



# **Guidelines and protocols harmonizing activities across case studies (Update)**

## **Deliverable D1.8**

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## **BESTMAP**

**Behavioural, Ecological and Socio-economic Tools for Modelling  
Agricultural Policy**



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## Preface

This document is the updated version of D1.3 *Guidelines and protocols harmonizing activities across case studies* of the H2020 BESTMAP project, submitted originally in month 14. The main updates pertain particularly to national/regional level of stakeholder engagement, final development of farming system archetypes, steps towards harmonizing modelling procedures, online survey with farmers and final decisions for implementing agent-based models.

This deliverable aims at documenting the efforts to harmonize data collection, research and outreach activities across all case studies (CSs). It covers the interaction with stakeholders on national and European levels and the dissemination and communication of project results. It provides guidelines for collection and harmonization of geospatial data. It elaborates on the dimensions and development of farming system archetypes (FSAs). Additionally, the document explains the selection of relevant agri-environmental schemes (AESs) and the ecosystem services (ES) BESTMAP aims to model. It also documents the methodology for stratifying and selecting farmers for the interview campaign and provides guidelines for conducting and analysing the interviews and the subsequent online survey, including the discrete choice experiment. Finally, the deliverable explains the approach to implement and document the agent-based models (ABMs).

## Summary

This deliverable contains several guidelines to harmonize the activities in BESTMAP.

Guidelines for stakeholder engagement at the EU level describe conducted interviews on policy perspectives and a technical workshop with DG-AGRI and JRC. At the national/regional level, the guidelines document the series of stakeholder co-design workshops that were organised to identify important policy interventions, discuss the BESTMAP dashboard and validate the ABM output. Overview of the key CS stakeholders and dissemination/communication activities are also provided.

Guidelines on geospatial data document the process of collecting and harmonizing CS-relevant data. These data are stored in the CS base layer database that is managed using the UFZ GeoNetwork application.

Guidelines on farming system archetypes describe the entire procedure of developing and mapping FSAs, including the rationale for selecting FSA dimensions and the final methodological approach of FSA data analysis that is consistent across CS and allows upscaling to European level.

The section on AES and ES documents the process of selecting schemes and services to model within BESTMAP, based on their relevance and data availability. We also identified the links between AES and ES and described the final steps taken towards harmonizing BESTMAP modeling procedures.

Guidelines on how to select farmers for interviews are based on the use of proto-FSAs for stratifying the CS farms into categories from which a representative sample of farmers was chosen. These were based on environmental stratification, type of farming in FADN and farmer profiles. Following are semi-structured interview guidelines that provided CS teams with specific instructions on how to conduct the interviews with farmers and subsequently transcribe, code and analyse the collected data. The actual Interview Protocol with all questions and instructions used for farmer interviews is included as Appendix 1.

We also document the procedure of conducting the subsequent online survey including the discrete choice experiment that was used to gain more information on differences in behaviour between farmer types needed to parameterize our agent-based models. The complete questionnaire is also included as Appendix 2.

Finally, the ABM guidelines specify how our ABM models are being implemented, including the final decision to use the commonly used NetLogo ABM environment, and how they are documented using the ODD+D standard.

## 1. Guidelines for stakeholder engagement

The guidelines for stakeholder engagement are based on the 'Plan of Engagement' that has been developed within WP6 - Capacity Building and Dissemination. They provide a plan for establishing strong connections with institutions (at the local, national, and EU level), projects and initiatives relevant to the BESTMAP project.

### 1.1. Stakeholder engagement in co-design activities

The co-design and co-development activities promoted by BESTMAP have the main objectives of:

- Identifying relevant policy scenarios and indicators at EU level
- Identifying relevant policy scenarios, agri environmental schemes and indicators for the case studies (CS), as to model its impacts in the area
- Consolidating the conceptual framework, design and development of BESTMAP- Policy Impact Assessment Model (PIAM)
- Designing and developing a policy dashboard platform and story maps for policymakers
- Developing economic scenarios based on co-designed policy workshops

Initially, all co-design activities were planned to be developed through face-to-face workshops involving key stakeholders both at EU level and at case study level. However, due to the restrictions related to the COVID-19 pandemic, different approaches and methodologies have been arranged for each specific activity.

#### 1.1.1. EU level

In order to identify present and future policy scenarios at the EU level, the project envisioned a co-design and co-development phase based on information gathered through several stakeholder/policy-maker workshops and focus groups where relevant policy scenarios and indicators at EU level would be discussed. These discussions would include the promotion of new challenges, such as climate change policies/Paris agreement-COP21, Sustainable Development Goals (SDGs), competitiveness, sustainable management of natural resources, and balanced development of rural areas together with new specific measures of interest defined by the European Commission (EC).

An initial Brussels EU workshop was planned to bring together EC policy-makers, environmental and development agencies, umbrella farmers' organizations, agricultural corporates and researchers. This workshop was originally scheduled at a very early stage of the project implementation, however, the approach was modified due to the following reasons:

- a. The SUPREMA project organized three similar workshops in 2018-2019, including topics and stakeholders that would have been engaged in the BESTMAP workshop, generating overlap and redundancy.

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- b. In January 2020, case study administrations reported that they were still waiting for post-2020 CAP guidance from the European Commission and as a result, strategic plans were still at a draft stage and could not be discussed at this stage.
  - c. Changing situation in two case studies, UK and Serbia. UK is undergoing Brexit and the scrapping of direct payments implies important new elements which need to be taken into account. Serbia does not currently have Agro-Environmental Schemes (AES) and is negotiating joining the EU.
  - d. There were new policy developments that affect the BESTMAP framework: the Green Deal was announced, including the idea of a climate law, as well as The Farm to Fork and Biodiversity strategies.

Therefore, BESTMAP decided to split the task into two main activities (which format was unfortunately changed due to COVID-19 restrictions of travelling): a) Interviews on policy perspectives at EU level and b) a technical workshop on EC assessment tools.

a) Interviews on policy perspectives

A set of telephone and on-line interviews of key policy influencers and stakeholders at the European level (NGOs, Farmers Unions and Industry lobbying groups) were performed from February to May 2020 to capture the important drivers of change and possible trade-offs of European agricultural policy and to obtain their opinion on the need for improvement of impact assessment tools for policy development. Interviewees were chosen based on 3 criteria:

- Representation of a stakeholder group in the pre-farm-gate aspect of the agri-food value chain or an expert analyst of the European agriculture policy
- Actively following European policy at the Brussels level
- Knowledge to be already active in the debate on the future of European agriculture

The possible candidates were split into 4 groups: Producers (representatives of farmer groups and sector producers), input industry (fertilisers, pesticides, machinery etc.), environmental NGOs working on European agricultural policy and expert analysis (think tanks). The selection allowed for a broad overview of producers' opinions, the main input industries and the environmental and climate concerns of NGOs.

b) Technical workshop with DG-Agri and JRC

An on-line workshop entitled "Improving environmental and social capacity of EC impact assessment tools" was held on the 14th and 15th of July 2020 (virtual meeting). It involved relevant stakeholders from DG AGRI/ENV/CLIMA and JRC with the objective to discuss needs and how to improve the tools used by the EC for agricultural policy impact assessment. The target participants were modellers and technical staff from the DGs and JRC, in particular in the area of environment and social impact. This workshop included discussions on agricultural impact modelling, post 2020 CAP indicators and SDGs indicators and some exploration of upcoming policies, for example the Sustainable Food Framework announced in Farm to Fork. It was organised over two consecutive mornings and implemented through a combination of plenary sessions and thematic breakout groups to facilitate contributions from all participants.

### 1.1.2. National/regional level



The initial objective of this activity was to identify the local impacts of translating EU level policy scenarios at each of the case studies (CS). That is, how EU policy scenarios would be translated into case study policy strategies. To do this, a co-design process was planned for each CS, using local language and conducted by CS partners.

In particular, three workshops per CS were planned with specific objectives:

Workshop 1: i) to obtain a list of policy interventions/Agri-Environmental Schemes (AES), based on different EU policy narratives/scenarios, ii) to discuss which indicators stakeholders would suggest being included in the models/dashboard and evaluate including, if possible, the identification of 'acceptable' values for each indicator.

Workshop 2: i) to generate input for the BESTMAP dashboard for each CS, ii) to present the BESTMAP preliminary models and gather stakeholder feedback. In those CS where stakeholders request it, carry on a final presentation with final results and dashboard.

Workshop 3: Workshops at EU level to present up-scale models and the dashboard

Workshop 1: Contacts and interviews to identify CS important interventions

Due to COVID-19 pandemic and its restrictions of in-person meetings and travelling, the initially planned workshop was transformed to telephone and/or on-line contacts with key policy stakeholders in each CS. The objective of the calls was to collect stakeholders' opinion on BESTMAP pre-selected AES (ELMS in the UK) with the aim to ensure that the AES selected to be modelled per CS are meaningful and relevant for each area. Initial discussions on a relevant list of indicators for each CS were also included as it is also necessary to distinguish the priority biophysical and socio-economic indicators associated with each AES, from those relevant for post-2020 EC CAP regulation (considering which ones BESTMAP can feasibly model) and/or Sustainable Development Goals indicators.

Workshop 2: Workshops for preliminary results and dashboard development

A set of workshops, one per CS, were carried out between M30-M32 of the project implementation in order to co-design the policy dashboard based on interactions among project partners and external stakeholders and end-users. The specific aims of these activities required input from all project partners (prototype of the dashboard ready, preliminary results of the models included in the dashboard, CS local expertise) in order to tailor the methodology to the projects' aims and above all to the CS needs and interests, and ensure its usefulness for project development. During this set of workshops, BESTMAP FSA and BPM preliminary model results were presented, and stakeholder feedback was gathered.

In preparation of these activities, several internal meetings prior to the final co-design sessions were conducted. In these one-to-one sessions, specific objectives to achieve during the final meeting were identified for each CS, as well as the potential actors (including facilitators, note takers, logistics, location, date setting, names and affiliation of stakeholders and end users invited). During this process each case study had the opportunity to tailor the session to local settings, including the approach chosen towards key stakeholders, more or less interactive, and issues like face-to-face to virtual workshop delivery. Once the actors and framework were set for each CS, the invitation process started by sending complete individual and attractive invitations to stakeholders, including an agenda with details, a flyer of the project. The final

sessions were carried out using local languages and were conducted by CS partners. Due to COVID national restrictions, 3 sessions were virtual and 2 were in person.

In general, attendees of the sessions were interested and enthusiastic about the project results. Questions related to specific stakeholders needs were raised, which could be translated into future improvements related to the model results or the dashboard.

Some CS requested to organize a progress meeting when the final results of the models would be available. Therefore, a final workshop targeting CS stakeholders and end-users will try to be organized at the end of BESTMAP implementation (M45) with the objective to validate the project outputs for each CS. This activity was not initially envisioned in the methodology but included at a later stage as a key step in getting feedback from stakeholders and end-users at CS level that have been informed, contacted and involved during the project development.

Detailed description of the sessions and outputs can be found in Deliverable 2.1 'Compendium of co-design session outputs'.

### Workshop 3: Workshops at EU level to present up-scale models and the dashboard

A workshop at EU level with stakeholders, aiming to present the dashboard with upscaled results and European story map narrative, may be organized at the end of the project.

## 1.2. Overview of relevant organizations and/or projects on CS level

Each Case Study will establish links with relevant organisations active in the CS region in order to enhance the visibility of BESTMAP and its outcomes, to explore potential common activities and complementarities and to enable knowledge exchange with other projects, institutions, farmers networks/unions, NGOs, etc.

### Germany:

**Sächsischer Landesbauernverband (SLB)** is the Saxon State Farmers' Association founded in 1991. The association represents the interests of around 4,600 members, of which 3,100 are individual members while 300 are organisations, companies or collectives. The Saxon State Farmers' Association offers its members legal advice as well as support and help with all questions regarding agricultural projects' funding opportunities.

**Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (LfULG)** is the Saxon State Office for Environment, Agriculture and Geology, responsible for the environment, nature conservation, agriculture, geology and rural areas. LfULG is not only a key data provider for BESTMAP (e.g. access to the LPIS data for the BESTMAP case study was given by LfULG), but also plays a key role in CAP implementation and monitoring at the federal state level. Two face-to-face meetings between LfULG members and BESTMAP scientists already took place, as well as several phone calls and video calls (due to the Covid-19 pandemic). Existing collaborations will be intensified during the project phase of BESTMAP and we also see that LfULG will play a key role in the planned policy workshops.

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**Landschaftspflegeverband Nordwestsachsen e.V. (LPV NWS)** is the Association for Landscape Conservation that works on creation of a comprehensive network of natural habitats and integrates them into a Saxony-wide network of biotopes, preservation of the diverse cultural landscape and promotion of environmentally friendly land use and ecologically oriented economical methods. The objective of engaging with this association is to invite their members to participate in policy workshops, to facilitate contact to local farmers and to disseminate project results. So far, the interaction works very well and several meetings or phone calls were already held. The LPV NWS shows great interest in BESTMAP.

**Spain:**

**Espais Agraris. Caracterització dels espais agraris de Catalunya** is a national project that carries out the process of characterization of agricultural areas in Catalonia. The knowledge and data exchange is the main objective of engaging with this project.

**Unió de Pagesos** is an organisation that brings together professionals working in agriculture, livestock or forestry on their own, and who stand in solidarity with the agricultural sector to improve living conditions. Since this organisation counts over 6000 members, the main objective of the engagement is to help facilitate contact to local farmers and to participate in policy workshops.

**Joves Agricultors i Ramaders de Catalunya (JARC)** is the Catalan agricultural organisation with the most representation in Spain and Brussels thanks to its membership in the Coordinadora de Organizaciones de Agricultores y Ganaderos (COAG). The main objective of linking with this organisation is to involve their representatives in policy workshops and jointly facilitate contact to local farmers.

**UK:**

**Champions for the Farmed Environment (CFE)** is a partnership established in 2009 with the aim to support farmers to deliver environmental benefits within a productive farm business. CFE provides guidance and support to allow more farmers to manage their land in a way which works for their business and the environment. CFE promotes good practices in sustainable yet productive farming and is supported by many organisations committed to both agriculture and the environment. The main objective of engaging with CFE with this organisation is to involve their representatives in policy workshops and facilitate contact to local farmers.

**Country Landowners Association (CLA)** is the membership organisation for owners of land, property and businesses in rural England and Wales. They have been safeguarding the interests of landowners, and those with an economic, social and environmental interest in rural land for more than 112 years. The main objective of linking BESTMAP project and this farming association is to involve their representatives in policy workshops and facilitate contact to local farmers.

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**The Soil Association** is the UK's leading membership charity campaigning for healthy, humane and sustainable food, farming and land use. The Soil Association is registered with the Charity Commission for England and Wales and has a wholly owned subsidiary, Soil Association Certification Limited, the UK's largest organic certification body. The main objective of linking the BESTMAP project to the Soil Association is to involve their representatives in policy workshops and facilitate contact to local farmers.

#### **Serbia:**

**The Serbian Environmental Protection Agency (SEPA)** is a public body responsible for the development, harmonization and management of the national information system for environmental protection. The main objective of the engagement is to participate in policy workshops and to disseminate project results.

