

# The future of agriculture and agricultural policy: perceptions of non-farmers and farmers

Tienhaara Annika<sup>1</sup>, Niemi Jyrki<sup>1</sup>, Vainio Annukka<sup>2</sup> and Pouta Eija<sup>1</sup>

<sup>1</sup>Natural Resources Institute Finland, Latokartanonkaari 9, 00790 Helsinki, Finland

<sup>2</sup>University of Helsinki, Latokartanonkaari 7, 00790 Helsinki, Finland

e-mail: annika.tienhaara@luke.fi

We examined the views of Finnish non-farmers and farmers on the desirable future developments of agriculture and agricultural policy using principal component and cluster analysis by focusing on three key themes: the structure of agricultural production, agri-environmental issues, and the funding of agriculture. There is strong public support for maintaining the viability of domestic agriculture through government intervention, but views differ on allocation of agricultural support and how agricultural production should be developed. A significant number of respondents supported the idea that climate and other environmental issues should be better considered in agricultural policy. However, about half of the respondents accepted environmental damage caused by agriculture and one-fifth perceived the importance of agriculture in a society as declining. These views, not prominent in the public debate, emphasize the importance of regular investigation of citizen opinions for including all the relevant stands in policy discussion to design legitimate policy measures.

Key words: citizen, clusters, perceptions, structure of agriculture, agri-environmental issues, funding of agriculture

## Introduction

The role of, need for and future of agricultural policy is a topic of ongoing social, political, and scientific debate in Europe and the rest of the world. In many countries, while aiming in sustainable food systems, agricultural policy faces versatile and often conflicting expectations, such as ensuring an adequate and safe food supply, securing farm incomes, strengthening the profitability and competitiveness of domestic production, maintaining the viability of rural communities, improving animal welfare, preserving biodiversity and the cultural landscape, as well as avoiding environmental problems related to farming activities. Furthermore, disagreements exist regarding the policy instruments that should be used and the role the government should play in meeting these diverse expectations. What is the need for government intervention and the appropriate allocation of support? Is there any reason why agricultural policy goals could not be achieved through the markets? Is intensive factory farming an acceptable strategy to promote favourable development or do small-scale family farms have development potential? Such questions regarding future agriculture remain contested among policymakers and analysts.

Given the inherent conflict between many of the expectations towards agricultural policy, it will certainly not be possible to fulfil all expectations, but a better compromise between conflicting expectations may be possible. Genuinely sustainable food system requires social commitment to guarantee political legitimacy (Røpke 2009, FAO 2014). Therefore, it is important to bring in the views of citizens, both non-farmers and farmers, on the future direction of agriculture and of the need for agricultural policy reforms. The perceptions of the overall importance of agriculture in the national economy and desirable future images of agriculture vary widely among non-farmers and farmers (Vanhonacker et al. 2008, Howley et al. 2014). The perceptions are also likely to differ regarding the role of the markets as a guarantor of sustainable food production, on the need for and proper targeting of agricultural support and on the advantages and disadvantages of diversified small-scale agriculture versus specialized large-scale production systems.

In previous studies, farmers have mainly been seen as adopters of various policy measures (for reviews, Ritter et al. 2017, Liu et al. 2018, Ugochukwu and Philips 2018, Dessart et al. 2019, Foguesatto et al. 2020, Sapbamrer and Thamachai 2021) and the role of non-farming citizens has been as consumers of various food products (e.g. Vanhonacker et al. 2008, Weible et al. 2016) or as citizens supporting different policy measures that may enhance multiple functions or ecosystem services from agricultural environments (e.g. Howley et al. 2014, Mittenzwei et al. 2016, Marques-Perez and Segura 2018, Moon and Pino 2018, Biedny et al. 2020). Few studies have compared the perceptions of farmers and non-farmers regarding the future of food system, agriculture and guiding policy in general, and these studies have mostly focused on agri-environmental policies (Howley et al. 2014, Smith and Sullivan 2014, Bernués et al. 2016, Sanderson et al. 2018, Vainio et al. 2021). The broader picture of the differences between farming and non-farming

populations in their perceptions of future agriculture and related policies is unclear and a more complete understanding of non-farmers' and farmers' perceptions and preferences on agriculture and agricultural policy is needed.

This study aims to depict visions of agriculture and agricultural policy in the future among Finnish non-farmers and farmers. The agricultural policy pursued in Finland under the EU's Common Agricultural Policy (CAP) has remained essentially the same over the past 25 years, largely achieving the main objectives set for it (Laurila and Niemi 2017). Agricultural production in Finland has remained at the same level as before EU membership in 1995. The conditions for production have also been secured in different parts of the country and in different lines of production, although the profitability and income development of the farming population has not met the farmers' own wishes. Moreover, there has been practically no discordance about the main goals in agricultural policy between the major political parties during the years of EU membership (Laurila and Niemi 2017). However, emerging agri-environmental issues such as biodiversity loss, water pollution, soil erosion, the contribution of agriculture to greenhouse gas emissions and the need for mitigation efforts have pointed toward a rethinking and restructuring of domestic agricultural policy.

Essentially, we aim to address what aspects of future food system Finns value and what they want from agriculture and the related policy, and in which direction and by what means do they want to develop national agri-food production. Additionally, we are interested in possible differences between non-farmers and farmers. The focus is on three key themes: the structure of agricultural production, agri-environmental issues and the funding of agriculture. By using principal component analysis and cluster analysis, we reveal respondent clusters with differing future visions.

## Previous literature

Information on citizens' (both non-farmers and farmers) views on the future is needed, in particular regarding the key themes that define future agriculture and agricultural policy in the EU and member states. These are 1) the structure of agricultural production, 2) environmental principles and practices and 3) the funding of agriculture. The structure of agriculture is strongly related to improving productivity and income levels in agriculture, which have been the basic objectives of the EU's Common Agricultural Policy (CAP) since the founding of the European Community in 1957, and on the other hand to securing the conditions for agricultural production in different regions of the Union and preserving the European family farm model. Environmental issues have become increasingly important on the political agenda in the 21st century. Agriculture is considered to play a significant role in reducing emissions, protecting biodiversity and promoting sustainable food production. And finally, the funding of agricultural policy determines how citizens' values and expectations towards agriculture materialize in practical agricultural policy (Niemi and Laurila 2021).

Previous research provides some information of the preferred *structure of agricultural production*. In the study of Kaljonen and Rikkonen (2004), farmers in Finland presented three different images of future agriculture: 1) an intensive and economically efficient farm enterprises, 2) an image stressing continuity and stable development and 3) an image focusing on the diversification of livelihoods. Also, Kvakkestad et al. (2015) observed heterogeneity in perceptions about future agriculture, identifying two groups of farmers: those who attach priority to fair income, food production, payment for food production and income support, and a second group emphasizing the importance of public goods such as producing cultural landscapes and payments for them. More one-sided view is dominant indicating the reluctance among farmers to engage in alternative farming practices (Burton 2004, Burton and Wilson 2006, Saunders 2016, de Krom 2017), partly explained by the long history of productivism in agricultural policies. Farmers have perceived themselves as food producers fully utilizing agricultural land for agricultural production and concentrating on farming, and they rejected the notion that they could be competitive without policy support (Gorton et al. 2008). Among citizens, the multifunctionality of agricultural production has been strongly supported. According to Howley et al. (2014), producing high quality and affordable food is viewed as the most important function of Irish agriculture by the general public, closely followed by environmental requirements such as ensuring the countryside in a good environmental condition. Farmers are likely to have productivist orientation and principally regard land as a productive resource to be used for economic benefit. On the other hand, the general public is much more likely to view the landscape in a holistic fashion, taking into consideration social, recreational and environmental, as well as economic benefits.

