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Finnish dairy farmers' perceptions of justice in the transition to carbon-neutral farming

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ABSTRACT

Environmental and political debate concerning the role of agriculture in sustainability has long been on the agenda. However, owing to climate change, an analysis of the transition to a low-carbon society must also be considered from the perspective of justice. Dairy farming, in particular, faces pressure in this context, when contemplating changing consumer behaviors and reduction in the carbon footprint of dairy products. Accordingly, many dairy farmers are struggling with the profitability and high production costs of farming. This study examines the experiences and perceptions of dairy farmers in Finland. The theoretical background is predicated upon the “just transition” literature. Additionally, recent literature regarding farmers’ attitudes and agency, related to climate and environmental change, is utilized. A collaborative, empirical study of the Finnish dairy co-op Valio Ltd.’s carbon-neutral milk chain program was conducted. The authors interviewed 18 dairy farmers and examined their motivations and barriers to carbon-neutral practices. Their experiences and perceptions of justice, in the context of a carbon-neutral milk chain, were studied. This study elucidates how to shift to carbon-neutral agriculture in such a way that dairy farmers perceive this systemic change as justified and acceptable. The results indicate that from the farmers’ perspective, three key justice issues need consideration: 1) profitability of farming, 2) blaming of farmers, and 3) use of agricultural peatlands.

1. Introduction

Low-carbon societies and carbon neutrality have become key goals in combating climate change (e.g., Rinfret, 2017; Tozer, 2018). Carbon neutrality is expected to both contribute to climate change mitigation and require adaptation in the agricultural sector. Developing the systems required by a low-carbon society is a process based on natural and agricultural sciences. For example, carbon neutrality needs changes in land use practices in farming. However, as it also involves political, social, and economic processes, the systemic change required in its implementation is extensive.

The inclusion of farmers in the transition process and an understanding of their perspectives on the change are required, in part, to achieve carbon neutrality. Studies on farmers’ climate change perceptions have predominantly reported a majority of them being skeptical of both the anthropogenic nature of climate change (Prokopy et al., 2015;

Doll et al., 2017), and its risks to their livelihoods (Islam et al., 2013). Consequently, it seems unlikely that farmers would be willing to proactively make considerable investments in carbon-neutral farming methods.

To improve the acceptability and adoptability of low-carbon policies and to better acknowledge their unwanted consequences, especially to vulnerable groups, the concept of a “just transition” has emerged and gained momentum. An example is the European Union’s Green Deal program (European Commission, 2019). This concept, as the name suggests, focuses on the fairness of the transition towards low-carbon societies (e.g., Williams and Doyon, 2019). The concept, which could be an important tool in improving low-carbon policies and policy-making processes, has expanded and become both more theoretically robust and academically interesting (Snell, 2020: 198). However, it has been insufficiently utilized in the agricultural sector, although there is growing interest therein (see Hale et al., 2020).

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Conversely, consideration of private companies' perspectives, for both the agricultural and transitional processes, is also important. Private companies operate dairy chains, and dairy farms are an essential part of these chains.

Dairy production currently faces many challenges, majorly in relation to discussions about its environmental impact. Demands for decreasing meat and milk production have increased (e.g., [Salter 2017](#)), while the legitimacy and continuity of dairy farming; practices, livelihoods, and the entire sector have been disputed. In Finland, the combined agricultural emissions from the EU's effort sharing sector and land-use are about 20% of the total carbon emissions ([Statistics Finland 2021](#); [Purola and Lehtonen, 2022](#)). Much of the agricultural emissions come from the use of peatlands, which are strongly connected to dairy production ([Berninger et al., 2020](#); [PTT, 2020](#)). The level of the agricultural emissions has remained stable ([Lounasheimo et al., 2021](#)) and there is a pressing need to find ways to reduce these emissions. Within this challenging situation, we scrutinize the transition towards carbon-neutral dairy farming in Finland.

Specifically, we study Finnish dairy farmers' experiences and perceptions of justice in the context of the Finnish dairy company Valio's carbon-neutral milk chain program. We aim to answer two research questions:

- 1) What are the key justice issues from the farmers' perspective?
- 2) How can private sustainability initiatives provide solutions to the justice-related problems farmers perceive?

The aim of this study is to clarify how to shift towards carbon-neutral dairy farming in Finland, such that dairy farmers can see the systemic change as equitable. The study focuses on Valio's carbon-neutral milk program. We acknowledge that the environmental measures promoted by the program are produced in this context. These measures are geared towards improving the practices and the profitability of the dairy sector. The program does not involve critical elements such as promoting the reduction of dairy consumption or limiting the number of livestock, although these would have beneficial climate impacts. This study does not aim to analyze the environmental impacts of the program but focuses on understanding farmers' perspectives on the role of such private sustainability initiatives for the promotion of a just transition.

We used a case study methodology to answer these research questions. First, we outline the theoretical framework of the study. Second, we describe our research data and the methods used. Third, we present the results of the study. The results are divided into three sections according to the three main themes that arose in the interviews: 1) the profitability of farming, 2) concerns and blame in the context of dairy farming, and 3) use of agricultural peatlands. Finally, we discuss the results in terms of the two research questions and draw meaningful conclusions.