**Chamber of Commerce and Industry of Vojvodina** is a gathering place of business people, a place of exchange of contacts, information, ideas and experience. The Agriculture Association of the Chamber of Commerce and Industry of Vojvodina is the basic form of organisation and work in the Chamber of those members whose main activity is agriculture, water management and forestry. Since this institution is a contact point of the Agricultural Association, the focus of the engagement is to facilitate contact to local farmers and to disseminate project results.

The Agricultural Advisory Service of the Autonomous Province of Vojvodina enables the Secretariat for Agriculture, Water Management and Forestry to monitor various parameters from the field of financing and implementation of measures for protection and improvement of agricultural land, financing and implementation of selection measures in livestock, with the aim of improving livestock production, financing and implementation of the Fisheries Stocking Program and financing and implementation of the Rural Development Program of AP Vojvodina. The focus of the engagement with this Government Department is to involve their representatives in policy workshops.

#### **Czech Republic:**

**Association of Private Farmers** advocates sustainable, multifunctional agriculture and environmentally friendly production. They promote balanced economic and ecological aspects of agricultural production that realistically correspond to the relationship between the demand and supply of private and public goods. The objectives of the engagement are to participate in policy workshops, to facilitate contacts to farmers and to exchange knowledge.

**The Agricultural Association of the Czech Republic** defends and promotes the interests of its members in the production, marketing and enhancement of agricultural production, strives for agricultural and rural development, assists its members in developing their business activities and provides advisory services and economic education in economic, business, commercial, legal and social issues. The objectives of the engagement are to participate in policy workshops, to facilitate contacts to farmers and to exchange knowledge.

### **1.3. Overview of dissemination and communication activities**

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Summary of all dissemination and communication activities of the BESTMAP project on Case Study and EU level will be presented in the Communication and Dissemination (C&D) reporting table. This will be a report of C&D activities that have taken place within the entire H2020 BESTMAP project.

It will include all offline activities such as:

- Organisation of conferences
- Organisation of workshops
- Press releases
- Non-scientific and non-peer reviewed publications
- Exhibitions
- Flyers
- Roll-ups
- Brochures
- Posters
- Booklets
- Newspaper/journal
- Magazine/article
- Communication campaign (e.g. radio, tv)
- Video/film
- Participation to conferences
- Participation to workshops
- participation to events other than conference or workshop
- Brokerage/event
- Pitch event
- Trade fair
- Bilateral meeting (face to face)

It will also include scientific dissemination activities such as:

- Articles in journals
- Publications in conference proceedings/workshops
- Books/Monographs
- Chapters in books
- Thesis/dissertation

Finally, the report will include all digital communication and dissemination activities, such as:

- Posts on websites
- Posts on social media
- Participation in on-line conferences
- Participation in on-line workshop/seminar
- Bilateral meeting (on-line)
- Direct email
- Newsletter

In month 8, D6.3 “Communication Plan and Dissemination Plan” was published as a framework for raising awareness of the project findings and promoting and disseminating the

BESTMAP research to stakeholders and the general public. The purpose of this document was to outline the strategy, to define means of communication, tools and actions that will be done within the BESTMAP project in order to reach a wide range of stakeholders. This deliverable also describes communication and dissemination channels, target groups, key messages and defines processes for successful reporting on C&D activities. The update of the Communication Plan and Dissemination Plan will be published in month 24.

## 2. Types of geospatial data to collect in each CS

### 2.1. General types of data

For modelling, analysis of spatial patterns, and to identify farming system archetypes, BESTMAP relies on a wide range of data. The data predominantly cover three different types. In detail, the project requires (geospatial) data for FSA identification (which will be utilized in ABM modelling) and for modelling of ecosystem services (ES), both on case-study level and European level. Additionally, spatially explicit data is required, e.g. for model parameterization. A general overview of BESTMAP's data requirements is given in Table 1. A more detailed description is available in the deliverable 'Case Study Base Layer dataset' (D3.1).

**Table 1:** Data types.

Data	Example	Used for	Notes
Case-study specific spatial data	<ul style="list-style-type: none"> <li>- land use</li> <li>- soil characteristics</li> <li>- species occurrence data</li> </ul>	<ul style="list-style-type: none"> <li>- FSAs (for ABM)</li> <li>- BPM (ES modelling)</li> <li>- model validation</li> </ul>	<ul style="list-style-type: none"> <li>- polygons or raster</li> <li>- ETRS_1989_LA EA</li> </ul>
European wide spatial data	<ul style="list-style-type: none"> <li>- land use</li> <li>- soil characteristics</li> <li>- species occurrence data</li> </ul>	<ul style="list-style-type: none"> <li>- upscaling</li> </ul>	<ul style="list-style-type: none"> <li>- polygons or raster</li> <li>- ETRS_1989_LA EA</li> </ul>
Non-spatial data	<ul style="list-style-type: none"> <li>- soil carbon content in each land cover/land use type</li> </ul>	<ul style="list-style-type: none"> <li>- parameterization/validation of models</li> </ul>	

### 2.2. Case Study Base Layer data

The Case Study Base Layer is a harmonised geospatial database across the five case studies. It includes spatial information on climatic and soil conditions, biodiversity, land use/land cover (including crop types), farm structure and socio-economic data. It serves as a base for biophysical ES models as well as socio-economic statistical models. Furthermore, it contains information on the Farming System Archetypes (FSAs) in each case study. FSAs have been used for building a common ABM framework. In order to facilitate a timely start of the modelling activities, a Preliminary Case Study Base Layer was compiled, including the most essential

variables at the highest possible resolution available in each CS. This preliminary base layer was created as milestone MS3 in month 5 and refined as deliverable D3.1 in month 15.

### 2.3. Geodata Management

Efficient geodata management is ensured by utilizing the UFZ GeoNetwork application (<https://geonetwork.ufz.de>). The software *GeoNetwork opensource* is a catalogue application to manage spatial data. It contains tools to edit, search and report metadata as well as a web map viewer functionality (<https://geonetwork-opensource.org>). As an initial data harmonization effort, CS-specific datasets are named uniformly, clipped to the CS areal extent, and projected to the geographic ETRS89 (Lambert Azimuthal Equal Area projection) coordinate system (EPSG: 3035) (in meters). Metadata is compiled in accordance with the ISO19139 standard. The record includes information on spatial and temporal extent of the dataset, keywords, a contact person and a download link to the data. The data compilation process is still ongoing and will be finalized as D3.1.

### 2.4. Limitations of harmonizing data across CS

There were several limitations and problems to be considered while collecting spatial data from several case studies. These included different temporal sampling (1) between case studies (e.g. potentially UK land use 2017, CZ land use 2019) and within case studies (e.g. land use 2019, land cover 2017). Besides this, also different definitions (2) of agricultural 'field/parcel' between the case studies had to be overcome. This is documented in the special report by Owen et al. (2016). A third realm of limitation were the data gaps (3) - either spatially or conceptually - of data that might be only available for certain CSs but not for all. And finally different naming of categorical data (e.g. soil types or crops) had to be solved. The use of the UFZ GeoNetwork as described above facilitated initial data harmonization and transparent handling of inconsistencies between the CSs. Furthermore, we took several actions to harmonize categorical data, e.g. by translating crop names according to a common convention. For the modelling activities, we selected a set of AES that occurred in all or most of the CS, and that were widely adopted. We later included ecological focus areas (EFA) to the AEM groupings, as some of these are very similar in management to the AES and hence lead to similar environmental effects. Organic farming was also selected as one of BESTMAP's focal management practices, due to its growing popularity and widespread uptake across all CS. To ensure consistency and comparability of the AEM groupings across CS, we outlined definitions for each measures' group (see D2.5). The final list of modelled AEM are: buffer areas/strips, cover crops, land-use conversion to permanent grassland, land-use conversion to forest, maintaining permanent grassland, organic farming and fallow land. However, the frequency and spatial coverage of these seven AEM groups varied across CS, as did their relevance/impact for different ESS and biodiversity models, so not all AEM were considered in all models and CSs. In the biophysical modelling tasks, we also encountered limitations of data harmonization. For example, biodiversity monitoring schemes in different CSs work at varying spatial and temporal resolution. In Catalonia, bird occurrence data was only available in gridded format at 1 km resolution. The model outputs were thus at a coarser spatial resolution than in DE, CZ and RS, where georeferenced occurrence points of bird observations were available.

The IACS/LPIS data of the CSs differed in their definition of field parcels. In Serbia, where IACS/LPIS does not exist, we relied on pixel-based data from a voluntary database instead.

The distinct structure of the IACS/LPIS data in each CS meant that the models had to be adapted from CS to CS to accommodate the variable input data while providing comparable results (see “D1.3 Guidelines and protocols for harmonising activities in each CS” and “D3.1 Case study base layer dataset for each of the case studies” for how the data were collected, harmonised and stored for the modelling task). This was documented in a CS specific factsheet for each model, see D3.3. In the development of Farming System Archetypes (FSAs), we decided to limit the number of dimensions to data available across the EU in order to facilitate linkages between the CSs and upscaling to the European level (see D3.5).

Regarding the agent-based models (ABM), we ensured comparability between CSs by using the same model structure. However, due to differences in the availability of data and existing policies and regulations, some parts of the model had to be adapted to local specificities. Details on the differences between CS and the implementation are described in D2.5 “Conceptual framework & architecture (update)” and MS6 “First version of ABMs for CS”.

### **3. Developing and mapping Farming System Archetypes**

A central concept of BESTMAP is the notion of Farming System Archetypes (FSAs). These archetypes are a generalized typology of farming systems defined by e.g. farm size and farm’s characteristics and management. These FSAs are assumed to react similarly to policy changes and can be mapped by geospatial relations of existing georeferenced datasets included (see Section 2). Identifying archetypical farming patterns (see Erb et al. 2013) enables an integrative understanding of agricultural systems.

FSAs are a major component of the project’s modelling architecture and integrate many aspects of it. They will (1) include characteristics of the agents used in the agent based modelling (ABM) and characteristics of the spatial patterns of agricultural land use in the CS. The FSA will also (2) define the frame for the statistical/biophysical models, working with maps and pixel information to assess biodiversity and ecosystem services.

The defined FSAs will be static and will therefore not change during the course of the analysis/project. However, the biophysical land-parcels classification will also use crop rotation as input, which can change, as well as AES implementation, which will be the ABM output. Therefore, being static does not mean the modelling using the FSAs is ‘frozen’. The ABMs will make use of certain attributes e.g. uncertainty threshold, initially chosen from a distribution based on FSA, but be adaptive with ‘learning’ from an agent’s own experience or social interactions. To describe e.g. the social and farm-specific characteristics, we conduct farmer interviews and surveys. To match the selected interview partners with the still-to-be-developed FSAs and to provide a preliminary stratification of farming systems in each CS, prototypes of the Farming System Archetypes (proto-FSAs) were developed in advance to the FSAs, these were mainly based on the Environmental Stratification of Europe and were used to select a representative sample of farmers for our interview campaigns (see also section 5.1).



We will develop a set of FSAs (not more than 5-6 per CS) based on (1) Europe-wide available data (FADN) on a coarser resolution and combine these with more (2) detailed information for each CS area. This will enable us to understand local patterns as well as to upscale to the European level.

### 3.1. Selecting FSA dimensions

There are numerous aspects to the issue of what dimensions actually define FSAs, including perspectives from the ABM modelling, biophysical modelling, project management and upscaling issues. In the BESTMAP proposal, we envisioned that FSAs will be characterized by (1) dominant environmental conditions (e.g. climate, soil), (2) land-use intensities and management practices (e.g. crop types, crop rotations, mechanization, fertilizer application), but also by (3) socioeconomic factors (e.g. land tenure and ownership, size of the fields/agricultural holding) that would provide a link to farmers' behavioral characteristics.

After further discussions we decided that for defining the FSAs the data should meet certain criteria. The data should be

- mappable for each individual farm in the all CS based on spatial data from public or administration sources (FADN, IACS LPIS)
- mappable from FADN microdata
- based on attributes that farmers can easily and reliably answer in short online survey
- correspond to or be proxies of factors affecting farmers' AES adoption decision

The FADN-based data we will use are farm specialization and economic size. For the first, we choose to reduce TF8 to five types - field crops (area-based rule:  $P1 > 2/3$ , see definition of P1 below), horticulture ( $P2 > 2/3$ ), permanent crops ( $P3 > 2/3$ ), grazing livestock ( $P4 > 2/3$ ) and mixed. This information will be combined/accompanied with more detailed information from LPIS data. For the second we decided to classify economic size as small or large. Also here we will use a combination of LPIS and FADN information. Economic size is not directly available from IACS/LPIS, but can be calculated using FADN Standard Output coefficients (EUR per hectare for ~90 crop types) available for 2013 in Eurostat<sup>1</sup>.

Besides the FADN-based data we will also consider other farmers' attributes. None of these met all objectives (i.e. mappable from spatial data for all farms, mappable to FADN microdata, available in FSS SUF to derive weights, easy for farmers to answer).

We list some of these attributes below, as they may be used in some steps e.g. as attributes assigned to each farm from spatial data that are used in ABM.

- past participation in AES - this is also a known factor differentiating farmers.

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<sup>1</sup> Standard output coefficients are the average monetary value of the agricultural output at farm-gate price, in euro per hectare or per head of livestock. For 2013 SO coefficients per regions calculated using the average of 2011-2015 prices in 2016 Farm structure survey data see <https://ec.europa.eu/eurostat/web/agriculture/so-coefficients>

- 
- average size of fields - may be a proxy of level of mechanization / intensification
  - average distance between groups of fields managed by the same farmer
  - average period of crop rotation
  - soil quality/agricultural productivity per field - is an important factor affecting farmers' adoption of AES on particular fields and not others
  - percent of UAA land under short lease / "field swapping" - may hinder farmers from adopting AES as they have little 'ownership' over the land
  - percent of farm area as standing woodland
  - percent of farm area as landscape features

A harmonized data request was developed in close collaboration with colleagues from all CS, all work packages and all thematic domains (e.g. interview conductors/developers, ABM modellers, BPM modellers). For information on CS base layers, see section 2.2.

### 3.2. Data analysis

After defining the essential FSA dimensions and the general overview of data available for each CS (see also [Section 2](#) and D3.1) we started to analyse possible correlations between potential FSA variables. The purpose of this is (1) to understand with data can be used as a substitute for others (in case not all data are available in each case study), (2) to limit the number of variables to consider in the cluster analysis and (3) to estimate which variables can serve as a good proxy for others, e.g. farm size as proxy for participation in AES.

Originally, we envisioned defining the FSAs by applying bottom-up (data-driven) cluster analysis. We planned to run different unsupervised classification methods (e.g. self-organizing maps, SOMs) with a varying number of clusters to understand which clustering is most robust and appropriate. This method would utilize several spatial (structural) information and the (cor)relation amongst them in combination with proxies for farmers' behaviour. However, to accommodate the above mentioned criteria for FSA dimensions and to keep a low number of FSA groups in each CS, we may give preference to a top-down approach with user defined thresholds (or categories) for defining FSAs.

As of month 14, the definition and mapping of FSAs was a work in-progress as stated in D1.3. At that time, we established an FSA working group within the project, in which we further specified the guidelines for FSA definition and mapping in BESTMAP case studies and at the European level.