Public funding of agricultural production and related policies has obtained support from citizens in previous studies. The results of Biedny et al. (2020) indicated that voters preferred increased government interventions for animal

welfare and affordable food. Lusk (2012) reported U.S. citizens as desiring more government action to support food health and quality, food safety and farm incomes. Moon and Pino (2018) found U.S. citizens to be strong supporters of national food security and family farms, but they also displayed preferences for environmental sustainability, and the multifunctionality of agriculture played a significant role in shaping their support for or opposition towards government intervention. Studies regarding citizen perceptions of farmers, their livelihood and income provide somewhat contradictory picture. For example, Ellison et al. (2010) found US taxpayers to over-estimate farmers' income and to believe that farmers are doing well financially. They observed a large majority to support government subsidies for farmers to ensure the food supply, and strong preferences for subsidizing small family farms over very large family farms. Also, farmers' economic share in supply chains is perceived as unfair by citizens (Busch and Spiller 2016). Preferences for international fairness have also been reported by Jensen and Shin (2014). They found that framing the agricultural policy of one's own country as less generous than other countries generates additional support for farm payments, illustrating the difficulty in reforming agriculture and the lack of public support for unilateral trade liberalization.

In EU context, farmers have strongly supported the direct payments but less than half of farmers accepted higher standards for the environment and animal welfare in return for continued direct payments (Latacz-Lohmann and Schreiner 2018). Farmers have opposed lump sum payment, the CAP bond (Howley 2016) or replacing commodity price support with payments for public good production, or income support (Kvakkestad et al. 2015). The current practice-based approach for environmental payments has been found to be more acceptable than results-based payments, but a quarter of farmers had a moderate compensation request under results-based AES (Niskanen et al. 2021). Also regarding the support, the typical observation from farmer studies is the heterogeneity of farmers in their preferences, perceptions, and attitudes (Kvakkestad et al. 2015, Hasler et al. 2019, Niskanen et al. 2021).

Agri-environmental issues and related policies have been the focus in several studies (e.g. Dominguez-Torreiro and Soliño 2011, Bernués et al. 2016, Rodríguez-Ortega et al. 2016, Novikova et al. 2017, Häfner et al. 2018, Varela et al. 2018, Novikova et al. 2020, Tienhaara et al. 2020). The perceived legitimacy of current and planned agri-environmental schemes (AES) is likely to be related to the perception of how well agricultural ecosystem services are currently managed (Jost et al. 2004, Vainio et al. 2021). On the one hand, satisfaction with the way ecosystem services managed in agriculture is likely to strengthen perceptions that the current AES are legitimate, thus causing resistance to change. On the other hand, dissatisfaction with the management of agricultural ecosystem services is likely to be associated with increased support for policy change.

In the context of agri-environmental policies, few studies have compared the perceptions of farmers and non-farmers. Previous studies conducted in different countries have revealed that non-farmers tend to emphasize more general socio-economic and environmental concerns, while farmers are more likely to concentrate on farm-level issues (Smith and Sullivan 2014). According to Howley et al. (2014), farmers expressed a level of concern about the environment that in general matched the concern of the general public. However, farmers felt certain environmental amenities, such as the importance of maintaining wildlife and habitats and having wild flora and fauna in the countryside, to be much less important than the general public. Both farmers and non-farmers have agreed that farmers should be paid for providing ecosystem services through the enactment of agri-environmental policies (Bernués et al. 2016). Both groups were, however, highly critical of the current implementation and monitoring of these policies within the CAP. Bernués et al. (2016) suggested that the perceived legitimacy of AES is likely to be associated with individual perceptions of the level and perceived importance of different ecosystem services from agricultural lands. For example, in Spain, farmers have been found to focus more on statutory ecosystem services, economic sustainability at the farm level and those regulatory frameworks that directly affect their activities, whereas non-farmers focus on the provision of quality food products and cultural ecosystem services. While value orientations seem to affect policy legitimacy, typically actors perceive a policy to be legitimate if it promotes shared values (Beetham 1991, Matti 2004). AES that promote environmental values are therefore likely to be perceived as a legitimate way to manage agricultural ecosystem services. This is more often the case among non-farmers than farmers (Vainio et al. 2021).

Some studies have revealed how *individuals' backgrounds* associate with agricultural policy preferences. The cultural background of respondents was able to explain agricultural policy preferences (Mittenzwei et al. 2016), but fact-based knowledge of agriculture to a very limited extent explained differences in policy preferences, although it shifted the attention from food price issues towards the delivery of public goods. Food ideology seem to represent a unique construct in its own right, although it relates to conventional measures of political ideology (Lusk 2012), and differences in value orientations have been identified as a reason for differences in policy preferences (Sanderson et al. 2018). For example, the values of actors can support either a change in policy or remaining

in the status quo (Bernués et al. 2016). Those individuals who are personally dependent on a system, such as a policy, tend to favour the existing policy and resist change (Kay and Friesen 2011, Jost 2015, Vainio et al. 2021). However, the way both farmers and non-farmers perceive the future of agriculture and agricultural policies is still poorly understood (Bernués et al. 2016) and the topic is understudied. There is a need for a comprehensive vision of the future of agriculture and a grouping citizens' responses based on this. This paper aims to fill this gap by tying different key themes together into coherent images of the agricultural futures. This also enables the comparison of the responses of non-farmers and farmers.

## Methods

### Survey

To evaluate the acceptability, feasibility, efficiency, and legitimacy of different agricultural policy alternatives, to measure the overall preferences of consumers for agricultural policy objectives and to analyse citizens' values for the food system and agricultural policy, we designed an Internet survey. The survey draft was developed together with the multidisciplinary team of researchers in discussions with the experts of agricultural policy to identify key issues regarding agricultural policy to be included in the survey. A pilot survey ( $n = 202$ ) was conducted in August 2020. After the pilot, two focus groups of citizens were implemented in collaboration with Inspirans Oy and Taloustutkimus. Researchers participated in the focus group discussions as observers. The aim of the focus groups was to examine, for example, what kinds of ideas the survey questions generally evoked in the participants and how understandable the survey instructions and information sections were. The questionnaire was further tested in a second pilot study ( $n = 205$ ) in November 2020. The pilot studies and focus groups confirmed that survey measures were interpreted as expected and that the response scales were applicable.

