LIFT

Low-Input Farming and Territories – Integrating knowledge for improving ecosystem based farming

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Farmer private social performance depending on the degree of ecological approaches

Nathalie Hostiou[1]*, Philippe Jeanneaux[2]*, Julie Duval[1], Jacques Veslot[1], Anne-Lise Jacquot[1], Maria Alebaki[3], Laura Eckart[4], Yan Jin[5], Kevin Kilcline[5], Vasilia Konstantidelli[3], Lena Schaller[4], Luiza Toma[6], Irene Tzouramani[3], Peter Walder[4]

[1] INRAE (France), [2] VetAgroSup (France), [3] DEMETER (Greece), [4] BOKU (Austria), [5] Teagasc (Ireland), [6] SRUC (United Kingdom)

* Deliverable leaders – Contact: nathalie.hostiou@inrae.fr, philippe.jeanneaux@vetagro-sup.fr

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About the LIFT research project

Ecological approaches to farming practices are gaining interest across Europe. As this interest grows there is a pressing need to assess the potential contributions these practices may make, the contexts in which they function and their attractiveness to farmers as potential adopters. In particular, ecological agriculture must be assessed against the aim of promoting the improved performance and sustainability of farms, rural environment, rural societies and economies, together.

The overall goal of LIFT is to identify the potential benefits of the adoption of ecological farming in the European Union (EU) and to understand how socio-economic and policy factors impact the adoption, performance and sustainability of ecological farming at various scales, from the level of the single farm to that of a territory.

To meet this goal, LIFT will assess the determinants of adoption of ecological approaches, and evaluate the performance and overall sustainability of these approaches in comparison to more conventional agriculture across a range of farm systems and geographic scales. LIFT will also develop new private arrangements and policy instruments that could improve the adoption and subsequent performance and sustainability of the rural nexus. For this, LIFT will suggest an innovative framework for multi-scale sustainability assessment aimed at identifying critical paths toward the adoption of ecological approaches to enhance public goods and ecosystem services delivery. This will be achieved through the integration of transdisciplinary scientific knowledge and stakeholder expertise to co-develop innovative decision-support tools.

The project will inform and support EU priorities relating to agriculture and the environment in order to promote the performance and sustainability of the combined rural system. At least 30 case studies will be performed in order to reflect the enormous variety in the socio-economic and bio-physical conditions for agriculture across the EU.

Project consortium

No.	Participant organisation name	Country
1	**INRAE - Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement**	**FR**
2	VetAgro Sup – Institut d'enseignement supérieur et de recherche en alimentation, santé animale, sciences agronomiques et de l'environnement	FR
3	SRUC – Scotland's Rural College	UK
4	Teagasc – Agriculture and Food Development Authority	IE
5	KU Leuven – Katholieke Universiteit Leuven	BE
6	SLU – Sveriges Lantbruksuniversitet	SE
7	UNIBO – Alma Mater Studiorum – Universita di Bologna	IT
8	BOKU – Universitaet fuer Bodenkultur Wien	AT
9	UBO – Rheinische Friedrich-Wilhelms – Universitat Bonn	DE
10	JRC – Joint Research Centre – European Commission	BE
11	IAE-AR – Institute of Agricultural Economics	RO
12	MTA KRTK – Magyar Tudományos Akadémia Közgazdaság – és Regionális Tudományi Kutatóközpont	HU
13	IRWiR PAN – Instytut Rozwoju Wsi i Rolnictwa Polskiej Akademii Nauk	PL
14	DEMETER – Hellinikos Georgikos Organismos – DIMITRA	GR
15	UNIKENT – University of Kent	UK
16	IT – INRAE Transfert S.A.	FR
17	ECOZEPT Deutschland	DE

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List of acronyms and abbreviations

AES: agri-environmental scheme

AT_SA: Austria_Salzburg

AT_SK: Austria_Umgebung Steyr-Kirchdorf

Cr: crops

DEA: Data Envelopment Analysis

EU: European Union

FADN: Farm Accountancy Data Network

FR_BR: France_Brittany

FR_PD: France_Puy-de-Dôme

FS: farm structure

GLAS: Green Low Carbon Agri Environmental Programme

GR: Greece

ha: hectares

hr: hours

IE: Ireland

INRAE: Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement

LS: livestock

LU: Livestock Unit

OLS: ordinary least squares

NbMV: number of missing values

NR: non-radial

NUTS3: Nomenclature of Territorial Units for Statistics (NUTS) areas

PCA: Principal Component Analysis

PDO: Protected Designation of Origin

PGI: Protected Geographical Indication

UAA: utilised agricultural area

WC: working conditions

WF: workforce

1 Summary

Social performance is the pillar of sustainability that is the most often neglected, compared to the evaluation of environmental and economic performances of farming systems. Farmers' working conditions are rarely studied. To understand farmers' working conditions and to assess them, it is necessary to develop a multicriteria approach including not only quantifiable dimensions (e.g., the length of working days) but also dimensions that can explain how working conditions are experienced by workers (e.g., by understanding farmer's reasons for acting). Multiple factors contribute to determine farmers' working conditions such as the composition of the workforce, the region, but also the degree of uptake of ecological practices. This deliverable contributes to knowledge on this issue, explaining the work carried out in task 3.3 of the LIFT project. The main objectives of task 3.3 were: i) to describe farmers' and farm workers' working conditions in different farming systems characterised by different degrees of uptake or ecological practices and; ii) to identify factors explaining these working conditions (degree of uptake of ecological practices, workforce composition, country, etc.).

To achieve these objectives, a set of indicators on working conditions was selected in a two-step approach: firstly, a theoretical basis from the literature, and, secondly, expert knowledge in the LIFT partners. Primary data was collected during interviews with 160 farmers in five European Union (EU) regions (Brittany in France, Puy-de-Dôme in France, Crete in Greece, Ireland, Salzburg area in Austria, Umgebung Steyr-Kirchdorf in Austria). Statistical analysis was conducted to describe the diversity of indicators (working conditions, workforce composition and farm structure) within the whole sample and in the different case study areas. A principal component analysis (PCA) was carried out on working condition indicators, using farms with complete data (123 farms). Farm characteristics and workforce composition indicators were shown on PCA factorial plans to explore relationships between working conditions and farm/workforce characteristics.

Main outcomes of this comparative analysis were identified. First, an overall positive feeling expressed by the farmers may seem contradictory at first sight with some of the results showing long working hours, little time for holidays and day off, etc. Second, the comparative analysis highlighted that farmers' working conditions differ across European regions. Working conditions in Ireland and Greece differ significantly from farms in other study areas. In the five European case studies, workers were mainly men (64.6%), and only 18.75% of farm managers were women. There was a broad diversity among case studies: female farm managers were most often present in both Austrian and in French Puy-de-Dôme case studies than in France Brittany, Greece and Ireland Third, the degree of uptake of ecological practices, defined here as organic farming practices or the livestock density, do not discriminate working conditions in the sample composed by the five European case studies. Two main factors considered in the comparative analysis explain the variability observed on farmers' working conditions: the case study area and the production system. Considering a more homogeneous sample - the dairy farms - other factors seem to explain the variability in working conditions, such as the level of education of farmers and the workforce composition. Fourth, another contribution of this comparative analysis in five European case studies is to propose a list of indicators to analyse farmers' working conditions based on different dimensions (work duration, work organisation, quality at work, work complexity, self-identity and attitudes, stress, satisfaction, social relations).

In some case studies (Brittany in France, Puy-de-Dôme in France, Crete in Greece), a more in-deep analysis was performed. Main results were that farmers experienced an impact of the adoption of ecological practices on their working conditions. Farmers indicated various impacts on workload, work organisation and the need for special equipment, depending on the nature of the production systems and the applied ecological practices. They all expressed a positive effect with an improvement of the

workload and their own perception of their job. The Scottish case study highlighted that the relationship between farm organic status and efficiency scores of labour used for both 'traditional' and 'diversification' outputs, emphasises that organic production is not only environmentally oriented but has a clear economic reasoning.

2 Introduction

Due to an important increase of apparent labour productivity over the last decades (Dedieu, 2019), working conditions on farms are evolving with tensions on work for some farming production systems. With a generation of farmers soon to retire, the farming sector is facing an additional challenge, namely, how to ensure that a new generation of farmers will step into their shoes. In Europe, just 7.5% of farmers are under 35 years of age, while 30% are over 65 (Council of the European Union, 2014). A major obstacle to ensuring continuity is the perceived lack of attractiveness of farming in general and livestock farming in particular, as a profession (Hostiou et al., 2020).

Despite this, social performance is the pillar of sustainability that is the most often neglected, compared to the evaluation of environmental and economic performances of farming systems. Farmers' working conditions, which are part of the private social performance, are rarely assessed (van der Linden et al., 2020). When 'work' is part of sustainability analyses, often, indicators of labour productivity or labour requirements are used. These indicators provide a too narrow view of farmers' work or working conditions (Toro-Mujica et al., 2012; Veysset et al., 2014; van der Linden et al., 2020; Duval et al., 2021). Different indicators are used to analyse working conditions, for example, work duration, work organisation (Cournut et al., 2018), and labour productivity (Aubron et al., 2016). To understand farmers' working conditions and to assess them, it is necessary to analyse different dimensions of work and their interactions, rather than focusing on one. It is also necessary to develop a multicriteria approach including not only quantifiable dimensions (e.g., the length of working days) but also dimensions that can explain how working conditions are experienced by workers (e.g., by understanding farmer's reasons for acting) (Kling-Eveillard et al., 2012).

Studying working conditions is complex as these conditions are themselves determined by multiple dimensions (e.g., work environment, nature of the job, balance between work and personal life, professional relations, health) (Kling-Eveillard et al., 2012; Dumont and Baret, 2017). Multiple factors contribute to determine farmers' working conditions such as the composition of the workforce, the region, but also the degree of uptake of ecological practices[1].

As 'work' is a key factor of evolutions of technical practices (Hayami and Ruttan, 1971), this dimension is important to be taken into account to study the capacity of agricultural systems to change. The transition to more ecological forms of farming, such as the reduction of the use of chemical inputs and a search for reduced dependency on external inputs, may lead to improved working conditions for farmers (Aubron et al., 2016; Stratton et al., 2021). The adoption of ecological practices, for example agroecology, promises to be an opportunity to obtain an honourable and fulfilling employment (Gliessman, 2007). But contrasting results can exist within dimensions contributing to working conditions (Dumont

[1] Ecological practices are understood in LIFT as low-input practices and/or practices that are environmentally friendly. The originality of LIFT in this view is not to focus on a specific type of ecological approaches, but to cover the whole continuum of farming approaches, from the most conventional to the most ecological, including the widest range of ecological approaches. This comprises the existing nomenclatures such as organic farming, low-input farming, agroecological farming, etc. It also encompasses approaches that are not yet part of a nomenclature, but that can be identified with various criteria such as management practices, on-farm diversification etc. Thus, conventional practices mean non-ecological practices.

et al., 2021; Duval et al., 2021). The reduction of the workload is not systematic and there is the possibility of an increase in the amount, technicality, complexity, and even drudgery of work (Jansen, 2000; Aubron et al., 2016; Dumont and Baret, 2017). The adoption of ecological practices may also coincide with an increasing complexity of production systems; multicrop-livestock systems are a potential example of this, as their management may run up against high workloads and complex organisation (Ryschawy et al., 2017). For example in the case of agroecological farms, Timmermann and Félix (2015) argue that agroecological practices can be more labour-intensive and complex but this disadvantage is compensated by the fact that the work is considered as more meaningful than in conventional systems. Applying agroecological practices requires understanding, observing, and monitoring the agroecosystem. It requires an increased development of social skills and cognitive capacities compared to conventional agriculture, and would stimulate more peer recognition of farmers' work (Timmermann and Félix, 2015). Indeed, Delecourt et al. (2019) highlighted that implementing practices enabling to reduce inputs, require cognitive changes, individual learnings and adaptations to crop producers, especially related to work organisation aspects (how to anticipate the work organisation and the tasks to do).

This deliverable contributes to knowledge on this issue, explaining the work carried out in task 3.3 of the LIFT project. The main objectives of task 3.3 were: i) to describe farmers' and farm workers' working conditions in different farming systems, characterised by different degrees of uptake or ecological practices, in European case studies areas; ii) to identify factors explaining these working conditions (such as the degree of uptake or ecological practices, the workforce composition, etc.), and iii) to propose indicators to study the different components of farmers and farm workers' working conditions. A comparative analysis across several case studies was conducted, as well as complementary analyses on specific case studies. This deliverable firstly explains the material and methods used, and then presents the results, before concluding and discussing.