### 3.3. Final development and mapping of Farming System Archetypes

In order to meet the assumptions required to upscale our FSA classification from CS to EU level (see D2.2 for details) and after discussing possible attributes included in IACS/LPIS and FADN data, BESTMAP made the decision to keep the FSA classification simple, and build it on two primary dimensions, following the FADN approach of (1) farm specialization and (2) economic size. Therefore, we used these two dimensions and a top-down approach with user defined thresholds for each of the dimensions to identify and map the FSAs for individual farms in each of the CS areas.

As data sources, we used national and regional datasets, generated directly from 'IACS/LPIS' (Integrated Administration and Control System / Land Parcel Identification System) or equivalent sources, rather than FADN itself. All CS data were stored and managed via the Preliminary Case Study Base Layer and were handled according to GDPR rules and local data sharing agreements.

For the farm specialization dimension, we chose to base our classification on the farm classification 'Type of Farming' (TF8) of FADN, as defined in Annex IV of EU regulation 2015/220. As planned in D1.3, we reduced the eight TF8 to four broad types of specialization: general cropping ('P1'), horticulture ('P2'), permanent crops ('P3') and grazing livestock ('P4'). To map spatial LPIS data to these classes, we used the area-based rules defined in EU regulation 2015/220, stating that farms classified as P1, P2, P3 or P4 have to dedicate at least 2/3rds (66.6%) of the total farm area to the corresponding land use type. If this area condition was not met, the farm was classified as a fifth type of farm specialization: 'mixed'.

For the economic size dimension, we adopted a simplified version of the FADN ES6 classification, which defines economic size categorically according to a series of 6 bounded economic ranges for total economic size (€). In addition to this a lowest category was recorded for farms with an (annual) economic size below €2000 – the minimum threshold for the main categories. For our classification system, 4 categorical values were assigned, as a simplification from the seven categories present under ES6: '<2000EUR', 'small', 'medium' or 'large'. Each of the 'small', 'medium' and 'large' categories were optimised such that within the sets available under the ES6 classifications across all BESTMAP case study regions, the criteria for each of 'small', 'medium' and 'large' farms was set so the totals in each category aligned as closely as possible to 1/3rd of the total sample (number of farms) each.

Accordingly, the mapping of individual farms to a specific FSA was the result of a direct combination of the two dimensions explained above, as identified per farm. This procedure evidently produced a maximum possible number of 20 unique FSA classes in a given case study. For details on the methods and results of FSA definition and mapping, please see Deliverable 3.5 - 'Farming System Archetypes for each CS'.

## **4. Specification of agri-environmental schemes and ecosystem services**

To ensure comparability among all case studies, we decided to focus on agri-environmental schemes (AES) that exist and are relevant (in terms of spatial coverage) in all case studies. Likewise, we selected only ecosystem services (ES) that are of importance in all case studies and are affected by one or several of the selected AES, as explained in more detail below.

### **4.1. Identification of AES and Ecosystem Services**

All models in BESTMAP work towards improving the understanding of how agricultural policy change may affect the entire agricultural sector and its associated ecosystems. Therefore, a set of agro-environmental schemes (AESs) to be modelled needed to be selected as a first step.

CS leads were asked to compile a list of the most common (in terms of implementation area) and most relevant schemes of each CS. As a temporal reference we chose the CAP period 2014-2020. Scheme descriptions were translated into English and organized into one database. This resulted in a total of 43 schemes.

Based on expert opinions of BESTMAP members, for each candidate AESs, a list of associated ES and trade-offs that are targeted by these schemes was developed. In this step we followed the TEEB classification (<http://www.teebweb.org/resources/ecosystem-services/>). Next, in an iterative process, the number of candidate AESs was reduced according to the opinion of local stakeholders (see section 1.1.2) and the following criteria: At first, AESs were excluded if their implementation in the CS agricultural area could not be inferred from remote sensing or from other data available from CS statutory agencies. Subsequently, these schemes were grouped into 12 comparable types:

- Maintaining grasslands (8 AESs in 5 CSs)
- Adding legumes in arable rotation (2 AESs in 2 CSs)
- Catch/cover crops (4 AESs in 4 CSs)
- Buffer areas/Field-margins (5 AESs in 5 CSs)
- Stubble AES (2 AESs in 2 CSs)
- Woodland AES (s AESs in 1 CS)
- Organic/integrated production (5 AESs in 4 CSs)
- Livestock production (2 AESs in 2 CSs)
- Land use conversion (3 AESs in 3 CSs)
- Fertilizer and pesticide application (4 AESs in 1 CS)
- Restoring wetlands/peatland (1 AES in 1 CS)
- Other (4 AESs in 1 CS)

Furthermore, the following aspects of the schemes that are relevant for agent-based modelling were evaluated. These included the following parameters:

- Long-term vs. short-term
- Spatial target of the scheme (feature, field, more than one field)
- Pre-conditions required (yes/no, e.g. presence of certain species)
- Action-based or result-based scheme
- Uncertainty/risk level to the farmer (1 to 5)
- Knowledge required by the farmer (1 to 5)
- Technology required by the farmer (1 to 5)
- Social acceptance of the scheme (1 to 5)

Taking into consideration the ABM-relevant aspects as well as the distribution of similar schemes between the case studies, the following preliminary list shows the AES types selected for modelling:

- Maintaining grasslands (8 AESs in 5 CSs)

- Catch/cover crops (4 AESs in 4 CSs)
- Buffer areas/Field-margins (5 AESs in 5 CSs)
- Land use conversion (3 AESs in 3 CSs)
- Organic farming (1 AES in 1 CS)

This led to the list of CS-specific AES shown in Table 6.

**Table 6. Overview of the pre-selected AES in all CS, taking into account area proportions, data availability and relevance for ABMs.**

CS	AES code	AES name translated
DE	GL1	Species-rich grassland, result-based compensation
DE	GL5	Special grassland use directed at species conservation, at least 2 uses per year
DE	AL4	Growing of intermediate/catch crops
DE	AL5	a) Annual self-greening fallow b) Perennial self-greening fallow c) Perennial flowered areas
UK	GS2	Permanent grassland with very low inputs (outside SDAs)
UK	SW1	4-6m buffer strip on cultivated land
UK	GS6/GS9	Grassland; maintenance of wet grassland for breeding waders
UK	SW6	Cover crop
UK	TE4	Woodland creation grant scheme
CZ	10.1.4	Grassland maintenance
CZ	10.1.2/1	Integrated grapevine/fruit production
CZ	10.1.5	Conversion of arable land into grassland
CZ	10.1.6	Biobelts (vegetated strips)
CZ	10.1.8	Grassing of concentrated outflow pathways
ES	5	Management and recovery of meadows and pastures
ES	2	Organic Farming
ES	4	Sustainable management of wetlands
ES	-	Improvement of the steppe habitats of the Natura 2000 Network
RS	1	Management of species rich grasslands
RS	2	Management and recovery of meadows and pastures
RS	3	Vegetation strips
RS	4	Conversion of arable land into grassland - increase landscape heterogeneity

The selection process of the AES in Catalonia deviated slightly from the other CS. Since “Integrated production” will disappear in the new CAP funding period the goal was to rather focus on sustainability (it is planned that, depending on a scoring system, farmers will get more or less subsidies. i.e. results-based). Therefore, the following AES were selected for Catalonia:

- Measures on management and recovery of mountainous meadows since these will continue in future CAP
- Measures on chemicals and wetlands are highly relevant due to storm events in Catalunya. Buffer areas along the coast are increasingly used for coastline stabilization. The wetland measures could be labelled as a land-use conversion

scheme: reverting floodplain agriculture (rice, sunflower) to wet meadows (used for grazing), but very few people are doing this (only in restricted area in Girona, close to the the border to France).

- Organic farming has been kept as an important AES in Catalonia.
- "Improvement of the steppe habitats of the Natura 2000 Network" was included since this measure has a requirement that is "keep an area around the field without sowing as a buffer area for biodiversity corridor" thus somehow and partly, it fulfills the AES generic type "buffer areas" (requires to leave buffer areas around fields)

The final selection of the AES to be modeled in BESTMAP will be made based on the possibilities and technical capabilities to run the models. This process is ongoing and described in detail in section 4.2.

By evaluating which ecosystem services are addressed or affected by this reduced list of AES, the most important target ES were identified: Food and Fodder, Fresh water (yield and quality), Erosion, Carbon sequestration and Biodiversity. The envisioned modelling approaches for these different ecosystem services are presented in the following sections.

#### 4.2. Linking ecosystem service models and AES

At the time of writing this deliverable it is an ongoing process among the BESTMAP modelers to identify the best and most appropriate way to include meaningful links between ES models and the pre-selected AES (see section 4.1).

To ensure the selection of AES and ES is meaningful, the BESTMAP modelers are collecting information and expert opinions on the question "Will the model be able to detect a meaningful difference in ES when AES is present or absent?" For each model/ES-AES combination the responsible modelers are currently collecting their expert opinions in a table as exemplified below in Table 7.

**Table 7.** Collection of experts' opinion on ability of models to estimate ecosystem services depending on AES. Example for one ecosystem service.

		Will the model be able to detect a meaningful difference in ES when AES is present or absent?									
		Maintaining grasslands		Catch/cover crops		Buffer areas/field margins		Organic/integrated production		Land use conversion	
ES	Model	Y/ N	Comment/ Explanation	Y/ N	Comment/ Explanation	Y/ N	Comment/ Explanation	Y/ N	Comment/ Explanation	Y/ N	Comment/ Explanation
<b>Example ES</b>	<i>InVest yield model</i>	Y	<i>the model includes variable x which is changed by</i>	NA	<i>this AES does target agricultural fields, the model only</i>	N	<i>the AES changes variable z which is not accounted</i>	Y	<i>works theoretically, due to coarse input data the accuracy is</i>	N	

		<i>the AES.</i>	<i>works for grasslands</i>	<i>for in the model</i>	<i>very low</i>		
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The collected information will serve as an input for the final selection of AES/ES combinations to focus on in BESTMAP. Individual AES and or ES may be dropped in this process. Since for some ES there are still ongoing discussions about which models we are going to use, there are multiple model options per service. BESTMAP modellers are aware that the AES are not identical across CS (nor do we consider all AES in all CS) but we rely on these expert judgements/opinions on the model/AES links in general and ignore the CS context for the most part. In addition, model/AES combinations that are meaningless although technically possible will be identified this way and discussed and potentially removed.

#### 4.2.1. Final selection of AES and ESS/biodiversity models

While the preliminary list of selected AES types (e.g. maintaining grasslands, catch/cover crops, buffer areas/strips, land-use conversion - which was since split into land-use conversion to forest and land-use conversion to permanent grassland, and organic farming) was confirmed, and one more AES type, e.g. fallow land, was added, the grouping of individual AES schemes within the 6 groups required some more work on the definitions of each of these AES types, to ensure comparability across CS, and the subsequent classification of schemes into the different groups. The definition of each AES group is reported in section 5.1 of 'D2.5 - Conceptual framework & architecture (update)'. Compared to the initial list of pre-selected AES (Table 6), many more AES, and for some CS also Ecological Focus Areas (EFA), were included in the modeling tasks; the full list can be found in table A1 in the appendix of D2.5.

The information collected in table 7 ([Linking AES and models](#)) allowed the modelers to identify ES for which changes in provision related to AES adoption could be modeled, and it also allowed to compare different possible modeling approaches for each ES, in order to choose the best one according to the available input data. The final list of ES for which models were developed are: food and fodder, carbon sequestration, water quality, and biodiversity. Additionally, a socio-economic model was developed which models the change in estimated Farm Net Value Added (FNVA) between adoption/non-adoption of AES scenarios, for a given year per farm. The models are described in detail in 'D3.3 - Ecosystem service, biodiversity and socio-economic models for each case study'.

### 4.3. Additional steps towards harmonizing modeling procedures

Modelling the potential effects of the most important AES on the selected set of ES in all case studies requires a harmonized approach. The additional steps towards harmonizing modeling procedures include:



1. Harmonization of input data in terms of data sources, units, as well as spatial and temporal resolution (see section 2.2 and Deliverable 3.1).
2. Consistent use of the same input information for several ES models, e.g. the same land-use data for crop yield modelling and carbon sequestration modelling, or the same elevation data for water quality modelling and habitat/biodiversity modelling.
3. Consistent calibration/parametrization of ES models and validation of model outputs done by comparative procedures and based on the most recent data to avoid validation data from different years between the case studies.
4. Harmonization of policy scenarios to be applied in all CS.

These challenges were identified during the BESTMAP biophysical modellers meeting held virtually on April 27th-29th 2020. In most cases, we identified the InVEST model as the platform to model the provision of ES and elaborated on the data/calibration/validation needs for each ES model. These were summarized for internal project documentation in Milestone MS4: Directives for Modelling Approach in Case Studies. However, the harmonization of modelling procedures is subject to change depending on the progress made in individual models.

#### **4.3.1. Final steps towards harmonizing modeling procedures**

When the previous version of this deliverable was submitted, modelers were not yet granted access to the IACS/LPIS data of all CS. IACS/LPIS data are a crucial dataset for the modeling tasks as they hold the spatially-explicit information on field management, i.e. AES adopted and crops grown. IACS/LPIS data from the different CS were found to be very diverse in their structure as well as information content (e.g. information on EFA, consistent field ID across years, etc.). Harmonizing activities included the already mentioned definition and grouping of AES/EFA schemes, and also of the crops (see [cropgroups](#)). While we initially planned to make a consistent use of the same input information for several models and across CS, as stated in the previous section, we later decided to use the best-available information for each CS and model (both in terms of model parameters and geospatial data), in order to maximize the quality of the model results for each CS. The input datasets used in each model are described in the model factsheets appended to D3.3, and more information on how the geospatial data employed in the models were harmonized and stored is available in D3.1. Despite these cross-CS differences, models were adapted to accommodate variable input data while providing comparable outputs across CS.