In this article, we focus on the part of survey that measured non-farmers' and farmers' views and preferences for future agriculture. The non-farmers and farmers were presented with the same questionnaire, with only a few additional questions about farm characteristics for farmers. The survey began with general questions about the respondents' connection to agriculture. To examine respondents' perceptions towards the structure of agricultural production, agri-environmental issues and funding of agriculture, three sets of statements were used. The statements applied a 5-point scale (1 = strongly disagree, 5 = strongly agree). First, we measured preferences for the future of Finnish agriculture and food production in 30 years with eleven statements (presented in Table 2). These statements were targeted at the production structure of agriculture on different levels: the farm level, regional level and national level. The topics included production lines, the scale of production, specialization, domestic production, the decline of agriculture and multifunctionality. Second, we measured respondents' perceptions regarding environmental issues related to agriculture with six statements (Table 3). The statements focused on environmental support for farms, the acceptability of environmental damage, the polluter pays principle, internalizing damage in prices and environmentally oriented management practices. Third, the respondents were presented a set of eight statements on different ways to finance agriculture (Table 4). These statements targeted the perceived importance of publicly funded subsidies, market-oriented funding via food prices, responsibilities for funding in the food chain and funding with investments.

For background information, we measured the perceived legitimacy of agricultural policy among respondents using five statements that were evaluated using a 5-point scale (Appendix). The legitimacy reflects "the belief that authorities, institutions and social arrangements are appropriate, proper and just" (Tyler 2006). The mean score of the five statements was used in the analysis. In addition, the New Environmental Paradigm (NEP) scale was applied to obtain information on the environmental orientation of the respondents (Dunlap et al. 2000). The measure encompasses statements with the following facets: (1) the balance of nature, (2) limits to growth, (3) the risk of an eco-crisis, (4) anthropocentrism, (5) the right of humans to control nature and (6) the limits of resources. The final NEP measure was the mean score of these statements with higher score indicating more pro-ecological world view.

The survey also included questions regarding budget allocation and the optimal size of the budget (Pouta et al. 2022), as well as a discrete choice experiment (Tienhaara et al. (forthcoming)) and questions about risk perception (Valtiala et al. 2023). The survey ended with questions on basic socio-demographics.

### Data

The sample of Finnish citizens was drawn from the Internet panel of the private survey company Taloustutkimus. This panel comprises a large number ( $> 30\,000$ ) of respondents representing the population who were recruited

using random sampling. The farmer sample was drawn from the register of the Finnish Food Authority and the data were collected by Taloustutkimus. The final survey data were collected during January and February of 2021. For citizens, a random sample of 10 362 respondents was selected and 2014 completed the survey (response rate 19.4%). Regarding farmer sample, the invitation e-mail was sent to 4 827 farmers and 518 responses were received (response rate 10.7%). Even though the response rates were rather low, especially for farmers, they were in line compared to other recent surveys conducted in Finland. As the citizen sample was random sample, it was likely that some of the respondents are farmers. Out of 2 014 completed responses, 87 respondents expressed that they are farmers. In the analysis, they were treated as farmers like the responses from farmer sample. Hence the final number of non-farmers in the data was 1927 and the number of farmers was 605.

## Statistical methods

Principal component analysis (PCA) (Hair et al. 2006) was used to increase the interpretability of the measures for perceptions of future agriculture and agricultural policy. PCA is typically used to reduce the dimensionality of large data sets, by transforming a large set of variables into a smaller set that still contains as much information as possible. Here PCA revealed possible components in perceptions of future structure of production, agri-environmental issues, and the funding of agriculture. The components obtained with PCA i.e., orthogonal principal component scores, are uncorrelated. The components with eigenvalues less than 1, i.e. having low ability to explain the variance of the original variables, were not considered for further analysis.

The standardized principal component scores were used to cluster the respondents with K-means cluster analysis (e.g. Majumdar et al. 2008, Soini et al. 2012), which assigns cases to clusters based on their cluster centre. We continued the analysis by examining the socio-demographic profile of respondent clusters. To describe the clusters and to test the differences between them in background variables, logistic regression models for membership (0/1 variable) in each cluster were used. We used backward stepwise regression, that begins with full model containing all variables under consideration and then sequentially eliminates the least significant variables. Variables were removed from the model if the  $p$ -value exceeded 0.1. Table 1 presents the explanatory variables used in the logit models.

Table 1. Explanatory variables used in logit models

Variable	Mean	Standard deviation	Min	Max
Farmer	0.24	0.427	0	1
Woman	0.43	0.495	0	1
Higher education	0.46	0.498	0	1
Childhood in the countryside	0.56	0.497	0	1
Under 35 years old	0.18	0.387	0	1
Over 65 years old	0.18	0.381	0	1
Vegetarian	0.07	0.253	0	1
Monthly income under €1500	0.26	0.436	0	1
Monthly income €1500–4000	0.53	0.499	0	1
Voted for:				
Left Alliance	0.07	0.253	0	1
Social Democratic Party	0.10	0.299	0	1
The Greens	0.11	0.314	0	1
Centre Party	0.18	0.386	0	1
National Coalition Party	0.12	0.329	0	1
Member of a nature conservation organization	0.13	0.127		
Finns Party	0.13	0.333	0	1
Legitimacy	3.76	0.721	1	5
NEP	3.84	0.734		
Area:				
Southern Finland	0.21			
Helsinki-Uusimaa	0.32			
Western Finland	0.25			
Eastern and Northern Finland	0.22			

To identify possible differences between farmers and the non-farming population, the means of factor scores were compared with t-tests. Differences in cluster memberships between farmers and non-farmers were compared with crosstabulations and the chi<sup>2</sup>-test.

As the share of farmers in the data (20.45%) was higher than that in the population (1.84%), weights were used in factor analysis and cluster analysis to obtain clusters that are representative of the population. Without weighting, the views of farmers would have been emphasized too much in the clustering. In other analysis, weighting was not used.

## Results

The first step of the analysis was to examine possible components revealed by the PCA on the statement sets of the three key themes selected: the structure of agricultural production, agri-environmental issues, and funding of agriculture. Table 2 presents the PCA of the respondents' expectations for what should Finnish agriculture and food production look like 30 years from now. The PCA produced three different components, which were named as declining importance of agriculture, intensive farming as a possibility and diversity and other benefits.

Table 2. PCA of responses to the question "What should Finnish agriculture and food production look like 30 years from now?" (5 strongly agree – 1 strongly disagree)

	Mean	Standard deviation	Component loading	Eigenvalue	% of variance	Cumulative %
<b>Declining importance of agriculture</b>				3.230	29.362	29.362
It is enough that half of the food sold in Finland is domestic.	1.930	1.080	0.634			
Some of the fields could be afforested.	2.638	1.184	0.725			
The majority of food could be produced industrially in production facilities.	1.857	1.004	0.648			
Animal production (meat, milk, eggs) should be significantly reduced, and mainly vegetarian products should be produced.	2.280	1.346	0.730			
The countryside will remain vibrant even without agriculture.	1.687	0.966	0.699			
Crisis situations are coped with well, even though some of the food needs to be imported to Finland.	2.374	1.258	0.629			
<b>Intensive farming as a possibility</b>				1.471	13.369	42.731
Finland could export more food than at present.	3.871	0.979	0.429			
It would be good if agriculture specializes in producing certain products in certain areas.	3.232	1.023	0.590			
Large-scale production would be suitable for Finnish agriculture.	2.614	1.080	0.818			
<b>Diversity and other benefits</b>				1.004	9.130	51.861
The same farm should have both crop production and production animals.	3.104	1.060	0.785			
Agriculture provides more benefits to me than just food production.	3.939	1.054	0.556			

We also conducted PCA related to the statements on agri-environmental issues and perceptions regarding the financing of agriculture. The results of these analyses are presented in Tables 3 and 4. Related to the agri-environmental issues, six measures were summarized as two components named as incentives for environmental friendliness and environmental damage acceptable. PCA on the statements posed on the respondents' opinions concerning how agriculture should be financed, revealed three components: anti-subsidy, support for subsidies and financing with investments.