2. Theoretical background

The concept of a just transition has evolved in relation to sustainability transition studies and various interlinked conceptualizations, such as environmental, energy, and food justice ([Williams and Doyon, 2019](#); [Schlosberg, 2019](#)). In the environmental justice literature, it is common to consider a just transition in terms of a set of justice dimensions. The most commonly used dimensions include distributive, procedural, and recognitive justice ([McCauley and Heffron, 2018](#); [Williams and Doyon, 2019](#)). As compensation for injustice may be required, the dimension of restorative justice is also relevant.

Distributive justice focuses on the distributive impact of a transition. Traditionally, at the core of sustainability discourse, there has been an interest in intergenerational equity; that is, a concern for the needs of future generations. However, distributional concerns need to account for intragenerational equity too ([Agyeman, 2008](#); [Timmermann, 2021](#)), aiming for a balanced distribution of drawbacks and benefits among

different actors in contemporary society ([Weinstein et al., 2013](#)). If an unjust distribution cannot be avoided, restorative justice can be used to compensate for the harm caused. For farmers, this could mean subsidies for changing farming practices or production lines. Procedural justice highlights the decision-making procedures used to reach and implement a sustainability transition in which every party should have an equal opportunity to participate. Finally, recognitive justice is related to procedural justice, but extends towards the recognition of different livelihoods and ways of knowing and being in society. In particular, this means the equal valuing of different cultures, with particular attention paid to vulnerable groups and elements of society, such as indigenous peoples ([Schlosberg and Carruthers, 2010](#)).

While farmers are not generally recognized as a group potentially at risk, owing to climate-related policies ([Green and Gambhir, 2020](#)), their vulnerability in the food system has been acknowledged ([Reidsma et al., 2009](#); [Paloviita et al., 2016](#)). As climate policies are shifting from a focus on energy to other key emission-producing areas, it is important to consider farmers and other workers in the land use sector.

Despite the recent interest in the concept of a just transition, empirical studies have largely focused on energy justice and the transition from coal in the context of coal mine closures (e.g., [Weller, 2019](#)). While farmers have not been studied previously in the context of a just transition, their perspectives on agri-environmental policies, climate change, and associated justice issues have been widely studied, providing important insights.

The changes required in agricultural production also raise questions related to regional viability and livelihoods, which are at the core of current EU agricultural policies. Despite efforts to provide sufficient livelihoods from agricultural production and to support investments in and changes to production lines, farmers may perceive the support system as unjust. In particular, this relates to gaining a livelihood from food production, versus so-called quasi-farming, where fields are maintained without productive goals. Another distributive justice issue for farmers relates to profit distribution among food system actors, visible in the food sovereignty movement ([Agarwal, 2014](#)), and the emergence of diverse alternative food systems, which farmers may see as a way of obtaining equal payment for their work ([Beingessner and Fletcher, 2020](#)).

The transition literature discusses restorative justice as a means of compensation for or alleviation of the distributive harms caused to particular groups, owing to transition or related policies ([McCauley and Heffron, 2018](#)). Restorative justice involves means, such as adjustment periods, education, and direct subsidies, to support structural changes. In the EU, agri-environmental subsidies follow the logic of compensation for the additional costs that implementation of environmental measures incurs. Undoubtedly, subsidies can also serve as a basic income. However, the changes required to reduce the climate impact of food production are likely to require more than mere adjustments to farming practices. Thus, the measures required for just compensation may also need to be wider in scope.

Farming generally means more than just gaining a livelihood. It is a way of life, intertwined with one's family, home, and local environments ([Silvasti, 2003](#); [Riley, 2016](#)). These issues can be considered in the light of recognitive justice. For instance, similar to farmers, for mine workers and the mining community, the coal mine represents more than just a job. The mine has socio-cultural value, in terms of place identity and the identity of community members ([Della Bosca and Gillespie, 2018](#); [Cha, 2020](#)). For the policies to be seen as just, these identity-related issues need to be understood and recognized. Studies on farmers' perceptions of agri-environmental policy implementation highlight the identity and socio-cultural aspects of farming purposes and practices ([Silvasti, 2003](#); [Burton and Paragahawewa, 2011](#); [Huttunen and Peltomaa, 2016](#)). According to these studies, farmers feel that their identity and values are threatened by agri-environmental policies and changes in farming practices. However, the ideals of good farming are diversifying ([Huttunen and Peltomaa, 2016](#); [Riley, 2016](#)), which also indicates the need

to recognize diversity in identities.

While farmers' experiences of blame and guilt in relation to climate change are under-explored, in the Dutch context, van der Ploeg (2020) discusses farmers' feelings of unjust blame with regard to nitrogen emissions. These feelings stem, on the one hand, from the highly specialized and export-oriented organization of farming in the Netherlands, which the farmers see as too vulnerable, damaging the landscape and producing profits for parties other than the farmers. On the other hand, consumers who do not understand the hard work of farmers do not want to pay enough for products to compensate for that work, and place increasing demands on them. These perceptions paint farmers as powerless victims, with little responsibility for the current situation and little power to act differently, which can negatively impact the recognition of farmers' agency in society. A recent Finnish study has also shown that two thirds of Finnish people find the discussion about climate change to be accusatory towards the regular Finnish person (Lehtonen et al., 2020). The study also suggests that people who feel they are being blamed for climate change do not feel motivated to engage in pro-environmental action. A previous study on Finnish farmers reported similar results (Kinnunen Mohr et al., 2019). It is important to explore what motivates farmers' feelings of unfairness and injustice in terms of their role in society and how they can be alleviated.