## **5. Guidelines on how to stratify and select farmers for interviews**

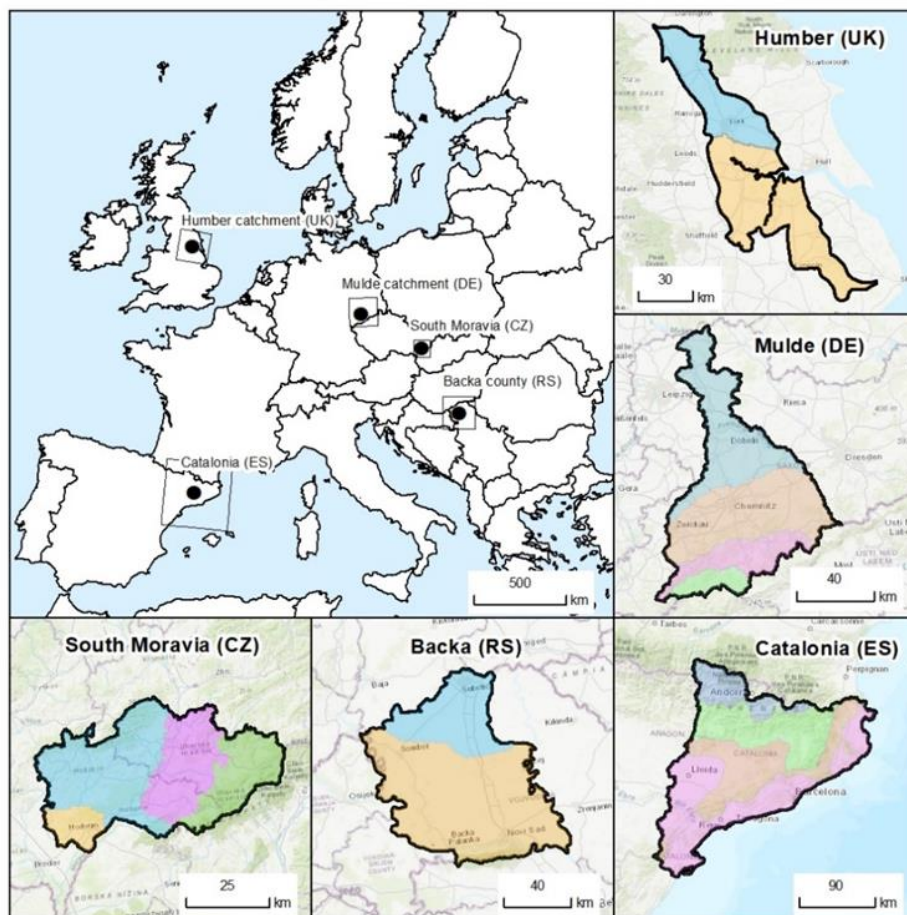
The BESTMAP project uses proto Farming System Archetypes (proto-FSAs) to stratify farming systems in each CS, from which CS interview teams select a representative sample of farmers that are a subject of BESTMAP interview campaigns. The original proto-FSAs proposed in stage 2 of the project proposal included an environmental dimension (climate, soil, topography), production dimension (field size, crop rotation) and land manager/farmer dimension (demography, tenure). Based on discussions in the Consortium Coordination Team (CCT), CS and working groups and the recommendation by DG-AGRI, we simplified the



concept and decided on using a combination of (1) the type of farming system as defined by Farm Accountancy Data Network (FADN), (2) the Environmental stratification of Europe and (3) the JRC typology of farmer profiles to define proto-FSAs.

### 5.1. Environmental stratification of Europe

Each CS area is divided according to the Environmental Stratification of Europe (EnS). This stratification was developed as part of the FP6 SEAMLESS project and provides relatively homogeneous regions suitable for stratified sampling of ecological resources, the selection of sites for representative studies across the continent, and the provision of strata for modelling exercises. The stratification is based on a principal component analysis of climate, elevation and soil conditions in Europe and the dataset is described in Metzger et al. (2012). The EnS has a 1 km<sup>2</sup> resolution, and consists of 84 strata, which can be aggregated into thirteen Environmental Zones (EnZ). The Czech, German, Serbian and UK case studies are each covered by 2-4 EnS strata (Fig. 1). As the Spanish case study is substantially larger, the coarser EnZ will be used for Catalonia (agreed on by DARP), resulting in 4 zones (Fig 1).



**Figure 1:** Overview map of BESTMAP case studies stratified spatially into environmental strata (EnS; for UK, DE, CZ and RS) and environmental zones (EnZ; for ES). Colours indicate different EnS/EnZ per CS. However, the same colours in different CS do not indicate membership in the same EnS/EnZ.

## 5.2. Type of farming in FADN

FADN uses a typology of farming systems which is characterised by the relative contribution of different enterprises to the holding's total standard output (a measure of economic output). Depending on the amount of detail required, there are three nested levels of farming type: 8 general types (+1 for undefinable), 21 principal types and 62 particular types. In BESTMAP we use the general types and decided to limit for the farmers' interviews to arable ('fieldcrops' in FADN) and livestock ('Other grazing livestock' in FADN).

## 5.3. Farmer profiles

Groups of farmers are selected from each CS environmental strata based on their farmer profiles. There is a JRC-led Foresight Study that identifies possible future professional and social roles of farmers in 2040 and explores the resulting potential implications for relevant EU policies. JRC produced 12 profiles of farmers as one of the outcomes of the 'Farmers of the Future' project. From those, 9 are relevant to BESTMAP: (A) 'Diversification; Adaptive', (B) 'Intensive; Production-focused; Specialization', (C) 'Tradition; Family; Heritage', (D) 'Recreational; Non-profit; Hobby', (E) 'Subsistence', (F) 'Corporate; Business unit', (G) 'Regenerative; Conservation; Agro-ecology', (H) 'Social and Health sector; Community; Social-inclusion', (I) 'Lifestyle; Neo-rural; New entrant'. In the interviews, we focus on three profiles – hobbyists (D), professionals (B) and companies (F).

Combining these factors together, we wish to select for BESTMAP interviews farmers that represent four different profiles:

1. Non-professional; non-profit; hobby farmers
2. Professional independent - field crops/arable farmers
3. Professional independent - meat/dairy livestock farmers
4. Company/co-operative appointed managers

## 5.4. Farmer selection

In each CS, we identified a total of 8-16 proto-FSAs based on the combination of the three datasets described above. The number depended largely on the size of the CS area, resulting in the range 2-4 EnS per case study. Given the combination of EnS and 4 farmer profiles, the CS interview teams were recommended to select 2-3 farmers from each proto-FSA, leading to approximately 25 envisioned interviews per CS.

Note: There are many important factors of farming systems that this stratification does not account for. For example, we include neither farm manager age, nor owner/tenant distinction, nor farm size. Therefore, it is assumed that these factors are not significant compared to the farmer profile and environmental context. However, the BESTMAP team identified and recommended a few other factors that should be considered when selecting farmers: organic/conventional farming, gender, previous participation in agri-environment schemes (AES). Therefore, while not part of proto-FSAs, the selected farmers should ideally be balanced in these categories.

## 5.5. Contacting farmers

The most effective way for the identification of farmers depends on the existing contacts interviewers have already but also cultural and social conditions (i.e. history of relationship between farmers and scientists).

Starting points for identifying farmers:

1. Local or regional farmer associations/chambers will have contact details (e.g. partners in the project)
2. Local or regional administrations also have contact details
3. Landcare associations, nature or environmental protection organisations are also in contact with farmers and might support you with identifying farmers
4. Colleagues, who worked in projects where farmers were involved.

At the end of the interview a question is integrated: “Can you suggest anyone else who might be interested in BESTMAP, and/or being interviewed by us?”. You may show the map with the zones and ask for farmers that fit the criteria. This so-called snowballing system (asking a farmer for other farmers) is a common approach.

The first step to contact farmers is to write a letter that can be sent by postal mail or via email where the interviewers introduce themselves, the project and the aim of the interview (see Annex 1 as an example). Moreover, it shall state that you will give the farmer a call to fix an appointment and already give information about the period when the interview will be conducted. Between the letter and the phone call not much time should pass (about a week) otherwise, the addressee might forget about it in the meantime.

## 6. Semi-structured interview guidelines

The aim of the interviews with farmers is to inform the project about the most relevant decision making variables. BESTMAP interviews are explorative, which means that they are used to open up or deepen a new or so far unknown field, which is the motivation of farmers in the CS regions to apply for agri-environmental schemes (AES). The information is gathered to inform the agent-based models (ABM) about relevant elements to be integrated into the model set-up and - beyond the ABM structure - getting a better feel about what the Farm System Archetypes (FSA) should include.

The interviews are designed as semi-structured interviews which means questions are pre-defined but interviewers are encouraged to ask additional questions (if something is not clear or additional questions arise) or change the sequence of the questions when it fits the situation.

In the project proposal we promised interviews with 50-70 farmers in all case areas. We amended this aim at the kick-off meeting for two main reasons:

1. We need to explore the field first to start designing the ABM and afterwards gather the data that will run the ABM

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2. For running the ABM, modellers request quantitative data rather than the more qualitative data gathered through the interviews.

However, some quantitative data are required already now, therefore, the **interview protocol** consists of two parts:

1. A part with mostly open questions for the interview – **the interview questions**.
2. A part with closed questions that will be handed to the interview partner to be filled in after the official interview – **the questionnaire**.

The full semi-structured interview protocol (its English version) with all questions and instructions can be found in [Appendix 1](#).

The following guidelines on “conducting the interviews” and “interview analysis” served as detailed instructions for local CS teams to complete the interview campaigns in a consistent manner. They are presented below in the same form as they were provided to the CS teams.

## 6.1. Conducting the interview

### 6.1.1. Preparatory tasks

As an interviewer, you do not have to be an expert on agricultural policy or agronomy. However, you need to understand the questions and why they are asked, especially the intention of the question (in case the interview partner asks back what is meant by the question). Moreover, the interviewer is supposed to know about the AES offered in the CS region to be able to understand the answer and ask back if needed. Moreover, the interviewer has to be able to shortly describe the schemes in case the farmer has a question about a scheme (especially in the questionnaire section).

In the first part, the interview questions, the majority of questions are open questions to allow an open interview situation and avoid the atmosphere of an interrogation. The interview partner should feel free to answer the questions in a detailed way (e.g. by giving examples). Every interviewer should know the questions very well to allow for a good interview atmosphere (keep eye contact and be able to ask back).

It is not requested that more than one person conducts the interview. However, in case the resources allow for it, it is suggested that the interviewer is supported by a second person, who could either be an expert who also asks questions or someone who observes and takes notes. Make sure the roles within your team are clearly defined. For example, is the second person allowed to ask questions or not? And if so, how does he/she give a signal without disturbing the flow of the core interviewer?

What you need for the interview is the interview questions (please fill in the key data in the blue box prior to the interview) either on paper or on a tablet (a laptop is not recommended as it might give the impression you are hiding behind the screen). The advantage of the printed interview question is that you can take notes. For the questionnaire part, it is easier for the analysis if the farmer would answer the questions electronically (on a laptop or tablet).

However, please also take a printed version of the questionnaire with you in case the farmer does not want to use the computer/tablet. You should prepare two versions of the questionnaire (for the laptop/tablet but also the paper version), one for the farmer participating in AES and for the ones who don't. In case you are not satisfied with the layout (due to the translation page breaks can occur), you are free to adapt the layout to your needs.

Prior to departure to an interview appointment, make sure you are well prepared for the interview, this includes being on time at the agreed place and have all the relevant documents with you. Being late or forgetting documents will negatively influence the first impression and can also influence the interview atmosphere (the interview partner spared time to talk to you and give you information relevant for the project. His/her benefits are usually low.

Therefore, make sure that prior to departure you

1. Check again directions and account for possible delays
2. Check contact details, such as phone number
3. Check you have all relevant utilities with you (recorder and spare batteries, tablet or computer for the farmer to fill in the questionnaire, interview protocol, consent form).

### 6.1.2. Getting started

All interviews have to be recorded. *Please do not use a smartphone for the recording*, use an [audio recorder](#) instead. If you use a smartphone, data protection cannot be ensured. Please ensure the interview takes place in a **quiet surrounding** (prior to the first interview, please check the quality of the recorder by recording a short statement in different surroundings) to ensure good quality of the recording and that both sides are focusing on the interview and are not distracted by noise.

Also make sure that you interview only one person. In case the whole family sits at the table and becomes involved it will be difficult to identify the individual statements. You can explain it this way: When too many people speak, we cannot analyse the data correctly.

At the beginning, interviewers should thank the interview partner for agreeing to participate in the interview and introduce the aim of the interview as well as their role. Also, inform the interview partner about the potential length of the interview. Afterwards please introduce the engagement consent form and inform the interview partner that the interview can be stopped at any time. Also, ask for open questions (to build up trust). Afterwards, hand two copies of the consent form to the interviewee to read and fill in – make sure that you take one home and keep it for your own records. The other copy stays with the farmer. Prior to the first question, please mention that the recording starts now and thank the interviewer that you are allowed to record the interview. Please emphasise that it is a qualitative interview and as such, it is a rather open conversation and that it is about the perspectives of the farmer. It is not a survey.

### 6.1.3. General rules

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The questions should be read out clearly (as with a standardized questionnaire) by you. For several questions, we added brackets that include hints for the direction of the answer. It is important that you read the question without the hints first. Only in cases where there is no answer or the answer covers only one aspects of the hint, you should ask back (i.e. To the question “Did you experience any difficulties while implementing the schemes? Which ones” the farmer mentions only administrative, the interviewer can ask if the farmer also experienced any technical, financial or social).

As an interviewer your basic attitude should be: The interviewed person has taken extra time for me, knows a lot and I am interested in his/her perspective. Even though as an interviewer you have your own opinion and assumptions, it is not relevant in the interview situation and you need to keep it to yourself because otherwise you will influence the answer.

#### **6.1.4. Challenging situations**

Conducting an interview for the first time often raises a lot of concerns. We cannot address all of them, but would like to give some guidance for situations that are likely to occur:

##### *The interview does not run smoothly, especially at the beginning*

For the farmer an interview is usually not an everyday situation. He/she might require some time to build up trust and feel comfortable answering the question. It means, if something does not go as planned, e.g., the conversation is not very smooth at the beginning, make yourself aware that it is not a mistake, but that it is quite normal. However, you should later on mention it in the postscript.

##### *You don't understand the answer*

You are interviewing an expert in the field of agriculture. So, in case you don't understand an answer to your question, don't worry. Not understanding some answers, especially in the first interview, is the rule rather than the exception. In such a case ask back nicely, e.g. as self-revelation: "Could you please explain what you mean by saying xy (or the term xy)". It won't harm the interview atmosphere and can even improve it because the interview partner understands that you are truly interested and are not just asking questions because they are on your list.

##### *A questions was already (partly) answered before*

The interviews are explorative and semi-structured, meaning that the interview is a conversation and not an interrogation. We are interested in the viewpoint of the farmer regarding his attitude and experiences towards AES. This requires that your interview partner has the freedom to talk. As a result, he/she might already answer questions, which come later in your guidelines. To avoid that the interview partner gets upset or annoyed, you need to decide if you have the question answered to your satisfaction already. In such a case, you can skip the question. In case you think the question is touched but not answered to you satisfaction, please tell the interview partner (i.e. “You already addressed the next question, which is “xy”. However, is there anything you would like to add?”). Please always keep in mind that it is an interview guideline and all questions are relevant, however since there will be no statistical evaluation, not every question needs to be answered in the same detailed way.

### *The farmer is questioning the recording of the interview*

Farmers might be skeptical about the recording, which is understandable because everything he/she says can be called. However, for the analysis it is necessary to record the interview. In case the farmer asks why it is necessary to record the interview you can answer that the project requires the input from farmers and that everything he/she says is valuable information, when not recording it, information might get lost. Moreover, the interview will take a bit longer and by taking notes all the time, the interviewer cannot concentrate well enough on what the farmers say. Finally, the farmer does not have to be afraid about recording the data, because the audio recording will be stored on a secure drive to which only the interviewer has access. The transcript of the recording will also be stored on another secure drive and apart from the personal data, which means it will be pseudonymised. So, no one can trace back where the information comes from.

## **6.2. Interview analysis**

After the interview, the data need to be further processed: Documents have to be stored, a report has to be written, the audio-recorded interview has to be transcribed and data to be analysed.

### **6.2.1. Data storage**

All documents (consent form, notes) and the audio recording have to be stored safely either on a secure drive (for digital documents) or stored in a place that only you can access (locked cupboard). Afterwards the interview has to be transcribed (see 4.3), this document also needs to be stored safely. Make sure that personal data are stored separately from the transcript. This you can do by setting-up a word or excel document (depending on your preferences) where you store personal data of the interview partner and provide codes for each interview (e.g. Guy Ziv (A1); Anna Cord (A2); Nina Hagemann (A3), ...). The code has then to be added to the transcript (and the personal data in the transcript are deleted).