3 Material and methods

The following methods were used:

- a comparative analysis, using statistical analysis (descriptive statistics and principal component analysis), was carried out on primary data collected from a sample of farms in five case studies in the following European regions: Brittany in France, Puy-de-Dôme in France, Crete in Greece, Ireland, Salzburg area in Austria, Umgebung Steyr-Kirchdorf in Austria (sections 3.1 to 3.4);
- in addition to this comparative analysis, a more in-deep analysis was conducted on some of these case studies (Brittany in France, Puy-de-Dôme in France, Crete in Greece, Ireland) (section 3.5);
- a specific analysis - Data Envelopment Analysis (DEA) - was used in Eastern Scotland to analyse data collected from the EU Farm Accountancy Data Network (FADN). Primary data from farmers' interviews were not applied. For this reason this case study was not considered into the comparative analysis (section 3.6).

Methods to sample farms and to analyse data are presented in the next sections: first for the comparative analysis, second for the more in-deep qualitative analysis conducted in both French case studies, and then for the Eastern Scotland case study.

3.1 Farm sampling for the comparative analysis of the five European case studies

As the main objective of this study was to investigate the effects of the implementation of ecological practices on working conditions on farms, a wide range of level of implemented ecological practices (from only few ecological implemented practices to the most ecological systems such as organic ones) was selected. For the comparative analysis across the five European regions, the sample was composed of farms which have adopted ecological practices within the studied regions (Brittany in France, Puy-de-Dôme in France, Crete in Greece, Ireland, Salzburg area in Austria, Umgebung Steyr-Kirchdorf in Austria). For some case studies, the sample was not only focused on organic systems, it has also included farms implementing other ecological practices. Some case studies also considered non-organic farms. Samples are not representative of the diversity encountered in the region of study: the aim was to explore and to cover a diversity of farm systems in each case study (Box 1). In each case study, a specific production system was selected according to the main agricultural characteristics of the region studied (Box 1).

To identify farmers, local farm groups known to be working on agroecology, local organic farming associations, and/or Chambers of Agriculture or extension firms were contacted by LIFT partners. Farmers were then contacted by partners of the research teams (for example extension officers of Chamber of Agriculture or of Teagasc) or directly by the researchers.

The sample of farms was, for some case study areas, a sub-sample of the LIFT large-scale farmers' survey (managed in task 2.2 in WP2, see Tzouramani et al., 2019), and, for other case studies, a specific sample depending due to the different timing of both surveys (task 2.2/task 3.3) and the availability of farmers (FR_BR and FR_PD). The range of numbers of interviews, decided by the LIFT partners, was from 11 to 47 per case study (Table 1).

Box 1. Selection criteria of farms

*Puy-de-Dôme case study (FR_PD): farms were selected according to the following criteria: all farms were certified organic, raised dairy and/or beef cattle (Duval et al., 2021).

*Brittany case study (FR_BR): dairy farms were selected according to the following criteria: adoption of ecological practices (on the herd, land area), specialised or diversified dairy farms, diversity of forage management (based grass system or zero grazing), diversity of workforce composition (individual or association farms) (Jacquot et al., 2020).

*Austrian case studies (AT_SA and AT_SK): dairy farms were selected according to the following criteria: milking robot or not, pasture or not, different level of input concentrate (proxy: hay milk), size (aiming at heterogenous sample), organic or not. All farms were specialised.

*Irish case studies (IE): The sample focused on beef farms located in the West and Midland NUTS3 regions where this system is predominant. Farmers were selected according to the following criteria: organic or not, beef or sheep/goat production.

*Greek case studies (GR): Farms were selected on the basis of the following criteria: (1) belong to the sample used in the LIFT large-scale farmer survey to exploit and combine data collected from the latter, (2) cultivate vines or olives.

The description of all the types of production systems and the types of farming systems are summarised in Table 1. The sample is composed of 160 farms in total. Dairy production is the most frequently represented production with 109 dairy farms (both Austrian case studies, both French case studies). The sample is also composed of other animal production systems: 12 cattle (beef) farms, 1 sheep/goat farm, 4 mixed livestock farms (dairy and beef), 4 mixed crops-livestock farms. Crop production is represented by 30 olives and/or vineyard farms (Greece). Each case study has selected non organic and organic farms (except FR_PD with only certified organic farms).

Table 1. Number of farms per production system and per case study for primary data collection

Acronym of the case studies	**AT_SA**	**AT_SK**	**FR_BR**	**FR_PD**	**GR**	**IE**	**Total**
Name of the case studies	Austria Salzburg	Austria Umgebung Steyr-Kirchdorf	France Brittany	France Puy-de-Dôme	Greece	Ireland	
Wine					10		10
Olives					11		11
Mixed crops (wine + olives)					9		9
Dairy cattle	46	43	11	9			109
Beef cattle	1	1		5		5	12
Sheep / goats						1	1
Mixed livestock		1				3	4
Mixed crops + livestock				2		2	4
Total	47	45	11	16	30	11	160

3.2 Selection of indicators on working conditions for the comparative analysis of the five European case studies

A set of indicators to be collected on working conditions was selected in a two-step approach:

- a theoretical basis from the literature on social performances and working conditions (Meul et al., 2008; Lebacq et al., 2012; Latruffe et al., 2016; Chen et Holden, 2017; Dumont and Baret, 2017; Gosetti, 2017; Cournut et al., 2018; Ariza-Montes et al., 2019; Walder et al., 2019);
- and expert knowledge (partners), discussed during meetings with LIFT partners.

It resulted in 1/ a selection of criteria and topics to investigate farmers' working condition (11 topics on working conditions were defined); 2/ a selection of identified indicators covering each of the 11 topics (Table 2).

Table 2. The common list of indicators to assess farmers' social performance

Topics	Indicators
Employment	Employment status, Gender, Level of education, Kind of employment, Voluntary work, Labour requirement, Work externalisation
Work duration	Total number of working hours, Working hours per category of workers, Appreciation of the time spent working on the farm, Intensity of work-load peaks
Work organisation	Versatility or specialisation of workers, Decision making, Replacement
Quality at work	Free time, Atypical working time, Work flexibility, Physical workload, Mental workload, Satisfaction of quality at work
Skills	Skills needed to adopt more ecological practices, Changes in skills
Work complexity	Complexity of work organisation with the implementation of ecological practices, Complexity of operating the farm
Equipment	Equipment needed for ecological farming practices
Self-identity	Motivations to be a farmer, Motivations to use ecological practices, Management style
Stress	Level of stress, Factors generating stress
Satisfaction	Satisfaction with daily job tasks, Satisfaction with work life balance, Satisfaction with being a farmer, Satisfaction with freedom of making decision, Satisfaction with quality of life
Social relations	Implication in social professional networks, Participation in supply chain - networks, Sharing experience with the local community

3.3 Data collection for the comparative analysis of the five European case studies

Data collection related to indicators was based on the collection of primary data during interviews with farmers in the five case studies. Some general data on working conditions were collected during the LIFT large-scale farmer survey and refer to the year 2018 (task 2.2, see the questionnaire in Tzouramani et al., 2019). For other indicators, enabling to further investigate farmers' working conditions and that were not available in this survey, a specific task 3.3 survey was designed and refer to the year 2018 (Figure 1 and Figure 2). This specific task 3.3 survey was composed of a questionnaire and a LimeSurvey frame to enter the answers. Both methods, i.e. data collection on working conditions using the LIFT large-scale farmer survey and the specific task 3.3 survey, were used in the five study areas.

For the specific task 3.3 survey, two types of interviews to collect data (Table 3) were applied depending on the involved researchers' preferences and skills: a quantitative questionnaire (using closed questions) (Appendix 1) or a semi-structured interview (using semi-directed interviews that are structured by an interview guide) (Appendix 2). Both types of interviews were designed to collect data on the same set of indicators (Table 2). The topics on working conditions were the same in both, but in the quantitative interviews closed questions were asked to the farmers, while in the qualitative interview open questions were asked.

To ensure comparability between data that came up from different methods and were of different nature (quantitative versus qualitative), data was harmonised through entering the answer from the farm surveys in the same LimeSurvey frame used by all partners.

Face to face interview was the most used approach to collect data (133 farms). Data was also collected by phone (25 farms in Greece). In two cases farmers filled in the questionnaire themselves (Austria).

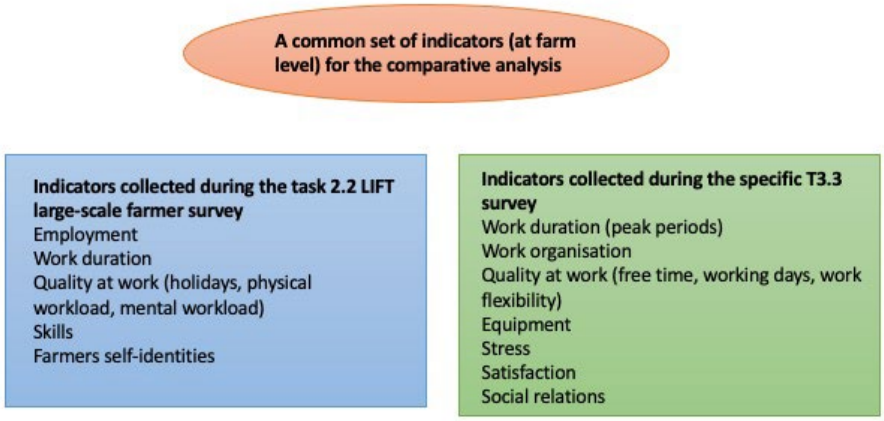

Figure 1. The common set of indicators collected

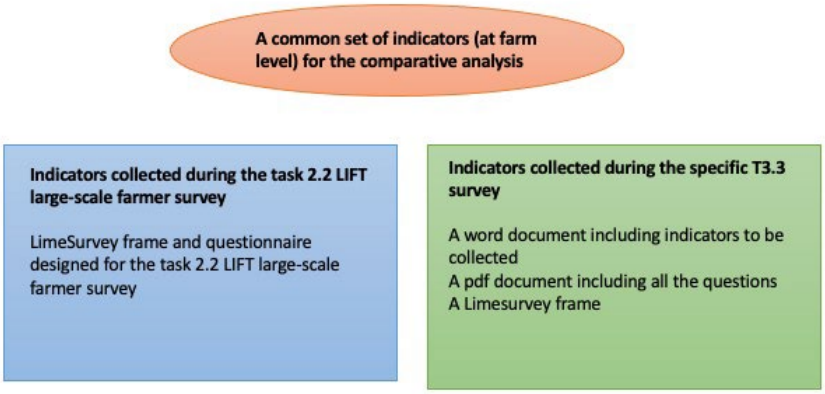

Figure 2. Data collection for Task 3.3

Table 3. Data collection in the cases studies for primary data collection

Case study	Sample	Task 3.3 survey and LIFT large-scale farmer survey	Type of questionnaire	Mode of interview (number of farms)
IE	Sub-sample of the LIFT large-scale farmer survey	During one visit or two visits to the farmers	Quantitative	Face to face (11)
GR	Sub-sample of the LIFT large-scale farmer survey	During one visit or two visits to the farmers	Quantitative	By phone (25) or face to face (5)
AU_AT and AU_SK	Sample of the LIFT large-scale farmer survey	During one visit to the farmers	Quantitative	Face to face (90), 2 farmers filled in the questionnaire
FR_PD	A different sample of the LIFT large-scale farmer survey	During one visit to the farmers	Qualitative	Face to face (16)
FR_BR	A different sample of the LIFT large-scale farmer survey	During one visit to the farmer	Qualitative	Face to face (11)

3.4 Data analysis for the comparative analysis of the 5 European case studies

A comparative analysis across the 5 European cases studies was conducted by INRAE with the partners involved in task 3.3. As the main objective of this study was to investigate the effects of the implementation of ecological practices on working conditions on farms, a wide range of level of implemented ecological practices (from only few ecological implemented practices to the most ecological systems such as organic ones) was selected. The analysis aimed at: i) carrying out a comparative analysis of the variability of indicators on working conditions in different EU case study areas, ii) to identify factors explaining those patterns such as the degree of uptake of ecological practices, workforce composition, countries, etc.

The analysis has followed different steps.

First, a database (excel spreadsheet) containing all the surveyed farms (in rows) and the data collected (in columns) was built based on the extraction of the data on working conditions from the task 3.3 and the task 2.2 surveys entered in the LimeSurvey frame.

Second, for each case study the partner responsible has carried out an analysis of the data and has written a report (available in appendix 3).