Farmers' feelings of not being recognized or understood can be linked to the wider socio-cultural context. An important element of cognitive justice concerns the recognition of different ways of knowing in policy-making and agricultural knowledge systems. Geoghegan and Leyson (2012) and Clifford and Travis (2018) have advocated a broader understanding of climate change that considers different ways of knowing, including farmers' local expertise and place-based climate knowledge. Farmers' and indigenous peoples' knowledge can serve as a valuable contribution to nature conservation and climate change adaptation (e.g., Kaljonen, 2008; Winter et al., 2011; von Glasenaap and Thornton, 2011), complementing knowledge from different sources (e.g., Lehébel-Péron et al., 2016; Sumane et al., 2018; Tengo et al., 2014). Furthermore, the wider socio-cultural context reveals a variety of mundane issues, related to adopting climate mitigation-focused or other environmentally beneficial farming practices (e.g., Beudou et al., 2017; Stuart, 2018), such as social goals, related to better work-life balance and family life (Burton and Farstad, 2020) or farm location and machinery-related constraints (Huttunen and Oosterveer, 2017). These interlocking issues may make changes in farming practices difficult, as well as making it difficult to communicate properly with people outside the farming context.

The recognition of different place-based identities, ways of knowing, and other sociocultural issues is directly linked to procedural justice, which concerns the fairness of institutional and decision-making processes. One goal of this aspect of justice is a balanced accounting of the different perspectives, interests, and goals related to the issue at hand, and ensuring equal opportunities to participate in decision-making processes (Williams and Doyon, 2019). In the mining transition, procedural justice concerns the involved participation of the affected community in the planning of the transition (Harrhill and Douglas, 2019), as participation opportunities are strongly related to the acceptance of decisions (Colvin, 2020). Participatory inequality is often produced by structural conditions (Bulkeley et al., 2014). In the context of state- and EU-level agri-environmental policies, farmers' opportunities to participate often come through farmers' unions in corporatist settings (Benoit and Patsias, 2017). In Europe in particular, the surveillance and sanctions of agricultural subsidies may appear to farmers as bureaucratic and lacking in procedural justice (Kaljonen, 2006).

3. Research data and methods

3.1. Context of research data: agriculture and dairy farming in Finland

Because of the challenging climate conditions in Finland and a

relatively short growing season of 125–180 days, milk and beef production has historically played an important role in the agricultural sector, comprising 50% of the agricultural gross return (Virkejärvi et al., 2015).

Finland is one of the northernmost grain-producing countries in the world. Almost all agricultural land is located above 60° N, and the production structure varies. While the southern part contains significant grain production areas, the northern part, through grass production, focuses more on ruminant husbandry, including dairy. The total agricultural land area of Finland is 2.3 million hectares, of which 35% are managed grasslands (Luke, 2020).

Finnish farms have traditionally been relatively small, stemming partly from the times after World War II, when migrants from the lost Karelian region resettled into what is currently Finland. Since Finland joined the EU in 1995, structural development, in terms of growing farm sizes, has been quite rapid. The average farm size is currently 46 ha. However, currently, only 5% of all farms have over 150 ha of agricultural land, and the largest size category is 25–50 ha, with 25% representation (Luke, 2020). In 2016, the average farm size in the EU was 16.6 ha and two-thirds of the farms are less than 5 ha in size. Since 1995, the number of dairy farms in Finland has declined at a yearly rate of 6.5% (Niemi and Väre, 2019). In 2019, only 12% of the 46,827 farms were engaged in milk production (Luke, 2020).

Structural changes have also increased the efficiency of milk production. Despite the decline in the number of milking cows since 1995, the quantities produced have remained stable. In 2018, there were approximately 270,000 dairy cows that produced 2.285 billion liters of milk (Luke, 2020). This is under 2% of total milk production in the EU area.

The average number of dairy cows per farm is 39. However, there is considerable variation. One-fifth of the cows are found in farms with 50–74 dairy cattle, which is the most common size category. Only 2% of cows are on farms with over 300 milking cows (Luke, 2020).

The average age of a Finnish farmer is 53 years, and in the EU, more than half of farmers are over 55 years old (Luke, 2020). Most farms are family-owned, but the realization of generational change is not self-evident because of the unattractiveness of the agricultural sector among the young. In addition, decreasing milk consumption may reduce the attractiveness of dairy farming (Asikainen, 2020).

Finnish consumption of dairy products, including liquid milk, is relatively high. On average, a Finn spends 17% of their food budget on dairy products (Arovuori et al., 2019). Dairy has traditionally been the most important product category among Finnish food exports, with a 20% share. Milk has been the only sector in the Finnish food industry with a positive trade balance since Finland joined the EU in 1995 (Arovuori et al., 2019).