### **6.2.2. Prepare a report for each interview**

A short report has to be prepared for each interview with a focus especially on framework conditions of the interviews, such as the obstacles and challenges of the interview. Each report has a cover page that gives information on the code under which the interview transcript is stored as well as the FSA code (see Annex for information on how to construct the FSA code). The report shall be about one page long and reflect on the following aspects:

1. First contact and appointment setting: How did the farmer react (willingness to participate, possible objections, etc.)?
2. Description of the framework conditions during the interview (duration, location, disruption, etc.).



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3. The course of the conversation (discussions about certain questions, resistance to answer any questions, etc.).
  4. The post-interview phase: Sometimes crucial things are mentioned off the record after the recording has ended.
  5. Did any unusual things happen?

The report should be written as soon as possible after the interview to ensure that no information will be lost. The report is crucial because it is the basis for the deliverable in month 17 (“Summaries of data, obstacles and challenges from interview campaigns”) so it has to be prepared in English.

### **6.2.3. Transcription**

A variety of established transcription systems with corresponding guidelines exist. The choice of the system depends on the aim of the interview. In Psychology, researchers are often interested in the behaviour of their interview partner. Therefore, they transcribe paralinguistic elements such as laughter, clearing of throat, interruptions. For BESTMAP we are interested in facts to inform the agent based model (ABM). This means we transcribe literally what was said without capturing side elements such as pauses, volume etc. For the modellers it is important that they understand what has been said in the interviews, so it is necessary to write sentences whenever possible. Because of resource constraints the transcripts cannot be fully translated into English. Therefore, for the analysis the original text (in the CS language) is used. Only quotes/text passages that go into analysis as examples need to be translated into English.

### **6.2.4. Data analysis**

Data analysis of qualitative data (part 1 and open answers of part 2) will be based on a coding frame for qualitative content analysis. To be able to provide a template for the analysis, first results are required. The preliminary coding frame will be prepared by the German team after having conducted and transcribed the first interviews. In general, we will use a combination of deductive and inductive categories to develop our coding frame. The preliminary coding frame will consist of concept-driven categories derived from our interview protocol (main topics and aspects we ask for, e.g. “personal meaning of agriculture” will be such a category). The next step is data-driven: Based on the coding of the first 3 interviews in each CS, we will differentiate the initial coding frame by developing inductive subcategories that capture the variety of what was mentioned in the interviews (e.g. “producing high-quality food” could be such a subcategory). In order to do that, an online meeting will be organized. It is essential that everybody who has conducted the interviews, who has coded them and those colleagues who will do the coding participate in that online meeting (here we need the knowledge of what has been said in the interviews, how it has been said and the experience of how the preliminary coding frame worked). Based on this online meeting, the German team will revise and expand the coding frame. This final version then needs to be applied to all interviews. Short guidelines with information on how to do the coding will be provided prior to the online meeting. Since it



is unavoidable that some information gets lost, each CS needs to write one short interviews summary report (see Annex) that complements the information in the coding frame and the short reports.

For data analysis of qualitative data, each CS needs to buy, install and get familiar with the software [f4analyse](#). It is a very effective and simple tool that enables us to develop the coding frame, code the interviews and merge our results in the end.

Data analysis of quantitative data (closed questions of part 2) will be less sophisticated, as these can easily be coded. For example, farmer A1 answered the question 5: “How many total years have you been working in agriculture?” as follows: 10-30 years. In the coding system 10-30 years is a “3”.

1 = < 5 years

2 = 5-10 years

**3 = 10-30 years**

4 = 30-60 years

5 = > 60 years

In the software you will then add a 3 for A1/Q5. Table 8, that will be prepared for all interviewers, is a very simplified approach but gives you an idea of how the template could look and what you will have to do. The German team will provide an Excel sheet as a template for this part of the data analysis as well.

**Table 8: Example of template for coding the interview answers.** Here farmers A1-A3, questions Q1-Q6.

Code	Q1	Q2	Q3	Q4	Q5	Q6
A1					3	
A2						
A3						

## 7. Online survey including discrete choice experiment

Despite the quantitative component, our interview campaign provided limited information to parameterize the agent-based model (see Section 8) and infer differences in behaviour between farmer types. Therefore, we decided to conduct a follow-up online survey consisting of mostly closed-ended questions and a discrete choice experiment (DCE) (see Appendix 2 for the complete questionnaire). With the survey, we covered in particular farm characteristics (including questions on the specialization of the farm), personal values (covering questions on attitudes towards the environment, societal influence and exchange with other farmers) and socio-demographic questions. In addition, we included experience with existing AES and asked for reasons why farmers did or did not participate in specific schemes. The main objective of the DCE was to investigate the preferences of farmers across case studies for a selection of agri-environment contract characteristics. Respondents had to choose between four alternative AES and a “no scheme” option where farmers would not get any funding for agri-environmental practices. In addition to the offered payment level, we chose contract length, bureaucratic effort and advisory support as key attributes to be varied between the schemes.

The design of the questionnaire and the DCE was pretested with 13 completed questionnaires from the five CS collected between September and October 2021. Data collection in the four case studies took place between September 2021 and April 2022. Data from farmers in the four case studies were collected through online questionnaires and were disseminated through established farmer networks.

In the Czech case study, we disseminated the survey first via the two main farmer's associations: the Association of Private Farmers and the Agricultural Association of the Czech Republic. These organizations shared our request using their contacts to farmers in our case study area. However, the response from farmers was initially low, yielding only a few dozen responses. Therefore, we decided to increase the survey area to the whole coverage of the two counties in which the South Moravia CS is embedded. In addition, we got approval from the State Agricultural Intervention Fund, the agency who administers agricultural subsidies in the country, to use their contact list to disseminate our survey. This strategy led to the total of 140 participants who completed the questionnaire.

For the German case study, we decided to increase the case study area to the whole of Saxony, the part of Germany where the Mulde region is located. We chose to do this because (1) it would have been difficult to approach only farmers from the Mulde region, which is not a geographically distinct region, and (2) this significantly increased the number of possible participants and was the only way we could expect to obtain a sufficiently large sample. We contacted farmers through farmer associations (Sächsischer Landesbauernverband and their regional sub-organizations) and an association for landscape conservation (Landespflegeverband and their regional sub-organizations) by having an announcement of the survey included in their newsletters. We also attended two regional events to promote the survey and directly contacted farmers whose email addresses were available in a local apprenticeship database.

The ES case study survey distribution was intended to be co-organized and distributed by DARP. Indeed, it was co-organized with them, but at the time the survey was launched (some months later than scheduled initially), DARP was undergoing intense negotiation discussions with farmers (and associations) regarding the new-CAP schemes and economic aids, and they declined to distribute the survey in order to avoid confusion among farmers. Therefore, CREAM

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distributed the survey through their communication channels, network recipients and specific contacts in the farmers associations. Unfortunately, since the survey was launched during this delicate negotiation period, and DARP was not “supporting” the participation, the survey was not very successful. Before the distribution, CREAM asked the opinion of the survey to some farmers who had already expressed their concern related to the length of the survey and some specific questions regarding areas or “personal” information which were not considered easy to be answered. Since BESTMAP wanted to get comparable data between all the CS, we decided not to simplify the survey format of the ES case study and proceeded with the distribution. We got 89 responses, but only 22 were complete. Once we confirmed this low success in finishing the survey, we make a consultation to CEFRETA, a Spanish company expert in the farm sector and with expertise on distributing surveys to farmers, and it agreed that the survey was too long and “complex” to be answered in an easy and efficient way. This low number of responses was not enough to perform an objective analysis and therefore, ES CS was not included in the further evaluation.

The UK case study team first attempted to disseminate the survey via its own network of contacts (via social media, farmers’ associations etc.) but the response rate was poor (leading to nine usable responses). This led to the project contracting the survey company Qualtrics to obtain responses from a country-wide farmer panel. However, to do this we had to increase the case study area and ended up with 98 usable responses from across England.

The survey for RS case study was distributed in a targeted way through BioSense's network of contacts and also broadcasted on social media (BioSense web site, twitter and linkedin). More than 200 participants started the survey and 131 full responses were collected and usable for further analysis. In a targeted way, associations of farmers were contacted through main contact persons. The survey was distributed among members of Vojvodina organic cluster, The National association for development of organic production “Serbia Organica”, Centre for organic production Selenča, Chamber of Commerce and Industry of Serbia, Agricultural Extension Service in Subotica, Sombor, Vrbas and Novi Sad (the main municipalities of Bačka region). Furthermore, BioSense sent the survey directly to farmers that are on the mailing list of BioSense Digital Farm as well as to AgroSens digital platform users that subscribed for receiving general notifications.

Also, BioSense prepared an article for a Serbian web portal dedicated to the subventions in agriculture. The article briefly introduced the BestMap project and explained the purpose of the survey. After publishing the article, a notable increase in responses was observed.

subvencije.rs/vesti/agro-ekoloske-suvencije-u-srbiji/

subvencije.rs

Вести Берзе Закопи, правилицаи, уређење Остале информације ЕУ и Свет Презентације и алати Маркетинг Контакт

**Субвенције**  
у пољопривреди

**ПОПУСТ 10%** НА СВЕ КУКУРУЗНЕ СЕЈАЛИЦЕ УПЛАЋЕНЕ ДО КРАЈА ДЕЦЕМБРА

БИЛНА ПРОИЗВОДЊА - СТОЧАРСТВО - ОПРЕМА И МЕХАНИЗАЦИЈА - КРЕДИТИ - ПЕРЕРАДА ПРОИЗВОДА - ОСТАЛИ ПОДСТИЦАЈИ

Home » Вести » Агро-еколошке субвенције у Србији?

**Агро-еколошке субвенције у Србији?**

in Вести 28 фебруара, 2022

Скоро 90% свих предела у ЕУ је пољопривредно. Међутим, услуге које пружају ови екосистеми (храна, бιονергија, вода, складиштење угљеника, бидиверзитет) су угрожени процесима као што су интензивно коришћење земљишта и климатске промене. У циљу ублажавања ових проблема, у ЕУ се дају субвенције пољопривредницима за спровођење агро-еколошке праксе на њиховим пољопривредним газдинствима.

Међутим, поред разних бенефита које нуде агро-еколошке праксе, пољопривредници су често невољни да их примене. Креатори политика из тих разлога морају да преиспитају и пробликују постојеће субвенције како би побољшали одрживост пољопривредног пејзажа, истовремено осигуравајући egzистенцију пољопривредника.

**СКОРАШЊИ ЧЛАНЦИ**

- Предсезонска акција у Агронанци
- Све о субвенцијама за пољопривреду на једном месту
- "Обрачун и анализа економских резултата пословања у функцији унапређења одрживости пољопривредних газдинстава"
- Субвенције за заштитне рамове за тракторе
- Захтев за нултом контролом за учешће на конкурсима Пољопривредног секретаријата за пољопривреду у 2023. години

**ПРЕДСЕЗОНСКА АКЦИЈА У АГРОНАНСИ**

Све о субвенцијама за пољопривреду на једном месту

"Обрачун и анализа економских резултата пословања у функцији унапређења одрживости пољопривредних газдинстава"

Субвенције за заштитне рамове за тракторе

Захтев за нултом контролом за учешће на конкурсима Пољопривредног секретаријата за пољопривреду у 2023. години

**ЦЕНЕ ПОЉОПРИВРЕДНИХ ПРОИЗВОДА НА БЕРЗАМА**

динит	W	U	U	U	U
	15.00	21.80	37.30	-	-
	-	-	-	-	-
	19.41	21.86	-	-	-
	14.25	16.28	30.90	-	-

Детаљније

**КУРСНА ЛИСТА**

Kursna lista na dan 19.12.2022.

	Kupovni	Srednji	Prodajni	
EUR	116.9701	117.3221	117.6741	-0.02%
USD	110.2660	110.5978	110.9296	+0.36%
CHF	118.1039	118.4593	118.8147	-0.35%
GBP	134.1554	134.5591	134.9628	+0.07%
AUD	73.9007	74.1231	74.3455	+0.34%
CAD	80.6134	80.8560	81.0986	+0.01%
HRK		15.5118		-0.28%
BAM		59.9858		-0.02%

**ПАМЕТНА РЕШЕЊА ЗА ВАШ АГРОБИЗНИС**

Raznovrsna paleta bankarskih proizvoda RBA banke.

**KROKUS**

AGROBIZNIS

**Figure 2:** An article for a Serbian web portal explaining the purpose of the online survey and discrete choice experiment.

Furthermore, we advertised the survey on the BESTMAP Twitter account in local languages. In all CS, we incentivized participation in the survey with the opportunity to take part in a raffle.

Overall, 660 questionnaires were collected (146 in DE, 140 in CZ, 154 in the UK and 220 in RS). After removing incomplete questionnaires, 381 responses remained (74 in DE, 69 in CZ, 107 in the UK and 131 in RS). The median completion time in the retained questionnaires was 21 minutes for DE, CZ and SR samples and 9 minutes for the UK (mostly online and experienced with farmer surveys) sample. For the DCE analysis, speeders (those taking less than 5 minutes to go through the survey, i.e., 30% less than the median survey completion time) were removed which lead to 354 questionnaires (74 in DE, 69 in CZ, 107 in the UK and 104 in RS) remaining for analysis (27 responses from RS were removed). For ES, we received only 22 completed responses, which we decided not to evaluate due to lack of representativeness.

## 8. Implementing and documenting ABM using the ODD+D standard

BESTMAP will build the ABMs based on an open-source modelling platform. As the InVEST modelling toolbox that is employed in BESTMAP to model the provision of ES (see section 4.3) is implemented in Python, our first choice is to use an existing open-source Python-based ABM environment. This would allow easy scripting and interchange of data between the two platforms. Our current implementation plan builds on Mesa (<https://mesa.readthedocs.io/en/master/index.html>), a modular framework for building, analysing and visualizing agent-based models. The modules of the package are grouped into three categories:

1. Modelling: Modules used to build the models themselves: a model and agent classes, a scheduler to determine the sequence in which the agents act, and space for them to move around on.
2. Analysis: Tools to collect data generated from your model, or to run it multiple times with different parameter values.
3. Visualization: Classes to create and launch an interactive model visualization, using a server with a JavaScript interface.

There is also an extension to Mesa which allows to incorporate GIS data into models called mesa-geo (<https://github.com/Corvince/mesa-geo>) that will be used in the project. BESTMAP will explore existing open-source Python libraries to perform calibration/validation and sensitivity analysis - for example using SALib (<https://github.com/SALib/SALib>) package. High Performance Cluster resources to perform the analyses are available in several consortium organizations.

If, during the implementation phase, we encounter insurmountable challenges with Mesa, BESTMAP will adopt the more commonly used NetLogo ABM environment (which most ABM modellers, including our own, have experience with). The tight integration with python-based biophysical models can, in that case, be achieved by using the pyNetLogo package (<https://pynetlogo.readthedocs.io/en/latest/>), a library that allows to access and run NetLogo from Python (Jaxa-Rozen and Kwakkel, 2018). As with Mesa, this environment supports the use of python packages to sample and analyze a suitable experimental design for sensitivity analysis and to parallelize the simulations. Additionally, a NetLogo extension is available that provides the ability to load GIS data in NetLogo models (<https://ccl.northwestern.edu/netlogo/docs/gis.html>).

