ways of doing this, but, but I guess they're also the, the, the, one of the challenges is that many of these systems are built to make them easy for the administrators rather than to make them work practically for the ones who are supposed to use them. And if we have this sort of governance mindset that I would, I need to check this, I need to find easy ways for me to control. Uh, it might not be what's best for the ones that I have to go into, carry it out. And you might create much more problems even though with the best of best of intentions that they say that the road to hell is paved with great intentions. And I think that's so fun.

Speaker 1 (23:36):

Yeah. Yeah. I mean, I'm sure they're all trying to be good. It's just, um, I guess it goes back to the communication, um, like with Morris,

Speaker 2 (23:45):

I think trust is one of the key issues here, because if you think that people are trying to trick you, you will think that whatever they say is just to get, I mean, you try to control them and they just want to get out. I think that's one of the saddest part of this, but if you show for example, or it has been done in Sweden of them, of course, are Swedish farmers who are willing to, to get at least the way out. But if we actually look, I mean, we have, we send out me a check to our, our members just by asking them, because we found out that people have been doing much more without getting any kind of money from the government then have been doing things with money for the government. But the government doesn't know that because they don't check the money.

Speaker 2 (24:22):

They don't really check the activities. So we ask them, why are you doing this? Why are you spending your own resources, knowing that you only get like 4% return on investment and those 4% spend you give to the bank. So, so why haven't you done? And I thought that many of the things that they were doing were actually to, to create wetlands. So at least that what we looked at and I thought, okay, I get it. It's the summer 18. So they are afraid that they won't get water for the product. So they are now building dams and stuff and wetlands. No, that wasn't the issue. Th th the things that they raised, where I do this biological diversity, I do this for better water management. And I do this for water for wild animals.

Speaker 2 (25:06):

10% said they wanted to practice their own water resource, but the other ones took up their money to invest in things that are good for society as a whole. And still people don't trust them to try to do the right thing. People sort of the attitude from the authorities is that you need to be controlled because you are not wanting to do good. And I think that's so sad that instead of building on that sort of moral fiber, that you find most farmers across the world, because they live in of, and with environment every day and trying to help them and doing the right thing, rather than putting them into a straight jacket and hindering them from doing what they know would work. And then of course, some of them lack knowledge, some of them, but then you

can help them with that rather than trying to control them, because we know that sitting in Brussels or in Stockholm, whatever, and trying to tell people how they should work their land. No, it won't work.

Speaker 1 (26:03):

Yeah. So it would be better to do something like a pilot, um, give them like some sort of money, then just follow the money, uh, see what happens and then create, like, I have the trust and then keep going

Speaker 2 (26:16):

Three services. I mean, if you tell people this is a smarter way of using and then putting the incentives, right? So that it costs more, for example, to use things that we know are bad. So to say that, yeah, you can use them. If you think you need to, it's okay to continue using it, but it'll cost you. So if you use lists and are smarter in the way that you apply these technologies, it will be better for us and you'll get more money. And then you can actually, and then try to find market solutions that, okay, this produce is produced with minimal antibiotics. And then you put a label on that, and then you sell that in the market. So somebody else is willing to pay more for that because knowing that, okay, we are now preventing the next pandemic, which would be a good sales point.

Speaker 2 (26:58):

Then this point in time, I mean, doing that and giving that money back to the farmer, not keeping it only in the, in the grocery chain that of course will then make more farmers wanting to do this. You're showing that this is the way to get economically more viable in your efforts. And everybody would jump on that one. So, so, I mean, there are so many things that we can do Hertz to get this to work. I don't think that sort of trying to push sustainability down on farmers by enlightened bureaucrats will be the way forward. No, you need to build this from below. And I think there's a huge opportunity there. Yep. And then I see a difference often between Sweden and many other European countries, but for some reason there's still a higher level of trust. And I guess it has to do with our history that it was actually the former sort of aligned with the king to kick out the, the, the noblemen and stuff like that. Another it does. I mean, it might sound strange, but for the bag and the, there is sort of the farming community in Sweden has been tough guys and they are, it's still something they're in, in, in, in the image

of themselves that no, we know what to do. It's not easy to move them. And, uh, I think it's something that you could build on that. Pride is something that is very, very useful in these times to sort of, to use that, to make them move forward. Sorry, I talk too much. No,

Speaker 1 (28:19):

It's, it's good. Um, yeah. So for one of these alternatives, um, how do you feel about hydroponic farming as a solution to become a more sustainable,

Speaker 2 (28:34):

Uh, great. When it works? I mean, that's the thing, I wouldn't say that it's better than anything else. If we have, I think counter products has its huge advantages. It also has some disadvantages and, uh, sorry, I didn't need to, I have a new form apparently. Oh, sorry. Um, yeah, no. I mean, sometimes it works great sometimes it's it's, it has my challenge challenges. It has sometimes been hailed as the holy grail that if we could fix this, and I see that in a lot of things, when it comes to agriculture, that people say that we have filled the basement in central Stockholm with artificial lights and we don't have, and we have this clean and it's hydroponic and everything, and it can provide the city with green leaves. First of all, we probably walked, second of all, green leaves are great. I mean, they're very nutritional when it comes to, to, to certain things that we absolutely need and we should eat more of them, but it won't fill your stomach, doesn't contain the calories.

Speaker 2 (29:42):

And it doesn't really mean. And also if you look at investment to maintain and keep that a system is often extremely costly, but it's a sexy idea. It's kind of making that seller into the space ship and sort of, this is what we would use when we travel to Mars. But I think in the, in the same way of sort of traveling to Mars, it's a kind of escapism. It's not looking at what can we do with what we have where hydroponics work. It's excellent. But I don't think that we should see that as the solution. It's one beautiful piece of a very integral puzzle and we should use it where it works, but we should not see it as a way that, uh, will change things entirely. I mean, it's also one of these way by which we can control far more of the environment where the plants are in.

Speaker 2 (30:30):

And that's great. On the other hand, it's also quite sensitive and requires a lot of investment, both in money and time and, and technology to make it work. Uh, so, so I think it's an excellent tool to have in our toolbox, uh, among several others. Uh, and great if people wanted to do a also, I mean, some of the things that had been raised with, with this is that it's sometimes a great way for people to start interesting themselves for the green sectors. I mean, if you come from a more technological point of view, this is what you would do. This pumps, this water, it's so fancy materials and stuff, and you can grow things from there. You might move on to greater understanding. And that's one way of luring people into the activities, because I think that's one of the challenges that we have that we've been talking about before. I mean, people don't trust it because until you know what we're doing and why we're doing it. And that's because they don't understand the basics of producing, I mean, helping photosynthesis along. And if people do get an interest in doing that, what are the means? It could be, that is something that could help us in explaining why this is so important that sort of, yeah. What photosynthesis, this did 400 million years ago put up that into all great, but we can't continue using it, but from the sentences does today, I've continually worked on that.

Speaker 1 (31:53):

Yeah. Yeah. So it's, um, especially about like a situation. So it might be better in Spain, um, where there might be parts where you cannot grow traditionally anymore. Probably sometimes. Um,

Speaker 2 (32:08):

On the other hand, I mean, you have to look at the water consumption also. I mean, maybe the things that you produce hydroponically are not the ones that you should be focusing most about bother actually moving into more dry land production stuff like in some parts at least. Uh, so, so, so, so absolutely, but I guess also there, again, the technology choices, SIS should be down to the actual farmer because it depends on what they like as well. I mean, if they feel that this is something that attracts me, this is something that I would actually want to invest in, not just my, my money, but my time and my, my, my reading of books and instruction manuals and stuff like that. Absolutely give it a try. Uh, but I don't think there's something that we could say that more people should be doing this, but God that we should align sort of the incentives, uh, not according to technology, but to if possible to results achieved. And then of course, then, then let them market and people's interest and everything else sort that out so that you get what

you want without the damages that you don't want. So the lowest price possible for society and, and by price and not just meaning economically, but socially and all those things. And I think that's why I wouldn't want to go into a, there are several interesting technologies and, and, and I'm, so I love talking about them, but, but not as sort of the solution, the solution, but part of a palette of solutions.

Speaker 1 (33:32):

Yeah. So it's, uh, I mean, she is, obviously you cannot force it on farmers, especially if they are not well-known with technology, then it won't work. Um, but yeah, it could be like an additional option, um, and then subsidize the technology, um, and then give them the option to choose without having to spend like another 100 million euros, just to be able to try it.

Speaker 2 (33:56):

Yeah. Or make it part of research. I mean, these pilots we were talking about before, I mean, actually check it out, see what works, how it works when it works under what circumstances and what are the sort of the challenges with it. I mean, and different things like that. I mean, to the extent that you could use waste water from other parts of society in the systems, and maybe clean that water at the same time, of course, then you would have to have financial incentives also for being able to clean it and produce what to do. And then of course, we were into the sort of resource efficiency parts. And if you can develop those tanks types of systems, you have to convince people that it will be okay to eat food, the bids go and buy their own faces. And I think that's a huge challenge, but I guess we need, that's the way we need to work. And then of course, uh, finding sort of how this jigsaw fits together. Absolutely.

Speaker 1 (34:46):

Yeah. Okay. And then we also get to the last question, which basically captured what we just talked about and it's how you see the, um, the future of farming, like, um, in Sweden and in Europe more generally.

Speaker 2 (35:04):

Yeah. And maybe also globally. I think everybody needs to move in the right way. I think that this is huge sometimes going, I want to be provocative. And especially when people accused me of saying what, you know, all the food system you knew, you use, you, you stand for 23%

of the global, uh, carbon emissions. And I say, yeah, that's too bad. We should have a hundred people could, well, what do you mean? And my point there is of course that we should not do other things that pollute our climate. I mean, the other stuff should be gone. So we should be the only ones emitting climate disturbing substances of course are, should be as low as possible. So I mean, our 23%, we should not be more than that hopefully, but I mean that, that's the challenge that people don't understand the differences here.

Speaker 2 (35:48):

So I think the future of farming is that everything that is not recycled is being grown and that we don't have sort of waste dumps or anything like that. But rather that what, and I think it needs to be connected to too. I mean, these, for some of these 23% that came from when the PCC looked at the land use and in Sweden, there was this discussion of, of farmers shame that sort of, you would feel ashamed for eating, stuff like that. And I think that the challenge that had got me so surprised and I was, had recently started at LLS, I made this quick calculation of, okay, what would it mean if you use this absolute, the same type of, of mathematical, uh, ways of working and also using sort of data from our, uh, natural world FAC or whatever the quote yeah, no, not to reflect it.

Speaker 2 (36:44):

No. And, and looking at the, the emissions that figure globally, that is 23% for Sweden as a country, that would be minus 230% because our forest bind so much almost all of the sort of climate emissions that come from the rest of society are every year Bree and captured by our forests. And of course people don't get that. So I think first of all, there's not the future of farming is the future of photosynthesis, and we need to see how this interact. Uh, and I see it as being in a sense, extremely bright because people who know how to work and to sort of help photos and synthesis, alongs, and convert that into valuable products. That would be the thing. I mean, that, that that's the new one, no it or oil industry. I mean, being able to do that is, will be hugely important.

Speaker 2 (37:41):

Uh, on the other hand, we're still not out of the stitch. I feel we're still not really understanding as a society that this is the road we have to take. And I fear that we are losing so much knowledge and so much experience. So we'll have things in Sweden where I think we're losing

one farmer, every eight hours, three farmers a day net are quitting the sector because they're all locals. They don't want to do it anymore. They feel like they're being exposed to harassments by animal rights, activists and all those types of things. And they just give up. And of course, if you, if you don't earn money on it, but you did it because you felt it was a good thing. You wanted to carry on the legacy and all those things, but people don't seem to care about that. People actually, you, your children are getting bullied for what you do.

Speaker 2 (38:27):

I'll take a job in teaching or in it, industry, whatever I earn more, I get free time off and I'm happy. So, so, but we, a lot of that experience and that knowledge will desperately will need in the future to come to be able to manage these systems more effectively. So, uh, the near future, it's a huge challenge to change people's attitudes. I mean, we want more people to work in this. We need to get not just the ones who have the moral fiber, but own also those who are only in it for the money. I mean, we need the best in practice working with agriculture and forestry. Uh, otherwise we won't be able to produce what the rest of the society can work with and then we need to attract them. And then when they meet have to make it interesting to work here for different reasons, for all the different people who are there.

Speaker 2 (39:20):

Uh, and then of course we will eventually come to that because that's the only hope we have. I mean, I, I, I'm sometimes upset with people with a lot of money, uh, Elon Musks and Jeff Bezos, and think that we should create something on Mars when we have opportunities here. I mean, why are you spending money to go there instead of trying to do the best you can here? I mean, that's the kind of escapism that doesn't make sense to me. And then there are other people who say, no, no, no, we should bring back the wooly mammoth because what was in the past was great. And trying to sort of turn back time. And we know that that's escape is more so we cannot look and trying to keep what was, because change is inevitable. Nothing is constant, but change, I think was Buddha. So that, and then of course it needs, I mean like a lot, just like it, we need to understand that from here on, in forward, we need to need to do the best we can with what we have.

Speaker 2 (40:17):

And then of course looking at this quite dispassionately, but also with a lot of tolerance and a lot of understanding for other people's wishes and wants, and then try to design our societies to the best way. And I think in that th th the nucleus, the core of that were Bri photosynthesis and the green sectors, uh, we're not there yet, but that's what at least we are working for trying to show Sweden Europe and the rest of the world that the green sectors are the solution, not the problem. And I think that's a huge challenge because we are many times today being presented as problems that need to be solved by others. And, and, and no, that will not work unfortunate. Yeah.

Speaker 1 (41:00):

So then marketing is actually also an important point, um, to change the view on the sector and maybe also get like, um, renewals, like more young people, uh, interested in

Speaker 2 (41:14):

It. Absolutely. And that, of course is also a huge challenge because, I mean, if you, if you kind of inherit your farm from your parents, uh, to come up with the money since it's very capital intensive and the more technology, the more precise, the more you have, the more capital-intensive your culture then for the banks to say that, yeah, I knew you were leaving mother. And she was really great at this, but I had no idea who she managed this and managed to work well for 30 years. So I could loan her the money, but you're a complete newcomer and you wouldn't be owning this entire farm and I should loan you 10 million, or I don't know, 3 million euros or something like that. No, you risky for me in the kind of change we were heading towards. And then of course, how to resolve those things and to get new people on board, what type of inter internships and stuff like that, could we use what types of other ways of managing the farms and sort of, I also feel that many times it's very lonely for farmers because they are alone in their vehicles and with their fields not working sufficiently together.

Speaker 2 (42:14):

And there are of course, great benefits with that. But also if, if you can't get sort of information from enables what worked for them and sort of share these things and do more things together, only the ones who are kind of introverts will want to work with farming. And we cannot have that because we need everyone. And then of course we have the huge challenges of, of sexism that we are far too few women work in this, I think actually forestry is better. I think forestry

is the biggest, uh, or the category of owner, uh, company ownership with the biggest number of, uh, women in. So a lot of women own forests in Sweden. I don't know. I think it was almost a half a million or something like that. So it's, I mean, it's a big chunk then came here hairdressers. I think so.

Speaker 2 (42:59):

I mean, all of those things, and of course with people from other parts of the world, they could bring huge experiences of managing situations that we haven't had in Sweden in the past, but they have been able to, or have been, had to work with, I mean, droughts and stuff like that are far more often occurring in places like Syria, the man has been in Sweden. So those experiences your work here. So I mean, making the best use, we can all the resources we have around us, but that also means that shown that this is where we should be focusing on this is what we should be, be heading towards and then arranging kind of a rest of society around it. And until we get there, we'll continue to struggle like fair.