3.2. Valio and carbon farming training

Valio Ltd. is the largest dairy company in Finland. Established in 1905 as a milk processing enterprise, it has a diverse selection of processed foods and beverages, including plant-based foods. Valio's share within the dairy product market has traditionally been large, and it purchases approximately 80% of the raw milk in the market (Arovuori et al., 2019).

Valio is owned by milk producers through cooperatives. Of the fourteen owner co-ops in Finland, five supply Valio. These five co-ops, with 4,700 dairy farmer members around Finland, own over 99% of the company. Valio is governed by a Board and Governing Council, both having a strong representation of milk producers selected by the member co-ops. Currently, Valio is placing itself as the frontrunner in climate change mitigation and has set a target for itself—of reaching carbon neutrality by 2035 (Valio, 2020).

The underlying motivation within Valio to undertake the carbon neutrality initiative has been to tackle the challenge of climate change. However, this is also a way to maintain consumer satisfaction. Pursuing

climate neutrality is regarded as an important opportunity for primary producers. In the general discourse, farmers often reported feeling that they and their livelihood were blamed for environmental damage. Based on research, the management deduced that enhancing carbon sequestration efforts offered a chance to change the general attitudes towards farmers as climate heroes rather than its destroyers (Nousiainen, 2019).

Valio's objective is to reduce emissions from all phases of the dairy value chain. In addition to primary production, the measures target reductions in logistics and industrial processes. The three main ways to reduce emissions in primary production are to 1) enhance carbon sequestration into the soil, 2) enhance the circular economy by using manure to produce biogas for fuel and energy, and 3) reduce emissions from organic soils, that is, fields that were originally peatlands.

In practice, Valio's work with producers commenced in 2019 with training on carbon farming methods, aiming to engage farmers in applying suitable methods to enhance carbon sequestration and monitoring emissions from their fields. Carbon farming methods focus on improving grassland management by cultivating deep-rooted species, using manure as fertilizer, and utilizing certain harvesting techniques. Improved grassland and water management are the main solutions for reducing emissions from peatlands. Focusing on a prolonged grass cycle and year-round vegetation cover ensures these carbon farming measures are not too different from the ones that most farms have already implemented under the agri-environmental support scheme of the Rural Development Program of Mainland Finland. However, carbon farming takes these measures one step further to improve soil conditions.

In 2020, approximately 300 producers participated in a carbon farming training event. Valio also released an application (CARBO® environment calculator) that producers could use to monitor the carbon balance of their farms. The calculation methods developed by Valio are still in the validation/certification process.

Participation in the program is voluntary, without any specific incentives. At present, Valio offers a responsibility premium that is linked to efforts to improve animal welfare. An objective has been set to have every farm on board by 2035, but the challenges to this are significant. The variety in farm size, location, and future plans makes it difficult to offer one-size-fits-all solutions.

3.3. Data and analysis

Our study is based on qualitative methodology. We used a case study approach (Yin, 2009), to investigate Valio's carbon-neutral milk chain program, and provide new insights into carbon farming practices and farmers' attitudes and perceptions related to carbon-neutral dairy farming. Based on this case, it is possible to outline relevant policy instruments supporting a future transition towards carbon-neutral dairy farming, and the findings of this study can be broadened to other similar contexts of carbon neutrality and justice.

The sample for the case study consists of farmers who supply milk to the dairy co-op, Valio. The interviewed farmers comprised both those who participated in Valio's carbon farming training and those who did not.

We conducted 17 interviews and interviewed 18 farmers (Table 1). During the time of the interviews, seven farmers had already participated in the program, whereas 11 had not. However, most of them had intentions to take part in the trainings. The age of the farmers ranged from 32 to 59 years. Both small and large farms were represented: the number of cattle varied from 15 to 180 milking cows, and the total land area under cultivation, including owned and rented land, varied from 42 to 200 ha. As additional, but marginal income sources, some farms had forestry, contracting services, or sales of grain or grass fodder. Several farmers had active or frozen investment plans, while others, usually older farmers, were certain of being the last active generation in business. The majority of the farms were single family-owned, while a few had established joint companies with siblings or neighbors.

The interviews consisted of four themes, which were based on the

Table 1

Data on the interviewees for the study.

Interview	Gender	Age	Cattle
1.	M	54	68
2.	F	44	60
3.	F	35	40
4.	M	39	180
5.	M	46	60
6.	M	39	18
7.	M	59	70
8.	M	32	25
9.	M	36	38
10.	M	53	90
11.	F, M	53	15
12.	F	55	26
13.	M	32	150
14.	M	47	85
15.	M	59	65
16.	M	56	60
17.	M	40	90

dimensions of justice: distributive, recognitive, procedural, and restorative justice. Within these themes were included many different questions related to emission reduction and carbon farming. There were discussions about opportunities, obstacles, challenges, and concerns. Additionally, the division between winners and losers due to the policy, and possible compensations, was also discussed. However, the interviews were guided by the interviewee's own speech and narration, in accordance with the principles of the qualitative thematic interviews. The duration of the interview varied from one-and-a-half to 2 h. The interviewers were Antti Puupponen, Annika Lonkila, Kaisa Karttunen and Anni Savikurki.