The final ABMs for each CS will be documented using the ODD+D protocol and deposited to an online code repository (e.g. GitHub, CoMSES Net). The ODD+D protocol is an extension of the 'ODD' (Overview, Design Concepts and Details) protocol describing ABMs that include human decision-making (Müller et al., 2013). It consists of three parts. First, it provides an 'Overview' of the purpose and main processes of the model. Second, in the 'Design Concepts' block, the general concepts underlying the model design are depicted. Third, in the 'Details', all of the necessary information is given that would allow for a reimplementing of the model. ODD+D adds elements on decision-making, adaptation and learning to the protocol. The

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standardized form of the ODD+D protocol allows to document necessary information about the models to support transparent and complete model description.

### **8.1. Final decisions for implementing the ABM**

During the implementation phase we realized that the Python-based ABM environment Mesa has limitations especially when running the model with many agents. Therefore, we decided to implement the model in the commonly used NetLogo ABM environment and use a NetLogo extension that provides the ability to load GIS data in NetLogo models. To ensure a tight coupling with Python-based biophysical models, we first planned to use the pyNetLogo package. However, due to the higher flexibility and more options to perform sensitivity analyses, we finally decided to run the models using the R package NLRX (<https://docs.ropensci.org/nlrx/reference/nlrx-package.html>) (Salecker et al., 2019). The input data for the biophysical models is provided via shapefiles as output of the ABM.

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## Appendix 1: Semi-structured interview protocol

### Semi-Structured Interview Protocol (English)

All text in yellow highlights needs to be edited by the Case Study partners before translation

#### A. Interview information

Name of person interviewed: [Click here to enter text.](#)

Address of farm: [Click here to enter text.](#)

Name of BESTMAP researcher and organisation: [Click here to enter text.](#)

Date of Interview: [Click here to enter text.](#)

*[The following information needs to be added to the transcript]*

Gender: [Click here to enter text.](#)

Strata code: [Click here to enter text.](#)

#### B. Introduction

*[Please introduce yourself and the project, the purpose of the interview]:*

*My name is/our names are ..... I am/we are ..... (your role) from the ..... (please mention your organisation(s)).*

*BESTMAP is an European Union funded research and innovation project that runs for four years. The project aims at shedding light on the differences in farmers' motivation and decision making to allow the European Union to better include expected behaviour into design of new regulations and subsidies for agriculture.*

*This interview is part of a series of interviews across BESTMAP Case Studies in the Czech Republic, Germany, Serbia, Spain and the United Kingdom [please reorder, your case study first] gathering information on the motivation of farmers to apply environmentally sustainable practices that are either supported by agri-environmental schemes or applied on a voluntary basis.*

*The interviews are explorative to inform the project about the most relevant decision making factors. We are interviewing farmers – like you – representing three different groups: hobbyists (subsistence farmers), professionals (independent) and companies, who either participate in agri-environmental schemes or who don't participate.*

*The procedure will be as follows: We will go through a series of prepared questions in the first part. In the second part you will be given a list of closed questions which we would like you to answer. The estimated time of the interview will be approximately one and a half to two hours. If there are questions you feel uncomfortable answering, we can record this and skip them.*

*[Please introduce the engagement consent form and clearly point out to the interview partner that the participation in the interview is voluntary and can be stopped at any time. Also ask for open questions about what has just been said (to build up trust). Afterwards hand a copy of the consent form to the interviewee to read and fill in – make sure that you take this away with you and keep for your own records.]*



## Part 1 – Interview questions (please mention that the interview starts now)

### C. Background information on the farmer

1. What is your role on the farm?
  - Owner
  - Tenant
  - Employed manager (corporate/company farm, only decision-maker)
  - Other:

2. What kind of farm do you manage?
  - An individual / family-run farm
  - Cooperative of farms
  - Company owned
  - Other: ...

### D. Attitude towards farming – open questions

3. Agriculture has a different meaning for different people. What does agriculture mean to you personally? (*i.e. food producer, philosophy of life, making profit, ...*)
4. How do you define a "good farmer"? (*i.e. one who works economically, one who works ecologically, who preserves the cultural heritage, ...*)

### E. Motivation to apply for agri-environmental schemes – open questions

Within the Rural Development plans of **England/Saxony/Catalonia/Czech Republic (e.g. Countryside Stewardship)***[please use the right country and replace with the applicable term of the RDP]*, farmers are offered to participate in agri-environmental schemes that focus on sustainable agricultural practices on cropland but also grassland. A certain amount per hectare is paid to remunerate the costs of the measure (*i.e. seeds*) and the income loss (due to yield loss).

5. Do you participate in an AES?
  - If no, why? (*i.e. economic, ecological, social, administrative barriers*)
  - If yes, why? (*i.e. economic, ecological, social reasons*)
6. Have you talked to other farmers about participating in AES?
7. If yes, how has that information contributed to your management decisions?

**The following four questions are only for farmers who participate in AES.**

8. Did you experience any difficulties while applying/implementing the schemes? Which ones (*i.e. technical, financial, social, administrative*)?
9. Does the remuneration from the scheme compares to your expenses and income losses? Please specify.
10. How did you learn about the schemes you implemented? (*i.e. personal contact: Farmers, consultants, authorities, associations; print and online media*)
11. What is relevant to you when choosing schemes to implement? (*i.e. efforts and benefits, such as financial, social (e.g. social appreciation), ecological, ...*)

**The following questions are again for all farmers:**

12. Have you implemented on your own (without any financial incentives) interventions that are offered in the Rural Development Plan **[please use the applicable term for your country]**? [If not, please continue with question 16]
13. What are these interventions?
14. Why did you implement these? (*i.e. good for my core business, environmental reasons, part of business diversification plan etc.*)
15. Why did you not apply for an AES to receive the remuneration?
16. Are you getting subsidies / grants from other sources besides public funded Rural Development Plans (*i.e. from companies, trusts, NGOs*)?
17. Do you think your decision influences the adoption of AES by other farmers?
18. Are you planning to apply for (additional) AES in the future? Why?  
If yes, under which terms would you apply for (additional) AES?  
If no, under which terms would you apply for AES? (*i.e. better financial resources, less effort (technical, administrative)*)
19. Are you interested in participating in collaborative schemes? [collaborative means that several farmers apply together for a scheme] Why?
20. Are you interested in participating in result-based schemes? [result-based means that a certain outcome has to be provided (*i.e. certain number of species on the field*), in order to receive financial support] Why?
21. Now we've asked you a lot of details - what do you think in general about AES?

**F. From a farmers perspective – open questions**

Farmers have a lot of knowledge about nature. Regardless of current agri-environmental schemes, we are interested in your perspective on some ecological aspects.

22. From your perspective, what can you do on your farm to conserve biodiversity?  
*[Please note down if the farmer actually does it or if it is hypothetical]*
23. From your perspective, what can you do on your farm to support better water quality in your catchment? *[Please note down if the farmer actually does it or if it is hypothetical]*
24. From your perspective, what can you do on your farm to support soil quality and store more carbon in soil? *[Please note down if the farmer actually does it or if it is hypothetical]*
25. From your perspective, what can you do on your farm to reduce GHG emissions (*i.e. methane, nitrogen oxide*)? *[Please note down if the farmer actually does it or if it is hypothetical]*

### G. Ending the first part of the interview

26. We are now at the end of the interview part, thank you very much for participation! We/I asked many questions. Is there anything else that is important from your point of view and has not been addressed? Or do you still have questions?
27. Would you like us to keep you updated about BESTMAP? If yes, how would you like to receive the information?
28. Can you suggest anyone else who might be interested in BESTMAP, and/or being interviewed by us?

The part of the interview is now over. However, we have some additional questions and we are interested in your answers to better understand farmer's decision making. We keep recording, because additional relevant aspects might be addressed when answering the closed questions.

Part 2: Quantitative information	
A. Background information on the farm	
1. What share of your farm is managed as conventional, organic or integrative type of farming?	Conventional    % Organic        % Integrative     %
2. What is your total agricultural area in hectares?	ha
3. How many hectares of this agricultural area is	<input type="checkbox"/> Owned:    ha <input type="checkbox"/> Rented:    ha
4. What are additional sources of your household income (i.e. agro-tourism, part time job, bioenergy, off-farm income)? <a href="#">Click here to enter text.</a>	
5. What is your age?	<input type="checkbox"/> Below 45 <input type="checkbox"/> 45 or above In case you want to specify:    years
6. How many total years have you been working in agriculture?	<input type="checkbox"/> < 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 10-30 years <input type="checkbox"/> 30-60 years <input type="checkbox"/> > 60 years
7. What is the highest degree related to farming you have completed? If currently enrolled, highest degree received.	<input type="checkbox"/> No training <input type="checkbox"/> Trade/technical/vocational training <input type="checkbox"/> Bachelor's degree <input type="checkbox"/> Master's degree <input type="checkbox"/> Professional degree <input type="checkbox"/> Doctorate degree
If you have an additional degree, please mention it here: <a href="#">Click here to enter text.</a>	

Part 2: Quantitative information	
A. Background information on the farm	
1. What share of your farm is managed as conventional, organic or integrative type of farming?	Conventional    % Organic        % Integrative     %
2. What is your total agricultural area in hectares?	ha
3. How many hectares of this agricultural area is	<input type="checkbox"/> Owned:    ha <input type="checkbox"/> Rented:    ha
4. What are additional sources of your household income (i.e. agro-tourism, part time job, bioenergy, off-farm income)? <a href="#">Click here to enter text.</a>	
5. What is your age?	<input type="checkbox"/> Below 45 <input type="checkbox"/> 45 or above In case you want to specify:    years
6. How many total years have you been working in agriculture?	<input type="checkbox"/> < 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 10-30 years <input type="checkbox"/> 30-60 years <input type="checkbox"/> > 60 years
7. What is the highest degree related to farming you have completed? If currently enrolled, highest degree received.	<input type="checkbox"/> No training <input type="checkbox"/> Trade/technical/vocational training <input type="checkbox"/> Bachelor's degree <input type="checkbox"/> Master's degree <input type="checkbox"/> Professional degree <input type="checkbox"/> Doctorate degree
If you have an additional degree, please mention it here: <a href="#">Click here to enter text.</a>	







**B. Environmentally sustainable practices (to be answered by everyone)**

14. What kind of landscape features do you have on your farm? Please let us know if you protect these features.

<b>Landscape features</b>	<b>Are they present on your farm? yes / no</b>	<b>Do you protect / maintain the features? yes / no</b> (if yes, please continue with the questions to the right)	<b>Are you in an agri-environmental scheme to protect / maintain these features? yes / no</b> (if not, please continue with the question to the right)	<b>Do you protect / maintain these features as part of cross-compliance or greening measures? yes / no</b>
Isolated trees		Click here to enter text.	Click here to enter text.	Click here to enter text.
Woodland		Click here to enter text.	Click here to enter text.	Click here to enter text.
Hedges		Click here to enter text.	Click here to enter text.	Click here to enter text.
Ditches / ponds		Click here to enter text.	Click here to enter text.	Click here to enter text.
River / stream vegetation buffercorridor		Click here to enter text.	Click here to enter text.	Click here to enter text.
Wetlands		Click here to enter text.	Click here to enter text.	Click here to enter text.



Historical farm buildings		Click here to enter text.	Click here to enter text.	Click here to enter text.
Other:		Click here to enter text.	Click here to enter text.	Click here to enter text.

15. The **5 options** that are most often applied in agri-environmental schemes in England *[replace with case study]* are listed below. *[each CS to replace with 2-3 schemes with largest area based on JRC data (excluding organic farming, schemes to prepare management plans etc.) 2-3 schemes with largest number of farmers adopting the scheme (may need to come from stakeholders), 1 scheme stakeholders/experts think is best for biodiversity and 1 scheme stakeholders/experts think is best for GHG emission reduction/soil organic carbon sequestration].* Do you apply one of the following options? Why / why not? Please note: In case you are not familiar with one of the options, please ask the interviewer for explanation.

Options	yes / no	Area / length	Why do you / why don't you apply this option?
Scheme 1			Click here to enter text.
Scheme 2			Click here to enter text.
Scheme 3			Click here to enter text.
Scheme 4			Click here to enter text.
Scheme 5			Click here to enter text.

16. Above, we asked more generally about AES, here we would like to ask more specific questions to two selected measures (please only fill it in when you are applying agri-environmental schemes)  
Please name and list the two most relevant options you apply according to their importance to you (most relevant option to be mentioned as option 1) and answer the following questions

**Option 1:** [Click here to enter text](#)

I apply this option because:

	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree
it increases my crops yield / improves livestock health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
of the monetary compensation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
of the ecological effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
many of my neighbouring farmers apply this scheme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
family and friends think it is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think it improves my image as a farmer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can sell my products better (i.e. higher price, more products)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other reason: <a href="#">Click here to enter text.</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I learnt about this option through (multiple choices possible)

- Information on the internet/government website
- Farmers in the neighbourhood
- Farmers in the same association
- Representatives of companies

- Advisors, please specify:
- Local authorities
- Own past experience
- Other:

I experienced the following difficulties while implementing the option:

	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree	Please shortly specify the difficulty:
Technical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Financial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Criticism from other farmers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Criticism from public (i.e. from the village)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Other reason: <a href="#">Click here to enter text.</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.

<b>Option 2:</b> <a href="#">Click here to enter text</a>					
<b>I apply this option because:</b>					
	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree
it increases my crops yield / improves livestock health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
of the monetary compensation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
of the ecological effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
many of my neighbouring farmers apply this scheme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
family and friends think it is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think it improves my image as a farmer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can sell my products better (i.e. higher price, more products)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other reason: <a href="#">Click here to enter text.</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>I learnt about this option through (multiple choices possible)</b>					
<input type="checkbox"/> Information on the internet/government website <input type="checkbox"/> Farmers in the neighbourhood <input type="checkbox"/> Farmers in the same association <input type="checkbox"/> Representatives of companies		<input type="checkbox"/> Advisors, please specify: <input type="checkbox"/> Local authorities <input type="checkbox"/> Own past experience <input type="checkbox"/> Other:			

I experienced the following difficulties while implementing the option:

	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree	Please shortly specify the difficulty:
Technical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Financial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Criticism from other farmers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Criticism from public (i.e. from the village)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Other reason: Click here to enter text.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.

**C. Questions for farmers not participating in AES**

17. In the interview we already asked some questions about your participation about AES. Some of the following questions are similar but with very differentiated answer categories to understand better the reasons why farmers do not participate in AES.

Why did you so far not participate in an agri-environmental scheme?

	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree
Demand for extra time or labour for installing, maintaining the scheme is too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demand for extra time or labour for bureaucratic tasks is too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The financial support does not cover the costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have other priorities and I find this not important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A contract duration of 5 to 10 years is too long	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The losses of yield count more for me than the financial compensation and environmental benefits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participation requires knowledge/skills which I do not have	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participation requires technical equipment which I do not have	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The ecological effectiveness/benefits of the scheme are uncertain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am not sure whether I will actual get the reward (for result-based schemes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None of the farmers in my social network participates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of support from advisory services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other reason, which is: <a href="#">Click here to enter text.</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### D. Opinion on (future direction) of the CAP

18. Currently, the European Commission is working on the next programme period of the Common Agricultural Policy. This includes revision on the direct / basic payments but also the agri-environmental schemes.