Third, missing values were identified in this database: values for some indicators in the task 2.2 LIFT large-scale farmer survey and in the task 3.3 survey were not completed for some farms. There were 113 out of 160 farms of the sample with all values completed (Table 4). Most missing values were encountered in the FR_PD and IE case studies for values on working conditions and workforce composition (Table 5). In different case studies missing values were identified for three questions of the task 2.2 LIFT large-scale farmer survey (Skills requirement in last adoption of ecological practices, Skills missing to adopt more ecological practices, Composition of total net household income) (Table 5). Further data collection enabled to retrieve 88 missing values (34 in FR_PD and 54 in IE) (Table 6). It was not possible to retrieve all missing values due to the impossibility to contact farmers again, no response from contacted farmers, etc. (Table 7).

After retrieving missing values, as shown in Figure 3, missing values (2% of the total) are clustered for some groups of indicators. Finally, we had 123 farms with complete data among the 160 initial farms (Table 8).

Table 4. Number of farms per number of indicators with missing values (before retrieving values)

N° of indicators with missing value	0	1	2	3	4	5	11	12	20	21
N° of farms with the indicators missing (before value retrieving)	113	16	9	9	6	2	1	1	1	2

Table 5. Initial number of missing values per case studies for each indicator

Description of the indicator	**Type**	**AT_SA**	**AT_SK**	**FR_BR**	**FR_PD**	**GR**	**IE**
Mean working hours for the farm manager	WC	0	0	0	2	0	3
Mean working hours for the family workers	WC	0	0	0	2	0	3
Total working hours per ha of UAA or 10 LU (family)[2]	WC	0	0	0	2	0	3
Farmer as a decision maker	WC	0	0	0	0	0	3
Specific tasks assigned to specific workers	WC	0	0	0	0	0	3
Capacity to replace a worker in case of absence	WC	0	1	0	1	0	3
Holidays for the family workers	WC	2	2	0	3	3	3
Holidays for the farm manager	WC	2	2	0	3	3	3
Free days	WC	0	0	0	0	0	0
Complexity of operating the farm	WC	3	1	0	0	0	0
Skills requirement in last adoption of ecological practices	WC	4	0	0	6	4	1
Skills missing to adopt more ecological practices	WC	2	0	0	10	4	0
Being a farmer	WC	1	0	0	1	3	1
Prioritising environment important as a farmer	WC	1	0	0	1	3	1
Level of stress	WC	0	3	0	1	0	0
Mean satisfaction Level with his/her working conditions	WC	0	0	0	0	0	0
Need to reduce physical workload	WC	1	1	0	1	1	0
Need to reduce mental workload	WC	2	1	0	2	1	0
Need to reduce isolation	WC	1	1	0	1	1	1
Social relations of the farmer	WC	1	0	1	2	1	0
Main production	FS	0	0	0	0	0	0
Total UAA (all farms: livestock or crops)	FS	0	0	0	0	0	0

[2] UAA: utilised agricultural area. LU: livestock units. The livestock unit is a reference unit which facilitates the aggregation of livestock from various species and age as per convention, via the use of specific coefficients established initially on the basis of the nutritional or feed requirement of each type of animal (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU))

Size (UAA for GR and LU/10 for other case study areas)	FS	0	0	0	0	0	0
Total arable land (all farms: livestock or crops)	FS	0	0	0	0	0	0
Organic / Not organic	FS	0	0	0	0	0	0
LU / UAA (livestock farms)	FS	0	0	0	0	0	0
Management structure	FS	0	0	0	0	0	0
Number of family workers	WF	0	0	0	0	0	0
Proportion of family workforce in the total workforce	WF	0	0	0	0	0	0
Proportion of men (family) in the total workforce	WF	0	0	0	0	0	4
Workforce age of the family workers (mean per family)	WF	0	0	0	0	0	3
Workforce education of the family workers (mean per family)	WF	0	0	0	4	0	3
Workforce experience of the family workers (mean per family)	WF	0	0	0	2	0	3
Gender of farm manager	WF	0	0	0	0	0	4
Age of the farm manager	WF	0	0	0	0	0	3
Experience of the farm manager (years)	WF	0	0	0	2	0	3
Education level of the farm manager	WF	0	0	0	5	0	3

WC: indicators on working conditions; WF: indicators on workforce, FS: indicators on farming structures

Table 6. Retrieved missing values, total and per indicator type, for each case study

Type	**AT_SA**	**AT_SK**	**FR_BR**	**FR_PD**	**GR**	**IE**
WC	0	0	0	+24	0	+28
FC	0	0	0	0	0	0
WF	0	0	0	+10	0	+26
Total	0	0	0	+34	0	+54

WC: indicators on working conditions; WF: indicators on workforce, FS: indicators on Farming structures

Table 7. Final number of missing values per case studies for each indicator

Description of the indicator	Type	AT_SA	AT_SK	FR_BR	FR_PD	GR	IE
Mean working hours for the farm manager	WC	0	0	0	0	0	0
Mean working hours for the family workers	WC	0	0	0	0	0	0
Total working hours per ha of UAA or 10 LU (family)	WC	0	0	0	0	0	0
Farmer as a decision maker	WC	0	0	0	0	0	0
Specific tasks assigned to specific workers	WC	0	0	0	0	0	0
Capacity to replace a worker in case of absence	WC	0	1	0	1	0	0
Holidays for the family workers	WC	2	2	0	0	3	0
Holidays for the farm manager	WC	2	2	0	0	3	0
Free days	WC	0	0	0	0	0	0
Complexity of operating the farm	WC	3	1	0	0	0	0
Skills requirement in last adoption of ecological practices	WC	4	0	0	3	4	0
Skills missing to adopt more ecological practices	WC	2	0	0	5	4	0
Being a farmer	WC	1	0	0	0	3	0
Prioritising environment important as a farmer	WC	1	0	0	0	3	0
Level of stress	WC	0	3	0	1	0	0
Mean satisfaction Level with his/her working conditions	WC	0	0	0	0	0	0
Need to reduce physical workload	WC	1	1	0	1	1	0
Need to reduce mental workload	WC	2	1	0	1	1	0
Need to reduce isolation	WC	1	1	0	1	1	0
Social relations of the farmer	WC	1	0	1	1	1	0
Main production	FS	0	0	0	0	0	0
Total UAA (all farms: livestock or crops)	FS	0	0	0	0	0	0
Size (UAA for GR and LU/10 for other case study areas)	FS	0	0	0	0	0	0
Total arable land (all farms: livestock or crops)	FS	0	0	0	0	0	0
Organic / Not organic	FS	0	0	0	0	0	0
LU / UAA (livestock farms)	FS	0	0	0	0	0	0
Management structure	FS	0	0	0	0	0	0
Number of family workers	WF	0	0	0	0	0	0
Proportion of family workforce in the total workforce	WF	0	0	0	0	0	0
Proportion of men (family) in the total workforce	WF	0	0	0	0	0	0
Workforce age of the family workers (mean per family)	WF	0	0	0	0	0	0
Workforce education of the family workers (mean per family)	WF	0	0	0	0	0	0
Workforce experience of the family workers (mean per family)	WF	0	0	0	1	0	0
Gender of farm manager	WF	0	0	0	0	0	0
Age of the farm manager	WF	0	0	0	0	0	0
Experience of the farm manager (years)	WF	0	0	0	1	0	0
Education level of the farm manager	WF	0	0	0	1	0	0

Table 8. Number of farms per case study with complete and uncomplete data

Case studies	Complete	Uncomplete	Total
AT_SA	35	12	47
AT_SK	38	7	45
FR_BR	10	1	11
FR_PD	9	7	16
GR	20	10	30
IE	11	0	11
Total	123	37	160

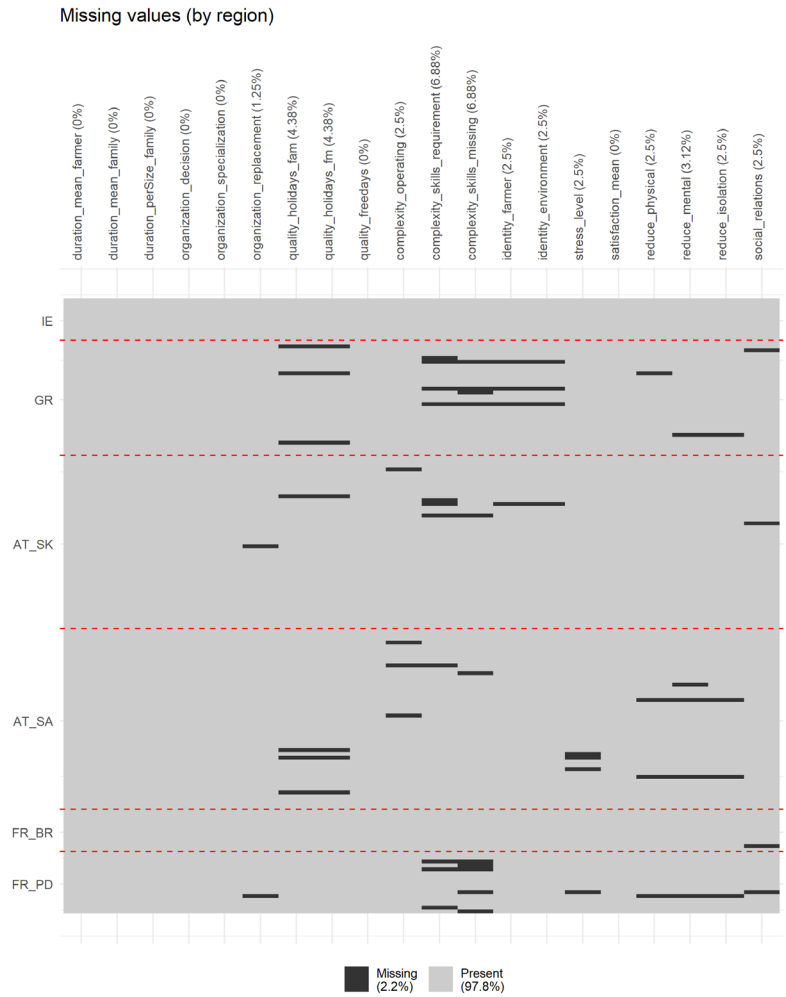

Figure 3. Remaining missing values by farm (each line is a farm, available data in grey and missing in black) grouped by case study area

In a fourth step, a sub-set of indicators to assess working conditions was selected to perform the analysis according to: i) their relevance to answer the questions of this study, ii) missing values, iii) data consistency (Table 9). Variables to explain working conditions were also defined on farm characteristics (location, size, degree of uptake of ecological practices, farm management, workforce composition) and farmer characteristics (Table 10). At the moment where those analyses were performed, the LIFT protocol to assign farms according to a degree of uptake of ecological practices designed in the WP1 was not available. Therefore, two main degrees of uptake of ecological practices were retained for the analysis presented in this deliverable: organic and not organic. The assignation of a farm to be organic or not was done using data from the task 2.2 LIFT large-scale farmer survey. In addition, the degree of uptake of ecological practices is also measured here with the livestock density, namely the number of LU per ha of UAA.