Speaker 1 (43:39):

Yeah, yeah. Just baby steps. Um, but yeah. Yeah. I feel like that's an important point that the communication, um, like in both directions, both with the EU and also with the individual farmers absolutely will make them all streamlined somehow. Yeah. Trying to, yes.

Speaker 2 (44:02):

I think also accepting that things won't be streamlined at times. And I think that's also one of the parts of the thing that not being too caught up in. I feel the minute of times we w we, the way we work. So the friction is so high that we'll get much more heat than light. And sometimes we just need to sort of, okay, that's fine. Let's move on. Uh, not take everything. Like sometimes, I mean, not personally, but I mean, it's hugely important. That's why we need to keep moving. We cannot get bogged down in sort of differences, stuff like that. Just let people be and sort of say that, that that's okay to do that thing. I do this thing. Let's not put a label on it and we'll see what works.

Speaker 1 (44:43):

Yeah. Yes. Um, yeah, those were all my questions. I didn't know if you have anything else that you are like, this is very important, uh, which I didn't ask, but

Speaker 2 (44:57):

No, I would, I would love to get sort of.

Interview Denmark

Speaker 1 (00:02):

Um, for starters, thank you a lot for taking the time to have this interview. Um, so let's dive into the questions and see where they bring us. So the first question is, um, what are the Danish plans to deal with the increasing demand for food due to the population growth?

Speaker 2 (00:31):

Uh, from our perspective, uh, I'm working for the Danish agriculture and food council, which is, uh, we represent farmers as well as the cooperatives pharmo and cooperatives. That's all of the, the main, uh, members of my organization. Of course you have all kinds of other members around it, the ingredients sectors, and, you know, people who do bonds and tractors and systems and all of that around it. Uh, so I take on it and then we've launched the diff uh, all kinds of visions on how to produce. Uh, one is the ultimate two-fifty goal of becoming climate neutral, which is what I'm working with. The policy advisor, which is a very difficult task. Uh, I've worked with the, we had 13 climate partnerships in Denmark. It was set down by the government where I was responsible for the one for the food and agricultural sector where we did our two 30 target, which was also rather substantial emission caught target within there.

Speaker 2 (01:47):

The idea of a common climate neutral is a very difficult task because they will always be in my perspective, emissions from food production, I think is rather a question on how a sustainable intensive, then you can become, and we have a list of, of ideas there on how to do it, but the idea is still, and, and, uh, this coming Monday, you should probably be aware that the world resources Institute, uh, in Washington, and you probably know them publishing a report on this issue too. And most of our thinking is in line with, with their thinking that you need to become sustainable intensive on your existing hectors, that, uh, your, your in your farm production and see how low you can go. And then, uh, be more, um, do more on how you can Obtain carbon in your sector.

Speaker 2 (03:04):

How, how much more intensive can you become sustainable intensive? Can you come and your production, but what could you do in terms of storing carbon? Uh, is it to removing peat lands, which is a thing in my country, that's what they're discussing right now? Or is it bio char or what, uh, you know, lots of possibility deaths as well. Uh, so we are exploring a lot of things, but it's the idea that you still need to produce. Yeah, there's no point. And then Mike put drawing himself out of the world, Margaret, if it just means that, you know, that that market share, which is bound to be there, it's going to increase more people is taken by countries that are less efficient.

Speaker 1 (03:50):

Yeah. Yes, that's true.

Speaker 2 (03:52):

So my production, but doing it better and less with more, I don't know, maybe we put it.

Speaker 1 (03:57):

Yeah. Yes. Um, and it also brings me to my next, uh, point, uh, and that is how climate change is currently impacting, uh, the agriculture, uh, as in, um, do you see that like crop yields are lower? Um, or is there anything that you notice at this point? Um,

Speaker 2 (04:21):

Uh, Denmark has seen a, more, seeing a more extreme weather. We have had a drought and we've had, uh, within a fairly short span of view. You have to be careful how, you know, you need to look at the long-term, but it strikes me sometimes that we've had, uh, one of the serious straws we've had in 30 years in Denmark. And then the year after that we had one of the wettest we've had. Yeah. So we've seen some extremes, uh, but, but quite frankly, in my mind, as we see it right now, um, Denmark is still in sort of a sweet spot in terms of production, compared to other clients. I think, uh, I think, uh, UC European con Spain, where this problem is much greater than is escalating. So despite that we've seen some extremes compare in Danish context, uh, we're still, uh, quite optimistic about our sweet spot. Uh, but I've sometimes I think about it, uh, that we've had those two extremes. And then so few years,

Speaker 1 (05:38):

Yes. Yeah. Compared to some other countries, especially in Southern Europe where it's still

Speaker 2 (05:46):

Projections about people saying that in the next hundred years probably won't be any food production in Spain, you know, all, you know. Yeah.

Speaker 1 (06:00):

Yes. That's going to be a new problem we have to deal with. Um, yeah. So you, um, already explained that you don't have like multiple, um, sustainable programs or, uh, like, uh, options, um, that you're looking at. Could you mention some of the main, uh, options that you're looking at right now?

Speaker 2 (06:32):

Uh, the things we're looking at short term, you have to think the short from a long-term here and then, uh, the, you know, then they won't bring us the full length anyway, but, but this thing, and then you will probably come up with something else as you go along, but short terms, uh, you have, uh, terms of, uh, you know, you, you, in Denmark, we have a lot of cows and pigs, uh, to our main, um, good emails popping up and get rid of them. Um, we're, we've, we're finding about what can you do in the field for let's take the field, first of all, if you take, um, uh, we've had a talk about removing peatlands, which meeting a lot of carbon, get rid of those, uh, take them out of production. Um, that's one thing doing it on a voluntary basis because there will be people that you have, some are high quality products actually being produced on them. And there are some, one of the things is getting rid of those. Then there you have nitrification inhibitors, which you probably heard of to get us all something you can do with emissions, from fields. That's one of them. Uh, you have, uh, how you feed your cows. You have, you could use fat for cows in the feeds. A lot, a lot of things are being developed in terms of feeding. There's a, uh, three knob on its way through the, where to something is developed is going to be approved very soon. You can use that.

Speaker 2 (08:23):

Yeah. I sometimes wonder why people at my work can see, um, sort of have a block calendar, but, but, uh, that's one thing, uh, there's something called the D uh, the feeding, the feed stuff, X, which is nothing being tested at the moment, which in a laboratory, uh, completely killed methane. It doesn't have the same effect when he tested on a cow, but it was very, very in a laboratory, very successful. So that's sort of the long term. You can have something is on the feeding in terms of the pigs, you get rid of the slurry faster, you put it into bio gas with us energy, you pay, but, but, you know, get rid of slurry faster from your stables. That's one of the things you can do, uh, short term. Uh, and then you, we have a strategy for developing a more, you know, grass that's also on field.

Speaker 2 (09:26):

Uh, biorefinery some days perhaps turning into feed staff for, you know, human consumption appliance. I think the idea of having more plant based is a, is a, is a good idea, but you would need to develop a value chain that strong enough. Some people have the idea, you just to grow some, uh, some beans and stuff. And then everyone lead that, you know, it has to be refined, put into a product, uh, you know, all of that. So you need a strong value chain there. So that's what all you can do on the short term. And then in the long term, you would need to, to do a lot of research and development within, in specialty feeding, and then what you could do with Excel, for example, biochar getting that on the fields, storing carbon and so on. Uh, that's just some of the ideas. I don't think, I don't think there, you know, things, I think you've heard of it before.

Speaker 1 (10:27):

Yeah. Yes. Um, and how is the, um, the connection and the communication, um, with academia and other, uh, like research institutes because

Speaker 2 (10:41):

Strong, uh, involvement of researchers in our work, they even were a part of our climate partnerships. Uh, and, and a lot of that, a lot of, uh, things we do in our own research is done in collaboration with other researchers around the world in Denmark. So yes, we, we always try to keep, uh, a strong case for, for it having a scientific base simply because, uh, you know, using, uh, getting rid of peatlands, you know, you can create a problem with your thoughts,

forests, and then, you know, you always need to be aware that what you're doing has to be sound and safe and a good idea.

Speaker 1 (11:25):

Yes. Yes. Cause that's something we heard from some other countries where they were not very close to the research institutes and then, um, the research has come up with something, um, which is nice in theory, but it's not practical. Nope. Um, so I guess it's good that that's different in Denmark. Um, yeah. So another question I have is what support and what kind of support, um, you are currently getting to improve food production, like from the Danish government and also from the EU,

Speaker 2 (12:06):

Um, from mainly, and some of that funding is, uh, it's, uh, also you funding first as the horizon. Something, you know, research is not my, uh, my best topic. We have other people working wherever you you've got we've, we've got some funding from various of horizon research programs and, and in later years, a, uh, more funding into the climate solutions in agriculture are being, being, uh, being prioritized. Normally you would get some, some, uh, some more general things you would fund in your research, but it's become much more tailored for, for the, the, uh, the agriculture and food part and latest, uh, latest, uh, proposal for the discussions on, on the climate deal. We are discussing on agriculture in Denmark at the moment, they also funded, found additional 700 million Danish corner for, for research within the sex, or so-so, I will say that that's become a higher priority right near the years.

Speaker 2 (13:22):

And then our own system is built the way that part of the milk price and price for grain and per price for pigs is channeled back to some funding within the sector where actually also the tax we have on pesticides is probably, uh, sent back to funds within the agricultural sector, which is so we are also on our own a basis found fund research. And that has also been turned more towards the climate. I think we actually, most of it is we found ourselves this climate. So we also have sort of our own, besides the more public use system we have our own, uh, own initiatives.

Speaker 1 (14:11):

Yeah. So they used the taxation and then put it back where they want to stimulate. Hmm. Okay. Um, another thing we are looking at is, um, what the main problems are for farmers. Um, well, working with sustainability, the new EU policies and the adaptation of new technologies.

Speaker 2 (14:38):

Yes. Uh, I guess you're thinking about a farm to farm and now all these, uh, things that have been put out to, you know, various, uh,

Speaker 3 (14:52):

Initiatives, but, but I think, um, they're talking a lot about carbon farming and it's, it's not exactly clear on what they're thinking about all of it, but there are some of the things that they mentioned are, um, you know, uh, better management, uh, more climate robust, uh, uh, what's the word in English Alcoa, you would say in Danish, you know, plants, plants, basically, they have to be more climate robust, uh, and DOI all, ideally you'd have to do more on methane and, uh, an emissions from Theo. So a lot of good things and also carbon storage is a good thing. And, uh, I think, uh, they have a good elements in there. I think I would probably, um, I, in a lot of blanks, you don't know exactly what they're thinking about, but I think the idea that breeding and genetics and how you handle your slurry and natural invocation inhibitors, we're past that I would like to see more and buyers yarn more clearly in their proposals.

Speaker 3 (16:10):

I think what they're thinking about besides research and development and more climate we're, both plants are probably conservation agriculture. I don't know about conservation agriculture. It's a big thing, some places, but, uh, my, my own take of it as I'm, I'm leaning back and then I'm done waiting until the researchers agree on what they think is a good idea because people, some people say is a good idea. Other people say it's a very bad idea. And in the middle you have some people who are very religious about it. And, you know, uh, so, so, uh, um, I'm leaning back on that one and I'm saying, when they're done discussing, I would have my stance on it, but I think they're thinking about that as a, in terms of conservation agriculture, I'm a little more skeptical to watch that part. So there are good elements in it, and there are elements that are not, uh, that great.

Speaker 3 (17:02):

I think the idea of climate or plants is a good idea. I, uh, I think, uh, you would see, over the next years, a more lean stance on, on certain parts of, uh, how you genetically modify, modify plants, uh, not, didn't genetics, but probably with the CRISPR idea. And I think that's a good idea to do. That's what, you know, many companies are doing already. They're just doing it the hard way through, uh, you know, mating planter. I don't always know the right way to put it, so good elements there. I lacked some things, but that's probably

Speaker 2 (17:50):

Due to, you know, things on that, progress that on all parts of it. One thing I would probably need to go a little more into detail on is actually, and you're probably already aware, but the idea that, you know, you have all kinds of intermingling, agendas on the EU, discussions. They just recently agreed to an EU climate law. Well, one of the amendments that I would propose was actually, instead of using the cap strategic plans to, necessarily you're copying carbon food, carbon farming, you also had the idea that you could actually put all the feasibility of a future market-based approach to carbon farming, um, and what they exactly, uh, support. It was the introduction of a market based carbon crediting scheme, where that'll also have all kinds of, uh, implications for how you, you think about your Lulu CAF and your ETA, non ETS sectors and the CAP and farm to fork and all the clients of the inter triangle say the ideas. But I think the idea that you could somehow have a crediting scheme would also be a way of exploring on an EDU basis to get more,, how will you put it more?

Speaker 2 (19:36):

You, I removed you from the screen and you needed to get back, uh, get some, some more momentum into a carbon farming when a market based instead of pigging, uh, some, some elements where you still would have a discussion, whether that's the right way to go.

Speaker 1 (20:02):

Yeah. Yeah. That makes sense. Um, like all these new ideas, they mainly use a lot of new things like research and technologies. Um, do you notice that farmers, are resistant against like these technological changes and improvements or are they, they seem willing to,

Speaker 2 (20:31):

It depends on how old you are if you're bad, but generally it's not fair to say how old you are, but, but if, if these are now there's, these are family farms that have been passed down from generations, you know, this from the farming community. So always developing your farm is essential. You're, uh, it's a very competitive sector. You're, you're fighting against the world market and you always need to have an edge since your Denmark has some of the toughest, uh, environmental legislations already. So you need to be really good at being efficient on your, uh, per product per unit. Uh, so they are always interested in developing it, uh, and they're also very entrepreneurial, uh, in, in the sector. So there's a, there's a great, uh, as, as long as the positive business case, as long as the market remuneration, then you, you, you, there's, there's a great, uh, feel for the, uh, for the investing more. And I must say since the collapse of the pig sector in China and the, in very positive prizes, you, especially on pigs, but also in recent years it's become better on milk. Actually, the debt in the Danish agriculture community has been heavily reduced, the last four or five years. Uh, and so we're seeing, since we're coming into the period, it looks like where investments are picking up. People are putting more money into their farms and companies. And, that's a good thing,

Speaker 2 (22:21):

Really heavily hit the, like most other countries, uh, on, uh, since the finance crisis, there was a lot of difficulties getting for banks to lend out money and banks nasty it a, since the raw material is the new black wrong word to use, but they're also very willing to put money into farm. So, yeah, it's certainly better, certainly better. Um, so I think that's a clear yes.

Speaker 1 (22:53):

Yeah, yeah. That's good. That means that there is there still hope? Um, yes. One of the other questions is, um, in European, what kind of changes and support are needed to be able to deal with, um, like increased demand for food, climate change and sustainability regulations.

Speaker 2 (23:17):

I think, uh, what is need is, is, uh, something that's common, uh, something that's common. So you of have a fair Margaret. I think the idea that you, uh, and then at that it's, market-based, uh, what is it then renumerated by the market will always drive a better, a better take on, on, on, on this, this, this, uh, this agenda, uh, we've had the problem that, uh, we've done a lot of organic and then my go last many years, but now we have problems with selling it. So certainly

in Denmark, because that market seems to be saturated. So you, you would, you're exporting more of it. That's also a good thing, but, but D just prove that if you regulate and say, Oh, now it has to be like this. Not always you get the relation from the market. So I think as you, you should always think about being common into a fair internal you, uh, approach between countries. And then, so certainly have as a guideline that you have a keen eye on what the market, what is the market driving? And I think, uh, something that could also drive in terms of regulation, is this sort of the carbon crediting within the non-US easiest sector would also be something that could drive a greater momentum for carbon farming within the, if that sort of renumerated or credited within the, a new non ETS scheme. Yeah.