What would be incentives for you to participate in future schemes?

	I fully agree	I somehow agree	Neither agree, nor disagree	I somehow disagree	I fully disagree
higher financial support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
scheme that do not change every few years but be constant for at least 10 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
long term contracts (e.g. for woodland creation/restoration)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
shorter contracts (i.e. annual or 2 years instead of 5-10 years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
lower bureaucratic burden (i.e. less paper work)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
more consultancy (i.e. agricultural education, training)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
better consultancy (agricultural education, training)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
higher environmental effectiveness than what is currently offered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
higher flexibility of schemes in terms of practices to adopt, as long as some measurable outcome is delivered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
higher recognition of the work farmers do (by society)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other incentive: <a href="#">Click here to enter text.</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix 2: Online survey questionnaire

### Consent

Thank you for your interest in this survey. The following questionnaire is part of research carried out by the *[please insert your institute]* as part of the European Union funded research project [BESTMAP](#). The project aims at shedding light on the differences in farmers' motivation and decision making to allow policy makers to better include expected behaviour into the design of new regulations and subsidies for agriculture.

This questionnaire focuses on the opinion of farmers on various issues regarding agri-environmental schemes and is conducted across BESTMAP Case Studies in the Czech Republic, Germany, Serbia, Spain and the United Kingdom *[please reorder, your case study first]*. It is carried out exclusively for academic purposes and it has no commercial intentions.

It will take you approximately 15 minutes to complete the questionnaire.

### Confidentiality Data use and Anonymity

You will not be asked any personally-identifying information, only general information about your activity and views. All information and data will be kept on password protected computer systems in line with University of Leeds protocols and the UK Data Protection Act *[check what needs to be inserted here for your CS]*, and will not be shared outside the research team. Results of the survey will be used for academic and other relevant publications. Results will only be published at the aggregated level and it will not be possible to identify answers from any individual participant.

If you have any questions about this questionnaire or the research, you can do so by contacting *[please insert CS contact person]* at the *[please insert your institute]* (*[please insert your email address]*).

### Withdrawal of consent

You may request that your answers are withdrawn up to 30 days after your interview by contacting the email address above. We will then destroy and not use your responses. If you contact us after the 30 days have passed, we will not be able to delete all your responses.

This research is funded by the European Union's Horizon 2020 research and innovation programme (grant agreement: No. 817501) and it has been approved by the Ethics Committee of the *[please insert your institute]*.

**By clicking "Next" you confirm that you have understood the above information and that you consent to taking part in this survey.**



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**Background information on the farm**

**Q1.1** What is the first half of your farm's postcode (if your farm is extensive across a large area, what is the postcode for the largest share of fields)?

\_\_\_\_\_

**Q1.2** What kind of farm do you manage?

- Full-time individual/family-run farm (1)
- Part-time individual/family-run farm (2)
- Cooperative of farms (3)
- Company owned (4)
- Other: \_\_\_\_\_ (5)

**Q1.3** Is your farm organic?

- No (1)
- Yes, certified organic (2)
- In transition to fully organic (3)
- Mixed, organic/non-organic (4)

**Q1.4** Do you participate in quality / voluntary certification schemes?

- Yes - which? \_\_\_\_\_ (1)
- No (2)

**Q1.5** What types of agricultural land did your farm manage last year (owned and rented)?

- Arable land (area in ha) \_\_\_\_\_ (1)
- Permanent grassland (area in ha) \_\_\_\_\_ (2)
- Permanent crops (area in ha) \_\_\_\_\_ (3)
- Vineyards (area in ha) \_\_\_\_\_ (4)
- Orchards (area in ha) \_\_\_\_\_ (5)
- Woodland or forestry (area in ha) \_\_\_\_\_ (6)
- Fallow, not in use (area in ha) \_\_\_\_\_ (7)
- Other use (area in ha) \_\_\_\_\_ (8)

**Q1.6** How much of the agricultural land have you rented (in ha)?

\_\_\_\_\_

**Q1.7** How good is the average fertility of your soil compared to the average soil fertility in your district?

- Much worse (1)
- Somewhat worse (2)
- About the same (3)
- Somewhat better (4)
- Much better (5)

**Q1.8** What share of land is more than 3 km away from your farmstead?

- <10% (1)
- 10-30% (2)
- 31-50% (3)
- 51-70% (4)
- 71-90% (5)
- >90% (6)

*Display This Question:*

*If What types of agricultural land did your farm manage last year (owned and rented)? = Arable land (area in ha)*

**Q1.9** What were your economically most important crops on arable land in the last year?

- 1: \_\_\_\_\_ (1)
- 2: \_\_\_\_\_ (2)
- 3: \_\_\_\_\_ (3)
- 4: \_\_\_\_\_ (4)
- 5: \_\_\_\_\_ (5)

*Display This Question:*

*If What types of agricultural land did your farm manage last year (owned and rented)? = Arable land (area in ha)*

*Or What types of agricultural land did your farm manage last year (owned and rented)? = Improved grassland (area in ha)*

*Or What types of agricultural land did your farm manage last year (owned and rented)? = Permanent grassland (area in ha)*

**Q1.10** Do you have livestock on your farm?

- Yes (1)
- No (2)

*Display This Question:*

*If Do you have livestock on your farm? = Yes*

**Q1.11** What are the most important livestock animals you have on your farm? Please indicate the number of animals for the last year if you remember.

livestock (1)	heads/individuals (2)
	(1)
	(2)
	(3)
	(4)
	(5)

**Q1.12** How often ...

	Weekly (1)	Monthly (2)	3-4 times a year (3)	1-2 times a year (4)	Never (5)
do you get consultation by an agricultural advisory or extension service in general? (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
do you get consultation related to nature conservation? (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
do you get consultation specific to agri-environmental schemes? (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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## DCE Intro

*[Please choose the introduction suitable for your CS:]*

**UK:** Following the exit of the UK from the European Union, discussions are taking place regarding new ways for farming subsidies, the details of which have not yet been fully developed. These schemes (such as Sustainable Farming Incentive and Local Nature Recovery) will subsidise farming practices comparable to those offered in the Countryside Stewardship, with the broad aim of enhancing the delivery of public goods on farmland. This part of the survey is aimed at getting your opinion on possible designs of agri-environmental schemes. **We are interested in your decision-making process concerning a particular group of farming practices.** You should fill this section of the survey imagining that your farm is receiving the 2019-2020 level of Basic Payments. Please consider what choices you would make for the **hypothetical agri-environmental options** presented below as offers in the Countryside Stewardship. These schemes would have different characteristics and we are going to ask you in repeated choices to select the option you prefer. Note that these schemes are designed for research purposes only. However, we will be sending the results of our research to DEFRA to feed into their ongoing discussions. Therefore, we kindly ask you to respond as if these choices were real, so we can provide accurate information on the true opinions of farmers.




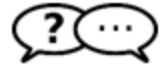




**RS:** In Serbia, the possibilities of financing environmentally friendly agricultural practices are currently being considered. The purpose of the survey is to examine the **attitude and interest of the farmer in applying such a practice.** For this purpose, 4 agro-ecological practices will be presented to you. After that, we will ask you to choose the option you would prefer.

**EU:** The European Union is discussing future options for **funding environmentally friendly agricultural practices** within its Common Agricultural Policy. This part of the survey is aimed at getting your opinion on possible designs of agri-environmental schemes. We are going to present you with a series of **hypothetical schemes.** These schemes would have different characteristics and we are going to ask you in repeated choices to select the option you prefer. Please note that these schemes are hypothetical and have been entirely designed for research purposes only. However, we will be sending the condensed results of our research to the policy makers responsible for agricultural policies in *[please insert your case study]* to feed into their ongoing discussions. Therefore, we kindly ask you to respond as if these choices were real, so we can provide policy makers with accurate information on the true opinion of farmers.

The choices are characterised as follows:

Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<ul style="list-style-type: none"> <li>• Sowing of a <b>specific seed mixture</b> required</li> <li>• Use of <b>fertilizers and plant protection products not permitted</b>, with the exception of those allowed in organic farming</li> <li>• <b>Cutting</b> only allowed to <b>prevent grasses smothering</b> the flowering species</li> <li>• Applicable on <b>arable land</b></li> <li>• Minimum plot size <b>0.1 ha</b> (whole parcels) or minimum width <b>6m</b> (strips at the border of a parcel)</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivation of cover crops <b>after harvesting the main crop</b></li> <li>• Cover crop <b>cannot be used as the main crop</b> in the following year</li> <li>• Cover crop must be removed no more than <b>6 weeks</b> before establishing the following spring crop</li> <li>• Applicable on <b>arable land</b></li> <li>• Minimum plot size <b>0.3 ha</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mowing</b> not allowed before a specific date announced by local authorities every year depending on the <b>phenological conditions</b></li> <li>• Use of <b>fertilizers and plant protection products is limited</b></li> <li>• <b>Ploughing</b> is prohibited</li> <li>• Applicable on <b>permanent grassland</b></li> <li>• Minimum plot size <b>0.1 ha</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mowing</b> not allowed before a specific date announced by local authorities every year depending on the <b>phenological conditions</b></li> <li>• Use of <b>fertilizers and plant protection products is limited</b></li> <li>• Area has <b>permanent grassland status</b> at the end of the contract</li> <li>• Applicable on <b>arable land</b></li> <li>• Minimum plot size <b>0.1 ha</b></li> </ul>





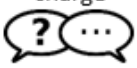
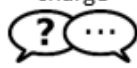
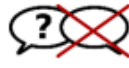
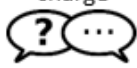




In addition, the four different schemes differ in a **range of characteristics** you will have to comply with in order to receive payment. In the table below, you can see a summary of these characteristics.

Attributes		Your options		
<b>Duration of contract</b>	<ul style="list-style-type: none"> <li>• <b>Duration</b> for which the respective practice would need to be implemented</li> <li>• The scheme has to be maintained on the <b>same plots</b> for the duration of the contract</li> </ul>	1 year 	5 years 	10 years 
<b>In-person advisory support</b>	<ul style="list-style-type: none"> <li>• <b>Availability of free in-person advisory support</b> specific to agri-environmental schemes</li> <li>• Support with <b>administrative work</b> and with <b>implementation</b></li> </ul>	Yes, free of charge 		No 
<b>Administrative effort</b>	<ul style="list-style-type: none"> <li>• Effort for <b>non-operational aspects of the scheme</b> such as information gathering, applying for and monitoring the scheme</li> </ul>	Low 	Medium 	High 

Each option will also include the **yearly payment** that you would receive for each hectare enrolled in the particular scheme.

We ask you to choose which of the schemes you would like to apply in each case and decide how much land (in % of your area of the respective land type) you would be willing to place under the chosen contract. Only consider schemes that are applicable to land types you have. If none of the schemes suits your preferences, you can choose the no scheme option. This means that you would prefer not to receive funding related to agri-environmental schemes on your farm.

An **example** of the types of contracts you will be asked to choose from is shown below:





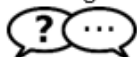

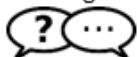





	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
Duration of contract	1 year 	10 years 	5 years 	10 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
In-person advisory support	Yes, free of charge 	Yes, free of charge 	No 	Yes, free of charge 	
Administrative effort	Low 	High 	Medium 	Medium 	
Yearly payment	£825 per hectare	£90 per hectare	£140 per hectare	£1,100 per hectare	

In the following, we will show you **six different scenarios** for agri-environmental schemes and ask you to select your preferred scheme for each combination.

*[each respondent is randomly assigned to DCE group 1 or 2]*

**DCE (group 1)**

**Q2.1** Scenario 1/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	10 years 	1 year 	10 years 	5 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
<b>In-person advisory support</b>	Yes, free of charge 	No 	Yes, free of charge 	No 	
<b>Administrative effort</b>	Low 	Low 	High 	High 	
<b>Yearly payment</b>	£620 per hectare	£180 per hectare	£190 per hectare	£1,100 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

**Display This Question:**

If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips

Or Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops

Or Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland

**Q2.2** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.




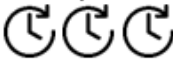
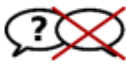
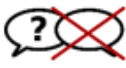
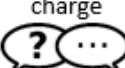
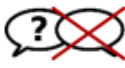




**Display This Question:**

If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland

**Q2.3** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.



**Q2.4** Scenario 2/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	10 years 	1 year 	5 years 	10 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
<b>In-person advisory support</b>	No 	No 	Yes, free of charge 	No 	
<b>Administrative effort</b>	Medium 	Medium 	High 	Low 	
<b>Yearly payment</b>	£690 per hectare	£135 per hectare	£190 per hectare	£800 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

*Display This Question:*

*If Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*








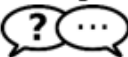




**Q2.5** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q2.6** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q2.7** Scenario 3/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	10 years 	1 year 	5 years 	10 years 	<b>You will not receive funding for any agri-environmental practices you may carry out on your farm.</b>
<b>In-person advisory support</b>	No 	No 	No 	Yes, free of charge 	
<b>Administrative effort</b>	Low 	Low 	Low 	Medium 	
<b>Yearly payment</b>	£410 per hectare	£135 per hectare	£285 per hectare	£1,250 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

*Display This Question:*

*If Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*





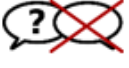
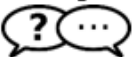
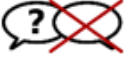
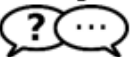




**Q2.8** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q2.9** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q2.10** Scenario 4/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	1 year 	5 years 	10 years 	10 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
<b>In-person advisory support</b>	No 	Yes, free of charge 	No 	Yes, free of charge 	
<b>Administrative effort</b>	Medium 	Medium 	Medium 	Low 	
<b>Yearly payment</b>	£410 per hectare	£120 per hectare	£285 per hectare	£1,100 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

*Display This Question:*

*If Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*


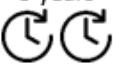
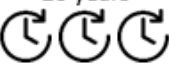
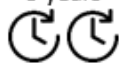
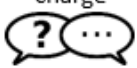
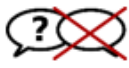
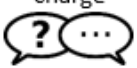





**Q2.11** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q2.12** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q2.13** Scenario 5/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	1 year 	5 years 	10 years 	5 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
<b>In-person advisory support</b>	Yes, free of charge 	No 	Yes, free of charge 	No 	
<b>Administrative effort</b>	Medium 	Medium 	Low 	Low 	
<b>Yearly payment</b>	£825 per hectare	£150 per hectare	£240 per hectare	£800 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

*Display This Question:*

*If Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*

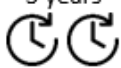
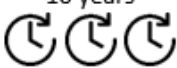

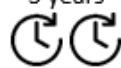
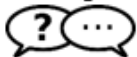
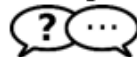
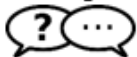





**Q2.14** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q2.15** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q2.16** Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland	No scheme
<b>Duration of contract</b>	5 years 	10 years 	10 years 	5 years 	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.
<b>In-person advisory support</b>	Yes, free of charge 	Yes, free of charge 	Yes, free of charge 	No 	
<b>Administrative effort</b>	High 	High 	High 	Medium 	
<b>Yearly payment</b>	£550 per hectare	£90 per hectare	£190 per hectare	£1,665 per hectare	

- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)
- No scheme (5)

*Display This Question:*

*If Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*

**Q2.17** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q2.18** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

*Display This Question:*

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

**Q2.19** In the previous questions you chose the "cover crops" option at least once. Which main crop would you cultivate after the cover crops?