Table 3. PCA of responses to the question “What do you think about the following statements regarding agri-environmental issues?” (5 strongly agree – 1 strongly disagree)

	Mean	Standard deviation	Component loading	Eigenvalue	% of variance	Cumulative %
<u>Incentives for environmental friendliness</u>				1.838	30.631	30.631
Some farms could focus on improving the quality of the environment with the support of society.	3.431	1.074	0.796			
The farmer must be paid if cultivation does not cause any environmental damage.	3.650	1.092	0.794			
Food can be more expensive if it is produced in an environmentally friendly way.	3.577	1.140	0.636			
<u>Environmental damage acceptable</u>				1.487	24.776	55.407
It is acceptable that food production causes environmental damage.	2.961	1.203	0.802			
The person who causes an agri-environmental impact must pay for the damage.	3.213	1.162	-0.750			
It is difficult to reduce agri-environmental damage by developing farming practices.	2.378	0.993	0.541			

Table 4. PCA of responses to the question “What do you think about supporting agriculture and the different ways of financing subsidies?” (5 strongly agree – 1 strongly disagree)

	Mean	Standard deviation	Component loading	Eigenvalue	% of variance	Cumulative %
<u>Anti-subsidy</u>				2.526	31.579	31.579
Agriculture must be supported by tax funds.	3.855	1.031	-0.780			
Agricultural support is not needed, as all costs could be included in the prices of domestic agricultural products.	2.338	1.124	0.839			
Agriculture should not be supported, even if it leads to a decrease in Finnish food production.	1.641	0.970	0.807			
<u>Support for subsidies</u>				1.383	17.282	48.861
The whole food chain should be financially responsible for the future of agriculture.	4.209	0.860	0.797			
The farmer should receive a higher share of the price of food.	4.449	0.747	0.729			
Support for Finnish agriculture should be in line with support in other countries so that Finnish products are competitive.	3.697	1.033	0.501			
<u>Financing by investments</u>				1.105	13.812	62.673
Citizens could participate in supporting agriculture on a voluntary basis, for example by buying shares in farms.	3.200	1.112	0.785			
International private equity investors could invest in Finnish agriculture.	2.715	1.274	0.799			

The differences of components obtained from the PCAs between farmers and non-farmers were examined by comparing the mean component scores using t-tests. Table 5 presents the mean component scores for farmers and non-farmers and shows that all component scores differed significantly between these two groups. Compared to non-farming citizens, farmers strongly disagreed with the viewpoint that the importance of agriculture would decrease in the future. In addition, the support for subsidies was stronger among farmers than non-farmers, as can be expected, and farmers saw less possibilities in financing agriculture with investments.

Table 5. Comparison of mean component scores for farmers (n = 605) and non-farmers (n = 1927)

Factor	Farmers	Non-farmers	t	p-value
Declining importance of agriculture	-0.8029	0.0154	18.394	<0.001
Intensive farming as a possibility	-0.2111	0.0041	4.723	<0.001
Diversity and other benefits	0.1691	-0.0033	-3.666	<0.001
Incentives for environmental friendliness	0.3501	-0.0067	-7.676	<0.001
Environmental damage acceptable	0.6154	-0.0118	-13.580	<0.001
Anti-subsidy	-0.1557	0.0030	3.470	<0.001
Support for subsidies	0.5942	-0.0114	-13.196	<0.001
Financing by investments	-0.5941	0.0114	12.525	<0.001

To reveal possible respondent groups with differing future images, the component scores presented above were used for K-means cluster analysis. This resulted in four respondent clusters with differing perceptions. The final cluster centres are presented in Figure 1.

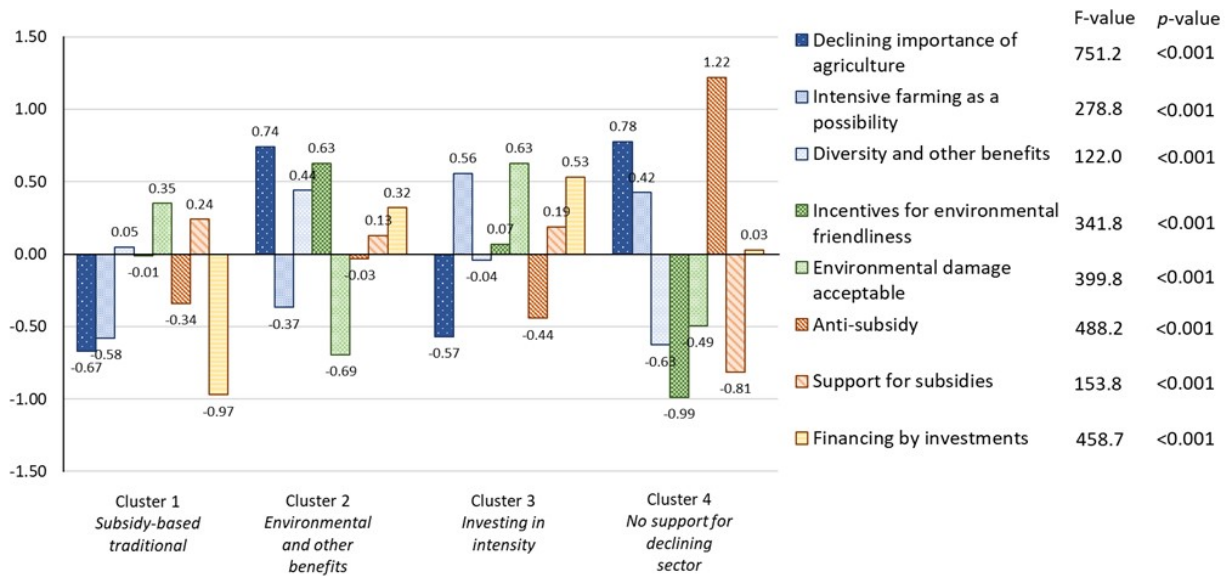


Fig. 1. Final cluster centres

To begin characterising the clusters obtained from cluster analysis, we first compared how the clusters differed in relation to the share of farmers, the production type (plant, animal or other), the share of organic farming and farm size (Table 6). The share of farmers and non-farmers differed significantly between the four clusters (chi<sup>2</sup> test, two-tailed significance < 0.001). Cluster 1 comprised highest share of farmers (41.5%), followed by Clusters 3, 2 and 4, with shares of 22.9%, 12.8% and 5%, respectively. The share of organic farmers also differed between clusters, and the share of farmers with larger farms (over 30 ha [median]) differed significantly across clusters, showing similarities between Clusters 1 and 3. However, the production type did not differ significantly across clusters and the shares of crop farmers and farmers with animal production were similar.