Speaker 1 (25:02):

And, uh, what would be like the main help, like from my EU perspective, what would be like the main thing they could do to help, uh, set that up or like, um, initiate and give it a push in the right direction?

Speaker 2 (25:22):

Um, I think, I think, uh, in the right direction while I think the other was talking about a new non, uh, ETS system trading system, I need to as trading systems. So that's on its way. I think it's important that they, um, the, uh, uh, in, in the regulation, whether it's capital or anything, be careful not to pick the winners, you know, lighting that it has to be conservation agriculture. It's not going to work everywhere. It has to be something that's driven by the community, and then having some flexibility in terms of what is, what makes sense for that region, uh, and, and, and what their, what their market is, is asking for. I think that's all of the guidelines I have in my perspective on it, the idea that you are very specific on picking your awareness where Bella would be conservation agriculture, it would be a very tricky thing to do.

Speaker 1 (26:36):

Yeah. Yeah. That makes sense. Um,

Speaker 2 (26:43):

Another thing

Speaker 1 (26:44):

We're currently looking at, um, is hydroponic farming, uh, for crops. Um, how do you think about hydroponic farming? Could it be part of the solution of, um, being more sustainable? Yes. Um, and, um, let me see how to translate this to English. Um, because like, with hydroponic farming as with everything, um, there are some benefits and some downsides of which like the pure water need is a positive, but there's also, um, the higher energy usage. Um, how could did this, um, lead to other issues, because if there's like a high need for energy, um, we need to find a way to provide energy. Um, this could mean that we have to keep the, um, the coal factories open, like the energy like freeze. Um, so how do you feel like hydroponic farming can help any general sense, uh, in becoming more sustainable?

Speaker 3 (28:08):

I think what you could do a, I agree it's a very energy intensive production. I think what you would look into in the coming years, and I see some of our co-ops already doing it. It's actually a, you know, whatever you're doing. I know it's difficult when you're talking about the UN guidelines to talk about one thing is agriculture. And then what happens with energy? That's the energy sector and you, you sort of have a, you know, claw closed, uh, silos, uh, more or less. And that's a, that's a tricky thing. And, and, uh, people get very at you. Basically, if you start talking about what you're producing of energy within the agriculture sector, because you are, it's not, you're crediting. If you talk about you and guidelines. And I think, I think you will see the solution being that you think more about how you circulate things in a more circular perspective, the idea being, and now you have, co-ops where you have farmers producing electricity with their own windmills.

Speaker 3 (29:17):

They are doing a lot of bio gas. Some of them won't a lot of bargains farms and sort of putting that energy back into the system. So you, from what you would call an LCA perspective are reading a climate neutrality sort of ish position. And I think the idea of when you're talking about a new energy farms, uh, it's going to be an area where a lot of things are happening. We are dealing a lot with biochar and the idea that you can do energy with the power, power political process. I think there are discussions without discussions about green ammonia energy and how you store it. Basically what the problem is for the wind sector. We have love windmills, and then you can store that frigging electricity anywhere. So they're going to need some, some, uh, carbon from someone basically to store it. So, so there are a lot of things going

on where, where the, the, the, the, uh, on the energy side is where the, the agriculture sector or the basis of it, uh, to, to, to store, uh, whatever comes out of the, that, uh, the, the windmills. So I think if you started in a small circular perspective, you have some, some things you can do there, but that's my best guess on how you do you do, uh, forget about a little bit about the UN and think more about the LCA perspective on how you can circulate from, from various boxes basically. Yeah.

Speaker 1 (30:56):

Yeah. So the, the energy supply should also be in line with the yes. Sustainability guidelines. Yes. Um, and then we are already at my last main question, and that is, uh, what does the future of farming look like according to you?

Speaker 3 (31:20):

Oh, that's a great question. Uh, I think I've returned back to my, uh, my general idea that it's certainly on less, uh, probably on, is more sustainable intensive, probably on less a smaller area.

Speaker 1 (31:39):

Yeah. So focus me or locally and not just, uh, like a general, uh,

Speaker 3 (31:47):

Eh, thinking, uh, local production, uh, necessarily. I, I, when I talk about you, you, you just, you certainly increase your yield and produce more with less, because you're going to need more food. I think the production of world resources Institute is that you're going to need 45% percent increase in all of world food production. If you're going to make it, that may certainly makes the, you need to produce more produce to do less. I think the, uh, and if, if you get to that point, uh, you were probably in a good reserve, more, uh, more area for biodiversity, uh, hopefully if you're really good at it. So you have a greater uptake there

Speaker 1 (32:37):

Yeah. To intensify and like increase productivity per acre. Basically that's the,

Speaker 3 (32:45):

Yeah. W w without clearing rainforest globally, but that's the, that's the big problem. You, you will still need, uh, any projections I've seen, you will still need an uptake from something you store in the ground a while. Why a tree, or that you are asking for biodiversity is you need to be better and restore more land for something that's not agricultural at the same time. You increase from what you have left. So, so in my perspective, when you say local, it's not just a heavy farmer with two pigs running around in his, in his backyard is it's, it's really, I'm, I'm actually proposing the, actually the really industrialized, uh, idea.

Speaker 1 (33:37):

Yeah. Yeah. And, um, yeah, what I meant, like with more local, as well as, uh, more looked like country specific. Um, so instead of having like one EDU, um,

Speaker 3 (33:51):

Yeah, I get your point. It has to be adapted to regions because we've seen various Capra forms over the years where you've symbol free new greening components, and they don't actually make sense everywhere. So we need some flexibility in what you're doing. Yeah. And again, I say it can't be right that you do conservation. I could call it with people that aren't in agreement, whether they probably, they wouldn't make sense if, if you do organic, if it's in some countries, it's your, you know, uh, Margaret isn't necessarily anymore, you know, backing it.

Speaker 1 (34:30):

Yeah. Yeah. I agree. Um, yeah, those were basically all my questions, um, that I wanted to ask. I don't know if you have anything, um, that you are like, I didn't ask it, but it's really important to, to mention it, not you have anything that you're like. Yes.

Speaker 3 (34:54):

Uh, Ron, my, my usual, uh, ideas about how the world works, but keep an eye on the world resources Institute on Monday.

Speaker 1 (35:05):

Okay. Yeah. Yeah. I mean, for us, um, because I'm doing it with someone else. Um, so TCIs, um, it's really interesting to speak to, uh, people from all the different countries like Northern and Southern Western and Eastern Europe, um, because there are a lot of different takes. Um,

for instance, we also have Bulgaria and they look very differently at the whole sector and what is required. So, yeah, I feel like there's a lot of room for improvement.

Speaker 3 (35:39):

Problem is when you look at it, there's so much diversity in what people are doing. And, and, uh, just getting some countries to the level that you would find in Northern Europe would probably mean a lot. Uh, and I think some of the problems they sometimes do with baselines is that you set them for instance, that your 2005 level when it's terms of emissions. And that means that it's very difficult for, for my country, because we already done it, what we could do, you know, the easy things to do the last things. Whereas I think some of the countries, basically, you mentioned Bulgaria, they have a very easy part actually getting, because there's so much they can do already. And I think, I think they needed some more commonalities and they probably needed to do more. It's a weird experience sometimes when you travel around and you see how much restrictions you have on how you, what you do with slurry in my country, and then you come some withdraws, some country where they just, Oh, was dropped it out, you know, no one who cares, you know?

Speaker 1 (36:55):

Yeah, yeah, yeah. I guess we haven't really thought about it again, but yeah, it actually makes a lot of sense

Speaker 3 (37:06):

[inaudible] requirements, for instance, they were done with the baseline that's 2005. Yeah. Uh, and, and makes it very difficult for countries that have already done it to do more. And some countries actually have an easier go at it because they have more, they could do. And that's very cheap.

Speaker 1 (37:24):

Yeah. Yeah. It's a big difference if the baseline is of 2005 or like 1990 it's yeah.

Speaker 3 (37:32):

Yeah. Normally when we talk about the UN system usage, you're talking about 1990 here, you're talking about 2005, but that's also baselines means a lot. Yeah. I think I need to drop

into my next meeting. So if there are any things, contact me again, if there are any things, you're exactly no sense. So

Speaker 1 (37:56):

Yes, I'll send you an email then. Um, but thank you a lot for, um, speaking to me and helping me, um, and it was very helpful interview, so thank you.

Speaker 3 (38:06):

You're you're a nationality. Exactly. Yes.

Speaker 1 (38:11):

I'm from the Netherlands.

Speaker 3 (38:12):

Of course. Yes. I suspected not, uh, not so much, uh, in the, you know, very similar countries I would say in terms of

Speaker 1 (38:28):

Yeah, yes. Yeah. Most of the Northern European union countries seem to be similar, um, in their approaches. So yeah, it would contact me if there were anything. Yes, I will. Yes. Okay. Thank you. And have a nice day.

Czech Republic

1. **What are the farmer associations plans to deal with increasing demand due to population growth?**
   Help contribute to food security by keeping the land and landscape in a state where it will be able to feed the growing population

2. **What is the farmer association promoting to improve production productivity?**

Support of family farmers which are focused on diversified production and multifunctional activities. APF promote and on-farm sale and processing.

3. **How does climate change impact agriculture?**

E.g. weather fluctuations associated with climate change contribute to the spread of diseases, changes in traditional production areas, disproportionate yields, a long growing season etc.

4. **What are the farmer associations' plans to deal with climate change?**

We are focused on defending rights and interest of private farmers, which are in general more environmentally friendly and sustainable, using various measures helping to mitigate the climate change compared to big agriculture conglomerates.

5. **What are the farmer associations' plans to become more sustainable?**

See previous answer.

6. **What support is the farmer association currently getting to improve food production?**

See no.1

7. **What are the problems that farmers face while working with sustainability, EU policy and adopting new technologies?**

Bureaucracy, lack of financial resources, lack of knowledge and informational support…

8. **What kind of changes and support are needed to be able to deal with a combination of increased demand for food, climate change and sustainability regulations?**

We believe that bigger support of family farmers is a key point in transformation of current agricultural practices to be more resilient, sustainable and in the same time providing sufficient amount of high-quality diverse production

9. **What is the farmer association's opinion on hydroponic farming?**
For some types of production could hydroponic farming be a good option.

10. **What does the future of farming look like according to the farmer association?**
Lively rural areas with functioning family farms of various specializations

Their website

Could changes in the CAP represent a desirable shift?

From the events that took place in the mid-October this year, it might seem that the outlines of the EU's Common Agricultural Policy (CAP) are clearer for the next seven years. The Council of the European Union (composed of government ministers from each EU country) and the European Parliament, has already agreed on the main position on the future reform. European Commission declared its position earlier.

Unfortunately, disagreements between all these bodies still persist, and farmers across the EU will have to wait for the final verdict as a result of the Trialogue negotiations, estimated to the end of this year, but possibly even later due to the coronavirus pandemic. In addition, disagreements persist between advocates of a more green and less green CAP, with the majority of the non-agricultural public evaluating the outcome of the October negotiations negatively (insufficiently green), while agricultural entrepreneurs across the EU consider thew outcome as a positive and acceptable compromise.

The final form will, of course, be a compromise, as another type of agreement is in fact not even possible within 28 (or more precisely 27) EU Member States with very different histories, political situations, geographical and climatic conditions and specifics. It will be important whether the result will be closer to the positions of the agrarian lobby (and especially the lobby of large industrial enterprises) or nature conservationists. However, the signals show that from the point of view of industrial farmers, the option "A" is correct so far.

This is despite the fact that the proposal of Monika Hohlmeier, Chair of the EP Committee on Budgetary Control, was adopted at the plenary of the European Parliament (EP), where she

was proposing a model of reducing subsidies to the largest farmers (capping), not for farms as it has been discussed for years, but for individuals without possibility of deduction of salaries and with the monitoring of the real owners of legal entities (ownership interconnection of companies). This would undoubtedly require less bureaucracy and stop the efforts to concentrate agricultural production, but it is uncertain whether such a proposal, as finally adopted, will indeed be one of the key parameters for drawing subsidies. The proposal was not adopted by a big majority of MEPs (the ratio was around 350:250 of MEPs), and mandatory capping is refused both by the Council of the European Union and the European Council. On the other hand, the so called „government of EU", i.e., the European Commission, is in favour of the mandatory reduction of subsidies to large industrial farmers. All of this basically means that some form of capping is likely to pass, as the opinion of the European Commission and the European Parliament cannot be completely circumvented. However, it will probably not be in the form that small, medium and mainly micro-farmers from family farms, not only in the Czech Republic, would welcome. Also, because capping is not a major problem for the EU as a whole.

That problem is, for farmers above all, especially the intensity of sustainability and greening of agriculture, and the rate of compulsory funding for the so-called eco-scheme. The share of finance allocated to eco-schemes should be at least 30 percent, it should be noted that these funds would be money allocated for farming regimes above the framework of already generally applicable as nature-friendly farming conditions, thus a share of money for sustainable farming in relation to the landscape and nature would be even higher. This is generally the right goal. However, it is particularly this area that concerns the highest risks for farmers, since the phrase "the devil is in the detail" is very much applicable in this case. Although it seems clear that all regulation and requirements, which are preferred by conservationists and environmentalist will not pass, it is practically certain that in this case the resulting conditions for the practical application of the CAP will come closer to conservation attitudes, also because greening and sustainable agriculture is supported by a large part of the non-agricultural public, including academia, i.e. scientists and researchers.

In any case, it increasingly appears that the shape of the CAP from 2023 (2021 and 2022 will be a transitional period) will be less different from the current CAP than most of the actors from both groups (farmers and conservationists) expected. Nevertheless, it can still be stated that even a partially reformed CAP will eventually be a shift, albeit more like a " moderate progress within the law". As for the position of farmers from family farms associated in the

Association of Private Agriculture of the Czech Republic, it can be stated that they still have more than two years to defend and justify their views and proposals, especially on the basis of somewhat overused but generally valid principle of common sense. So, there is no need to rejoice, nor to despair, although it will probably be possible to comment on any outcome of the final form of the CAP with the words 'it could be better'. However, not only in agriculture, but also in normal everyday life, the ideal does not exist, although sometimes it may seem like it.

The Netherlands

Climate agreement

Climate agreement

LTO Nederland endorses the urgency of the climate problem. As entrepreneurs who work in and with nature, the sector is feeling the consequences of climate change. The agricultural sector has therefore played an important role in achieving climate goals for some time. The sector has been producing renewable energy for many years. More than 80% of the final end use of agriculture (without greenhouse horticulture) is now generated in renewable energy and since 1990 it has reduced greenhouse gas emissions by 19%. LTO Nederland endorsed the draft agreement of the climate table Agriculture & Land use, one of the five climate tables that worked on the Climate Agreement in outline. The cabinet proposal for the Climate Agreement was subsequently presented in June 2019. The central goal of the Climate Agreement is a 49% greenhouse gas reduction by 2030. Implementation will start in 2020. However, after a grass-roots consultation, LTO Nederland sets important preconditions for the implementation of financial and policy support by the government.

Greenhouse

gas reduction The agricultural and horticultural sector has been making efforts to reduce emissions for 25 years. With success: the agricultural sectors have in total generated a greenhouse reduction of 6.1 Mton CO2 equivalents (19% reduction). An impressive decrease in the climate impact per unit of product can be observed in all sectors. The objectives of the Agro Covenant, a cooperation program for businesses and the government since 2008, have thus been largely achieved.