Table 9. Description of the indicators on working conditions (category, label of the variable, origin of the data, formula and units)

Index	Category	Label of the variable	Origin of the data (LIFT large-scale farmer survey or specific task 3.3 survey and related questions)	Formula (see Tzouramani et al., 2019)	Units
Mean working hours for the farm manager	**Work duration**	duration_mean_farmer	LIFT large-scale farmer survey *Q15_7A: Number of hours per week (including week-ends) working on farm on average in 2018 (You)*	Q15_7_A	Hours/week
Mean working hours for the family workers	**Work duration**	duration_mean_family	LIFT large-scale farmer survey *Q15: Besides you, how many family members (paid and unpaid) 16 years or older, worked on the farm in 2018?* *Q15_7_[A-J]: Number of hours per week (including week-ends) working on farm on average in 2018 (You + Family members 1 to 9)*	Sum of Q15_7 / (Q15 + 1)	Hours/week
Total working hours per ha of UAA or 10 LU (family)	**Work duration**	duration_per size_family	LIFT large-scale farmer survey *Q15_7_[A-J]: Number of hours per week (including week-ends) working on farm on average in 2018 (You + Family members 1 to 9)*	Sum of Q15_7 / (UAA (GR) or LU * 10)	Hours/week
Farmer as a decision maker	**Work organisation**	organisation_decision	LIFT large-scale farmer survey *Q15_5_A: Is this person a decision maker on the farm? (0: No; 1: Yes, sole; 2: Yes, joint)*	Q15_5_A	We consider if the farm manager is a decision maker on the farm. Categorical with 3 levels: No/Sole/Joint
Specific tasks assigned to specific workers	**Work organisation**	organisation_specialisation	LIFT large-scale farmer survey *QA5: Are specific activities dedicated/assigned to specific workers in general (over the past 5 years)?)?(4 answers possible : No, Yes for a few workers, Yes for most workers, Yes for all workers,)*	QA5	Categorical with 4 levels: No/Few/Most/All
Difficulty to replace a worker in case of absence	**Work organisation**	organisation_replacement	LIFT large-scale farmer survey *QA7: Is it easy to replace a worker in case of absence in general (over the past 5 years)?(4 answers possible: very easy, easy, quite difficult, very difficult)*	QA7	Categorical with 3 levels: Not difficult (*very easy or easy*)/Quite difficult/Very difficult
Holidays for the family workers	**Quality at work**	quality_holidays_fam	LIFT large-scale farmer survey *Q15_8_[A-J]: Number of weeks (including week-ends) vacation in 2018 (You + Family members 1 to 9)*	Sum of Q15_8 / (Q15 + 1)	Weeks/year

Holidays for the farm manager	**Quality at work**	quality_holidays_fm	LIFT large-scale farmer survey *Q15_8_A: Number of weeks (including week-ends) vacation in 2018 (You)*	Q15_8A	Weeks/year
Free days	**Quality at work**	quality_freedays	Specific task 3.3 survey *QA9: Do you have days off frequently during which you don't work at all (weekends or other day(s) in the week) in general (over the past 5 years)?*	QA9	Binary: No/Yes
Complexity of operating the farm	**Work complexity**	complexity_operating	Specific task 3.3 survey *QA19: Has the adoption of ecological practices changed your observation and/or monitoring habits (of the herd, crops, farm, etc.) in general (over the past 5 years)?*	QA19	Binary: No/Yes
Skills requirement in last adoption of ecological practices	**Work complexity**	complexity_skills_requirement	LIFT large-scale farmer survey *Q61: Thinking about the last time you have adopted one or some ecological farming practices, how have the skill requirements for farm work and management changed?* *Q61_1: Skill requirements for farm work and management: change for farm manager(s) (1: Large decrease; 2: Slight decrease; 3: No change; 4: Slight increase; 5: Large increase)*	Q61_1	5 levels with 1: Large decrease; 2: Slight decrease; 3: No change; 4: Slight increase; 5: Large increase
Skills missing to adopt more ecological practices	**Work complexity**	complexity_skills_missing	LIFT large-scale farmer survey *Q56: How prepared do you feel to use more ecological farming practices in the next 5 years?* *Q56_5: I do not have the knowledge and skills to adopt more ecological farming practices (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)*	Q56_5	5 levels with 1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree
Being a farmer	**Self-identity and attitudes**	identity_farmer	LIFT large-scale farmer survey *Q49: To what extent do you agree with the following statement about farmers and farming?* *Q49_1: Being a farmer is an important reflection of who I am (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)*	Q49_1 + Q49_2 + Q49_3	3 variables with 5 levels from Strongly disagree to Strongly agree (3 questions of the task 2.2 LIFT large-scale farmer survey were considered, each one was used as a variable to build this indicator. Each of these variables

			Q49_2: What happens to farmers as a whole will have an effect on what happens in my life (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree) *Q49_3: I have a strong sense of belonging to the farming community (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)*		was expressed on a scale from 1 (strongly agree) to 5 (strongly disagree). The sum of the three variables is converted into ordinal (which gives an index from 0 to 15).
Prioritising environment important as a farmer	**Self-identity and attitudes**	identity_environment	LIFT large-scale farmer survey *Q49_4: I see myself as a farmer who prioritises the environment (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)* *Q49_5: Understanding the ecology of the farm is what farming is about (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)* *Q49_6: Farming in a way that preserves the environment is part of who I am (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)*	Q49_4 + Q49_5 + Q49_6	3 variables with 5 levels from Strongly disagree to Strongly agree (3 questions of the task 2.2 LIFT large-scale farmer survey were considered, each one was used as a variable to build this indicator. Each of these variables was expressed on a scale from 1 (strongly agree) to 5 (strongly disagree). The sum of the three variables is converted into ordinal (which gives an index from 0 to 15).
Level of stress	**Stress**	stress_level	Specific task 3.3 survey *QA22: How do you experience your level of stress related to your work in general (over the past 5 years)? (Scale 0-10: 0 very stressful to 10 not stressful)*	QA22	Ordinal from 0 to 10
Mean satisfaction level with his/her working conditions	**Satisfaction**	satisfaction_mean	Specific task 3.3 survey *QA24: How do you rate your level of satisfaction concerning your daily work in general (over the past 5 years)? [Level of satisfaction concerning your daily work](scale 0 to 5)* *QA25: How do you rate your level of satisfaction concerning your work life balance in general (over the past 5 years)? [Level of satisfaction concerning your work life balance](scale 0 to 5)*	QA24 : QA28	Average of 5 ordinal satisfaction components from 0 to 5

			QA26: How do you rate your level of satisfaction concerning being a farmer in general (over the past 5 years)? [Level of satisfaction concerning being a farmer](scale 0 to 5) *QA27: How do you rate your level of satisfaction related to be free to make decisions in general (over the past 5 years)? [Level of satisfaction related to be free to make decisions] (scale 0 to 5)* *QA28: How do you rate your level of satisfaction concerning your quality of life in general (over the past 5 years)? [Level of satisfaction concerning your quality of life] (scale 0 to 5)*		
Need to reduce physical workload	**Need to reduce**	reduce_physical	LIFT large-scale farmer survey *Q19: If it were possible, how would you improve the working conditions on the farm?* *Q19_3: Reduce the level of physical work (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)*	Q19_3	5 levels with 1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree
Need to reduce mental workload	**Need to reduce**	reduce_mental	LIFT large-scale farmer survey *Q19_4: Reduce the amount of mental workload (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)*	Q19_4	5 levels with 1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree
Need to reduce isolation	**Need to reduce**	reduce_isolation	LIFT large-scale farmer survey *Q19_5: Reduce the isolation from working on the farm (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)*	Q19_5	5 levels with 1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree
Social relations of the farmer	**Social relations**	social_relations	Specific task 3.3 survey *QA29: Do you participate in the local community relating to agricultural activities (e.g., participation in local festivals, local farmers' market...) in general (over the past 5 years)?* (0/1 for No/Yes)	QA29 + QA30 + QA31	Sum of 3 social relation components (in the local community, in village/rural area events, in meetings concerning supply chain-networks / food chain or professional organisations (0/1 for No/Yes)

			QA30: Do you participate in village/rural area events (e.g., voluntary work for associations, church, school, family, local politics (mayor, etc.) in general (over the past 5 years)? (0/1 for No/Yes) *QA31: Over the past 5 years, have you participated in meetings concerning supply chain-networks / food chain or professional organisations (for example: dairy/beef association….)?* (0/1 for No/Yes)		

Table 10. Indicators on farm characteristics and workforce selected for the comparative analysis

Category	Description	Units
Farm location	Country	Categorical with 4 options
Farm location	Case study area	Categorical with 6 options
Farm size	Total UAA (all farms: livestock or crops)	Ha
Farm size	Total arable land (all farms: livestock or crops)	Ha
Degree of uptake of ecological practices	Certified organic farm	No/Yes
Management	Management structure	Categorical with 3 options (Individual / Partnership / Company)
Workforce composition	Number of family workers	Integer
Workforce composition	Proportion of family workforce in the total workforce	Percentage
Workforce composition	Proportion of men (family) in the total workforce	Percentage of male family members
Workforce composition	Workforce age of the family workers (mean for the family)	Years
Workforce composition	Workforce education of the family workers (mean for the family)	Average of education levels across family members converted into ordinal from 1 (No schooling) to 7 (University – non-agricultural)
Workforce composition	Workforce experience of the family workers (mean for the family)	Years
Farmer	Gender of the farm manager	Binary: 0 (Female) / 1 (Male)
Farmer	Age of the farm manager	Years
Farmer	Experience of the farm manager	Years
Farmer	Education level of the farm manager	Categorical with 7 levels: 1 (No schooling), 2 (Primary school), 3 (Middle or secondary school), 4 (High school or sixth form college – agricultural), 5 (High school or sixth form college – non-agricultural), 6 (University – agricultural), 7 (University – non-agricultural)

Fifth, descriptive statistics (mean, standard deviation) were calculated to describe the indicators for all the farms and for each case study.

Sixth, a principal component analysis (PCA) was carried out on working condition indicators, using farms with complete data (123 farms). Some indicators are redundant or intrinsically correlated and thus PCA could help looking at main independent components. All indicators were scaled. The four first components of the PCA were considered. More components could be investigated to go further into more specific dimensions, but since the three first components recovered most of redundancies, only the two first factorial plans were considered. Farm characteristics and workforce composition indicators were shown on PCA factorial plans to explore relationships between working conditions and farm/workforce characteristics. Groups of farms (in the same class of a given categorical variable) are drawn on factorial plans, either with ellipses representing 95% of cases assuming a multivariate normal distribution, or with the convex hull containing all farms in the same class.

3.5 Complementary analysis conducted in case studies

In addition to comparative analysis to complete the data, specific analyses were conducted for some case studies in order to fit with the main objectives of the task 3.3.

3.5.1 French case studies

Both French case studies (FR_BR and FR_PD) have also conducted a more in-deep qualitative analysis
In French Puy-de-Dôme (Duval et al., 2021a and b), data concerning farmer's and farm's characteristics were organised in a database (Excel) for descriptive analyses. The interviews were transcribed and relevant statements were coded with headings. The codes were compared across interviews to identify overarching themes, which were further organised in categories. Within these categories, similarities across interviews and contradictory experiences were sought to try to understand the diversity of the situations encountered. A mind-map was created with the different dimensions of working conditions and new ones that emerged from the interviews and were illustrated by relevant verbatims.
In French Brittany (Jacquot et al., 2020), the interviews were transcribed, making it possible to analyse the effects of the change on the working conditions of the farmers, based on an inventory of the ecological practices implemented and then on the identification of the changes in working conditions induced. These changes were analysed with regard to the dimensions of working conditions.

3.5.2 Greek case study

In Greece a statistical analysis was conducted to identify main differences and similarities between the two farming systems (i.e., non-organic and organic).

3.5.3 Eastern Scotland case study

The analysis on labour conditions in the Scottish case study focuses on how efficient these farms are in their use of (paid and unpaid) labour to deliver environmental (renewable energy and woodland) and diversification (tourism) outputs.

For Eastern Scotland, a different protocol was used to create the database. Secondary data from the EU Farm Accountancy Data Network (FADN) were used and not primary data from farmers' interviews. For this reason this case study was not considered into the comparative analysis. A specific analysis was conducted by the partners on an exploration of the labour and environmental efficiency of Scottish cattle and sheep farms. FADN data was used for 165 cattle and 104 sheep farms (defined by FADN as farms where at least 66% of their gross margin comes from cattle and sheep products respectively). Observations for each farm for years 2011 to 2015 led to a total sample of 1,006 farms (630 cattle and 376 sheep farm observations). Two models were estimated: the 'environmental labour' model estimating the efficiency of labour used to create the environmental (renewable energy and woodland)/ diversification (tourism) output; and the 'traditional labour' model estimating the efficiency of labour used to create livestock/ livestock products output. The 'environmental labour' model was run for the farms with an environmental/ diversification output, which constitute a small sample (89 observations pooled for years 2014 and 2015 - cattle and sheep farms together). The 'traditional labour' model was run for the farms with livestock/ livestock products output (run separately for 630 cattle and respectively 376 sheep farm observations).

DEA was used i.e., Russell non-radial (NR) efficiency measure in a version of the model developed by Färe and Knox Lovell (1978) allowing for the nonproportional adjustment of different inputs/outputs and providing information on the efficiency of specific inputs or outputs. Next, Ordinary Least Squares (OLS) regressions with Huber-White robust standard errors were run to estimate the effect of secondary variables on efficiency scores within and across farm type (cattle and sheep samples).

4 Results on the comparative analysis of the five European case studies

4.1 Description of the sample

4.1.1 Farm structure

The sample consisted in a diversity of production types with permanent crops (Wine: 10 farms / Olives: 11 / Mixed Crops: 9), livestock (Dairy cattle: 109 / Beef cattle: 12 / Sheep/Goats: 1 / Mixed livestock: 4) or crop-livestock production (Mixed Crop+Livestock: 4). The sample was made up mainly of dairy livestock farms (Table 11).

For livestock farms herd size was 70.1 LU on average with a standard deviation of 43. The UAA for all farms was 43.3 ha on average with a standard deviation of 39.8. But the sample is characterised by a large variability for herd size and UAA within the farms.

Most of the farms (137) were managed by individual farmers. Only 18 farms were managed by partnership and 5 by company.