The research data were analyzed using content analysis, a general qualitative method that combines data-based and theoretical analysis (e.g., Timmermans and Tavor, 2012; Silvasti, 2014). The data were coded and separated using NVivo. For coding, we used the dimensions of justice. The text was segregated using different keywords related to the justice dimensions. By re-combining the coded data, we formed larger themes that were relevant for answering the research questions. In nearly all interviews, three main themes were identified: 1) profitability of farming, 2) blaming of farmers, and 3) agricultural peatlands.

4. Results

4.1. Profitability of farming

Finnish farming has long suffered from profitability problems (Niemi and Väre, 2019); profitability and low income are consistent concerns of farmers (e.g., Puupponen et al., 2015; Kuhmonen, 2020). These concerns were also borne by our interviewees with respect to the impacts of carbon-neutral requirements on the profitability of dairy farming.

The profitability of farming and the costs of carbon neutrality policy implementation relate to the distributive aspect of justice. The farmers we interviewed thought that they were the most vulnerable group among food system actors, and they hoped that income would be distributed equally among the actors in the food chain. If carbon-neutral agriculture were to incur new costs, many farmers believed that they would not be able to survive, especially older farmers.

However, they generally believed that the carbon neutrality program is good for their farming practices and farm businesses, in general, as most methods of carbon farming seem to have lower production costs. Still, several critical opinions emerged. Some farmers believe that carbon neutrality is primarily just branding for dairy companies, understanding Valio's business strategy as being based on international markets and operation.

In recent years, a major problem of Finnish farms has been debt (Niemi and Väre, 2019). In that sense, the carbon neutrality program

does not pose a great risk because it does not require large investments in production. Nonetheless, it should be noted that a basic issue regarding the program is, once again, the profitability of agricultural production as a whole. Farming has to be profitable for farmers to be able to adopt new practices stemming from the carbon neutrality requirement.

Profitability and costs also relate to the discussion of compensation and agricultural subsidies. According to the interviewed farmers, one basic question is whether compensations create profitability and the possibility of maintaining employability at the farm. However, only a few measures seem to generate the need for potential compensation, such as possible land use restrictions. For instance, if there were compensations for shifting the farm's direction of production, farmers would have to calculate the profitability thereof. Changes are usually made from a long-term perspective. Hence, many of the farmers interviewed highlighted the long return time of farm investments:

If the changes are mandatory. If they have to be done and you do not have enough money, then there is nothing you can do but stop. Moreover, if this is compensated for in some way, the change can be made. That is how you start the change, of course, if the calculations show that you can handle it. However, in this area, the farms have very easily stopped production if there have been even the slightest difficulties.

According to the interviews, compensation and subsidies are necessary, but they have to create profitable work for farms. In an ideal situation, farms would only need compensation or subsidies for a short period, after which there would be an increased demand for carbon-neutral milk products in the market.

Despite the farmers being critical of the functionality of subsidies, an interesting point relates to the compensation for carbon sequestration. Could it be possible to create an agricultural system where a farmer receives compensation for actions that promote carbon farming? Could the state or dairy companies, like Valio, pay that compensation? The interviewed farmers seemed quite skeptical, although a majority of them thought that this kind of incentive would be a better steering mechanism for agricultural policy, compared to different regulations or sanctions. Overall, improving profitability seems to be important for the motivation of farmers.

However, the compensations paid by private companies have at least one problem. Carbon sequestration is difficult to verify, so using it as a basis for subsidies is challenging. Thus, much work is required before a system where subsidies are connected to carbon sequestration would be ready. Still, private companies can easily pay different kinds of compensation to dairy producers. For instance, Valio already pays responsibility premiums to farms who meet certain requirements related to animal welfare.

Additionally, the interviewed farmers had many expectations regarding biogas production. This is an exceptional carbon-neutral solution, because a biogas power plant requires investments and large-scale production. Hence, typically, it is not an option for individual farms, but requires regional cooperation between farms. Furthermore, farmers perceive that public policy does not support or encourage biogas production. Thus, unlike other potential carbon-neutral actions, the risks for an individual farm to undertake the production of biogas, are currently too high.

However, especially from the perspective of profitability, producing biogas could be beneficial for farms in the future. In addition to the economic benefits for farms, biogas production has other benefits, such as improved manure management and other environmental considerations (Winquist et al., 2019). Hence, biogas production could support goals such as carbon neutrality or viability in rural communities and in wider society (Bartolini et al., 2017; Naumann and Rudolph, 2020). It is also a concrete solution in which private companies, such as Valio, can take on a greater role alongside public policy.

4.2. Concerns and blame

The interviewed farmers were specifically concerned about media representations they see as being based on falsehoods. The farmers frequently expressed skepticism about the comparability of Finnish production of beef and dairy, with that in Brazil, the United States, or even Central Europe, in terms of scale and impact, feeling that, since the perceptions of climate impacts are based on global calculations, the much smaller environmental impact of Finnish cattle production is unacknowledged in the media.