Preconditions for ambitious goals

The aim of LTO Nederland is and remains that farmers and horticulturalists have concrete solutions to combat climate change. But then the government must create the financial, policy and innovation space for farmers and market gardeners. Only then can farmers and horticulturists achieve their ambitions up to 2030. In the draft climate agreement, the Agriculture & Land Use climate table embraced the reduction of 3.5 Mton CO2-eq requested by the cabinet on top of already planned reductions. In the first instance, the sector even saw opportunities for an additional reduction to a total of 6 Mton CO2-eq. But these ambitious goals can only be achieved if the preconditions regarding regulations, financing and cooperation with relevant chain parties of the Agriculture & Climate Table are met. Land use.

Conclusions after consultation with the supporters

Climate measures must be feasible and affordable for the 54,000 Dutch farmers and horticulturists, their chains and the consumer. The current earning capacity of farmers and market gardeners is not sufficient to achieve the desired transition. Sustainable government policy with appropriate legislation and regulations and additional resources are necessary to be able to invest sufficiently in climate measures. LTO Nederland will assess for each measure whether and how the government and the parties involved support the efforts of farmers and market gardeners financially and in terms of policy.

LTO directors speak to MEPs about the Green Deal

The European Green Deal determines a large part of the European Union's agenda: by 2050, the European Union must be climate neutral. Dutch farmers and market gardeners are world leaders in sustainable production and the Green Deal offers opportunities for further sustainability. But there are also concerns, for example about the feasibility and affordability of the high targets. To find out how this file is viewed in the European Parliament, directors of LTO Netherlands talked to MEPs Jan Huitema (VVD), Annie Schreijer-Pierik (CDA) and Bert Jan Ruissen (SGP) on 9 November.

Léon Faassen, board member of LTO Nederland: “The European Green Deal contains very high ambitions. Shared European objectives can help us to become even more sustainable, but now too much is determined top-down from Brussels. Ideas are poured over us and that creates a lot of uncertainty for our members. We have shared this concern with the MEPs. ”

The three MEPs see positive sides to the Green Deal: an opportunity for the image of the sector, helping agriculture in the transition to even more sustainable. However, they also see problems in the feasibility of the plan. According to Huitema, the end user who has to achieve the objectives is forgotten. He stressed that the support and support of those who have to implement it is crucial. Schreijer-Pierik said that Dutch agriculture and horticulture is innovative, but it needs the land and space to actually do something. According to Ruissen, the farmyard should be central and the target figures now come too much from a Brussels conference table.

The directors of LTO Nederland also asked the MEPs to pay attention to crop protection, the level playing field within the EU and the lower remuneration from the Common Agricultural Policy.

The plans of the European Commission regarding the Green Deal will be further developed into concrete policy in the coming years. The proposals are also discussed in the EU Councils of Ministers and must be approved by the Member States. LTO Nederland continues to bring its position, concerns and ideas to the attention of the relevant ministers in The Hague and the House of Representatives. We also closely monitor the development at European level, in collaboration with umbrella organization Copa-Cogeca.

New CAP more ambitious than ever

Today the European Parliament reached an agreement on the new Common Agricultural Policy (CAP). LTO calls Parliament's agreement ambitious, but a step in the right direction.

In recent days, the European Parliament has voted on hundreds of amendments to the CAP and the overall package was approved this afternoon. Earlier this week, the EU Agriculture Council also reached an agreement on the new CAP. In the coming months, the European Parliament,

the European Agricultural Council and the European Commission will enter into negotiations to reach a final agreement. The new policy must start in 2023.

Léon Faassen, board member of LTO Nederland, responds: "The agreement of the European Parliament is ambitious, with an accumulation of existing and new measures. Nevertheless, we see it as a step in the right direction, in which farmers and horticulturists are rightly rewarded for the actions they take. It is good that there is now a realistic deal in which the Green Deal with its high objectives is not funded with farm money. "

Distribution of the agricultural

budget For LTO it is especially important that the CAP continues to provide support to farmers and market gardeners. The basic fee per hectare that is required for this remains. The European Parliament proposes that Member States spend at least 60% of the pillar 1 budget on the basic premium per hectare. LTO, together with the European agricultural umbrella organization COPA-COGECA, is committed to the same percentage. The CAP also offers market instruments. The current uncertainties (corona, Brexit, international tensions) show that a safety net remains necessary.

No final agreement has yet been reached in Brussels on the multi-annual budget. While LTO is committed to preserving the agricultural budget, the Dutch government is committed to less money for agriculture. Faassen: "Green ambitions are not free. As LTO, we have already emphasized that it can not be explained that farmers and horticulturists will have to perform more, while there is less money in return. Farmers and horticulturists want to, but it must be possible to earn money! "

Sustainability

The new CAP is an ambitious package combining existing and new measures. Measures previously covered by greening will now form part of the basic conditions. The so-called national eco-schemes come on top of that. Farmers and horticulturists can become more sustainable through the eco-schemes. Both the Agriculture Council and the European

Parliament want to leave the choice of making use of the eco-schemes to the farmer and horticulturist. This is in accordance with LTO's commitment.

The eco-schemes are being further elaborated by the Netherlands. As far as LTO is concerned, this will result in a simple menu from which farmers can make choices that best suit their business, for example for the protection of climate, biodiversity and animal welfare. Precision farming and more support for young farmers are also options. The European Parliament also proposes this.

Continuation

The European Parliament and the member states are now meeting with the European Commission to reach a compromise. That process is called 'trilogue'. This could take a few more months and will in all probability last until the spring of 2021. The Netherlands can then write the 'National Strategic Plan' and submit it in Brussels for approval. This will have to be done before the end of 2022. The new CAP will start in 2023.

Interview EC

Speaker 1 (00:00):

Yeah, absolutely. Sorry. Um, yeah, what I was asking is that, um,

Speaker 2 (00:05):

We have, yeah. Could you explain the question? What, so what are we promoting to improve? So you mean, what things are we doing to improve productivity? Yeah.

Speaker 1 (00:15):

What efforts, what strategies are we trying to use to improve productivity? Yeah,

Speaker 2 (00:21):

So, um, well there's a range of, of actions, so, um, let's put it this way. I work for, uh, the EU. Uh, so, uh, at an immediately you think about, um, uh, public efforts to improve productivity,

but I think the first thing is that a farmer is probably keen to make sure that he gets, uh, uh, an optimal yield, uh, production from his, um, his, uh, uh, farm. Um, uh, so there is a drive in being a farmer and it is, this is helped a lot by having good education. Um, so I think that education for farmers, uh, education in rural areas is key. So I just mentioned Erasmus well, that's just a small part of what we can do in terms of education, but it's part of that, you can add. But I think, uh, issues around education for farmers are key.

Speaker 2 (01:21):

And if you look at the statistics on education of farmers in the EU, uh, there are very relatively few farmers with, uh, more than secondary education or web specialized education in agriculture. So I think we have a lot to work to win in that area. That's one then of course, there's a lot of companies who will help farmers be more productive, uh, seed, seed breeding, uh, animal breeding companies. And so the whole infrastructure in the EU in terms of productivity is, uh, is, is there. So what can we add as the EU, what we are really trying to focus, um, is to make sure that this productivity increase is, uh, sustainable. Uh, so we would like to have more production, but not more pesticides. We would like to have more production, but we want to reduce the losses of nutrients. Uh, so the use, um, that you use a research program, uh, horizon Europe, a continuation of the horizon 2020 program contains a number of, uh, packages related to areas around the environment, agriculture, water, quality food, uh, that's uh, focused on these things.

Speaker 2 (02:30):

And for the, for the next seven years, this whole area of food environment, agriculture bio economy, we're spending a 9 billion on it, very 20, 21, 2027. So that is also a major effort that we can do to improve, uh, uh, to improve productivity. Maybe one thing I should mention is that, uh, there was always a lot of talk about, uh, uh, genetic modification of breeding techniques. So, um, here Europe has a more, um, uh, a different approach, a very prudent as so everything's allowed, but you need to be authorized. And very few things are authorized. Uh, uh, we have now recently announced that for certain new breeding techniques at the CRISPR CAS technology, if you, if you are familiar with that, that's for those technologies, we're going to review the, and, and change the, uh, authorization rules with the idea to make the, uh, to, uh, facilitate access for seeds made using that technology on the market easier.

Speaker 2 (03:32):

But before we can do that, we need to change laws. So we need to do as you're being commissioned. And it's what we call an impact assessment. We need to look at all the options and weigh, uh, the pros and cons, um, that is now, uh, starting then, uh, we, um, uh, as subsequently, we need to go through a, uh, legislative, uh, approval process at the, the, the, the draft law needs to go through European parliament and the council of ministers, and afterwards it needs to be implemented. So that whole process can take a number of years. So this is not something from today to tomorrow, but the European commission has clearly made the choice to, to also facilitate the use of these technologies all with the w the back against the background of what we call the green deal has. So this European commission that came, uh, in the, uh, December, 2019, let's put on the table a green deal, which means, yes, we want to really green the European economy and all sites, including the food area.

Speaker 2 (04:32):

We've published the farm to fork strategy with all kinds of actions to improve the sustainability of agriculture, but, but also using technology. So it's not just about more organic and more organic farming is one part of it. But even an organic farmer can only, uh, can only survive when he has a good yields. Hey, he also needs to, to, to, to, to harvest a good crop. So an organic farmer also needs, needs, um, uh, knowledge, uh, and organic farmers also use some pesticides, for example, copper, which is very, uh, um, uh, uh, pesticide that we, we don't like to use, but for several, uh, crops in organic farming, this is, uh, used a lot. Um, and, uh, there is also a research ongoing precisely to see if we have alternatives for a product like, uh, like copper. So also in that area, we are working hard to, um, improve the sustainability, uh, uh, of, uh, of farming. I hope that I've covered ground in terms of how we try to improve productivity, but you let me know if you have follow-up questions.

Speaker 1 (05:40):

I do quickly cause, uh, the interviews we conducted to the farmers, uh, they highlight that all of these organic farming, bio farming policies that are coming into place, which are aiming to increase the arable land, maybe 30, 20% of 30% dedicated to, um, organic farming. And some of the complaints they had is that whether, I mean, if they are not allowed to use pesticides and feed sanitizer products, their crops will be damaged. They will be affected either by pests or other diseases. So this is where gene editing comes into play. Then they argue that, okay, then that you should provide some seeds, some plants that have strong genetics that are more

resistant, more resilient to changes in weather. So this was the controversy that, okay, if we are not allowed to use fertilizers, then we need to have the plants in itself to be stronger to survive. Um, so we would like to ask you do, uh, that's the European commission get the opinion from farmers. Do you receive input from them?

Speaker 2 (06:49):

Yeah, we, uh, we talk con continuously to, um, uh, to farmers, uh, for all our policy proposals. Uh, so wherever we continue, uh, we continually listen to them. We have various ways in which to consult them. So we have, uh, in, in my, uh, director general, we have a, uh, a forum where we talk to all the parties in the food chain. Um, the same goes for other DGS. How did you Sunday that this lead for this farm to fork strategy also has a as a consultation body, when we do an impact assessment for, uh, policies, we, um, we also have an obligation to consult, uh, stakeholders, but also citizens. So there's a continuous dialogue, uh, but however, uh, much dialogue there is, uh, there will always be disagreements. And, uh, the disagreements you mentioned from the farmers are I think very understandable.

Speaker 2 (07:47):

Um, and this precisely also why I mentioned this, uh, um, uh, this change of policy on new breeding techniques, because precisely we want to use the latest technology to improve, um, uh, seats and, and varieties that are on the market. But I think there is one, um, uh, point I would like to make is, is, is, um, we are not prohibiting, um, uh, we are not saying a farmer isn't allowed to use the best society. Okay. Some pesticides are taken off the market because they are judged to be safe. Uh, this is on the basis of food, safety and environmental, um, um, considerations on the basis of, uh, scientific assessment by, by the European food safety authority and in Italy. Uh, so, but, uh, so, so, so, but the, the, the, the pesticides that are authorized, our farmers can use them within the constraints that they, that they are for use that exists.

Speaker 2 (08:48):

Um, and the idea is not to say, okay, we want to reduce the use of pesticides. We prohibit the use. Now, the idea is on the one hand, of course, that we will continue to evaluate whether these pesticides should stay on the market on the basis of this scientific advice. But on the other hand to generate new bio pesticides, or new ways of controlling plant disease. And we are not

a seed breeding company, we are not a pesticide company, so we can't make it, but we can put money into research. And what we can do is we can help farmers, um, uh, find different ways of farming. So with the common agricultural policy, what we tried to do is to subsidize ways of farming that are different. Um, for example, you could imagine that, um, there is in a number of areas of Europe, uh, monoculture farming.

Speaker 2 (09:39):

So every year, the same crop increases disease pressure and increases the need for pesticides. So what we, what we are now doing, and the negotiations are ongoing this week is to say, we want diversification of crops. Um, have we want rotations every year and other crops that there is not going to be the same, uh, so that we have reduced disease pressure and some farm farmers resist such change. And I also understand that resistance because often the choice to grow only one crop is because the most yielding crop is the crop that generates the profit for the fund. And, and, and it's a risk to suddenly start into another business, but we have to do that. So what we can do is we can, uh, provide, uh, some subsidy money to, to, to, to, to encourage, uh, the farmer, to compensate the farmer for, uh, for, uh, for some losses.

Speaker 2 (10:30):

But we have to change the mentality. That is not what we are really trying to do is to say, yes, we understand, but we want to go to an agriculture that is more sustainable. So we are doing all kinds of things. Did the things I mentioned, uh, are on the one hand, new pesticides were doing research. We helped with the common agricultural policy. We help with the education of farmers, because we also should realize, I think that, that, uh, we can learn from each other. So we have, um, uh, in many, a good example, the example I like is the use of antibiotics in livestock farming. Uh, so the, the, the use of antibiotics has decreased dramatically in some member states. Uh, that means that, and, and the production of poultry or pigs is not decreased. And why is this because the member states have worked with veterinarians to, uh, tell them, uh, how they can, uh, uh, um, uh, prescribe these medications in a better way.

Speaker 2 (11:30):

Uh, they have worked with farmers to tell you, if you, if you have a cleaner, stable, or a different building, and they've supported the construction of new stables, you do not need a high level of, uh, medication to be applied to the animals. They have removed, uh, preventive treatment

with antibiotics, and only do treatment. Only give antibiotics when the animals are ill. So all these changes have resulted in a major decrease of use of medication while not decreasing production levels. And there's a number of countries in Europe, but it's just not the case at all. They still have very high use levels of antibiotics. So what we want, and what we're trying to stimulate is that the countries where we already have had this experience and where the members that administrations already know what, which actions were successful and which are not successful, how they can, uh, help other member states do so. So it's not always, um, uh, it's, it's, it's not always impossible what we're asking, I would say

Speaker 1 (12:31):

Very good. Well, thank you for the insights. It's really important.

Speaker 3 (12:36):

Um,

Speaker 1 (12:37):

Okay. We have some follow-up questions, but we're going to continue with a, with a 10 questions and two or three in this. Yeah. Yes. We would like to know, how does climate change in the European commission's view? How does it impact the different regions in Europe? Because we have conducted a statistical analysis where we collected data from different weather stations across Europe and outside Europe as well. And we divided the data into north and south Europe, and we observed that there is, um, regional differences, um, in terms of temperature precipitation. So we would like to ask you, how does climate change impact agriculture in Europe?