Sampled farms are quite balanced between organic (78 farms) and non-organic farms (82). It is the same for each case study area: AT_SA with 22 organic and 25 non-organic farms, AT_SK with 27 organic and 18 non-organic farms, FR_BR with 7 organic and 4 non-organic farms, GR with 19 organic and 11 non-organic farms, IE with 6 organic and 15 non-organic farms, except for FR_PD where 15 out of 16 were organic farms in 2018 (but the non-organic farm is in conversion to organic farming). Apart from organic farming, the degree of uptake of ecological practices is measured here with the livestock density, namely the number of LU per ha of UAA.

The analysis showed a diversity of farm structure within the cases studies (Table 12):

- Farms in the two French cases studies had larger UAA than in the other case study areas;
- Farms in FR_BR had larger herd size than in the other case study areas;
- Farms in the two Austrian case studies had more LU/ha in comparison with the two French cases studies;
- Farms in the two French cases studies had a larger diversity of management structure whereas for the other case study areas there are mainly or only (IE) farms managed by one farmer.

Table 11. Statistics on farm characteristics (all case study areas)

Index	Category	Mean (sd) / Frequencies **
Main production **	Farm type	Wine: 10 / Olives: 11 / Dairy cattle: 109 / Beef cattle: 12 / Sheep/Goats: 1 / Mixed Crops: 9 / Mixed LS: 4 / Mixed Cr+LS: 4
Livestock Units (livestock farms)	Farm size	70.1 (43.0)
Total UAA in ha (all farms: livestock or crops)	Farm size	43.4 (39.8)
Size (ha UAA for GR and LU/10 for other case study areas)	Farm size	7.1 (4.5)
Total arable land (all farms: livestock or crops)	Farm size	28.9 (27.3)
Organic (0)/ Non-organic (1) **	Degree of uptake of ecological practices	0 (non-organic): 82 / 1 (organic): 78
LU / ha UAA (livestock farms)	Degree of uptake of ecological practices	1.6 (0.9)
Management structure **	Farm type	Individual: 137 / Partnership: 18 / Company: 5

Table 12. Statistics on farm characteristics (per case study area)

Index	NbMV*	AT_SA	AT_SK	FR_BR	FR_PD	GR	IE
Main production **	0	Dairy milk: 46 / Cattle: 1	Dairy milk: 43 / Cattle: 1 / Mixed LS: 1	Dairy milk: 11	Dairy milk: 9 / Cattle: 5 / Mixed Cr+LS: 2	Wine: 10 / Olives: 11 / Mixed Crops: 9	Cattle: 5 / Sheep/Goats: 1 / Mixed LS: 3 / Mixed Cr+LS: 2
Total UAA in ha	0	36.8 (18.2)	36.2 (15)	113.7 (48.2)	104.1 (51.5)	7.5 (5.3)	40.5 (25.7)
Size (ha UAA for GR and LU/10 for other case study areas)	0	7.3 (4)	6.6 (4)	11.1 (5.6)	4.8 (2)	7.5 (5.3)	6.7 (5.3)
Total arable land (all farms: livestock or crops)	0	33.2 (16.8)	32.6 (14.9)	33.0 (46.9)	56.6 (47.1)	0.0 (0)	30.4 (12.8)
Organic (1)/ Non-organic (0) **	0	0: 22 / 1: 25	0: 27 / 1: 18	0: 7 / 1: 4	0: 1 / 1: 15	0: 19 / 1: 11	0: 6 / 1: 5
LU / ha UAA (livestock farms)	30	1.9 (0.5)	1.8 (1)	0.9 (0.2)	0.5 (0.2)	not calculated	1.6 (0.8)
Management structure **	0	Individual: 44 / Partnership: 3	Individual: 45	Individual: 2 / Partnership: 8 / Company: 1	Individual: 7 / Partnership: 6 / Company: 3	Individual: 29 / Partnership: 1	Individual: 10 / Company: 1

*NbMV: number of missing values. The figures in the table correspond to the mean (and standard deviation) except for ** where the frequency of farms is indicated.

4.1.2 Workforce composition

The workforce consisted in 2.8 family workers on average in the whole sample (Table 13). The sample consisted mainly in family farms, with few wage earners. Workers were mainly men (64.6%). Only 18.75% of farm managers were women.

Workers and farm managers were on average 46.5 years old and 44.8 years old, respectively. Workers had a long experience in farming (they have been working in the farm for 26.8 years on average for all workers and 25.3 years for the farm managers). The mean level of education is slightly higher than « High school or sixth form college – agricultural ».

Workforce composition also presented a large diversity between the case studies areas (Table 14):

- FR_BR, GR and IE had a higher proportion of men in the workforce;
- Female farm managers were most often present in AT (27.8% and 20% respectively in AT_SA) and FR_PD (25%) than in FR_BR (9%), in IE (9%) and in GR (3%).
- Family workers were older in GR (49.9 and 51.3 years old respectively) and younger in AT_SA (42.9 and 40.4 years old respectively);
- Farmers were older in GR (mean age: 51.3) and younger in AT, notably in AT_SA (mean age: 40.3);
- Mean levels of education in Austrian case study areas and Greece were around "High school or sixth form college – agricultural", slightly lower in FR_PD and higher in FR_BR. Highest levels were in IE with 7 out of 11 farmers with a University level.

Table 13. Statistics on workforce composition (all case study areas)

Index	Category	NbMV*	Mean (sd) / Frequencies **
Number of family workers	Workforce composition	0	2.8 (1.3)
Proportion of family workforce in the total workforce	Workforce composition	0	1.0 (0.1)
Proportion of men (family) in the total workforce	Workforce composition	0	0.6 (0.2)
Workforce age of the family workers (mean for the family) (years)	Workforce composition	0	46.5 (8.8)
Workforce education of the family workers (mean for the family)[1]	Workforce composition	0	4.2 (1.1)
Workforce experience of the family workers (mean for the family) (years)	Workforce composition	1	26.8 (9.8)
Gender of the farm manager (0 = woman; 1= man) (Count) **	Farmer	0	0: 30 / 1: 130
Age of the farm manager (years)	Farmer	0	44.8 (10.9)
Experience of farm manager (years)	Farmer	1	25.3 (11.3)
Education level of the farm manager[2]	Farmer	1	4.2 (1.2)

*NbMV: number of missing values. [1]This indicator is expressed as ordinal in tables since it seems to be more readable (with seven nearly ordered levels), but in the following it is considered as categorial when used to identify farms on PCA factorial plans. [2]For clarity reason, farmer and workforce education levels are expressed in tables as an average of education level classes considered as ordinal.

Table 14. Statistics on workforce composition (by case study area)

Index	NbMV*	AT_SA	AT_SK	FR_BR	FR_PD	GR	IE
Number of family workers	0	3.0 (1)	3.9 (1)	2.3 (1.3)	2.1 (0.9)	2.1 (1.2)	1.5 (1)
Proportion of family workforce in the total workforce	0	96.7 (0.1)	94.9 (0.1)	90.0 (0.1)	97.9 (0.1)	97.5 (0.1)	93.2 (0.2)
Proportion of men (family) in the total workforce	0	53.1 (0.2)	58.3 (0.1)	75.5 (0.3)	64.6 (0.3)	77.8 (0.3)	93.2 (0.2)
Gender of the farm manager (0: woman; 1: man) (count) **	0	0: 13 / 1: 34	0: 9 / 1: 36	0: 1 / 1: 10	0: 4 / 1: 12	0: 3 / 1: 27	1: 11
Workforce age of the family workers (mean in the family) (years)	0	42.9 (7.6)	47.7 (7.5)	46.9 (8.2)	47.2 (9.2)	49.9 (11.1)	46.3 (8.8)
Age of the farm manager (years)	0	40.4 (10.2)	43.3 (10.1)	46.1 (10.8)	48.0 (11)	51.3 (10.9)	45.5 (9.4)
Workforce education of the family workers (mean for the family)[1]	0	3.9 (0.5)	3.8 (0.7)	4.8 (0.8)	3.5 (1.2)	4.7 (1.3)	5.7 (1.4)
Education level of the farm manager[1]	1	4.0 (0.8)	4.0 (0.7)	5.0 (1.2)	3.5 (1.3)	4.4 (1.7)	5.5 (1.6)
Workforce experience of the family workers (mean for the family) (years)	1	25.8 (8.5)	30.6 (7.3)	21.7 (11)	21.9 (10.8)	26.1 (12)	29.5 (9.6)
Experience of the farm manager (years)	1	24.1 (10.3)	26.4 (10.1)	21.2 (13.8)	21.7 (10.9)	27.3 (13.9)	29.5 (9.6)

*NbMV: number of missing values. The figures in the table correspond to the mean (and standard deviation) except for ** where the frequency of farms is indicated. [1]For clarity reason, farmer and workforce education levels are expressed in tables as an average of education level classes considered as ordinal.

4.1.3 Working conditions

Farmers' working conditions of the whole sample were characterised as follow (Table 15):

- A high working time on average for the farm managers (56.4 hours on average per week) and lower for the other family workers (42.4 hr/week);
- Family workers took few holidays (1.2 week on average for family workers and 1 week on average for the farm manager) and few days free (104 farms without free days);
- Farmers expressed difficulties (quite difficult: 85 farms, very difficult: 23 farms) to replace a worker in case of absence;
- The workers were mainly specialised and they carried out specific tasks (all workers specialised: 62 farms, most of the workers specialised: 67 farms);
- Farmers tend to agree that being a farmer is an important reflection of who they are, and to be part of the farming community. They also tend to agree to consider the environment as important;
- Farmers expressed a moderate level of stress (5.6/10) and a quite high level of satisfaction (3.7/5);
- Farmers expressed a need to reduce physical and mental workload (3.5 and 3.6 respectively on a scale from 1 to 5).

Table 16 shows means and frequencies for the different indicators on working conditions per case study area. Due to the high variability within case study areas, the distribution of some indicators is detailed in the next section.

Table 15. Statistics on working conditions (all case study areas)

Index	Category	NbMV*	Mean (sd) / Frequencies **
Mean working hours for the farm manager (hours/week)	Work duration	0	56.4 (22.8)
Mean working hours for the family workers (hours/week)	Work duration	0	42.4 (20.7)
Total working hours per ha of UAA or 10 LU (family) (hours/week)	Work duration	0	22.2 (19.8)
Holidays for the farm manager (weeks per year)	Quality at work	7	1.0 (1.3)
Holidays for the family workers (weeks per year)	Quality at work	7	1.2 (1.4)
Free days (yes / no) **	Quality at work	0	No: 104 / Yes: 56
Difficulty to replace a worker in case of absence (not difficult, quite difficult, very difficult)(count) **	Work organisation	2	not: 50 / quite: 85 / very: 23
Specific tasks assigned to specific workers (no worker specialised, few workers specialised, most workers specialised, all workers specialised)(count) **	Work organisation	0	no: 14 / few: 17 / most: 67 / all: 62
Complexity of operating the farm (yes / no) (count) **	Work complexity	4	No: 68 / Yes: 88
Skills requirement in last adoption of ecological practices (1: Large decrease; 2: Slight decrease; 3: No change; 4: Slight increase; 5: Large increase)	Work complexity	11	3.8 (0.6)
Skills missing to adopt more ecological practices (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)	Work complexity	11	2.2 (1.1)
Being a farmer (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)(sum of score 0 to 5 for each of the 3 questions related to this indicator)	Self-identity and attitudes	4	12.7 (2.1)
Prioritising environment important as a farmer (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)(sum of score 0 to 5 for each of the 3 questions related to this indicator)	Self-identity and attitudes	4	12.9 (1.8)
Level of stress (scale from 0 to 10)	Stress	4	5.6 (2.3)
Mean satisfaction level with his/her working conditions (scale from 0 to 5)	Satisfaction	0	3.7 (0.6)
Need to reduce physical workload (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	Need to reduce	4	3.6 (1.1)
Need to reduce mental workload (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	Need to reduce	5	3.5 (1.2)
Need to reduce isolation (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	Need to reduce	4	2.9 (1.4)
Social relations of the farmer (in the local community, in village/rural area events, in meetings concerning supply chain-networks / food chain or professional organisations)	Social relations	4	2.2 (0.9)

*NbMV: number of missing values

Table 16. Statistics on working conditions (by case study area)