Table 6. Cluster comparisons

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	All	Chi <sup>2</sup>	p-value	N
Farmer %	41.5 <sup>a</sup>	12.8 <sup>b</sup>	22.9 <sup>c</sup>	5.0 <sup>d</sup>	23.9	255.325	<0.001	2532
Production type						10.101	0.120	605
Plant %	69.5 <sup>a</sup>	64.0 <sup>a</sup>	70.0 <sup>a</sup>	73.7 <sup>a</sup>	69.1			
Animal %	24.6 <sup>a</sup>	20.0 <sup>a</sup>	20.6 <sup>a</sup>	15.8 <sup>a</sup>	22.6			
Other %	5.9 <sup>a</sup>	16.0 <sup>b</sup>	9.4 <sup>a,b</sup>	10.5 <sup>a,b</sup>	8.3			
Organic %	14.4 <sup>a</sup>	33.3 <sup>b</sup>	14.1 <sup>a</sup>	10.5 <sup>a,b</sup>	16.6	16.547	<0.001	605
Farm over 30 ha %	51.8 <sup>a</sup>	29.3 <sup>b</sup>	49.4 <sup>a</sup>	36.8 <sup>a,b</sup>	47.8	13.482	0.004	604

Each superscript letter denotes a subset of clusters whose column proportions do not differ significantly from each other at the 0.05 level, i.e. if the superscript letter is same for clusters, clusters do not significantly differ from each other and, vice versa, if letter is different for clusters, they do differ.



The characteristics of clusters were further examined using logit regression model for each cluster (Table 7). Cluster 1, named as *Subsidy-based traditional production*, comprised approximately one-fourth (25.6%) of the respondents. These respondents favoured agricultural support over the financing of agriculture with investments. They considered agriculture to remain important in the future and did not support more intensive production systems. The respondents in Cluster 1 were more likely to be farmers, female, they had spent their childhood in the countryside, were middle-aged and had an average income. They also voted for the Centre Party, which is traditional party for farmers, and were less likely to follow a vegetarian diet. Respondents in Cluster 1 did not perceive agricultural policy as legitimate. They were somewhat environmentally oriented, as suggested by the positive coefficient for the NEP variable. However, the coefficient was small and its significance rather low.

Cluster 2, named as *Environmental and other benefits*, contained 26.3% of the respondents. This cluster emphasized that the importance of agriculture will decline in the future. They thought that agriculture also provides other benefits in addition to food production and that environmental damage caused by agricultural production is unacceptable, and they strongly supported the idea of developing more incentives for environmentally friendly production. These respondents were more likely to be young females. They were more likely to vote for left-wing and environmental parties and to be a member of a nature conservation organization. Cluster 2 also had a strong environmental orientation measured with the NEP scale and considered agricultural policy as legitimate.

Table 7. Logistic regression models for cluster membership

	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E	Coefficient	S.E
Farmer	0.970***	0.130			-0.569***	0.128	-1.587***	0.285
Female	0.348***	0.104	0.190*	0.114			-0.755***	0.129
Higher education					-0.209**	0.099		
Childhood in the countryside	0.209**	0.106					-0.342***	0.128
Under 35 years old	-0.588***	0.143	0.683***	0.132				
Over 65 years old							0.327**	0.152
Vegetarian	-0.910***	0.254			-1.216***	0.311	1.141***	0.211
Monthly income under €1500					-0.371***	0.116		
Monthly income €1500–4000	0.265***	0.097	-0.295***	0.112			-0.321***	0.121
Left Alliance			0.957***	0.187	-0.722***	0.240	-0.889***	0.267
Social Democratic Party	-0.384**	0.179	0.284*	0.172				
The Greens	-0.550***	0.190	0.936***	0.158	-0.702***	0.191	-0.369*	0.198
Centre Party	0.381***	0.145					-1.877***	0.341
National Coalition Party	-0.393**	0.166						
Finns Party	0.284*	0.152	-0.498**	0.233			-0.752***	0.192
Southern Finland					0.000		0.000	
Helsinki-Uusimaa					-0.311**	0.135	0.442***	0.171
Western Finland					0.078	0.137	0.164	0.196
Eastern and Northern Finland					-0.108	0.142	0.397**	0.198
Legitimacy	-0.452***	0.074	0.575***	0.100	0.122*	0.073		
NEP	0.128*	0.075	1.016***	0.102	-0.558***	0.073	-0.273***	0.089
Member of a nature conservation organization			0.451***	0.148			-0.437**	0.199
Constant	-0.066	0.353	-4.957***	0.398	1.313***	0.332	0.123	0.744
Cluster size, %	25.5		26.3		29.6		18.5	
N	2375		2375		2375		2375	
Nagelkerke R2	0.182		0.313		0.116		0.176	
Correctly classified	72.5		79.8		70.5		84.0	

\*\*\* 99% significance level; \*\* 95% significance level; \* 90% significance level

Cluster 3, *Investing in intensity*, was the largest cluster with 29.6% of the respondents. Environmental damage caused by agriculture was viewed as acceptable in this cluster, and these respondents saw potential in intensive agricultural production systems in the future. They were in favour of agricultural support but also thought that agriculture could be financed more with investments. Respondents in this cluster were less likely to be farmers. Contrary to Cluster 2, voting for left-wing and environmental parties negatively affected cluster membership. In addition, these respondents were not environmentally oriented, as shown by the negative coefficient for the NEP. Instead, respondents in Cluster 3 voted for right-wing parties, had a lower educational level, did not follow a vegetarian diet and were less likely to live in the metropolitan area in Southern Finland. The coefficient for legitimacy of agricultural policy was positive but had low significance.

Cluster 4 (18.5% of the respondents) strongly opposed agricultural support. The respondents in this group were confident that the market will provide adequate food security and that no support or government interventions are needed. They also perceived that the importance of agriculture will decline in the future. Hence, this cluster was named as *No support for declining sector*. Even though these respondents did not consider environmental damage acceptable, they did not support more incentives for environmentally friendly production. This cluster contained more male respondents who were likely to be older than 65 years. These respondents included fewer farmers compared to other clusters, they had spent their childhood in cities, were not members of a nature conservation organization and were generally environmentally oriented. Surprisingly, a vegetarian diet positively affected membership of the cluster. Vegetarians are likely to see the current support policy as favouring animal production too much. The respondents were more likely to live in either the metropolitan area or Eastern and Northern Finland compared to Southern Finland, where agriculture is strongly present in the landscape.

## Discussion, policy implications and conclusions

The main objective of this study was to examine the views of Finnish farmers and non-farming citizens regarding the desirable future developments of agriculture and agricultural policy. Based on their perceptions on the structure and environmental issues of agriculture and food production, as well as financing of agricultural policy, we were able to identify distinct groups of respondents in Finland. These groups displayed clear differences in their future images. We also associated the future images with respondents' background variables.

Our results revealed that more than half of the respondents (55%) considered agriculture to remain important in the future. The majority (greater than 80%) of respondents were in support of agricultural subsidies and government intervention in domestic agricultural markets. This is in line with previous results from other countries (Lusk 2012, Busch and Spiller 2016, Moon and Pino 2018, Biedny et al. 2020). It is noteworthy, however, that almost one-fifth of the respondents strongly opposed agricultural subsidies and perceived the importance of agriculture in society as declining. The views of this group have not been very visible in the public debate. Among the main political parties, there have been practically no discordances regarding the main lines in agricultural policy implemented in Finland during EU membership from 1995 onwards. The primary objective has been to maintain domestic production, and agricultural support payments have played a central role in ensuring the conditions for competitiveness in different parts of the country.