Speaker 2 (13:20):

Yeah, so you have done more research than I have. And what I wanted to do for this question was to look at some maps, because of course, the rest of agencies and, and, and, and, uh, that have, that has made nice maps about, uh, what is happening. I mean, clearly you see different, uh, uh, different developments in different parts of Europe. Um, and so more, more, uh, more and more drought in one part, uh, uh, more rain than others. But I think the key and you, you, you will have looked at that and I'm, you know, I'm not the specialist, so I won't tell you exactly what's happening here, but I think the key message for, for farming is that, uh, that the, that

the, the variability is increasing. So you cannot count on the weather as you could count on it, maybe 20, 30 years ago, or even longer ago.

Speaker 2 (14:05):

So, and, and because you can't count on it, you need to be much more, um, uh, you, you need to improve your resilience. So you, you cannot, uh, count on, okay, I can always. So in those 10 days, at the beginning of April, now, you need to make sure that you are, you have options. Uh, you need to, um, uh, a lot of farmers are already doing that. They are, they are changing the way they work the soil, because they know that they need to retain more water. They know that if they treat the soil differently, they will be able to, uh, work the land, uh, earlier. Uh, for example, with that tractors, because the water, uh, um, doesn't stay on top of the land, as long as the water, filtrates better. I don't know what the English words is. Um, uh, so there are many things that farmers can change in the way they farm that will improve the resilience of their operation.

Speaker 2 (15:07):

They can also choose, uh, of course, different crops, um, which is sometimes necessary, uh, because of disease pressure, or because of, uh, of other, uh, problems. Maybe there's also opportunities, um, in terms of cropping, if you look at them, um, I'm not in this from the Netherlands, uh, and you're from the east of the Netherlands, I'm sure you have in your vicinity, a winery. Well, at 30 years ago, a winery in that area, everybody would be laughing at the stuff was horrible. I think now they produce a decent wine and, and, uh, this is really new. It's moving up to the mark now. So it's been worth, I dunno if I would order a Davies mine and the rest of them rapidly, but, uh, but I'm curious now, but I mean, th this is opportunity also. I mean, some of these wineries first was more a hobby and you would think, okay, a local restaurant sells the stuff and the guy's doing something nice, but, but nowadays these are some of these operations are, uh, they're making money, which is great.

Speaker 2 (16:01):

They're, they're having a nice new, uh, way of, uh, of, of, of farming. So, um, yeah, so I think the, the, the, if, if, if the, the, the short answer to this would be, uh, make sure you, you become a resilience and you adapt, uh, um, and, um, uh, uh, and, and, and, and, uh, yeah, you get various ways of doing that. There's of course, a whole story that I haven't mentioned now, which is all

about reducing emissions. And that also impacts agriculture. I don't know if you want me to talk about that, but that is, of course also, uh, something that,

Speaker 1 (16:38):

Uh, w we have some more questions. Maybe we can dig a bit deeper in emissions, because it's a big topic actually. Um, but let's continue with the fourth question, uh, which is what are the EU plans to combine farmer associations together with individual pharmacist will to deal with climate change? So we've been talking about resilience. Maybe we have already answered partly this question. Um, but is there more cooperation needed to achieve more resilience towards climate change?

Speaker 2 (17:08):

Um, well maybe I talk a little bit about the work we're doing with the agriculture policy. So, uh, right now we are in a reform process for the agriculture policy. And one of the key changes that we are putting into place is that, um, we are asking all member states to make a strategic plan for implementing the agriculture policy. Right now, we have this for rural development, but not for the direct support to farmers. And this is all based on regulations that are written and made in, uh, in Brussels. And, um, what we would like, uh, with these, um, strategic plans is that they are much more closely linked to what's going on in member states and in regions. And the whole idea is that, that the environmental policy that we put in place, um, in 2013 for agriculture as not being successful. And one of the reasons it has been successful is that it's not very ambitious, but also that is not well adjusted to the local circumstances.

Speaker 2 (18:12):

So we want these strategic plans to be, you know, to be, to be really, um, uh, matching the local challenges. Um, and these plans, uh, member states must consult with stakeholders, including farmers when they make these plans. So I think that is one of the first big things is, um, the Netherlands, for example, or Denmark or Spain, uh, they, they must, um, uh, um, yeah, there must talk to the, to the farming associations to say, what do you think is necessary? Of course, they will also have to talk to the environmental association, so they will have to find a balance. So that is one way of, of, of, um, working more closely with pharma associations. Um, yeah, I think, uh, yeah, w when you ask it's got more cooperation needed. Yeah, probably yes. There's

always more cooperation needed, but, um, I think at the EU level, we work a lot with farm associations.

Speaker 2 (19:16):

We listened to them a lot. We have a lot of contacts, but they're not the only ones we've talked to obviously. And, um, uh, there's always controversy about agriculture policy, but that is also because it's a, something that excites everybody. And because there are very, uh, divergent views about it. Um, uh, but, uh, cooperation works. I mean, yesterday, uh, in, in, uh, from the Netherlands, as you would have guessed and, and, uh, uh, yesterday to farming as associations of the Netherlands, uh, together with the environmental NGOs announced a plan, uh, uh, around the reduction of nitrogen in the Netherlands, which is a big environmental problem. And, uh, where the government didn't really, um, come up with a credible solution. Um, the various, uh, organizations managed to come with a common plan, which shows you that cooperation is possible, but maybe doesn't always have to be Brussels that, uh, that sits in between. So

Speaker 1 (20:17):

Do you think, is there a centralization of this, do you think maybe the issue could be, could be solved if there was more decentralization if organizations could make their own plans instead of relying only on the central cup pillar?

Speaker 2 (20:36):

Um, well, I, I think, uh, uh, uh, yeah, we have to see what the cap is. The cap is what we are talking here about now. Um, uh, is it gap is a subsidy instrument. So it's basically a big pot of money that, that can kind of help, uh, address certain challenges, um, but by giving money. So, uh, originally we were focused mainly on, uh, addressing the issue of income, not enough money for farmers. Now, the income challenge is still there. Uh, let's, let's not forget it. We have a very low incomes from, uh, agricultural activity in the EU. So we, we, we give, uh, income support, uh, but we do a lot of other things that we talked about, the environmental programs and so on and so forth. So, um, but that's an, that's an subsidy instrument. So w when you want farmers locally to do something, uh, this is of course very much possible within, within the regulatory schemes.

Speaker 2 (21:38):

Uh, one of the challenges of course, for, for climate change climate change is that, um, uh, if you are, uh, if you want to regulate the car industry or a electricity generation, that's for the car industry, you have a couple of big companies, uh, that produce cars. So you can talk to them. You can regulate which cars are on the market, which is also doable for energy. You have a couple of big energy suppliers, but for farmers, we have about 6.8 million beneficiaries of CAAP. So active pharmacists say 7 million. So, um, to change the behavior of all these 7 million people is very difficult. So if farmers in one region, so let's take a, we had a good meeting yesterday with Navarra, so let's take Nagata, um, if they want to work together to improve their environmental, uh, uh, performance, that's perfect, you know, but usually that, those, those sort of cooperations, um, work within legal constraints that work within, uh, say, uh, if there, uh, a task to say you have to reduce your emissions with so much.

Speaker 2 (22:47):

And then, um, then, uh, it, it, it, it works better. You, you are more likely to achieve your results. So I, to ask, should we cooperate more at local level? Yes. And, and does the common agricultural policy help to create this local cooperation? Yes, we do. Yeah, but that is all through the subsidy instrument, but just regulation as such. Um, uh, the challenge is then to, to, to get, to get farmers or, or other organizations to, or, or, or other people to really, um, um, to, to take the initiative, to reduce. So an example, maybe in a different, uh, area is, uh, is the Dutch dairy sector who may come to the Netherlands again. So we use that dairy quota, so that limited the production of milk. And we also limited the production of manure. Now we have, uh, uh, abolish the milk quota and quite quickly afterwards, the number of cows increased considerably and the production of manure increased.

Speaker 2 (23:55):

And, uh, the Netherlands breached its uh, regulatory limits, uh, for phosphates and, um, set by the EU. So without, so the limits were there, the producers were there, they have all kinds of way of cooperating, but they were not able to meet the limits. So, uh, further regulation, uh, from the Dutch government was necessary to make sure that these operators respected that limit. So on the one hand you can say, yes, very nice to cooperate voluntarily together, but sometimes you need regulation, especially when you have, uh, uh, a sector with many small operators. So, so that is why I believe that that regulatory measures, uh, will, will remain

necessary. And the nice form of regulation with that come back to the, to the beginning is, is to, uh, to use the carrot, to use subsidy money, to encourage behavior in a certain direction anyway, long story, but I hope I've been clear. Very good.

Speaker 1 (24:57):

No, it was very good answer. Um, okay. Well, it's connected to the next question, actually, uh, we're asking farmers associations under European union, uh, what kind of challenges, um, do farmers go through? What kind of problems do they go through, um, when they are working with the new sustainability, the new EU policies and the new adoption of technology, what are the main, uh, problems that you've encounter?

Speaker 2 (25:24):

Yeah, so I, you know, I don't know what farmers have replied to you. Uh, it'd be interesting to know. Um, uh, but, um, I, I think what I, what I would say is what we've talked about, the talked about earlier, um, uh, what the main problems are that, that they want to maintain a certain level of productivity. I mean, in the end, farming is a business that with very small margins and, um, and the farmers are not, uh, happily, uh, um, uh, resorting to all kinds of, um, um, chemical inputs because they like it, but because they need to make sure that at the end of the year, they have a crop. Um, and, uh, uh, yeah, seeing, I don't think any farmer likes to see a crop, uh, dwindle. Um, I work in Brussels and now with Corona, you, uh, you can't really travel that much, so that's a pity, but, uh, I, uh, I follow a lot of farmers on Twitter, which is kind of a nice way of knowing how the crops are doing, because they love to take pictures of what's going on in the field either.

Speaker 2 (26:34):

Cause they're very proud of what they achieved. So I see beautiful pictures from all over Europe, but I also see, uh, problems, uh, um, uh, the, this just yesterday, I was telling a lot of, uh, newly sound fields, uh, where, uh, ducks, uh, birds, slugs had been eating, uh, um, uh, you know, a lot of little, little plants and this is extremely costly, you know, and this, so this is, uh, this is of course a challenge. And if you don't have the tools to protect your crop, uh, yeah, you, you, you lose your income. Um, so I think these are the big challenges. How can you combine farming more sustainably farming with fewer inputs and still, um, yeah. Obtain a good results,

but, uh, I, I don't know, but I mean, it's maybe more for the farmers also to indicate what they, uh, what they, what they consider the biggest to the biggest challenge. So,

Speaker 4 (27:36):

Yeah, they basically had a similar response, um, and also for them, um, one of the main issues or the things they struggled with was, um, the adaptation, um, because they say, yes, um, we understand that, just doing it the way we did it forever. It doesn't work anywhere anymore. We need to change. We need to like acknowledge, uh, uh, new technology, some innovation. Um, but that's also like their main struggle because they're not used to all the technology. We never really used it and now, um, they have to implement it. Um, there's not really that much choice anymore. Um, and that's like a main struggle for them because they don't feel like it's going with like baby steps, but it's like a, a big jump for them. Um, and then one of their experiences was, um, the longterm strategy, uh, because it's difficult to plan ahead for a long time. And I think like the cap is like six or seven years. Um, and they say for them, that's a problem because, um, in six to seven years, they have to like make changes, uh, get used to the whole new way of farming. Um, and then they already know that they're going to be slight adjustments after those years and they have to keep changing again. I was

Speaker 2 (29:09):

Going to ask, do you have the feeling from the people you've talked to, that this is a generational issue, like this hesitation for the use of new technology and change linked to the age of the people you have spoken to?

Speaker 4 (29:24):

Yeah, they basically explain that there's like two streams of farmers. Um, basically like the, well, the old school farmers, the people who always did, and they struggle with the technology and you have the new stream of farmers who are like basically our age. Um, and they see it as an opportunity and they're like interested. Um, and it's sometimes even a reason to go into agriculture. So there are just like two very different streams where for one it's, um, it's an obstacle. And for the other one, it's like a challenge, like a trigger to join the sector.

Speaker 1 (30:02):

It was quite clear in the interview with Bulgaria, we interviewed, uh, grain association in Bulgaria and they told us that farmers are often old school, traditional people who like to do the same methods, the same agricultural practices that they've been doing from previous generations. So they sort of inherit this agricultural mindset. And now when we implement new cap policies that involve adaptation to a lot of new things like technology, they're very skeptical of adopting these new policies because they don't see necessarily the economical benefit for them. They might think that it's more costly to be able to fulfill the requirements expected for the cup, with the output that they are going to be able to generate. So there is a generational gap, uh, we've identified. Yeah. Um, but we, I, at least, I assume that this generation will, there will be a new, younger generation that will take over at some point. So it will balance out, but as it is now, there is big, um, generational gaps. Yes.

Speaker 2 (31:05):

Yeah. And maybe one, uh, you're, you've been reading a lot already, but one thing, uh, if you haven't read it, I could recommend this, uh, report that, uh, the European union did recently is called farmers of the future. It's a foresight study. Uh, it came out end the last year. Uh, I can send it to you it's it's online, but, uh, it would be basically, I've identified the 12 different types of farmers, uh, that might be present in your, in 2040. So it, it, and this is a foresight exercise, so it's not a prediction, it's not what we want. It's just to sort of explore trends. Uh, so that might be interesting to, to, uh, to, to develop and to as backgrounds. Uh, what I, uh, yeah, what I, uh, I think what you, you just mentioned is, I mean, farmers are all professionals, uh, and, and, uh, and, and if you tell a professional how to do his work, it will be difficult.

Speaker 2 (32:05):

So, and who I, in a way, that's what we're trying to do. We're trying to say to a farmer, okay, you've done a great job feeding Europe for the past, uh, 30 years, but now we want you to do your business differently because we know it better than because this pesticides is really bad and because all the birds are dead and, uh, and your soil is not healthy anymore and this and that, the other, and okay. I think a lot of people will have an understanding. They've also seen that they have, their eyes are opened, they've seen the change, but then to change the way you do your business, it's scary, it's uncertain. And indeed, are you going to make, uh, money, uh, by making these changes because changes often also mean, uh, investing and getting a loan from the bank. Uh, can you pay that back?

Speaker 2 (32:47):

Because the return on investment in farming is extremely low. Uh, so, uh, this is, this is, uh, we're in a very precarious situation. So, uh, that is why, uh, I started the answer, your questions about talking about education. Um, that is also why we, uh, are really stepping up our farm advice. Um, as part of the European, uh, agric common agricultural policy, we are, uh, now also developing a system, um, that, uh, we have, uh, what we call a farm accountancy data network. It's a big, it's been around for 50 years. It's basically we gather economic data from farms to understand, uh, the economics at micro level. Uh, we are now expanding this to sustainability criteria. So we want to know, not only, uh, for how many hectors of wheat did you have and what, uh, how, what would the cost of the machines to harvested and how much money did you make selling it?

Speaker 2 (33:45):

But we also want to know how many pesticides did you put on it, which pesticides, what quantity, uh, how much water did you, uh, use to irrigate certain crops, all these other things. So we are trying to expand this and, and, and then to turn this into an advisory to also for farmers prefer to be at regional basis, because this, this farm accountancy data network, uh, is, uh, exists throughout Europe and, and, and we, uh, choose to farmers to participate, and they got a bit of money for sharing the data, uh, anonymously, but, uh, um, uh, we, we are able to extrapolate, uh, results. So it's scientifically, uh, is statistically sound. Uh, so that also means that we hope to be able to at least give us some more regional advice to farmers on some of these aspects. You also show the economics of, of, of, uh, what's going on on farms.