The farmers' claims are based on the fact that, in Finland, cattle eats mostly grass. Based on a holistic system analysis, Virkajärvi and Järvenranta (2018) found that, in the Finnish production system, negative environmental impacts are indeed smaller than in other countries, due to, for example, lower animal density, locally produced feeds, and the beneficial effects of grasslands. This concern was shared widely among the interviewed farmers, although some stated that, in the past year, the media had become more accurate and the understanding of Finnish cattle production practices had increased. Simultaneously, many farmers stated that there would always be those who rejected the facts, such as refusing to believe that Finnish cattle are not fed soy feed. Such people are considered loud minorities who receive a lot of media attention. Attempting to influence this group of people was seen as futile, as their goal is to end livestock production rather than improve its practices. Many farmers stated that the messages presented by this group (comprising animal rights and environmental activists), although still in the minority, had gained momentum in recent years.

I: How do you feel you are valued [as a farmer]?

F: Well, on a national scale, appreciation has always been low. We have always been guilty of this. When I started, they said we took people's money because they paid subsidies to us. Then came the Baltic Sea, that we pollute the Baltic Sea, the Finnish farmer [does]. Now we ruin the environment; we are causing climate change. So yeah, we have always been blamed. It has never been "it's so good that we have Finnish farmers," I have never experienced that at least.

Nearly all interviewed farmers felt that they were unfairly blamed for climate change, stating that the media attention directed at them is not proportional to their role in causing negative environmental impacts. Although they see this as nothing new, they perceived that the media discussion on farmers' role in climate change had accelerated significantly in the past few years. Many farmers spoke of a new level of blame, with some stating that the feeling of guilt has affected their mental health, citing the "public lynching" farmers experience. They spoke also of how being valued in society is crucial for mental well-being, which has not been the case in recent years in Finland. In particular, as the discussion has evolved towards suggestions to end livestock farming, farmers have felt more pressure.

The way they talk about farming, that we have ruined the Baltic Sea, that's horrific. [...] So, I have really felt that there is a lot of blame put on us, that they have searched for ways to link agriculture to it. [...] I see it as political. Not to use the word manhunt, but there is something there, because it always slips into all the news, that agriculture is the one that has polluted the Baltic Sea.

In relation to environmental issues, many farmers still feel resentment about how much they have been blamed for polluting the Baltic Sea. This experience made them wary and suspicious of the motivations behind the discussion around climate change. Some farmers also felt that the various environmental goals, targets, and programs, such as the carbon-neutral milk chain, are impinging on their free will. These farmers fear that simply producing food is no longer sufficient, and that there needs to be an additional justification for farming. Nonetheless, other farmers noted that adjusting their practices to meet changing societal and environmental objectives is part of maintaining a successful

business in any sector. Some also stated that the opportunity for carbon farming has given them hope that farmers will become more valued in society.

The discussion on societal justifications for farming is related to the concern voiced by many farmers that consumers are so detached from food production that they do not see the value in farmers' work or domestic food production, in general. Furthermore, they feel that consumers do not recognize that farms create employment, generate services, and general liveliness in rural areas that would not exist without them. The various positive characteristics of Finnish production are also not perceived or valued, such as minimal use of antibiotics and pesticides or the relatively small size of Finnish farms. On a broader scale, the contribution of Finnish farms to the self-sufficiency of food production has not been valued, though the COVID-19 pandemic has improved this somewhat in farmers' eyes.

The farmers also perceived that the environmentally conscious measures they employ are not recognized in society, which is connected to the recognitive dimension of justice. Most farmers acknowledge that food production, especially dairy production, creates emissions, but note that the industry also has various positive ecological impacts, such as the carbon sequestration of grass fields and the positive biodiversity impacts of farmlands. Many of the farmers stated that dairy farmers are generally interested in environmental conservation or, as one farmer put it, are already "climate workers," due to the amount of year-round grassland they maintain. The farmers also expressed frustration that their work in reducing the carbon footprint of dairy had not been recognized, pointing to an increase in the cattle's milk production, which means that fewer cows are needed to produce the same quantity of milk, significantly decreasing the emissions from the animals themselves. Similarly, the farmers felt that their work in reducing the use of fertilizers to minimize nutrient washout was absent from public discourse. While the farmers perceive carbon farming as potentially providing a new kind of identity for them, a positive way to communicate this and influence public discussion is required.

4.3. Use of agricultural peatlands

The most difficult question, from the viewpoint of justice, relates to the use of agricultural peatlands, which are concentrated in western and northern Finland (Kekkonen, 2017). Farmers from those areas are concerned about the future of their work.

And it's kind of crazy to think that [farming on peatlands] would be banned. The truth is that, at the same time, farming and milk production are banned in most parts of Lapland. In such northern areas, most farmers have plenty of peatland. There are only a few such farms where fields are based on clay soil.

This is a difficult question in the context of Finnish climate policy. On the one hand, agricultural peatlands are undoubtedly a source of substantial carbon emissions (e.g., Ekardt et al., 2020), many times higher than those from mineral land use. These emissions are estimated to correspond to 14% of Finland's annual greenhouse gas emissions (Regina, 2019) and 60% of Finnish agriculture's total emissions (PTT, 2020). Additionally, agricultural peatlands are associated with water management and biodiversity problems (Ferré et al., 2019). However, some farmers have heavily invested in farming on peatlands because of the location of their farms, leading to concerns over environmental policies that could lead to new restrictions on the use of peatlands in agriculture.