Concerning the question about intensive farming as a way forward, citizens' views were almost evenly divided. Slightly more than half of the respondents did not support more intensive production systems, but the other half saw the potential to increase production efficiency. One important insight from the study was that the respondents in the largest cluster, almost 30% of those surveyed, perceived very significant potential in more intensive agricultural production systems with greater emphasis on increasing farm size and investments in new technology. Despite the group's relatively large size, its views have not been very visible in the public debate. On the contrary, the intensification of farming (i.e., industrialisation of agricultural production) has often been viewed quite negatively in the public debate. The strong support for intensification with low emphasis on the environment also challenges the focus of research on public opinions, which has been strongly targeted at agri-environmental programmes (e.g., Domínguez-Torreiro and Soliño 2011, Bernués et al. 2016, Rodríguez-Ortega et al. 2016, Novikova et al. 2017, Varela et al. 2018, Grammatikopoulou et al. 2020, Tienhaara et al. 2020).

The survey results also indicated that environmental concerns such as enhancing biodiversity, protecting natural resources, and tackling climate change were a priority for many citizens. About half of the respondents expected agricultural policy to guarantee that food production is friendly to the environment. It can therefore be assumed that a greener, more environmentally oriented agricultural policy, as demanded by many environmental organizations,

would be able to rely on the political support of citizens. However, political support for a more environmentally friendly agricultural policy is by no means unanimous based on the results of this study. The respondents in Clusters 1 and 3, comprising more than 55% of those surveyed, accepted environmental damage caused by agriculture, although they did not strongly oppose the use of policy incentives to reduce environmental impacts or payments to farmers for ecosystem services.

As in previous studies (Howley et al. 2014, Sanderson et al. 2018), value orientations could be observed from the future images of this study, as both the environmental orientation of respondents and the political party they supported explained cluster membership. Similarly, to Lusk (2012), we found that future visions for the agri-food sector were associated with the conventional measures of political ideology. Support for green and left-wing parties was associated with the cluster (CI 2) that endorsed environmental support and regulation. Support for right-wing parties associated with either the cluster agreeing with a conventional support-based policy (CI 1) or the one preferring a more market-oriented policy in which farms would rely on investments (CI 3).

Similarly, to previous studies (Kvakkestad et al. 2015, Hasler et al. 2019, Niskanen et al. 2021), our results also indicated heterogeneity among farmers in their future visions. The expectations regarding agricultural policy varied widely among farmers, although there was a strong consensus that agriculture needs support from society. Farmers' views differed on the future importance of agriculture in society, the potential for more intensive production and the acceptance of environmental damage. However, more than half of the farmers in our study belonged to Cluster 1, which considered agriculture to remain important in the future, and viewed government intervention as necessary in protecting domestic producers from foreign competition. Furthermore, this group of farmers accepted environmental damage caused by agriculture, although they did not support more intensive production systems. This line of thinking suggests that many farmers feel that agricultural policy has become too burdened with trying to fulfil wider social functions (e.g., biodiversity, climate change) that are not the sole or main responsibility of farming and is not sufficiently focused on the task for which it has the primary responsibility (food production, farm income).

Although farmers feel that the burden of agricultural policy has increased, the current agricultural policy follows better the perceptions of the average farmer than to the views of the average non-farming citizen. In fact, the current policy can be considered to be practically very close to the status quo, i.e. cluster 1, which the majority of farmers support. The importance of environmental issues has certainly been emphasized in the Common Agricultural Policy (CAP) in the 2010s, and the conditionality of subsidies tightened, but the basic structure of CAP has remained similar for the last 20 years. The political climate surrounding agriculture has not been particularly favourable for fundamental policy changes in the EU, nor in Finland, during the last 10 years.

The perceptions of government intervention in agriculture among non-farmers and farmers in this study were measured through survey questions, and the responses were based on the respondents' subjective rather than profoundly informed understanding of agricultural policies and their effects. Providing information about the nature of agricultural policies and their effects to the general public and testing whether such information influences their opinions could be an interesting topic of future research. In previous studies, fact-based knowledge of agriculture has only slightly explained the differences in policy preferences (Mittenzwei et al. 2016). Nevertheless, as suggested by Mittenzwei et al. (2016), such knowledge could be expected to shift attention from a production orientation towards the delivery of public goods. However, implementing more profound information sharing would be demanding in the survey context and would lead to more qualitative methods with lower representativeness of the public.

In the key themes concerning future visions, we focused on the structure of agricultural production, agri-environmental issues, and the funding the agriculture. Although the survey was designed during the COVID-19 outbreak, neither the design nor the responses took into account the uncertainty in the food markets due to Russians invasion to Ukraine. If the survey had been designed and carried out, for example in 2023, the sharp rise in food prices and concerns about the functioning of the food supply chain would have most likely changed the design as well as relative weight of the key themes. The views of the respondents could also be different as a result of the Russian attack, which in turn, together with the revised survey design, would most probably also lead to slightly different clustering of respondents. The survey will be repeated in 2024, when there will be an opportunity to consider aspects related to uncertainty in food supply, and therefore provide interesting material for follow-up.

Overall, the results of this study confirm that it is very difficult to design an agricultural policy that will fully satisfy all citizens, which is not surprising given the different expectations for agriculture. Although there is very strong

public support for maintaining domestic agriculture through state intervention, opinions differ on how support should be allocated and how agricultural production should be developed. Pressure to take environmental and climate issues better into account in agricultural policy has increased, which has been the subject of public debate. On the other hand, less attention in the public debate has been paid to the finding of this study that a significant proportion of citizens accept the environmental burden of food production and support the idea of more intensive agricultural production systems with an emphasis on increasing farm size and investments in new technology.

In closing, a more complete understanding of both non-farmers' and farmers' perceptions and preferences on agriculture and agricultural policy requires repeating this type of research often enough. This would allow us to see to what extent opinions are stable and, on the other hand, how various crises and market shocks create variation in them. The design of the survey also allows us to see which respondent groups' opinions are most sensitive to changes in the market and policy environment. This emphasises the need for regular investigation of citizen opinions to be able to include all the relevant stands in policy discussion and to design legitimate agricultural policy measures.