Speaker 2 (34:43):

Uh, another thing that we are developing and which a lot of farmers have already, uh, in Southern countries is, is, uh, is, um, uh, nutrient management. Um, uh, if you measure, um, what's going on in your farm, the first thing you do when you measure something is to figure out how to reduce losses. You know, when you know what's going on, you can, you can immediately reduce already some costs by, uh, by improving the management of, uh, of, for example, application of fertilizer or something else. So, um, also making sure farmers use nutrient management tools, uh, is good. And sometimes it can be just an app on your phone where you plug in a couple of numbers and you get an advice. Um, and I think maybe the final point to Meg, you mentioned Bulgaria, uh, uh, but we could also talk about Lithuania, for

example, Portugal, and then you, you, we can talk about the Netherlands or, um, uh, or Denmark.

Speaker 2 (35:39):

I mean, these are completely different worlds, completely different worlds in terms of, of farming. They all have problems. It's not easy in any part of Europe, but, uh, being a farmer in Denmark means, uh, to stay alive. You probably have, uh, two, 300 guys at the least and quite a large area. Uh, if you are in a, in, in Bulgaria, you have a few extremely large funds and also a lot of small ones, um, and maybe a couple of jobs on the sides too, uh, uh, just to say alive. Uh, um, so, uh, also as you look at at the education level of farmers differs considerably, uh, so talk about farmers in Europe is, is maybe a bit, uh, uh, it's not really the right terminology. I think, uh, a Danish farmer is much more, an entrepreneur is a businessman he's, he's running, or she is running an operation, uh, um, uh, really, you know, managing an important cashflow, uh, uh, and, and, um, a large part of the farmers, particularly Romania, Poland, Lithuania, Portugal, are doing what some would call peasant farming.

Speaker 2 (36:55):

There is small, they're relatively, um, uh, not a lot of capital, sometimes not, uh, too much, uh, um, knowledge, uh, investments, uh, often relying on the jobs outside of the farm to stay alive, or at least the partner, uh, would do that. These are completely different worlds, and it's very difficult to compare that, but we have to take care of all of them somehow, because there is not, I think everybody in Europe talks about the European family farm model, which is the ideal, uh, way of, uh, running a business, but there are many different types of family farms. And, um, and I, uh, I think our philosophy is not that there should be only big farms, small farms. We really need to, uh, make sure we have a combination, uh, of different types of farms, um, in the, in the EU. And politically now we're really trying to say, we need to help the small guys, but I would always add, we need to help the small guys, but I don't want to help us a poor farmer to stay small and poor.

Speaker 2 (37:56):

You know, I, I, maybe this is my, and my background may be in, mom's old, said the Dutch, uh, commissioner for agriculture, the first commissioner for agriculture, we basically created a common agricultural policy. He was really a socialist of the type who wanted to, to help, um,

the smaller farmers, um, uh, have, uh, have a life like have the life that others would also have. Uh, the, the, the socialist movement helps laborers and industries get decent wages, uh, uh, health insurance, and a holiday a year and months old saw the Romanian farmers in Europe who don't have health insurance or Donovan decent wage. And I've never been on holiday. So, you know, we, we want to, in a way, make sure that there's also a decent life for farmers to be had, so helping small yes. But also helping them to have a, have a decent life.

Speaker 2 (38:47):

And that, that is why, uh, you know, there's TV shows about farmers seeking a wife are so, uh, insightful because they show you that the challenge, uh, it is to stay alive and to even attract a partner, you know, for a lot of, uh, farmers in rural areas, not no great income, nothing to do. Um, you know, uh, and, and you know, who wants to live with you basically, you know, so anyway, I go off on, off on different tracks, and I think I may have another meeting at 10 o'clock. So you make, make sure you get through your questions quickly. Yes.

Speaker 1 (39:20):

We were going to jump to the last part of the interview. We just want to know whether hydroponic farming, for example, uh, we see it as a solution because as we described now, Europe is really big. The differences, the regional differences are really big. Um, it's a broad sector, so we want to discuss the potential solutions and hydroponic could be one. What is the European union, uh, opinion on hydroponic farming?

Speaker 2 (39:44):

Yeah, pretty good. I saw my next meeting is at 10 15, so we have a little bit more time a hydroponic farming. So, um, very interesting actually, we're I I'm having my colleagues, uh, write, uh, write a paper on this right now. Uh, well, there is hydroponic farming in Europe.

Part 2

Speaker 2 (00:00):

Plenty of it. I mean, uh, greenhouses, I mean, uh, the, this is, this is a technology that is already several decades. Um, and you know, this is running, we don't pay any subsidies. We only pay

subsidies for agriculture on land. Uh, we have land based subsidies. Uh, some of the people were using hydroponics, uh, um, our member of producer organizations in the fruit and vegetable worlds. And we do provide some support there for marketing or for some environmental measures. But the, the, the area based subsidies don't go to people growing on hydroponics. I was basically, it's basically a business, right? It's an industry. It's a, it's not land, it's not land land-based, um,

Speaker 1 (00:45):

Commission have any plans to, at some point subsidize hydroponic farming in the future? No,

Speaker 2 (00:52):

The answer to the question is, do we have any plans? No, I don't know of any plans, but you can of course think about, uh, w w what we are now. Um, uh, I think what we need to reflect upon, um, uh, is, uh, is what, what, that's, why this farmer of the future study is us are interesting. So what is developing now? Okay. Hydroponic farming is already there. A lot of the fruit and vegetables, uh, come from farms using hydroponics. And, uh, increasingly you see also urban, uh, um, yeah. Companies in urban centers, uh, using hydroponic technologies to generate food. Um, to our knowledge, a lot of these companies are, uh, have a great, uh, financing needs, uh, very capital incentive intensive, and they don't make a lot of money. So this is we're really in a, in a, in a startup business environments.

Speaker 2 (01:59):

Yeah. Um, the question is for startup businesses, do we need to, you know, do we need to subsidize them? I think, what do you, what do you, if, if there are private investors finding this interesting, I mean, this is great, you know, what is the role of public authority in this context, we do research in this area. So if you look at our research programs, there's a number of projects where we look at urban farming. We look at at, uh, vertical farming projects. Uh, so in that sense, there is support, but more support to explore the ideas and to, uh, uh, research look at technologies, but not really at, at, you know, fix our, our, our subsidies are moved from supporting farm income to increasing, to public goods. So two environments basically. So what we are subsidizing now is like, I was talking about rotation of crops.

Speaker 2 (02:55):

Um, uh, we have a big, uh, discussion ongoing on farming. So, uh, carbon sequestration, uh, there are private markets for this, but what is the role of government subsidies in this area? Um, biodiversity. So creation of heteros, uh, and, and, and making sure that landscape elements stay in fields. Um, we are, uh, financing, um, uh, for example, we are financing programs for farmers to farm their lands in a less intensive way to allow birds to nest and all these things to happen. So we are, we are increasingly focusing our subsidies on the environmental connection, uh, of farming, um, because that is what the public wants. That is also what we believe is good for farming in the future, because it keeps it sustainable, uh, resilience. We talked about climate change. So the question is hydroponic farming, do they need all this money? Uh, if I buy an out of tomatoes from a hydroponic greenhouse here in Belgium, um, I, I don't think there's a need to subsidize these guys, maybe, maybe in terms of the research, maybe in terms of their energy use, especially here.

Speaker 2 (04:14):

I mean, you know, here in Spain, you have, uh, uh, of course not that problem. Maybe there you have a problem with the plastics now, Maria, you know, so there was always an environmental challenge, but, but, um, uh, uh, so if you would ask me now, do we need to subsidize hydroponic farming? The answer would be no, but there was one, uh, development that is now coming along. That is interesting, which is cultured meat, uh, so that I don't think we should be subsidizing guts. Um, but that could be also, it could potentially be a game changing exercise. So if you would start growing meat in labs, uh, um, uh, you know, that would be a lot of the land where you ha we have, is used for animal feed production, right? So if you don't need, if you don't need so much land to feed the animals and produce your meat in a lab or a part of your meat, um, maybe meat for ultra processed foods, or you, you buy some pizza or some whatever cheap hamburger and a half the meat is from a lab, and you don't know, and you eat it.

Speaker 2 (05:19):

I mean, I think that the market opportunities might there might be there. Uh, they think that in about 10 years, this could be a commercially, uh, um, competitively on the markets. Um, that's that's would really change the equation. I think for if that development would really happen, it would change the equation for, uh, for farming sensitively, but also there, I wouldn't necessarily start subsidizing right now. Okay. So

Speaker 1 (05:45):

We had already talking a bit about it, and the last question has to do with, how does the future look like for the European union in terms of agriculture and so on? So what thoughts do you have?

Speaker 2 (05:56):

Well, um, uh, I think the first, the first thought I have, uh, it links to Corona. So I think, uh, uh, and, uh, we are quite proud of that, even though I haven't done much for it personally, but I think the fact that we have a strong agricultural sector in Europe, that we don't depend on imports, that we, um, that we have a very good, uh, you know, processing, uh, capacity, uh, transportation, retail, um, that, that is all that all works during Corona with big changes with suddenly people working from home. But we were all fed for the first time in our lives. We had to queue for the supermarket. I think we've all, uh, been surprised, but, but it all worked. We all had something to eat. So I think, uh, the strategic importance of food was underlined and the importance of a resilient food system is underlined.

Speaker 2 (06:53):

So I think that would be my first thought and that we need to keep that, uh, maintain that. So that means also that you need to reflect on how are you going to spend your money? Uh, how are you going to regulate, uh, such the sector in Europe? I think that would be the first thing I would do. I think the second point is all about resilience. So it's all about, um, uh, if climate change continues, um, uh, the risks for farmers increase and the risks for our food security increase. So we need to make sure that we tackle climate change. And with that we, that we, uh, are able to produce, um, that we were able to produce food, uh, under different circumstances. And so that I think is a, is a big John's. And we talked about all the educational importance and the investment needs about, um, taking care of soil programs to, to improve, um, uh, that, so I believe we will see a continued structural change as so fewer farmers in Europe.

Speaker 2 (08:01):

Uh, um, uh, at some point it stops because I think it's extremely important to keep it. It's very, um, we need large body of skilled farmers in Europe. So I think that is key. Um, but if I, if I

mentioned it, I mentioned a figure of six, 7 million farmers that we now have, uh, about half, I think about 2 million are in Romania and they're very small. Uh, so, um, uh huh. Th th there will be changed there. I mean, uh, the Romanians, uh, Bulgaria is maybe even a more, more telling example. There are so few Bulgarians still in Bulgaria. Yes. How business, you know, they, they, they, they fix our houses here. Uh, they cleaned the apartments, you know, they, they are nurses, uh, here because they want to make a living. So it's very difficult to keep farming. Therefore, this is a generational change, but it's going to be a major change. And it's, um, uh,

Speaker 1 (09:00):

European commission observed a reduction of farmers. Okay.

Speaker 2 (09:03):

Yeah. Continuously. Yes. Yes. We see already, since the fifties, uh, we see a strong reduction of farmers and it goes on and on, it goes on and on, and it's been the major theme politically. Also, our commissioner is very much aware and wants to stop the decline of farmers, of the number of farmers. But, um, uh, at the same time, we have to realize that a lot of these farmers don't stop because they, uh, they stopped because they, they die and they're very old, uh, or they stopped because there's simply no future in their operation, no profits, uh, no profits. So, um, but I think what is important is to, to, to distinguish this trend from the need to keep, uh, a good, uh, and well-educated, uh, farming population in Europe. Uh, so the very small ones might go, but it's very important to maintain, uh, to maintain a good farming class. You could say. Yeah, I think that that's also key for the future of farming. And, uh, I wanted to make one more, uh, one more point. Um, and we haven't talked really about this yet. Uh, but, um, we need to also look at consumers. So w w w I haven't really talked about our policy

Speaker 1 (10:26):

In the console. They have

Speaker 2 (10:27):

The last word and, and, and, uh, we have, so we have put on, on the table of farm to fork strategy last year, which talks a lot about changes to agriculture, but it talks even more about changes in food consumption, which is very difficult to change that because food is culture and

like farmers have learned the way to farm from their, uh, parents. Uh, people have learned, uh, how to eat from their parents or grandparents. And, uh, um, it's very difficult to change. So, uh, but we want people to consume more sustainably. So we would like people to eat a little bit less meat, a little bit more plant-based foods. We want them to buy more organic, uh, products. Uh, um,

Speaker 1 (11:12):

There's a small contradiction with sustainable products because they are often more expensive than regular products. So from a consumer point of view, why do people should spend more money if they don't have a big income, a big salary? How can we make it work?

Speaker 2 (11:26):

Yeah, no, that's a very good point. Um, uh, firstly, I think there are people with a decent income who can pay a little bit more for the organic food because in fact food prices are extremely low in Europe. If you look at the Eurostar statistics on the sheriff, our income we spend on food is going down and down and down. It's incredible. And if you look at the prices for agricultural commodities, they don't go up at all. it's so the, the, the squeeze is right there. Um, there are interesting examples. We talk about Scandinavia, lots of Copenhagen is very interesting. The city, uh, so buys, uh, has, uh, as a, as a food policy and they buy the food for their hospitals, their schools, uh, the administration, um, and it is, uh, 80 to 90% organic and the prices have not gone up.

Speaker 2 (12:17):

So how did they do that, for example, by buying less meat and more plant-based products by buying seasonal, uh, by, so there are ways in which you can, um, uh, eat, uh, more organic food without, uh, um, uh, hideout increasing the process. So that, of course, is a challenge. I think it is, if you look at the treaty, yeah. Maybe that's a good way to end this conversation. I don't hesitate if you still have questions, but maybe it's good to underline that the European treaty, the articles and the agriculture policy, uh, have not changed since the 1957. Uh, so we are still working on the, the same, uh, priorities and these include making sure that there was a decent income for farmers, but also that suppliers reach consumers at reasonable prices, reasonable, whatever reasonable is, but both elements, there's attention between them and both elements are part of the policy considerations that we have every day

Speaker 1 (13:18):

Very well. Okay. That's very good answer. Um, well, the last bit, uh, for the interview, we want to explain, um, how we have framed our thesis and we're using transformational leadership and change management from an organizational point of view to see how this sustainable transition and climate change, how they impact farmers. So maybe Martin, uh, uh, can, uh, help us with some of the last questions we have regarding the theories. and we would like to know how these theories, um, work with the European commission or if they don't work. ,

Speaker 3 (13:57):

I think it's probably easiest if we give like a short summary of like our main findings that come from the pharmacy association, um, and then like a short recap, or like summary of the theories we use, um, what they stand for basically, and how we think they can help in reaching sustainable agriculture in the future in Europe., and a lot of the things are in line with the things you mentioned. Um, some are a little bit different, but one of the main things they pointed out was like, they need a variety of options because they all get impacted differently, um, on like the different local regions. So they need different options. Um, another thing they pointed out, um, was a lack of communication and then not completely like the lack of communication, um, but like miscommunication, since as you point out with, uh, education, they need like more education, but at the same time, they feel like when there is research, um, the researchers don't listen enough to them, uh, which, and in, um, theoretical solutions that they cannot use in practice and therefore, uh, they end up with not changing.

Speaker 3 (15:24):

And the last one which they kept pointing out was, um, like a top-down structure, which you mentioned as well. Sometimes they feel as if they're being told what to do, and you're like, but we're the ones with experience. We know what to do. Um, and they're, they understand that they need the regulations, but they're, they feel like they want, I mean, they have input, but they would like more input. Um, so therefore we came with change management and transformational leadership, which basically, um, state that in order to change, it's important to have like co-creation process and get the farmers committed to the changes because in the end, uh, change is only as successful as the people, um, that implement the change in the end. Um, so therefore, um, our main question basically is, um, do you see, um, like room for improvement or like, um, increasing the role? Well, probably not a farmers because there's a

lot of them, but maybe a farmer associations, uh, and maybe increasing the communication between farmer associations, um, so they can learn from each other, uh, and in proof and have like this more extensive cooperation, cooperation, um, and efforts maybe, and with more successful change.