Different justice dimensions intersect with each other in this discussion. First, it is a distributive issue for farmers who are dependent on farming such peatlands. Second, related to recognitive justice, some farmers are of the opinion that their views are not heard or even recognized in public discourse. Finally, in terms of procedural justice, the farmers hope to be able to participate in decision-making processes

regarding the usage of peatlands.

The question of agricultural peatlands also concerns compensation, and therefore restorative justice. If new limitations to using peatlands in farming are introduced, how will farmers be able to depend on their use in the future? One farmer who was interviewed pointed out the following:

But then of course there are certainly those farmers who now own those peatlands. If they have to give up farming on their peatlands, they are left with no fields at all. What other options do they have, rather than just quit? Then they have to quit even in a situation where they have a lot of debt.

Hence, farmers who own agricultural peatlands may be under pressure from different directions. One mentioned that even mutual solidarity between farmers has weakened, so, they do not necessarily have common views on different questions and cannot rely on mutual support, as they could in the past.

The question of using peatlands relies on state-level decisions (PTT, 2020). If farming on peatlands is banned, some farmers will require compensation. The interviewed farmers thought that this compensation could primarily involve farmland on inorganic soils. In many cases, this is not feasible, as suitable land is unavailable; hence, other types of solutions are required. One potential solution is land consolidation (PTT, 2020), which the farmers saw in a good light. However, they were aware that such processes are difficult to implement. Land consolidation requires the willingness of landowners, and most farmers want to keep ownership of their fields. It would certainly be possible to develop incentives to encourage farmers to engage in consolidation processes.

Another approach would be to politically indicate the correct use of peatlands. Several studies have argued that, in terms of limiting emissions, much can be done if only certain cultivation methods are accepted in peatlands (Berninger et al., 2020). For instance, it is important to maintain plant cover in fields whenever possible. However, these are not trouble-free solutions either, as farmers value a certain level of sovereignty in their work and their choices of production methods. Nonetheless, Valio, for instance, is doing a lot of work to identify better methods for the use of agricultural peatlands. Ultimately, however, public policy guidance is urgently needed.

5. Discussion

5.1. Dimensions of justice in each identified issue

According to our study, the key justice issues in the transition to carbon-neutral farming relate to the profitability of farming, the distribution of blame in society, and the use of agricultural peatlands. These dimensions and justice issues are summarized in Table 2.

The issue of the profitability of farming is significant in terms of distributive justice. It is an intergenerational issue in the sense that it can threaten the continuity of farming (cf. Agyeman, 2008; Timmermann, 2021). Dairy farmers are of the opinion that they do not receive an equitable share in milk prices, and they are concerned about changes in the operational environment of milk production. They desire to achieve carbon neutrality goals in the dairy chain to create more profitability at the farm level in the future, such as through the adoption of different farming methods and resource efficiency. Additionally, in terms of the carbon-neutral milk chain program, there are expectations for biogas production to prosper.

The feelings of blame experienced by Finnish farmers, are related to recognitive justice. Recent surveys from Finland suggest that they specifically feel that public discourse around climate change, is accusatory in nature, and these feelings of blame translate into a decreased willingness to engage in climate action (Kinnunen Mohr et al., 2019). Also, in this study, the feeling of being blamed caused a passive mindset in some farmers. It is important to explore whether increased recognition

Table 2
Justice dimensions and the core themes of the study.

	Distributive	Recognitive	Procedural	Restorative
Profitability	*Related to existing concerns of profitability and price of milk, and farmers' poor position in the food chain *Program can also increase profitability		*Limitations to participation in discussion and decision-making processes	*Premiums for carbon farming
Blaming		*Adding to existing feelings of guilt and stress *Program has potential for generating positive discussion and associations *New identities of farmers		
Peatlands	*Concerns of peatland owners *Regional aspects	*Farmers' voices are weak		*Possible restrictions create need for public compensation *Not just monetary compensation

of farmer agency, for example, by focusing on the positive societal impacts produced by farmers, would change this. Although research shows that anger, fear, and guilt can motivate climate change action (Bamberg and Möser, 2007; Harth et al., 2013; Rees et al., 2015), there has been less empirical analysis on how feelings of being blamed impact attitudes or willingness to act. One reason for this, as suggested by our interviews with the farmers, might be the large physical and psychological distance from the impacts of climate change experienced by Finnish farmers. In contrast to the Global South, in Finland, climate change is expected to have positive effects on farming conditions. Thus, Finnish farmers mostly reject the notion of guilt, which can lead to feelings of being unfairly blamed. This is in line with previous research suggesting that guilt, anger, and fear are often rejected as motivators for action in the Global North, unlike in the Global South (Kleres and Wettergren, 2017).

Concerning the question of agricultural peatlands, different justice issues intersect. The use of agricultural peatlands is also a politically sensitive question, as the owners perceive themselves as being in the most vulnerable situation in terms of carbon neutrality goals in Finland. Hence, there is a concern that the use of agricultural peatlands will be a distributive issue, as some farmers will certainly experience greater disadvantages than others. This consequently creates a need for restorative justice considerations (cf. Timmermann, 2021). If public policy restricts the use of peatlands, farmers also expect public compensation.