## References

- Beetham, D. 1991. *The Legitimation of Power: Issues in Political Theory*. Macmillan Press, London. <https://doi.org/10.1007/978-1-349-21599-7>
- Bernuès, A., Tello-García, E., Rodríguez-Ortega, T. & Casasús, I. 2016. Agricultural practices, ecosystem services and sustainability in High Nature Value farmland: unraveling the perceptions of farmers and nonfarmers. *Land Use Policy* 59: 130–142. <https://doi.org/10.1016/j.landusepol.2016.08.033>
- Biedny, C., Malone, T. & Lusk, J.L. 2020. Exploring Polarization in US Food Policy Opinions. *Applied Economic Perspectives and Policy* 42: 434–454. <https://doi.org/10.1002/aep.13053>
- Burton, R.J.F. & Wilson, G.A. 2006. Injecting social psychology theory into conceptualisations of agricultural agency: towards a post-productivist farmer self-identity? *Journal of Rural Studies* 22: 95–115. <https://doi.org/10.1016/j.jrurstud.2005.07.004>
- Burton, R.J.F. 2004. Seeing through the 'good farmer's' eyes: towards developing an understanding of the social symbolic value of 'productivist' behaviour. *Sociologia Ruralis* 44: 195–215. <https://doi.org/10.1111/j.1467-9523.2004.00270.x>
- Busch, G. & Spiller, A. 2016. Farmer share and fair distribution in food chains from a consumer's perspective. *Journal of Economic Psychology* 55: 149–158. <https://doi.org/10.1016/j.joep.2016.03.007>
- de Krom, M.P.M.M. 2017. Farmer participation in agri-environmental schemes: regionalisation and the role of bridging social capital. *Land Use Policy* 60: 352–361. <https://doi.org/10.1016/j.landusepol.2016.10.026>
- Dessart, F.J., Barreiro-Hurlé, J. & van Bavel, R. 2019. Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. *European Review of Agricultural Economics* 46: 417–471. <https://doi.org/10.1093/erae/jbz019>
- Dominguez-Torreiro, M. & Soliño, M. 2011. Provided and perceived status quo in choice experiments: implications for valuing the outputs of multifunctional rural areas. *Ecological Economics* 70: 2523–2531. <https://doi.org/10.1016/j.ecolecon.2011.08.021>
- Dunlap, R., Van Liere, K., Mertig, A. & Jones, R. 2000. New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues* 56: 425–442. <https://doi.org/10.1111/0022-4537.00176>
- Ellison, B.D., Lusk, J.L. & Briggeman, B.C. 2010. Taxpayer Beliefs about Farm Income and Preferences for Farm Policy. *Applied Economic Perspectives and Policy* 32: 338–354. <https://doi.org/10.1093/aep/ppp014>
- FAO 2014. *Sustainability Assessment of Food and Agriculture Systems (SAFA) Guidelines, Version 3.0*. Rome: Food and Agriculture Organization of the United Nations.
- Foguesatto, C.R., Borges, J.A.R. & Machado, J.A.D. 2020. A review and some reflections on farmers' adoption of sustainable agricultural practices worldwide. *Science of The Total Environment* 729: 138831. <https://doi.org/10.1016/j.scitotenv.2020.138831>
- Gorton, M., Douarin, E., Davidova, S. & Latruffe, L. 2008. Attitudes to agricultural policy and farming futures in the context of the 2003 CAP reform: a comparison of farmers in selected established and new Member States. *Journal of Rural Studies* 24: 322–336. <https://doi.org/10.1016/j.jrurstud.2007.10.001>
- Grammatikopoulou, I., Badura, T. & Vačkářová, D. 2020. Public Preferences for Post 2020 Agri-environmental Policy in the Czech Republic: A Choice Experiment Approach. *Land Use Policy* 99: 104988. <https://doi.org/10.1016/j.landusepol.2020.104988>
- Hair, J.F., Black, B., Babin, B., Anderson, R.E. & Tatham, R.L. 2006. *Multivariate data analysis*. Prentice-Hall, London.
- Hasler, B., Czajkowski, M., Elofsson, K., Block Hansen, L., Konrad, M.T., Ørsted Nielsen, H., Niskanen, O., Nömmann, T., Branth Pedersen, A., Peterson, K., Poltimäe, H., Häggmark Svensson, T. & Zagórska, K. 2019. Farmers' preferences for nutrient and climate-related agri-environmental schemes: A cross-country comparison. *Ambio* 48: 1290–1303. <https://doi.org/10.1007/s13280-019-01242-6>
- Howley, P. 2016. Subsidy streams versus a CAP bond: an assessment of farmers' preferences. *Land Use Policy* 51: 182–190. <https://doi.org/10.1016/j.landusepol.2015.11.007>
- Howley, P., Yadav, L., Hynes, S., Donoghue, C.O. & Neill, S.O. 2014. Contrasting the attitudes of farmers and the general public regarding the 'multifunctional' role of the agricultural sector. *Land Use Policy* 38: 248–256. <https://doi.org/10.1016/j.landusepol.2013.11.020>