Speaker 2 (17:06):

Um, thank you for, uh, explaining your assessment. I think it's quite a fair assessment. So, uh, yeah, the point on different options, I think that's very fair. Absolutely. Uh, the communication yes. Is, is, um, probably not always ideal, but this is also the fact that, I mean, they're there, this is not in somebody. The world is just complicated and everybody's shouts and has opinions and is on Twitter and whatnot. And, and, and there are people who have a completely different views about what agriculture and farming should do and, and yeah, whatever we want, we can't stop these people, having those views as, so we can of course try to come up with a, a compromise, but, but, um, um, I think what farmers should realize is that the more conservative approach to, you know, to keep income subsidies with farmers, to not make their, uh, the, the, the, the, the, the, the challenges for them too big in terms of policy, uh, uh, uh, they have a very strong, um, voice in the council and the, the, the, the ma the agriculture ministers are extremely conservative.

Speaker 2 (18:35):

Um, I don't, don't tell them, I said this, uh, don't quote me on this, but I mean, there is, there is, uh, there is, the council is not the one moving here. The, the, the organizations that are moving things in terms of agriculture are mainly the, the, the European commission and also the European parliament to some extent. So, so you cannot argue that they're not being heard, but in this, in this big world of, of opinion about what farming should be and what food we should eat, they are, they are, they are one voice, and maybe in the past, people accepted a voice more, and now they're part of this bigger world, and that's how it is. Uh, and, and, and they, they defend themselves and they defend themselves well, but, but it's difficult. And especially if you are a smaller farmer farming somewhere, and, and if you are, you're also always in one place, you know, your farm is a place.

Speaker 2 (19:28):

So you are at the, the, the, the, the famous, uh, uh, the somewheres in there anywhere as farmers are somewhere, they are, they are with somewhere, but it also means that they, they, they, they may be less in touch with others. Social media is helpful maybe in that regard, but you also get all the noise in. Um, so, uh, um, so I can imagine that the communication, uh, challenge and the top-down structure, um, yes, yes. That is also I think, extremely cultural, um, uh, although even in countries like the Netherlands where it usually there's a lot of cooperation, there are not quite a big conflict, so, um, yeah. Um, yeah, but to get back to your final question, you asked whether there's room for improvement and whether there's room for improvement in cooperation between farmers associations, but farmer associations work together in Europe, uh, quite well.

Speaker 2 (20:24):

Uh, even though they have sometimes very different points of view, but you also have different groups of farmers association. So we have the young farmers who work together and the national young farmers associations you have with the traditional farmer associations, you work together, you have via compass Sienna who are more the smaller farmers, or the more left-wing farmers, or, uh, you want to call it the, the peasant farmers, uh, the completely different tradition. You have a European, uh, circle of organic farmers who work together. So I think you have a lot of cooperation there and they all do their best, and they all play their part in the big, uh, world of, of lobby and influence. And, uh, and we also work with organizations like pesticide action network, uh, uh, which is quite an interesting organization. And they often bring farmers to Brussels who show how they can work with your best side.

Speaker 2 (21:16):

So that there's plenty of cooperation. There's always room for improvement, or we are really trying to listen, work with the farm organizations, but we're also a public administration. And when a farm association comes to us, they are lobbying us, you know, so, uh, we, we treat them as, as very seriously, but we treat them also according to rules for lobby. And when you read in the newspaper, the KLM lobbies and shell lobbies and, and, and, uh, bus F lobbies and, and, and, and, uh, everybody tries to influence the government. So the same goes for farming. So we treat them as we would also environmental organizations, consumer organizations, the processing industry for agricultural products or retail. Um, so, um, we try to listen to it. Yeah. Sorry.

Speaker 3 (22:16):

The main idea behind it was, um, like with climate change, um, for instance, in the Netherlands, we now have issues due to climate change, which are new to the Netherlands. Uh, but they're not new to other countries in Europe. Um, like less rain. So in that way, um, they can like to share experiences and, um, they don't have to start from zero. They can help each other in providing solutions.

Speaker 2 (22:44):

Yeah. So I think, uh, yeah, I can't really speak for farmer associations. I hope that they have this exchange among themselves. And, um, uh, we have something to strive to, um, to organize, uh, uh, to subsidize farmer exchanges between farmers. Um, but then quickly, if you look into this, you find out that they exist already, uh, privately organized farm, uh, organizations have traditionally made sure that their sons and daughters could spend time several months or half a year or a year at somebody else's farm to experience life there and to learn. So I think a lot of this exists, uh, but from the angle of climate change, I think if you conclude that this is very important, uh, that that would be a conclusion I could fully strive to because, uh, indeed add to what I said about antibiotics. The same goes for, for issues related to climate change or soil management, or, um, you know, whatever you, you, you can think of all farm practices, uh, can benefit from such exchanges.

Speaker 2 (23:54):

So there I would, I would really agree. Um, uh, yeah, and, and I think what is also helpful is of course, if a farmers, if, if, if, if there are people who, what you mentioned is, is that the changes in the farming sector, um, uh, go, uh, um, you mentioned a short period of, uh, of an agricultural policy cycle as seven years or five years or whatever we have. And then, then things would change. And I would dispute that. I don't think things changed that much. I think since the nineties, we've had a continuous line of market orientation, so more and more free markets, uh, support prices, guaranteed prices that are lower and lower, and this, this is not changed at all. Actually not only for the wine sector, there is now a little bit of a hesitation, but for the rest it's purely now market oriented.

Speaker 2 (24:52):

The importance of the environment has increased already since the nineties. And since the year two thousands, uh, especially when we are increasingly linking essence, 2003 direct payments for farmers are linked to environmental conditions. And this week, again, those conditions are becoming higher. So this is not a change. I also think that the reason for putting on the table, this farm to fork strategy in the context of a green deal with talks about climate neutrality in 2050, is precisely to, to, to provide the long run perspectives. So if somebody asks, what do you, what do you want? And I say, yeah, we want fewer pesticides. And we want climate neutrality, and they may disagree with that, but they can't argue that we are not providing a long-term perspective. They may challenge whether it's possible. And then, okay, then let's see. Yeah, we, we, we believe this is possible.

Speaker 2 (25:49):

We also believe, believe there's hard work, not all the technology exists yet and so on, but I think there's quite a consistent line. And what is probably missing is in some member states, at least is somebody who is, who is standing for that line, uh, who is selling that message. Frans Timmermans is really selling that message. Now he is, uh, maybe a, a transformational leader. I don't know if you would use that. You, you have read the science on that, but maybe in other countries we needed it. I know in the Netherlands, you have the old guy from the rival bank, uh, um, what's his name again? I used to be a leader of, uh, it used to be Robert monk and he wrote, he also wrote a book. He wrote about the importance of sustainability. For example, in, in, in, in, in the changing society, he wants us to have more female leadership.

Speaker 2 (26:40):

For example, he believes that that is much more linked to, to, to sustainable management of natural resources. So maybe in other countries, you need people who defends the message of sustainability. The question is, of course, do farmers listen to those messages, but maybe they vote for a different party. Then I would like that the figureheads. So, um, yeah, you basically need one of your own to pass the message of sustainability to pass the message of change. And that is very difficult. Uh, and, uh, um, and to be on the one hand, trusted by your people and to give them a message of change, that is, I mean, that is what defines a real leader, but, but, you know, and, and maybe, maybe, uh, you know, you could, you could see if there are such leaders in, in other countries in agriculture. I, I think France is doing a, uh, Chris, [inaudible] the head of the European farmers, but also the head of the French farmer association. I think she is also

somebody who really can, can make this transformational message, uh, uh, but always struggling of course, cause you're always trying to make sure that you don't leave, lose your people, that they, that they follow you.

INTERVIEW SCOTLAND

Speaker 1 (00:00):

So question one, what are the farm associations' plans to deal with increasing demand due to population growth? Yes. Okay. And with these, is it, does it work if I just sort of, when I read farm associations, I basically think co-op. Is that, is that a good fit for you guys or

Speaker 1 (01:03):

Yes, exactly. We want to have your individual associations perspective.

Speaker 2 (01:10):

Maybe an addition to that. So I don't, maybe it's worth just starting here actually is the worst thing, a little bit about SOS and who we are and that kind of thing.

Speaker 1 (01:25):

If you want to give a small introduction about your association.

Speaker 2 (01:28):

Yeah. Just because it's maybe relevant to that. So where you maybe are aware already in which case apologies, but we're a co-op of co-ops. Yeah. So we're like a Federation organization and all our members are agricultural co-ops themselves. So I suppose it's up to you, but I guess I could, I was thinking it might make more sense for you from your perspective. If I try to answer from a kind of agricultural co-ops in Scotland perspective, I don't know.

Speaker 1 (02:01):

That will be, that will be useful as well because we've interviewed only single associations. So with your perspective, sort of it encompasses like a number of different associations.

Speaker 2 (02:16):

Yeah. There's about, we have about 60 member co-ops and they're all agricultural co-ops, so six zero. And they're, they range from anything, you know, like from land to shellfish, to daffodil bulbs, to potato degree, the whole sort of sector in agriculture is represented in that. And in 10, their farmer men Michif is a total of about 25,000 farmers. So I could imagine,

cause of your research, it might be more useful for me to try and give you an answer in that context, because if I just talked to you about SEOs, it's almost quite narrow. Cause we're yeah. We're almost like an office based organization rather than our farming route is all through our membership.

Speaker 1 (03:10):

It still is relevant. And yeah, I think you can speak sort of with this perspective of taking into consideration all the associations' problems and opinions. So, okay. With the first question which was what are your associations plan to deal with increasing demand due to population growth? Do you have any specific strategies that you are communicating with the associations?

Speaker 2 (03:39):

So the short answer is no. And I suppose I was thinking about the question beforehand and I think that, broadly speaking, our membership will react to an increase in demand. So, you know, if whichever product they're producing, whichever kind of agricultural product also serves, if there's an increase in demand, then they'll be generally quite pleased about that and try to meet that demand. But I suppose we have, you know, in Scotland it's quite our own perspective and our own constraints. So that population growth isn't happening for us here. So there are some of the co-ops who obviously are exporting a product and therefore have access to bigger markets. And so that might be more directly relevant, but in short, the answer to that question is no.

Speaker 1 (04:40):

Okay, perfect. Then the next question we're asking has to do with the productivity of your crops and your farms in Scotland. Do you have any specific strategies? Are you trying to promote the way they produce? So, we could improve the production on a farm level.

Speaker 2 (05:08):

Yeah. And again, this is an interesting one. I kind of like our members' perspective in particular. And I suppose that they almost constantly do that. So as individual businesses, if they can find a way through like a new technique or a new process or a new variety, you know, whatever it might be, then the individual co-op will implement that and evolve. And I'm sort of thinking of an example. It can be linked to productivity, but also I suppose like a reaction to the market for the market demand. So we have a broccoli co-op member who helped develop a new variety of broccoli in order to try and, you know, fill a niche and respond to that demand. So yes, it's, it's ongoing all the time. There's nothing specific that we do as a member organization on that side of things, because typically the running of the business is almost left to the individual

businesses. So our direct involvement with them would be at a slightly different level. Does that make sense? So we don't tell them how to do their day job versus what I'm saying. Yeah, we're more, we might be more involved with something strategic or like governance or maybe thinking about sustainability or yeah, like those broader, higher level challenges that the business might find it harder to tackle on their own.

Speaker 1 (06:37):

How do you manage the exchange of knowledge? For example, you talked about one of your members, they could find a new way or a new method to produce and become more productive. Do you exchange knowledge among members? How can I say it promotes the exchange of knowledge so they can all improve as a whole, not individually?

Speaker 2 (07:00):

Yeah. So it's a really interesting one. We would, we would try and do that. What's tricky is that typically the members are either doing very different things. So like the daffodil bulb co-op can't really help the lamb marketing co-op can't really help the shellfish. Yeah. So there's either that, or because we're a small country we've got, so we have a few grain co-ops, so they will gather and dry and store and market and sell grain on behalf of their members. And they are, that can be slightly tricky because they're in different parts of Scotland, but there is an element of competition. So there are some sensitivities between them, between the co-ops that are doing the same thing. They tend to be a little sensitive about that. But generally speaking, we would try anything, especially at an SEOS level, so our ourselves, and anything that we were implementing and rolling out, we would make accessible to everybody. So there's no, you know, if we were trying to raise, say, understanding of the west of livestock production efficiency, which is a project that we're running at the minute that those findings will be for all of our members who are involved in livestock, it won't be just for one or another. So yeah, I have to, if that answers that question,

Speaker 1 (08:32):

For our thesis, we are specifically focusing on horticulture and agriculture. So we are not digging too deep into livestock for example, or fishing. So we're mainly sticking to agriculture like inland, you know, as arable is the arable land. Exactly. Animal farming. So the next question we're asking has to do with, how do you think climate change impacts agriculture in your region in Scotland? Is there any specific evidence or events that affect farmers in Scotland due to climate change?

Speaker 2 (09:18):

Yeah, I mean that undoubtedly it is mainly. I suppose the obvious is, you know, in the form of weather patterns and extreme weather patterns, I think it's always been, I think it's increasingly accepted that the direct, the variation and the kind of increase in extremes is a direct link to climate change. I think the farming industries where we've always had to deal with those fluctuations, so it may not have always seen it. Those have been the reasons. But yes, I mean we're subject to climate change like anywhere else. I suppose what's maybe worth saying from a Scottish perspective is that we're probably fortunate in some ways and that the kind of climate modeling and temperature and rainfall and predictions for Scotland, what they probably do for us is they give us a longer growing season. So, you know, typically we were quite cold and quite wet.

Speaker 2 (10:29):

And if you look at other parts of the UK, like down south in England, they are going to get, it's going to get hot in a way that's going to cause them problems, probably because of our temperature, our norm, our norms on temperature, it's going to be positive for us. I'm not saying climate change is a good thing obviously, but I think that probably is true. There will be interesting impacts in terms of giving us a longer growing season, but it may also obviously mean that kind of pest and other diseases and issues like that may well be more problematic, but it might mean that we can grow a wider variety of props. You know, there's a January, it's quite limited for what we can do. You know, we wouldn't have been able to do vines or, you know, wineries or anything like that, but probably we will be able to do that kind of thing.

Speaker 2 (11:23):

Maybe more fruit, something like that. But I don't know if you're aware, but you know, in Scotland generally our sort of quality is pretty cool. So you have very little land that's good enough for terrible soil. So it's quiet, it's like the type of soil is good for grass. We can grow grass great, but not very good at doing any kind of arable crop or any kind of fruit or veggie production. So down the east coast of Scotland, there's quite a small strip. I can send you a map showing it, but if you're talking, if you've talking about agriculture in Scotland, you're generally predominantly talking about livestock because we have lots of grass and therefore sheep and cattle, and far less tolerance for growing fruit and veggies and green.

Speaker 1 (12:17):

Perfect. okay. So do you have any specific plans within all the associations that you work with to mitigate climate change or promote the reduction of certain practices or pesticides? It could be anything, but if you have any specific strategy

Speaker 2 (12:41):

Yes. So we do, and that maybe comes back to my point about saying, you know, the activities we are involved in and the sort of maybe the higher level work that we try and do for our membership, which is not so much the day-to-day running of their businesses. So about five, six years ago when we started doing climate change, sustainability focused work and that's the work I lead and head up on. And I guess our sense was going, we need to try and think proactively to help the industry. You know, it's such a huge issue. It's very difficult for farmers who are running businesses, 24/7. We need to help them tackle that. So there's a number of things we're doing, including a program called carbon positive, which is trying to, we're trying to demonstrate the positive activities that are happening on farm and use data to give an individual farm profile for every farm in Scotland so that the farmer has a greater understanding of what they're doing well to drive change and get them to do more.