Index	NbMV*	AT_SA	AT_SK	FR_BR	FR_PD	GR	IE
Mean working hours for the farm manager (hours/week)	0	68.3 (15.3)	57.1 (17.4)	59.1 (14.6)	80.6 (21.5)	31.4 (15)	33.5 (16.7)
Mean working hours for the family workers (means in hours per week)	0	51.8 (15)	38.2 (13.5)	58.2 (15.1)	61.7 (28.2)	22.9 (14.1)	29.2 (16.7)
Total working hours per ha UAA or 10 LU (family)	0	26.9 (17.4)	31.4 (25.7)	12.4 (4.1)	26.7 (13.6)	7.4 (5.6)	8.5 (6.3)
Specific tasks assigned to specific workers (no worker specialised, few workers specialised, most workers specialised, all workers specialised) **	0	no: 2 / few: 2 / most: 21 / all: 22	no: 0 / few: 2 / most: 30 / all: 13	no: 3 / few: 0 / most: 2 / all: 6	no: 5 / few: 1 / most: 2 / all: 8	no: 1 / few: 6 / most: 12 / all: 11	no: 3 / few: 6 / most: 0 / all: 2
Difficulty to replace a worker in case of absence (not difficult, quite difficult, very difficult) **	2	not: 12 / quite: 22 / very: 13	not: 11 / quite: 28 / very: 5	not: 8 / quite: 1 / very: 2	not: 11 / quite: 3 / very: 1	not: 5 / quite: 23 / very: 2	not: 3 / quite: 8 / very: 0
Holidays for the family workers (mean of number of weeks per year)	7	0.9 (1.1)	0.9 (0.8)	2.2 (1.1)	1.4 (1.5)	0.5 (1.2)	3.7 (1.9)
Holidays for the farm manager (number of weeks per year)	7	0.6 (0.8)	0.9 (1.1)	2.2 (1.1)	1.3 (1.5)	0.4 (0.8)	3.5 (1.8)
Free days (yes / no) **	0	No: 41 / Yes: 6	No: 37 / Yes: 8	No: 5 / Yes: 6	No: 13 / Yes: 3	No: 3 / Yes: 27	No: 5 / Yes: 6
Complexity of operating the farm (yes / no) **	4	No: 30 / Yes: 14	No: 17 / Yes: 27	No: 3 / Yes: 8	No: 6 / Yes: 10	No: 10 / Yes: 20	No: 2 / Yes: 9
Skills requirement in last adoption of ecological practices (1: Large decrease; 2: Slight decrease; 3: No change; 4: Slight increase; 5: Large increase)	11	3.7 (0.6)	3.8 (0.6)	3.7 (0.8)	3.5 (0.7)	4.1 (0.6)	3.9 (0.8)
Skills missing to adopt more ecological practices (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)	11	2.2 (1)	1.8 (0.9)	1.5 (0.9)	2.4 (1.3)	3.0 (1.2)	2.3 (0.9)
Being a farmer (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)(sum of score 0 to 5 for each of the 3 questions related to this indicator)	4	13.2 (1.3)	12.7 (2.2)	11.1 (2.2)	11.1 (2.7)	13.3 (2.1)	12.9 (1.8)
Prioritising environment important as a farmer (1: Strongly disagree; 2: Disagree; 3: Neither agree nor disagree; 4: Agree; 5: Strongly agree)(sum of score 0 to 5 for each of the 3 questions related to this indicator)	4	12.6 (1.7)	12.9 (1.5)	12.6 (2.1)	13.4 (1.6)	12.8 (2.6)	13.4 (1.4)
Level of stress (scale from 0 to 10)	4	6.1 (2)	5.1 (2.1)	6.2 (1.1)	2.8 (3)	6.7 (2.2)	4.8 (1.3)
Mean satisfaction level with his/her working conditions (scale from 0 to 10)	0	3.6 (0.6)	4.0 (0.5)	3.9 (0.4)	3.8 (0.6)	3.5 (0.7)	4.0 (0.4)

Need to reduce physical workload (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	4	3.3 (0.9)	3.7 (1.2)	3.6 (1.4)	3.3 (1)	3.9 (1.2)	3.3 (0.9)
Need to reduce mental workload (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	5	3.5 (1)	3.4 (1.4)	3.7 (1.3)	3.9 (1)	3.4 (1.2)	3.6 (0.8)
Need to reduce isolation (1: Strongly disagree; 2: Somewhat disagree; 3: Neither agree nor disagree; 4: Somewhat agree; 5: Strongly agree)	4	2.8 (1.3)	2.6 (1.4)	3.4 (1.6)	2.9 (1.2)	3.1 (1.5)	3.5 (1)
Social relations of the farmer (in the local community, in village/rural area events, in meetings concerning supply chain-networks / food chain or professional organisations)	4	2.7 (0.7)	2.6 (0.7)	2.2 (0.9)	1.4 (1.1)	1.2 (0.7)	2.1 (0.9)

*NbMV: number of missing values. The figures in the table correspond to the mean (and standard deviation) except for ** where the frequency of farms is indicated.

4.2 Analysis of working conditions: distributions among the five European case studies

4.2.1 Work duration

Farmers' mean working hours were lower for GR and IE with around 30 hours per week, whereas mean working hours were around 75 hours per week in other case study areas, 2.5 times higher, but with a lot of variability (Figure 4). Mean working hours for all family members – including farm manager – were clearly lower, medians were almost 30% lower – except for FR_BR where they are quite the same – although there was no difference for all individual farms (Figure 5). When looking at total working hours per size (per ha UAA for GR, and per 10 LU for other case study areas), values were distributed around 10 for GR, IE and FR_BR, and around 25 for AT_SA, AT,SK and FR_PD, with some very high values in AT_SK (Figure 6).

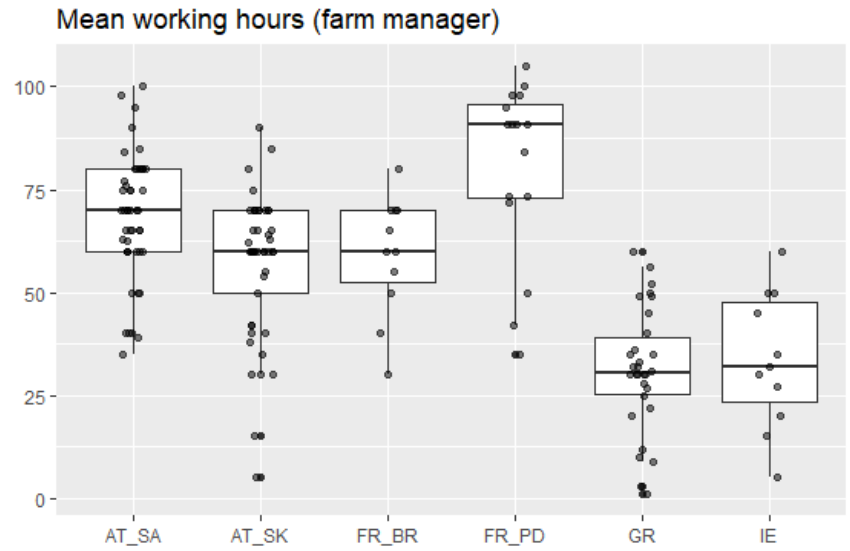

Figure 4. Mean working hours for the farmer per case study area

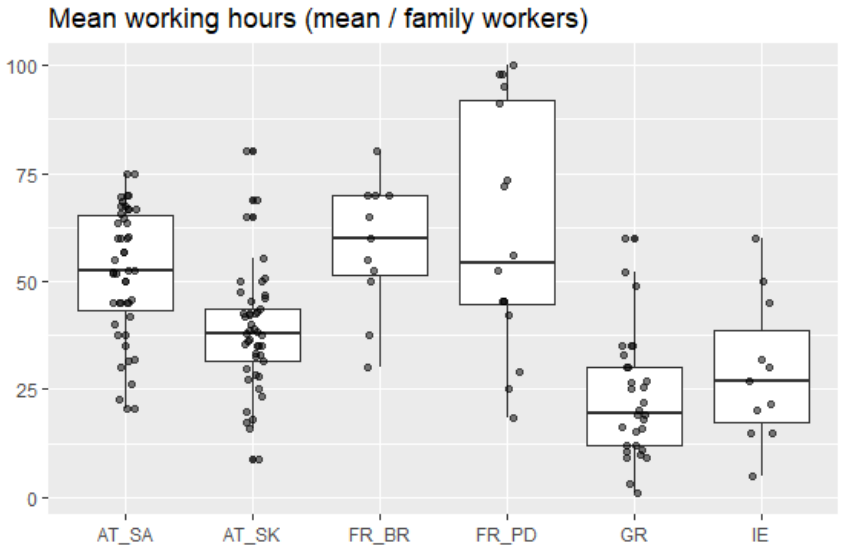

Figure 5. Mean working conditions for the family workers per case study area

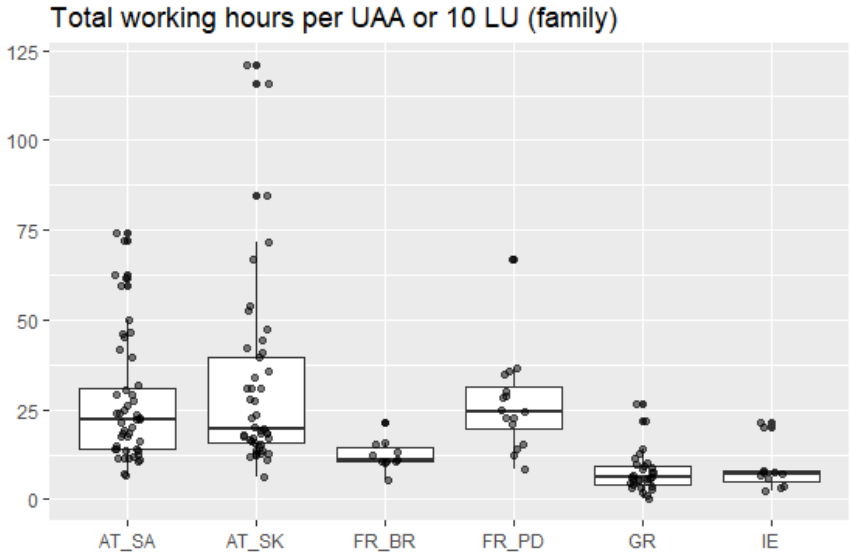

Figure 6. Total working hours per ha of UAA or 10 LU (family) per case study area

4.2.2 Work organisation

Workers were more specialised in the two Austrian cases studies. In IE the level of versatility of workers was more important (Figure 7).

It was more difficult to replace a worker in case of absence in GR and IE than in FR_BR and FR_PD (Figure 8).

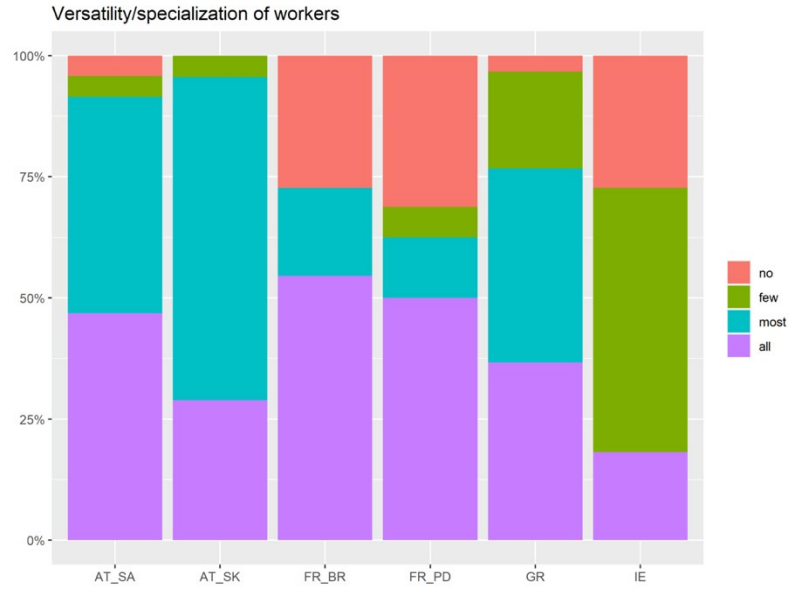

Figure 7. Proportion of farmers per case study area depending on the tasks: Specific tasks assigned to specific workers (no: no specific activities dedicated to specific workers, few: specific activities dedicated to few workers, most: specific activities dedicated to most specific workers, all: specific activities dedicated to all workers) (%)

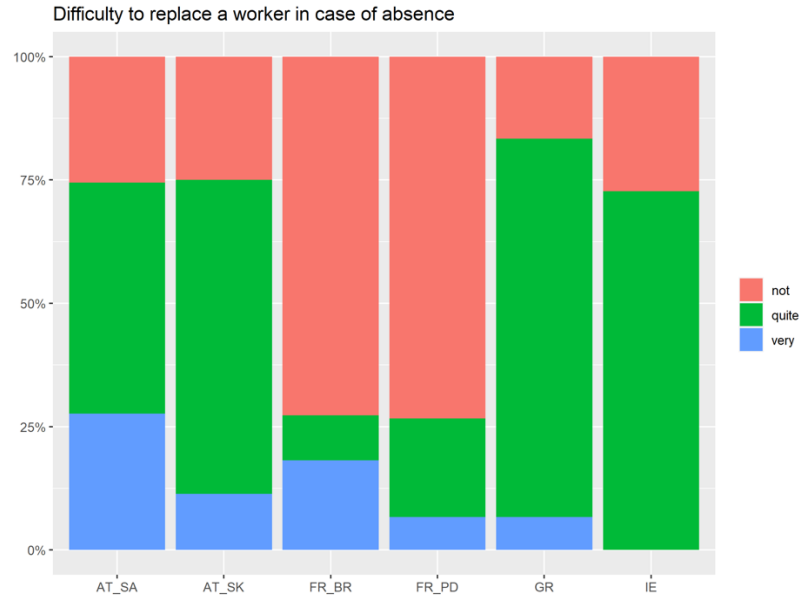

Figure 8. Proportion of farmers per case study according to their difficulty to replace a worker in case of absence (not: not difficult; quite: quite difficult; very: very difficult) (%)

4.2.3 Quality at work

Most farmers in GR sample did not take vacation, whereas in IE and FR_BR all farmers took vacation. In FR_PD and Austrian case study areas, some farmers did not take vacation. The mean number of weeks was lower for GR, slightly higher in Austrian case study areas and FR_PD, and much higher in FR_BR and even higher IE (Figure 9).