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*Display This Question:*

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

**Q2.21** In the previous questions you never chose the option "Converting arable land to permanent grassland". Can you indicate why? (several answers possible)

- I do not want to lose arable land. (1)
- I do not think this scheme will improve the environment. (2)
- Participation requires knowledge/skills which I do not have. (3)
- Participation requires technical equipment which I do not have. (4)
- Converting arable land to permanent grassland would be a bad financial decision for me. (5)
- Other reason, please specify: \_\_\_\_\_ (6)

**Display This Question:**

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

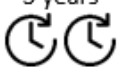



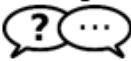
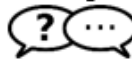
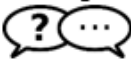
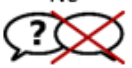

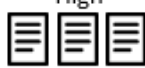


*And Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

**Q2.20** In the previous questions you chose the "no-scheme" option every time. Can you indicate why? (several answers possible)

- I am generally not willing to enrol in agri-environmental schemes. (1)
- I did not find the options suitable for my land or current situation. (2)
- Enrolling in such schemes would be a bad financial decision for me. (3)
- There is no need for actions to protect the environment in my farm. (4)
- Other reason, please specify: \_\_\_\_\_ (5)

**DCE (group 2)**

**Q3.1** Scenario 1/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		5 years 	1 year 	1 year 	10 years 
<b>In-person advisory support</b>	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.	Yes, free of charge 	Yes, free of charge 	Yes, free of charge 	No 
<b>Administrative effort</b>		Low 	High 	Medium 	High 
<b>Yearly payment</b>		£620 per hectare	£120 per hectare	£215 per hectare	£1,400 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

**Display This Question:**

If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips

Or Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops

Or Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland

**Q3.2** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.





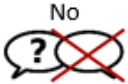
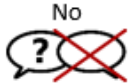
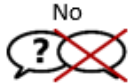
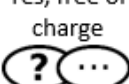




**Display This Question:**

If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland

**Q3.3** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.



**Q3.4** Scenario 2/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		5 years 	10 years 	1 year 	5 years 
<b>In-person advisory support</b>	You will not receive funding for any agri-environmental practices you may carry out on your farm.	No 	No 	No 	Yes, free of charge 
<b>Administrative effort</b>		High 	Low 	Low 	High 
<b>Yearly payment</b>		£550 per hectare	£180 per hectare	£140 per hectare	£1,250 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

*Display This Question:*

*If Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*




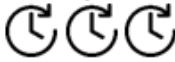
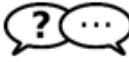
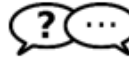

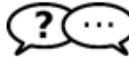




**Q3.5** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q3.6** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q3.7** Scenario 3/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		1 year 	10 years 	5 years 	10 years 
<b>In-person advisory support</b>	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.	Yes, free of charge 	Yes, free of charge 	No 	Yes, free of charge 
<b>Administrative effort</b>		Low 	High 	Medium 	Medium 
<b>Yearly payment</b>		£825 per hectare	£90 per hectare	£140 per hectare	£1,100 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

*Display This Question:*

*If Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*


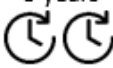

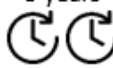
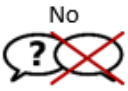
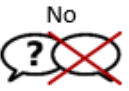
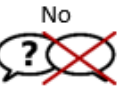
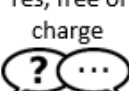




**Q3.8** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q3.9** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q3.10** Scenario 4/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		10 years 	5 years 	1 year 	5 years 
<b>In-person advisory support</b>	You will not receive funding for any agri-environmental practices you may carry out on your farm.	No 	No 	No 	Yes, free of charge 
<b>Administrative effort</b>		High 	Low 	Low 	Low 
<b>Yearly payment</b>		£550 per hectare	£150 per hectare	£140 per hectare	£800 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

*Display This Question:*

*If Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*





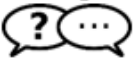
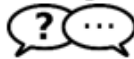
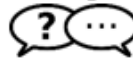
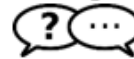



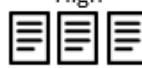
**Q3.11** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q3.12** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q3.13** Scenario 5/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		5 years 	10 years 	1 year 	5 years 
<b>In-person advisory support</b>	You will <b>not</b> receive funding for any agri-environmental practices you may carry out on your farm.	Yes, free of charge 	Yes, free of charge 	Yes, free of charge 	Yes, free of charge 
<b>Administrative effort</b>		Medium 	Medium 	High 	High 
<b>Yearly payment</b>		£410 per hectare	£120 per hectare	£215 per hectare	£1,665 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

*Display This Question:*

*If Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*





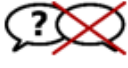
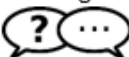
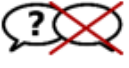
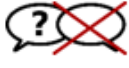




**Q3.14** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q3.15** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

**Q3.16** Scenario 6/6: Please choose your preferred scheme. Click [here](#) to reopen the summary of the scheme characteristics. If you do not have permanent grassland, please do not consider the option "Maintaining permanent grassland".

	No scheme	Flower areas/strips	Cover crops	Maintaining permanent grassland	Converting arable land to permanent grassland
<b>Duration of contract</b>		1 year 	5 years 	5 years 	10 years 
<b>In-person advisory support</b>	You will not receive funding for any agri-environmental practices you may carry out on your farm.	No 	Yes, free of charge 	No 	No 
<b>Administrative effort</b>		High 	High 	Medium 	Medium 
<b>Yearly payment</b>		£690 per hectare	£90 per hectare	£240 per hectare	£1,400 per hectare

- No scheme (5)
- Flower areas/strips (1)
- Cover crops (2)
- Maintaining permanent grassland (3)
- Converting arable land to permanent grassland (4)

*Display This Question:*

*If Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Flower areas/strips*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Converting arable land to permanent grassland*

**Q3.17** I would apply the chosen scheme on \_\_\_\_\_ % of my arable land.

*Display This Question:*

*If Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Maintaining permanent grassland*

**Q3.18** I would apply the chosen scheme on \_\_\_\_\_ % of my permanent grassland.

*Display This Question:*

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

*Or Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = Cover crops*

**Q3.19** In the previous questions you chose the "cover crops" option at least once. Which main crop would you cultivate after the cover crops?

---

*Display This Question:*

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

*And Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... != Converting arable land to permanent grassland*

**Q3.21** In the previous questions you never chose the option "Converting arable land to permanent grassland". Can you indicate why? (several answers possible)

- I do not want to lose arable land. (1)
- I do not think this scheme will improve the environment. (2)
- Participation requires knowledge/skills which I do not have. (3)
- Participation requires technical equipment which I do not have. (4)
- Converting arable land to permanent grassland would be a bad financial decision for me. (5)
- Other reason, please specify: \_\_\_\_\_ (6)

**Display This Question:**

*If Scenario 1/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 2/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 3/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 4/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 5/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

*And Scenario 6/6: Please choose your preferred scheme. Click here to reopen the summary of the scheme... = No scheme*

**Q3.20** In the previous questions you chose the "no-scheme" option every time. Can you indicate why? (several answers possible)

- I am generally not willing to enrol in agri-environmental schemes. (1)
- I did not find the options suitable for my land or current situation. (2)
- Enrolling in such schemes would be a bad financial decision for me. (3)
- There is no need for actions to protect the environment in my farm. (4)
- Other reason, please specify: \_\_\_\_\_ (5)

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**Experience with AES**

*[Please choose the introduction suitable for your CS:]*

**EU + UK:** After having shown you different design options, we would now like to know more about your current and previous participation in **specific agri-environmental schemes that already exist**.

**RS:** After we showed you the different options for agri-environmental subsidies, we would like to know more about your opinion about them. In addition, we would like to know about your views and your previous experience, if you have any, with organic production.

*[Present max. four CS-specific schemes which are the ones closest to our four selected schemes in the DCE. For RS: Present four schemes and additional scheme on moving livestock to state land for grazing.]*

**AES1** Is your farm engaged in the agri-environmental scheme "xyz"?

- Yes - on \_\_\_\_\_ ha. (1)
- No, currently not but I have participated in that scheme in the past. (2)
- No, I have never participated. (3)

*Display This Question:*

*If Is your farm engaged in the agri-environmental scheme "xyz"? = Yes - on ... ha.*

**AES2** I apply "xyz" because... (several answers possible)

- of the monetary compensation (1)
- of the ecological effects (2)
- many of my neighbouring farmers apply this scheme (3)
- I think it improves my image as a farmer in the society (4)
- it fits fit with what we do on our farm (5)
- it contributes to climate resilience and/or carbon sequestration (7)
- Other reasons, please specify: \_\_\_\_\_ (6)

*Display This Question:*

*If Is your farm engaged in the agri-environmental scheme "xyz"? = Yes - on ... ha.*

**AES3** What are the main criteria for selecting fields on which you apply "xyz"? I select fields that... (several answers possible)

- have a difficult to manage soil (1)
- are of low productivity (2)
- are of high elevation/steep slope (3)
- are further away of farmstead/farm yard (4)
- have higher expected ecological benefit (5)
- Other, please specify: \_\_\_\_\_ (6)



*Display This Question:*

*If Is your farm engaged in the agri-environmental scheme "xyz"? = No, currently not but I have participated in that scheme in the past.*

**AES4** Why are you currently not participating in "xyz"? (several answers possible)

- Demand for extra time or labour for installing and maintaining the scheme is too high (1)
- Demand for extra time or labour for bureaucratic tasks is too high (2)
- I have had negative experiences with the monitoring of the schemes (3)
- The scheme does not fit with what we do on the farm (4)
- The financial support does not cover the costs (5)
- The contract duration is too long (6)
- The scheme contains too many rules and constraints (7)
- I do not think this scheme will improve the environment (8)
- The risk of sanctions is too high (9)
- None of the farmers in my social network participates (10)
- Lack of support from advisory services (11)
- Other reasons, please specify: \_\_\_\_\_ (12)

*Display This Question:*

*If Is your farm engaged in the agri-environmental scheme "xyz"? = No, I have never participated.*

**AES5** Do you know that the agri-environmental scheme "xyz" exists?

- Yes (1)
- No (2)

*Display This Question:*

*If Do you know that the agri-environmental scheme "xyz" exists? = Yes*

**AES6** Could you in general imagine participating in "xyz"?

- Yes (1)
- No (2)

*Display This Question:**If Could you in general imagine participating in "xyz"? = Yes***AES7** Why did you not participate in "xyz" so far? (several answers possible)

- Demand for extra time or labour for installing and maintaining the scheme is too high (1)
- Demand for extra time or labour for bureaucratic tasks is too high (2)
- The scheme does not fit with what we do on the farm (3)
- The financial support does not cover the costs (4)
- The contract duration is too long (5)
- The scheme contains too many rules and constraints (6)
- I do not think this scheme will improve the environment (7)
- The risk of sanctions is too high (8)
- None of the farmers in my social network participates (9)
- Lack of support from advisory services (10)
- Other reasons, please specify: \_\_\_\_\_ (11)

*Display This Question:**If Could you in general imagine participating in "xyz"? = No***AES8** Why can you not imagine participating in "xyz"? (several answers possible)

- Participation requires knowledge/skills which I do not have (1)
- Participation requires technical equipment which I do not have (2)
- Demand for extra time or labour for installing and maintaining the scheme is too high (3)
- Demand for extra time or labour for bureaucratic tasks is too high (4)
- The scheme does not fit with what we do on the farm (5)
- The financial support does not cover the costs (6)
- The contract duration is too long (7)
- The scheme contains too many rules and constraints (8)
- I do not think this scheme will improve the environment (9)
- The risk of sanctions is too high (10)
- None of the farmers in my social network participates (11)
- Lack of support from advisory services (12)
- Other reasons, please specify: \_\_\_\_\_ (13)

*[Additional questions for cover crops]**Display This Question:**If Is your farm engaged in the agri-environmental scheme "xyz"? = Yes - on ... ha.***CC4** Which main crop would you cultivate after the cover crops?

\_\_\_\_\_

*Display This Question:**If Is your farm engaged in the agri-environmental scheme "xyz"? = No, currently not but I have participated in that scheme in the past.***CC6** Which main crop did you cultivate after the cover crops?

\_\_\_\_\_

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**Other AES**

**Q7.1** Has your farm ever been engaged in other agri-environmental schemes (in addition to the ones asked for in the previous questions)?

- Yes (1)
- No, I have not participated in other schemes. (2)
- No, I have never participated in agri-environmental schemes before. (3)

*Display This Question:*

*If Has your farm ever been engaged in other agri-environmental schemes (in addition to the ones aske... = Yes*

**Q7.2** The following other agri-environmental schemes are currently executed or have been executed in the last five years (please separate the individual entries with a comma):

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**Personal views****Q8.1** Please rate your level of agreement to the following statements:

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
Producing food is the single objective of farming (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safeguarding of the environment is an important task of farmers. (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maximizing profit is the single objective of my management (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important to be perceived as environmentally friendly by society (4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I always make time to socialise with other farmers (5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am keen to apply new technology on my holdings as it becomes available (6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Sociodemographic background

**Q9.1** How many total years have you been working in agriculture?

**Q9.2** What is the highest level of farming education you have completed? If currently enrolled, the highest certification already received.

- No training (1)
- Vocational/professional training (2)
- Bachelor's degree (3)
- Master's degree (4)
- Professional degree (5)
- Doctorate degree (6)
- Prefer not to say (7)

*Display This Question:*

*If What kind of farm do you manage? = Full-time individual/family-run farm*

*Or What kind of farm do you manage? = Part-time individual/family-run farm*

**Q9.3** Is there already a designated successor for your farm?

- Yes, a successor is designated (1)
- Not yet designated (2)
- No (3)
- Other (4)

*Display This Question:*

*If What kind of farm do you manage? = Full-time individual/family-run farm*

*Or What kind of farm do you manage? = Part-time individual/family-run farm*

**Q9.4** Is your household generating further income, besides agricultural production, on your farm (e.g. tourism/hospitality, lending storage space, food processing,...)?

- Yes (1)
- No (2)

*Display This Question:*

*If Is your household generating further income, besides agricultural production, on your farm (e.g.... = Yes*

**Q9.5** Which share of your household income is generated by activities other than farming?

- <10% (1)
- 10-30% (2)
- 31-50% (3)
- 51-70% (4)
- 71-90% (5)
- >90% (6)

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**Q9.6** How much of your produce is marketing directly to consumers (e.g. vegetable boxes)?

- <10% (1)
- 10-30% (2)
- 31-50% (3)
- 51-70% (4)
- 71-90% (5)
- >90% (6)

**Q9.7** What is your gender?

- Male (1)
- Female (2)
- Other (3)
- Prefer not to say (4)

**Q9.8** How old are you?

- Under 18 (1)
- 18-24 (2)
- 25-34 (3)
- 35-44 (4)
- 45-54 (5)
- 55-64 (6)
- 65-74 (7)
- 75-84 (8)
- 85 or older (9)
- Prefer not to say (10)