- Häfner, K., Zasada, I., van Zanten, B.T., Ungaro, F., Koetse, M. & Piorr, A. 2018. Assessing landscape preferences: a visual choice experiment in the agricultural region of Märkische Schweiz, Germany, *Landscape Research* 43: 846–861. <https://doi.org/10.1080/01426397.2017.1386289>
- Jensen, N.M. & Shin, M.J. 2014. Globalization and Domestic Trade Policy Preferences: Foreign Frames and Mass Support for Agriculture Subsidies. *International Interactions* 40: 305–324. <https://doi.org/10.1080/03050629.2014.899228>
- Jost, J., Banaji, M.R. & Nosek, B.A. 2004. A decade of system justification theory: accumulated evidence of conscious and unconscious bolstering of the status quo. *Political Psychology* 25: 881–919. <https://doi.org/10.1111/j.1467-9221.2004.00402.x>
- Jost, J. 2015. Resistance to change: a social psychological perspective. *Social Research* 82: 607–636. <https://doi.org/10.1353/sor.2015.0035>
- Kaljonen, M. & Rikkinen, P. 2004. Divergent Images of Multifunctional Agriculture: A Comparative Study of the Future Images between Farmers and Agri-food Experts in Finland. *International Journal of Agricultural Sustainability* 2: 190–204. <https://doi.org/10.1080/14735903.2004.9684578>
- Kay, A.C. & Friesen, J. 2011. On Social Stability and Social Change: Understanding When System Justification Does and Does Not Occur. *Current Directions in Psychological Science* 20: 360–364. <https://doi.org/10.1177/0963721411422059>
- Kvakkestad, V., Rørstad, P.K. & Vatn, A. 2015. Norwegian farmers' perspectives on agriculture and agricultural payments: Between productivism and cultural landscapes. *Land Use Policy* 42: 83–92. <https://doi.org/10.1016/j.landusepol.2014.07.009>
- Latacz-Lohmann, U. & Schreiner, J. 2018. Assessing farmers' preferences for the future of the Common Agricultural Policy: insights from a discrete choice experiment in Germany. Contributed paper at the 92nd annual conference of the Agricultural Economics Society Warwick, 16-18 September 2018.
- Laurila, I. & Niemi, J. 2017. Kansallista konsensusta: Suomen maatalouden selviytyminen EU-aikana (Abstract: National consensus has supported the survival of Finnish agriculture in the EU) In: Raunio, T. & Saari, J. (eds). *Reunalla vai ytimessä? Suomen EU-politiikan muutos ja jatkuvuus*. Helsinki, Gaudeamus. p. 149–169.
- Liu, T., Bruins, R.J.F. & Heberling, M.T. 2018. Factors Influencing Farmers' Adoption of Best Management Practices: A Review and Synthesis. *Sustainability* 10: 432. <https://doi.org/10.3390/su10020432>
- Lusk, J.L. 2012. The political ideology of food. *Food Policy* 37: 530–542. <https://doi.org/10.1016/j.foodpol.2012.05.002>
- Marques-Perez, I. & Segura, B. 2018. Integrating social preferences analysis for multifunctional peri-urban farming in planning. An application by multi-criteria analysis techniques and stakeholders. *Agroecology and Sustainable Food Systems* 42: 1029–1057. <https://doi.org/10.1080/21683565.2018.1468379>
- Matti, S. 2004. The Individual or the Community: Towards a Common Understanding of Values. SHARP Working Paper, 1. Luleå University of Technology, Sweden.
- Mittenzwei, K., Mann, S., Refsgaard, K. & Kvakkestad, V. 2016. Hot cognition in agricultural policy preferences in Norway? *Agriculture and Human Values* 33: 61–71. <https://doi.org/10.1007/s10460-015-9597-8>
- Moon, W. & Pino, G. 2018. Do US citizens support government intervention in agriculture? Implications for the political economy of agricultural protection. *Agricultural Economics* 49: 119–129. <https://doi.org/10.1111/agec.12400>
- Niemi, J. & Laurila, I. 2021. Maatalouspolitiikka: kehitys, haasteet ja tulevaisuudennäkymät. In: Tapio Raunio & Juho Saari (eds) *Moninaisuudessaan yhtenäinen? Euroopan unionin suunta*. Helsinki, Gaudeamus. p. 122–142. (in Finnish).
- Niskanen, O., Tienhaara, A., Haltia, E. & Pouta, E. 2021. Farmers' heterogeneous preferences towards results-based environmental policies. *Land Use Policy* 102: 105227. <https://doi.org/10.1016/j.landusepol.2020.105227>
- Novikova, A., Rocchi, L. & Vitunskienė, V. 2017. Assessing the benefit of the agroecosystem services: Lithuanian preferences using a latent class approach. *Land Use Policy* 68: 277–286. <https://doi.org/10.1016/j.landusepol.2017.07.051>
- Ritter, C., Jansen, J., Roche, S., Kelton, D.F., Adams, C.L., Orsel, C., Erskine, R.J., Benedictus, G., Lam, T. & Barkema, H.W. 2017. Invited review: Determinants of farmers' adoption of management-based strategies for infectious disease prevention and control. *Journal of Dairy Science* 100: 3329–3347. <https://doi.org/10.3168/jds.2016-11977>
- Rodríguez-Ortega, T., Bernués, A. & Alfnes, F. 2016. Psychographic profile affects willingness to pay for ecosystem services provided by Mediterranean high nature value farmland. *Ecological Economics* 128: 232–245. <https://doi.org/10.1016/j.ecolecon.2016.05.002>
- Røpke, I. 2009. Theories of practice - New inspiration for ecological economic studies on consumption. *Ecological Economics*, 68: 2490–2497. Rubin, A. 2013. Hidden, inconsistent, and influential: images of the future in changing times. *Futures* 45: 38–44. <https://doi.org/10.1016/j.futures.2012.11.011>
- Sanderson, M.R., Bergtold, J.S., Heier Stamm, J.L., Caldas, M.M., Ramsey, S.M. & Aistrup, J. 2018. Climate change beliefs in an agricultural context: what is the role of values held by farming and non-farming groups? *Climatic Change* 150: 259–272. <https://doi.org/10.1007/s10584-018-2283-2>
- Sapbamrer, R. & Thammachai, A. 2021. A Systematic Review of Factors Influencing Farmers' Adoption of Organic Farming. *Sustainability* 13: 3842. <https://doi.org/10.3390/su13073842>
- Saunders, F.P. 2016. Complex Shades of Green: Gradually Changing Notions of the 'Good Farmer' in a Swedish Context. *Sociologica Ruralis* 56: 391–407. <https://doi.org/10.1111/soru.12115>
- Smith, H. F. & Sullivan, C. A. 2014. Ecosystem services within agricultural landscapes - farmers' perceptions. *Ecological Economics* 98: 72–80. <https://doi.org/10.1016/j.ecolecon.2013.12.008>
- Tienhaara, A., Haltia, E., Pouta, E., Arovuori, K., Grammatikopoulou, I., Miettinen, A., Koikkalainen, K., Ahtiainen, H. & Artell, J. 2020. Demand and supply of agricultural ES: towards benefit-based policy. *European Review of Agricultural Economics* 47: 1223–1249. <https://doi.org/10.1093/erae/jbz044>

Tyler, T.R. 2006. Psychological perspectives on legitimacy and legitimation. *Annual Review of Psychology* 57: 375–400. <https://doi.org/10.1146/annurev.psych.57.102904.190038>

Ugochukwu, A.I. & Phillips, P.W.B. 2018. Technology Adoption by Agricultural Producers: A Review of the Literature. In: Kalaitzandonakes, N., Carayannis, E., Grigoroudis, E. & Rozakis, S. (eds). *From Agriscience to Agribusiness*. p. 361–377. [https://doi.org/10.1007/978-3-319-67958-7\\_17](https://doi.org/10.1007/978-3-319-67958-7_17)

Vainio, A., Tienhaara, A., Haltia, E., Hyvönen, T., Pyysiäinen, J. & Pouta, E. 2021. The legitimacy of result-oriented and action-oriented agri-environmental schemes: A comparison of farmers' and citizens' perceptions. *Land Use Policy* 107: 104358. <https://doi.org/10.1016/j.landusepol.2019.104358>

Vanhonacker, F., Verbeke, W., Van Poucke, E. & Tuytens, F.A.M. 2008. Do citizens and farmers interpret the concept of farm animal welfare differently? *Livestock Science* 116: 126–136. <https://doi.org/10.1016/j.livsci.2007.09.017>

Varela, E., Verheyen, K., Valdés, A., Soliño, M., Jacobsen, J.B., De Smedt, P. & Decocq, G. 2018. Promoting biodiversity values of small forest patches in agricultural landscapes: ecological drivers and social demand. *Science of The Total Environment* 619–620: 1319–1329. <https://doi.org/10.1016/j.scitotenv.2017.11.190>

Weible, D., Christoph-Schulz, I., Salamon, P. & Zander, K. 2016. Citizens' perception of modern pig production in Germany: A mixed-method research approach. *British Food Journal* 118: 2014–2032. <https://doi.org/10.1108/BFJ-12-2015-0458>

## Appendix

Table A1. Statements to measure perceived legitimacy and New Environmental Paradigm (NEP)

Statements	Cronbach's alpha
<b>Legitimacy</b>	<b>0.78</b>
Society has the right to regulate farmers' operations by means of agricultural policy.	
It is right that decisions made in agricultural policy are binding to farmers.	
It is right to expect that farmers follow agricultural policy regulations related to food safety, animal welfare and environmental protection.	
Farmers are obliged to follow agricultural policy regulations even if they disagree with them.	
I am confident that policymakers are able to make good decisions in agricultural policy.	
<b>New Environmental Paradigm</b>	<b>0.76</b>
The delicate balance of nature is easily disturbed by human activity.	
There is only limited space and resources on Earth.	
Plants and animals do not exist primarily for humans.	
Changing the environment for human use rarely causes serious problems.	
Economic growth has no limits.	
Man has the right to control the rest of nature.	
Scale 1 strongly disagree – 5 strongly agree. For the last three NEP statements, the scale was reversed.	