Speaker 2 (13:49):

So that's one initiative we're working on the livestock project. I mentioned. So the project, I just talked about that school carbon positive, the livestock project is called livestock performance program. And that's, I know you said you went into livestock so much, but that's all about driving efficiencies and that's relevant, very relevant in Scotland. You know, in terms of our, our kind of our industry, but also I guess the emissions associated with livestock. So we're trying to improve the efficiency of our national beef herd. So it's, there's different metrics, but carving into all days to sorta how often, you know, all of those important metrics, which need to be more efficient in order to reduce the intensity of those emissions we're working on. What's quite good timing for your research actually is. So we have co-op and climate change program that we, we run sort of five, six streams, and one of those we've had it up, we're calling the climate change challenge and we've actually done interviews with our membership over the last year, which is why I feel I could answer your questions in that light.

Speaker 2 (15:02):

So we do, we've done interviews with all our members, asking them about where their priorities are, what they'd like to be able to do and what they can't do. Why did the death happen, and the next two years, we're going to work to try and enable them to take forward some of those actions. And I guess we're trying to work on breaking down the boundaries and the gaps that are, may be in place that mean that for some reason, the businesses aren't taking those forward. So yeah, there are other bits of work as well, but that's maybe I wouldn't overwhelm you with

them, but yes, we have a series of a series of programs ongoing and are committed to continuing that.

Speaker 1 (15:40):

Perfect. Okay. Well, the next question has to do with sustainability and I assume actually some of these strategies that you have for climate change also apply for sustainability. But the specific question is if you have any plans to become more sustainable.

Speaker 2 (16:00):

Yeah. So maybe if maybe it's useful to talk about SOS on its own things, I've just talked about, you know, more the membership there, so were planning this year to in partnership with another organization, someone who's on our board to, for both organizations to do, to do your, kind of, to come up with a plan for achieving that zero. So to kind of benchmark ourselves, see where we are, and then come up with that plan. And I mean, we don't know dates yet. We haven't started the work yet, but ideally with the aspiration of having a date, you know, 20, 30, or sometime soon as soon as we can to become that zeros and organization, and we want to do that for ourselves. So we have a great understanding of our own impact and the ways that we can mitigate that, but also potentially as a model of something that if we build our own understanding, we could roll it out to our membership. So it could become an offering that they might increasingly have an interest in and appreciate our support in helping their businesses. Because in Scotland, we have our national legally binding target is net zero by 2045. So clearly as a country that has to happen, but obviously every business has a role to play in delivering, achieving that themselves.

Speaker 1 (17:27):

Yeah. Perfect. I'm just taking some quick notes. Okay. Let's see. Do you currently receive any type of support to improve food production within your members?

Speaker 2 (17:53):

Yes, I suppose we do in a way the co-op work, I mentioned that specifically for our membership. We get funding through from Scottish government to do specifically ring fence funding for engagement with our membership. So that can, that's quite a broad remit, you know, it could cover a range of things, but they're increasingly keen to see that linked, to be honest, actually, probably maybe more to do on the kind of climate change, sustainability side of things and food production paying for food production is a little bit out of fashion So yeah, we're increasingly seeing our kind of public funding or linked to some kind of climate change. Sustainability efficiency, focused output is what they want to see. But yes, we've always had

because organizations existed for about 110 years. So there's a sort of traditional core function to say we support the agricultural crops in Scotland. So Scottish government gives us funding to build that relationship and continue to have a relationship with those members and help them achieve various teams.

Speaker 1 (19:11):

Okay. The next question, will we need to contextualize a bit, because now with Brexit, I assume that cap policies don't really apply anymore in Scotland. I don't know if that's right. But the question we have is what problems do Scottish farmers face while working with sustainability, the cap policies of European policies and the adoption of new technologies to become more sustainable.

Speaker 2 (19:38):

Yeah. I mean, you're right. I guess we're sort of in the phasing out period of cap. So I think it's a good point that it's less relevant. I suppose what I think is really interesting from our perspective is what's going to happen now. So what's our replacement going to be? Because although it won't be CAP, it will be at the national level. Yeah. So it's the same idea. Right? Really. And that's quite a dilemma. I don't know if you've spoken much to, you know, falling businesses in England, but it's quite, it's quite a tricky subject working out what the UK will do and what the devolved administrations like Scotland will do. So, and they haven't decided

Speaker 1 (20:27):

That's how Scotland gets to create their own agricultural policies. And so you can, you're autonomous enough to control the ministry of agriculture now.

Speaker 2 (20:37):

Yes we are. We are, we aren't, we can't. So there are like reserved and devolved issues in terms of the Devolt administration of Scotland. And most of agriculture is under well, it's so difficult. A large proportion, a large proportion of agriculture is devolved, and we can make our own decisions about what we do, but there are some quite key bits. I don't know, that's the only reason you would invest. We had, but we've recently had issues in the news around trade deals, for example, with Australia and New Zealand. So if the UK makes a trade deal with Australia, New Zealand and says, you know, no tariffs, you guys can bring in everything like that. That's the kind of thing that, because we're not independent and you can argue the case either way for this, but we don't have control over that kind of issue. So some bits are devolved, some bits are reserved and that's quite contentious for obvious reasons.

Speaker 1 (21:45):

You, it is a challenge for farmers this sort of Brexit transition, adapting to the new framework. What kind of problems do they face?

Speaker 2 (21:57):

The biggest problem is the lack of clarity about what it's going to look like. Yeah. So that's huge. And we've just had a national election. So in may was our Scottish national elections. And it means that I think our government, they didn't really make their mind up. And obviously we were coming up to the election. So they were campaigning. And you know, not really saying this is what's going to happen. Because of the new parliament, a new government went in place. Now they are in place. We hope they will say at some point, but it's a new government. It needs time to settle in, to work out what they're going to do. So the biggest challenge is a lack of clarity. And I think in Scotland, farmers feel quite frustrated because in England they have been clear about the direction of travel. Then they have in Scotland, we know there will be more environmental measures, more linking of, you know, environmental outcomes for public investment, but there's no detail, just nothing.

Speaker 2 (23:00):

And that's really, really problematic. **And it means the combination of the combination of a number of things.** But it, it, it means that a lot of our, however, the public funding evolves, like I said to you about how significant livestock is for us, it looks increasingly like these livestock farms that are the bulk of our farming industry. I'm not going to be financially viable in the new world. So until they know what funding they're going to get, and we've had an England last week, this week, maybe an announcement about the British government English government saying they were going to pay older farmers to give up the farm. And that's really it because I think it's because it's an understanding that some older farmers, you know, it's traditional industry are going to really struggle to change without the subsidy. Often our farmers in Britain, we're only making a little bit of profit because of this big chunk of subsidy. So, I mean, these are just big problematic issues, but it means that there's a lot of businesses don't even know if they're going to be viable or not, whether they're going to be in business or not, whether they should retire, whether they should shut up, shop, how to evolve, to meet a new world, being more environmentally focused and lack of clarity is really difficult for them. That's the main challenge. I would say.

Speaker 1 (24:29):

We have identified this issue as well with other associations across Europe. And we have referred to these as a communication problem. Specifically when we are looking at the policies

from the European union, we find that most farmers at the individual level, they really struggle knowing what they expect and what they want with implementation of these new policies. So there is this uncertainty around the direction as well. So it seems that it's also part of the Scottish farmers' problems.

Speaker 2 (25:01):

Yeah, I think it is. And I think you're right. I think probably you're right to call it a communication problem in Europe, because I think sometimes it's not that Europe doesn't have a program, it's that maybe yeah. The communication of elements of it. Aren't, aren't fully successfully transmitted. I suppose our, I think our challenges right now, we just have this huge vacuum where schemes used to be. So there's not even for us. I think it's like, there's a lack of clarity about even what the programs will be. So it's not even that they haven't been communicating. They just don't exist. Yes.

Speaker 1 (25:42):

I see. Okay. There's a difference. Yeah. Yes.

Speaker 2 (25:45):

Yeah. There is. But communication issues. We have them as well.

Speaker 1 (25:54):

Question number eight, we are asking what kind of changes and support are needed to be able to deal with the combination of increased food demand because of the population growth we've been talking about climate change and increasing and stricter sustainability regulations is a bit long. But I guess the, the, what we want to find out is what type of changes are necessary to improve your sector and your industry in Scotland?

Speaker 2 (26:28):

I think, yeah. I think it's very tricky because I think he could argue with the model of so much public funding going to a sector. Yeah. I think you could argue that that is flawed and that creates all sorts of other problems and yeah. So on and so forth. But if we accept that, that's where we are and where we're likely to stay for a while. Anyway, I think it's, it's got to, it's a, it's a big ask and it's not easy, but that public funding has got to be better targeted. And it's got to be more intelligent about what it wants to achieve. I think often, and for quite valid reasons, you know, farmers will be blamed for doing X, Y, or Zed, but you have, you know, you have an industry that has been paid to do things and therefore does what it's paid to do.

Speaker 2 (27:27):

And there's always problems with that. And it is a fundamentally flawed approach, I think for several reasons. But if that's what we're doing, then the responsibility, I think, does lie with governments to understand what they want and pay for more intelligent outcomes. And it's not easy. It isn't easy, but typically yeah, you pay for something. And then you realize that means that the farmers are doing something you didn't realize they were going to do, and that causes another problem. And so they do something else. So you have to be more intelligent about that. And I would argue for trying to build in more, trying to build in more choice for farmers I think if there's, if you can try and drive more accountability into the farming industry, I give them more things that they have choice over and therefore feel more empowered about decision-making then I think you have more of a shot at getting a more aware and conscious sector that are making choices that you hope they will make. But it's, yeah, it's, it's challenging and they're commercial realities not insignificant and it becomes so normalized that I think they don't know how to work out what they would do if they were making a decision for themselves. So many other factors.

Speaker 1 (28:59):

Yep. This is a very similar opinion to other regions in Europe actually. So it seems like the problems that farmers face in one region of Europe are relatively similar to others. So, yeah. That's really good. So the last question we would like to ask you is in relation to, to these last answer, what do you think the future of agriculture will look like in Scotland? And this is sort of a long-term question. But in your opinion, which direction do you think is going?

Speaker 2 (29:39):

Yeah, it's, it's really tricky question for us right now.

Speaker 1 (29:43):

Well, the uncertainty there is, of course it's difficult to, to know

Speaker 2 (29:47):

It is. I mean, I think, I think it will inevitably be less Farmers , it feels inevitable that there will be less farmers and that, yeah, that's that, it's just not going to be viable. There are going to be, there are some small farming businesses that just are going to die out. They're going to be gone. So if we take them out in the mix and then it's interesting to see what's left. And I think, I think, unfortunately this will be a combination of some of the bigger guys getting bigger, like intensifying in a way that we maybe don't want for climate change, environmental reasons. But they are probably going to be more successful or aligned to their markets, you know, savvy businesses. So quite canny about what they're doing and very market driven and therefore

successful. And I think they'll do environmental things too, if they need to, but it's less of the focus.

Speaker 2 (30:53):

I think there will still be what we would describe as extensive farming systems, so that have livestock grazing and that kind of thing for us arable and stuff is more intensive like arable and the fruit and veggies all a more intensive operation. So I think there will still be, there will still be livestock systems, but there will be far more, we've got a big drive for tree planting. A lot of people, private entrepreneurs and businesses buying up land in Scotland to offset carbon is going to be a huge drive, like land being incredibly valuable, also carbon thing, incredibly valued to offset businesses and yeah. Emissions all over the place. So Scotland is kind of, it's a little bit like a rich man's paradise in some ways, you know, a big businessman buying up land to plant some trees or to do things like rewilding. Non-Fat what we would see as non-farming activities. And yeah, let's hope that the farmers that are left find a way to thrive amongst all of that. Yeah,

Speaker 1 (32:06):

It's very challenging. We see also a reduction all across European countries in farmer jobs and it's a trend, so this is decreasing less. People want to go back to farming. I don't know how it's gonna work out, but like we've been discussing technology with a few associations and how technology could replace and substitute some of these needs that we might face in the future. When we talked, you mentioned that you do intensive operations. When you grow vegetables, for example, or small scale agriculture, do you do green houses? Do you grow with hydroponic systems for example?

Speaker 2 (32:48):

So there are some greenhouses that I'm aware of a few of those kinds of setups. It's not hugely common. I don't know. It's partly to do with our weather. And also I think what we've found is, so I know there's someone, a dairy farmer, who's a diversified intern, has a greenhouse and uses waste from the dairy farm to power the greenhouse and grow tomatoes. Interesting. But I think typically the products road and the greenhouses are still, they're not that competitive price wise with like Spanish or Dutch inputs. So people like the idea that like, oh yeah, we'll have local peppers or whatever, but the commercial reality of that is that it is still viable. And hydroponics would be seen as really niche, like really quite small there's. The James Hudson Institute is kind of like the soil academic expert Institute in Scotland and they have a vegetable farm where they're doing hydroponics.

Speaker 2 (33:53):

And I think it's quite interesting, you know, cause they're all about soil too. This is like moving to like so it's quite interesting that they're doing it, but again, the same discussion we've had is really intensive farming farmers wouldn't see it as farming, but it's the only kind of crops that really work financially. Things like cannabis for medical use, maybe some micro hubs, but again, that's only relevant for a city because rural populations are not buying micro hubs. I had restaurants in Scotland, you know, we have a couple of big cities, but yeah, it's not enough really. And so yeah, at the minute it doesn't look like the market is really incentivizing investment in these and quite interesting, I suppose, typically, especially the vertical farming side, it's not farmers as we would see them who are getting involved. It's young business guys who are totally greenhouses, maybe slightly different. I know of actual farmers, you know, who are involved in those, but it's small and I don't even know. Yeah. I wonder if there's, if there's a few reasons, one is that you cannot make drivers that mean that it hasn't had a massive teacup people talk about it, get excited about it. And then they do the numbers.

Speaker 1 (35:20):

Maybe the land price is very high. The costs for setting up the greenhouse are quite high as well. So

Speaker 2 (35:26):

Yeah. Yeah. I think that's probably true. Yeah.

Speaker 1 (35:29):

Yeah, yeah. But while it's very interesting we weren't expecting to get similar answers from Scotland, but yeah, it's good. What

Speaker 2 (35:41):

Did you think would be different?

Speaker 1 (35:43):

Honestly, I don't know. I didn't think about it, but I guess that for example, livestock, you're more prone to have more livestock. So it's a very different sector. You have less agriculture, which is what we found out today. But yeah, also the weather is very difficult. We've been interviewing Denmark, which has similar weather. I lived in Denmark as well, so I'm familiar with rain. So it's very difficult to grow in those geographical locations. Whether it's everything, when it comes to agriculture, maybe for livestock is not as it doesn't affect as much directly.

Speaker 2 (36:27):

Exactly. I mean, it is an issue for grazing for us. Definitely. But yeah, you can have sheep out on a hill and the rain is typically good for grass.

Speaker 1 (36:39):

Yeah, yeah, of course. Okay. Emma, thank you. Thank you so much for taking the time today to answer these questions. We are actually handing in the thesis, so we are hoping to be done by tomorrow. So we will send you the thesis if you want to take a look and we will stay in contact if there is anything else we will email you. Yeah. So thank you very much. And half of my partner Martin and I, so

Speaker 2 (37:15):

Yeah, I know. Good luck, good luck. I hope you're not writing all night this week to get it in.