As regards free days, patterns were similar to those for vacation, except that most farmers in GR said they had free days (Figure 10).

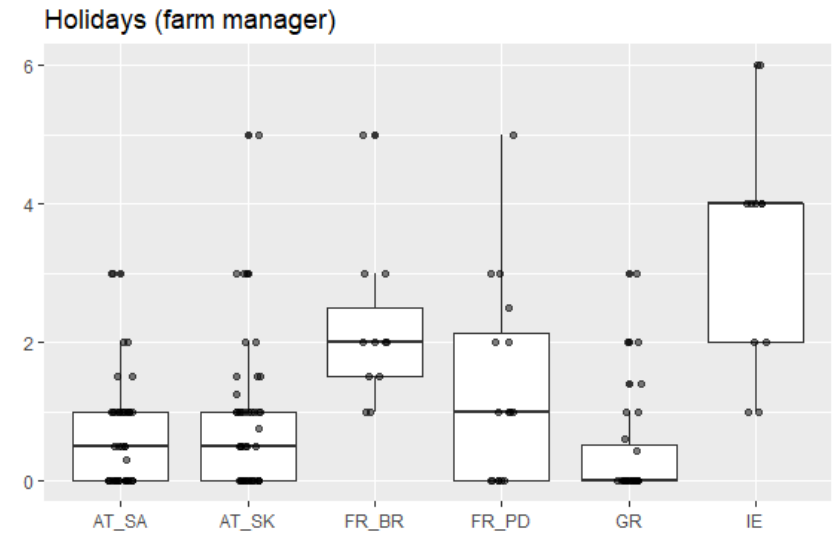

Figure 9. Number of weeks of holidays for the farm manager

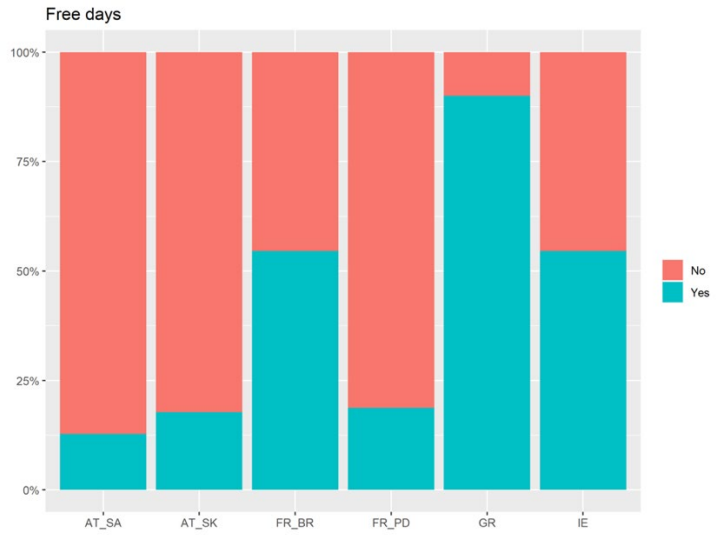

Figure 10. Proportion of farmers per case study area saying they have days off (Yes) or not (No) (%)

4.2.4 Work complexity

In most case study areas, 60% to 80% of farmers considered that adoption of ecological practices in the past has changed their observation and/or monitoring habits (of the herd, crops, farm, etc.) in general (over the past 5 years), but only around 30% in AT_SA (Figure 11). All farmers, and not only organic farmers, have answered these questions about work complexity. If they had not adopted ecological practices in the past, they had to imagine if they would. When considering skills requirement in last adoption of ecological practices, the distribution of answers was quite similar between case study areas, slightly higher in GR and IE, and slightly lower in FR_PD (Figure 12).

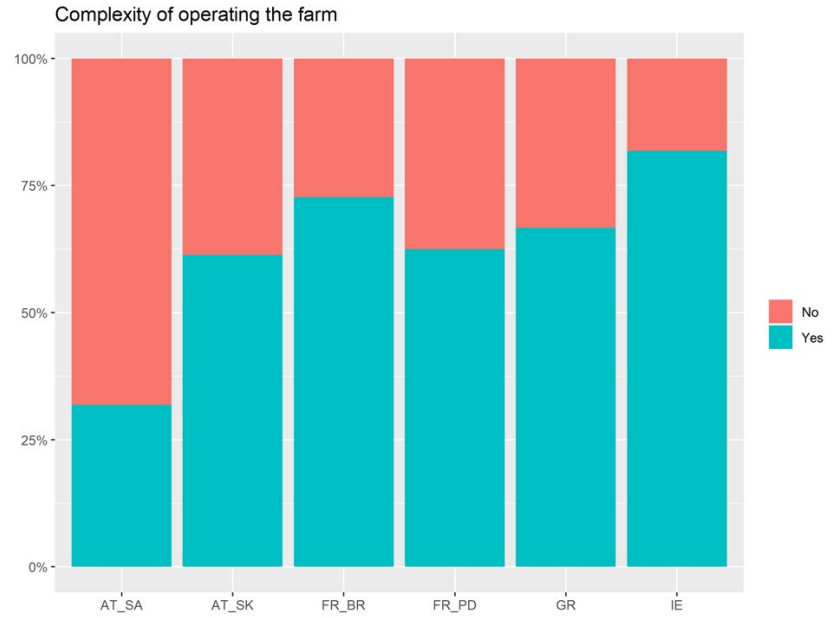

Figure 11. Proportion of farmers per case study considering that the adoption of ecological practices has changed their work complexity (Yes) or not (No) (%)

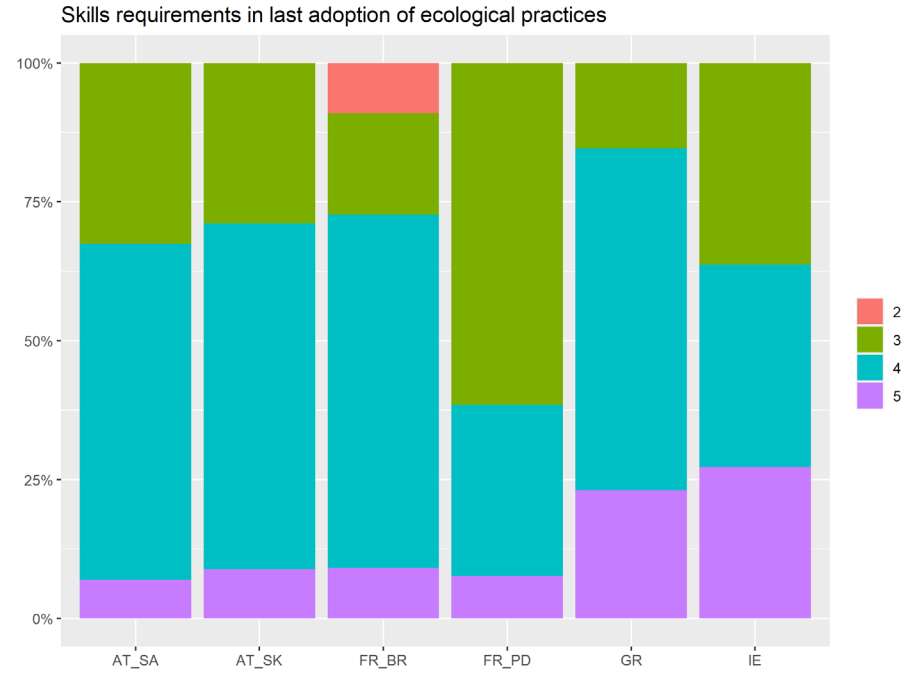

Figure 12. Proportion of farmers considering that they faced 2: Slight decrease; 3: No change; 4: Slight increase; 5: Large increase, in skills requirements for farm work and management in the last adoption of ecological practices (%). The option 1 "large decrease" was not selected by farmers. (%)

4.2.5 Self-identity and attitudes

The feeling to be a farmer and to belong to a farming community was relatively important in all case study areas, even if some farmers expressed a lower level (Figure 13). This variable is a bit difficult to interpret because the three questions making this indicator are different (one considers pride in being a farmer while the other two are more about the feeling of belonging to a community of farmers).

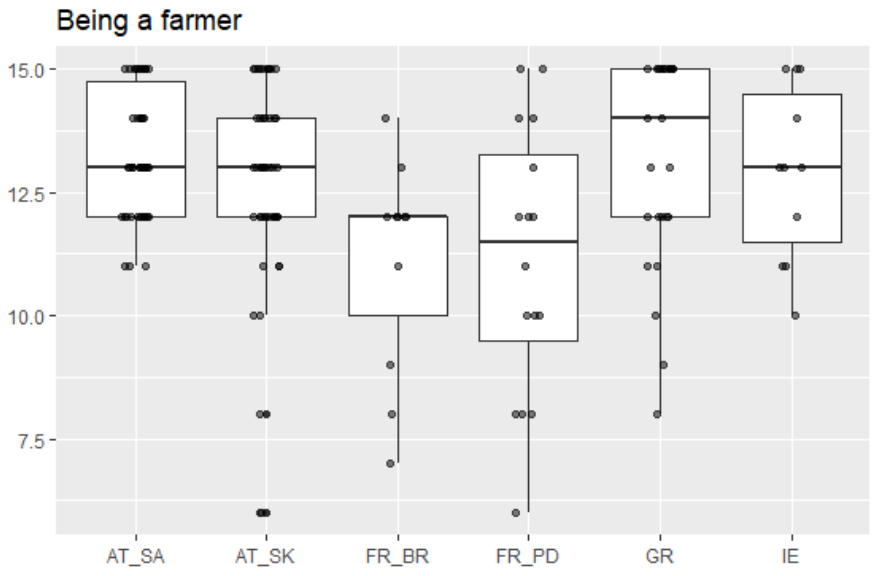

Figure 13. Being a farmer (total from 0 to 15, as a sum of score 0 to 5 for each of the 3 questions related to this indicator)

4.2.6 Stress and satisfaction

The level of stress was lower in FR_PD, but higher in GR. The medians of stress levels show a small gradient from 5 for AT_SK and IE, to 6 for AT_SA and FR_BR, and even 7 for GR, but with a lot of variability. In FR_PD, the median was significantly lower, close to 3 (Figure 14).

Farmers said to be less satisfied in AT_SA. The medians of mean satisfaction level are slightly lower in AT_SA and in GR, around 3, compared to other case study areas, around 4, but with a lot of variability in all case study areas (Figure 15).