In terms of procedural justice, the farmers perceive their voices as weak in the societal discourse and decision-making. They have limited resources to participate due to burdensome workloads. Hence, they could be better involved in various decision-making and preparation processes, which would require broader modes of support than only practical or financial ones. For example, support regarding mental well-being is also required, as supporting farmers in this and other ways

would give them a better starting point to allow them to participate in various decision-making processes. It would also motivate them better than feelings of being blamed (Kinnunen Mohr et al., 2019; Lehtonen et al., 2020). However, it should be noted that through farmers' union, Finnish farmers have a broad representation in different policy processes and that seems to be sufficient for some farmers. Others wish that the farmers' voices were stronger.

There were not many differences of opinion in our relatively small data, regardless of whether the farmer had participated in the training. Overall, farmers' opinions and perceptions of justice are strongly related to injustices they have experienced in the past. Therefore, targeting climate policy implementations toward them, is a challenge. In an equitable transition, past injustices and experiences should also be considered. Policymakers, researchers, and private companies can do more work to address the barriers that rural farmers face in working toward a just transition (Hale et al., 2020).

5.2. Justice and the program

According to this study, private initiatives can help dairy farmers see carbon farming and overall systemic change as more equitable. Generally, the interviewed farmers saw private regulations and guidance in a neutral or positive light. This is of interest, as farmers have traditionally been wary of public regulation (Kinnunen Mohr et al., 2019).

Most of the farmers interviewed had new kinds of learning experiences through Valio's carbon-neutral milk chain program. They expressed that it was important for them to understand how other farmers were doing their work and what the best solutions from their perspectives were. Connecting different farmers was perceived to be one of the most important parts of the program, which is also partly related to the need for support identified in this study.

Furthermore, the feelings of blame experienced by farmers are highly relevant in relation to the program. They indicated that the program had the potential to offer solutions to the issue of shaping their role and image in society more positively. If, owing to the program, consumers and the media perceived farmers as more active participants in the fight against climate change, farmers' public image could be improved. This might lead to multiple positive effects, if they feel less blamed and, as a result, are more willing to engage in practices that support their image as climate actors. Thus, farmers could play a more active role in climate policy. However, it must be recognized that the relationship between behavioral change and psychological factors is complex and difficult to measure. Nevertheless, it can be postulated that, if the program somehow contributes to farmers' experiences of guilt and public blame, opposition to the program could increase (Kinnunen Mohr et al., 2019; Lehtonen et al., 2020).

Some of the carbon farming solutions provided by the program require stronger public-private partnerships. The question of the use of agricultural peatlands, for instance, cannot be solved without public policy. Conversely, private companies can harness their own innovative capacities to advance carbon neutrality goals. In that sense, biogas production is one of the most important options from the farmers' perspective, but this too requires stronger public guidance. Investing in biogas systems is too high-risk for farmers in the current situation. Additionally, for the potential of biogas production to be utilized, public policy should consider the importance thereof in a broader sense (Bartolini et al., 2017). However, from the perspective of reducing agricultural emissions, the reductions obtained by using biogas instead of fossil fuels are largely calculated for the benefit of the energy sector instead of directly benefitting the agriculture-related aims (Lounasheimo et al., 2021).

The significance of Valio's program lies in its proposal of new solutions to identified problems. However, private and public regulation and guidance must work together to create the appropriate appreciation for farmers' work. As noted, previous studies have highlighted farmers' identities and socio-cultural dimensions in the implementation of

environmental policy (cf. Home et al., 2014; Riley, 2016). Hence, ultimately, this can result in a new kind of identity among farmers and better recognition of farming work in society.

6. Conclusions

According to our study, the shift towards carbon-neutral dairy production involves many justice-related issues. Currently, Finnish farmers are concerned about the profitability of farming, being blamed for the environmental impact of farming in society, and the future of agricultural peatlands. It is important for public policy to find ways to alleviate farmers' concerns about the transition. According to our study, private companies can play a bridging role in this context, mediating between farms and public policy to build trust between actors in the food system. In our case study, the structure of the company was cooperative, which seems to be beneficial from a trust-building perspective.

Carbon farming seems to have a favorable future, at least as Finnish farmers see it. In our case study, farmers were ready to adopt new farming methods. However, in some cases, there is a need to develop compensation mechanisms. Overall, the direction of carbon farming is dependent on the EU's common agricultural policy and the success of the Green Deal goals. Still, it is highly important to listen to the voices of farmers from different regions. The most effective policy practices ascend from the bottom-upwards, following the principle that farmers should have a certain freedom of choice in their work and farming methods. This is a significant lesson for other similar cases regarding the climate policy goals of agriculture.

Author statement

Antti Puupponen: Writing – original draft, Writing – review & editing, Conceptualization, Methodology, Formal analysis. **Annika Lonkila:** Writing – original draft, Writing – review & editing, Conceptualization, Methodology, Formal analysis. **Anni Savikurki:** Writing – original draft, Conceptualization, Methodology, Formal analysis. **Kaisa Karttunen:** Writing – original draft, Conceptualization, Methodology, **Suvi Huttunen:** Writing – original draft, writing –review and editing, Conceptualization, Project administration. **Anna Ott:** Writing – original draft

Declaration of competing interest

None.

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