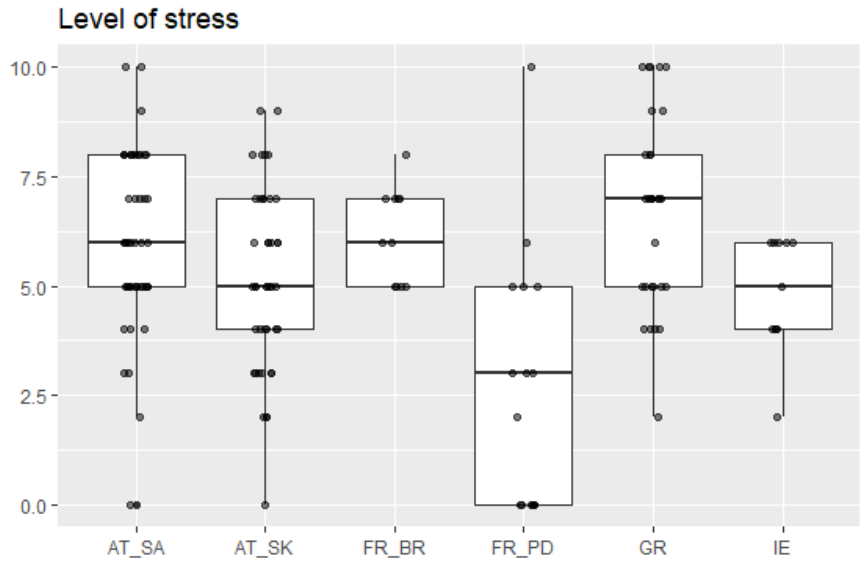

Figure 14. Level of stress expressed by farmers (on a scale from 0 – not stressed to 10 – very stressed) per case study area

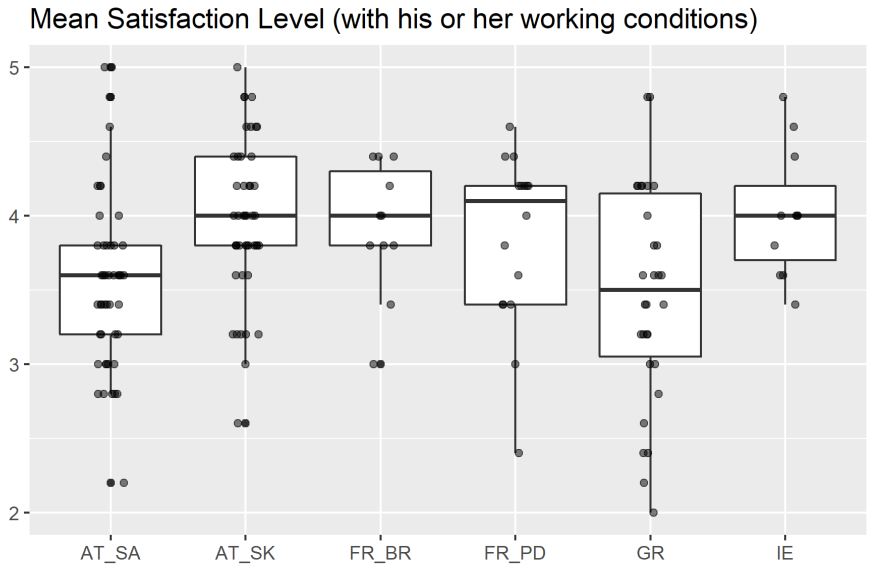

Figure 15. Level of satisfaction expressed by the farmers (scale from 1 – not satisfied at all to 5 – very satisfied) per case study area

4.2.7 Social relations

The number of social relations' types that farmers had, was mostly higher in Austrian case study areas with almost 75% of farmers having all types of relationships (local community, village/rural area events, meetings concerning supply chain-networks/food chain), a bit lower in FR_BR and IE with almost 40% with three types and 40% with only two types of relationship, and finally FR_PD and GR with more than 50% with zero or only one type of relationship (Figure 16).

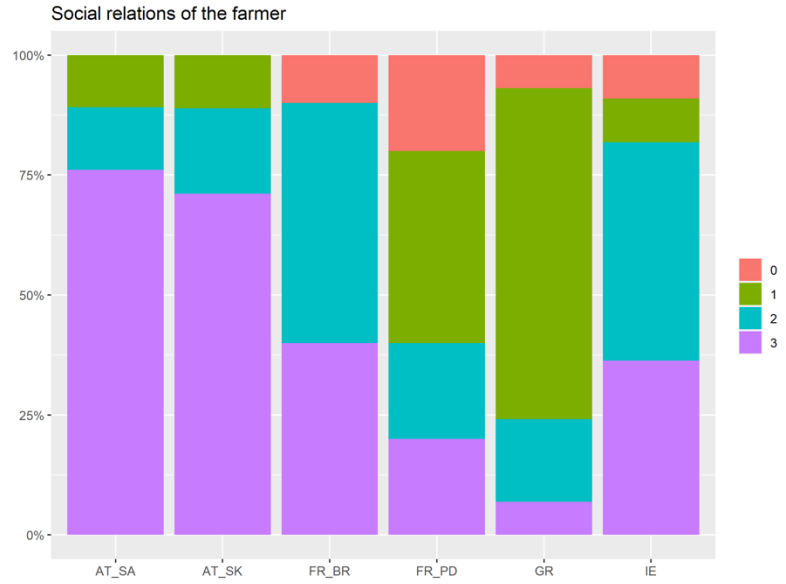

Figure 16. Proportion of farmers according to the number of social relations types they had (%) (0: no social relation, 1: one social relation, 2: two social relations, 3: three social relations within the types of relationships (local community, village/rural area events, meetings concerning supply chain networks/food chain) (%)

4.3 Analysis of working conditions: multivariate analysis of working conditions

The first factorial plan of the PCA of working condition indicators for farms with complete data represents 27% of inertia (Figure 17). The first component is negatively correlated with mean working hours and to decision making, and positively with vacation and free days. The second component is negatively correlated with mean satisfaction level, and to a lesser extent with vacation, social relation and the complexity of operating the farm, and positively with skills missing for change, difficulty to replace and stress level. To summarise, the first axis represents a gradient to more vacation/free days and lower values of mean working hours, and the second axis a gradient to lower mean satisfaction levels.

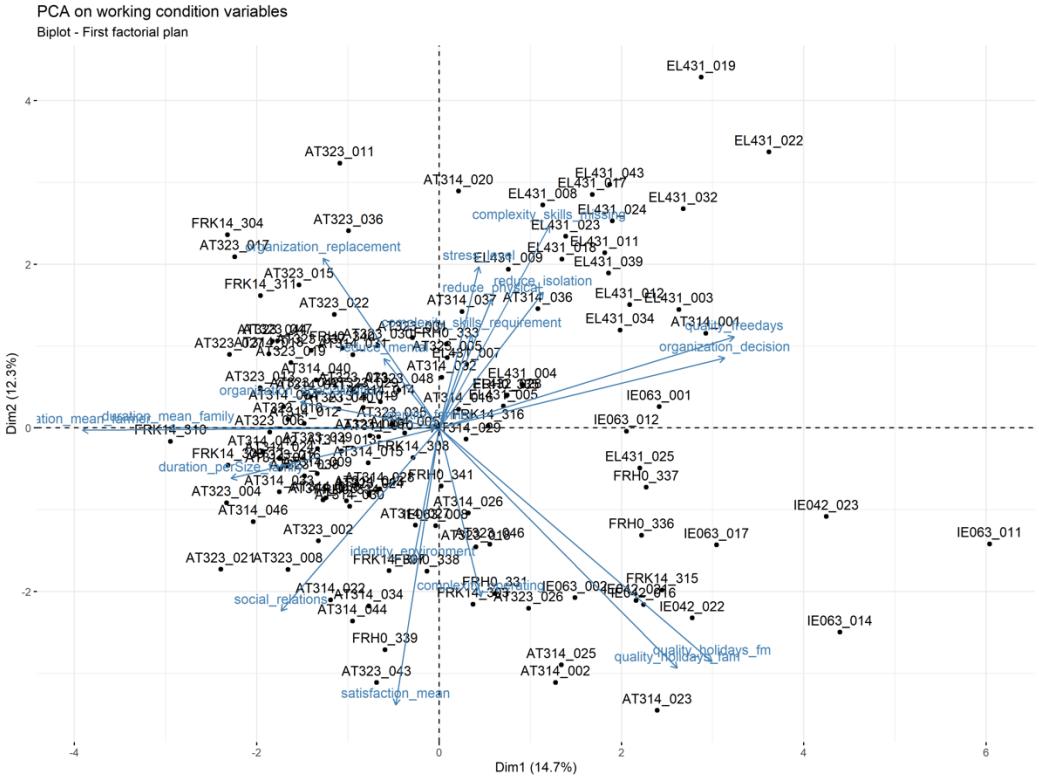

Figure 17. PCA on working condition indicators – First factorial plan (biplot)

The second factorial plan represents less than 17% of inertia (Figure 18). The third component is negatively correlated with mean working hours, and positively with self-identity indices, both to be a farmer and to work with/for the environment, as well as with specialisation of tasks. The fourth component is mainly positively correlated with the need for change to reduce physical, mental work and isolation, and the feeling that skill requirements for farm work and management were needed to adopt ecological practices.

To summarise, the first axis represents a gradient from more working hours to more self-identity and specialisation, and the second axis a gradient of stronger feelings of the need for change and for skills requirement to do it.

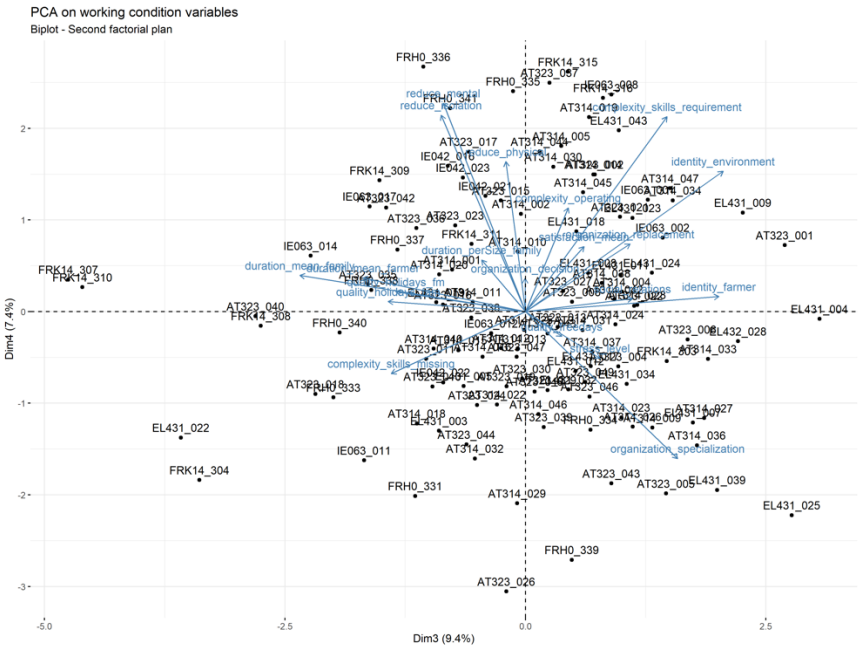

Figure 18. PCA on working condition indicators – Second factorial plan (biplot)

The projection of supplementary variables on the first factorial plan shows that production indices are clearly correlated with different components. It could be also noted that the education level and the gender ratio in family workforce is related to the first axis (Figure 19).

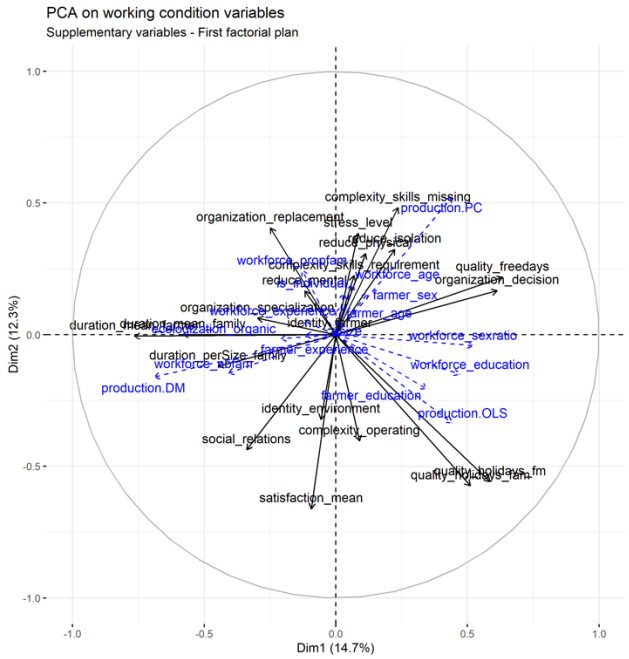

Figure 19. PCA on working condition indicators – Supplementary indicators (Axes 1 & 2)

The projection of case study area shows that GR and IE case study areas are clearly discriminated on the first factorial plan, which probably indicates that working conditions in these case study areas differ significantly from farms in other case study areas, which is probably due to other agricultural systems involved, especially in GR (Figure 20).

Organic and non-organic farms are not well discriminated on this first plan (Figure 21) although organic farms within GR and IE case study areas seem to be quite clustered along the first axis, even if no clear patterns were identified; this could be checked by looking at the distributions by organic type (organic or not) and by case study area (Figure 22).

Farms according to their productions are very clustered along the first axis, notably dairy milk farms with low values, except for cattle farms which are more scattered (Figure 23).

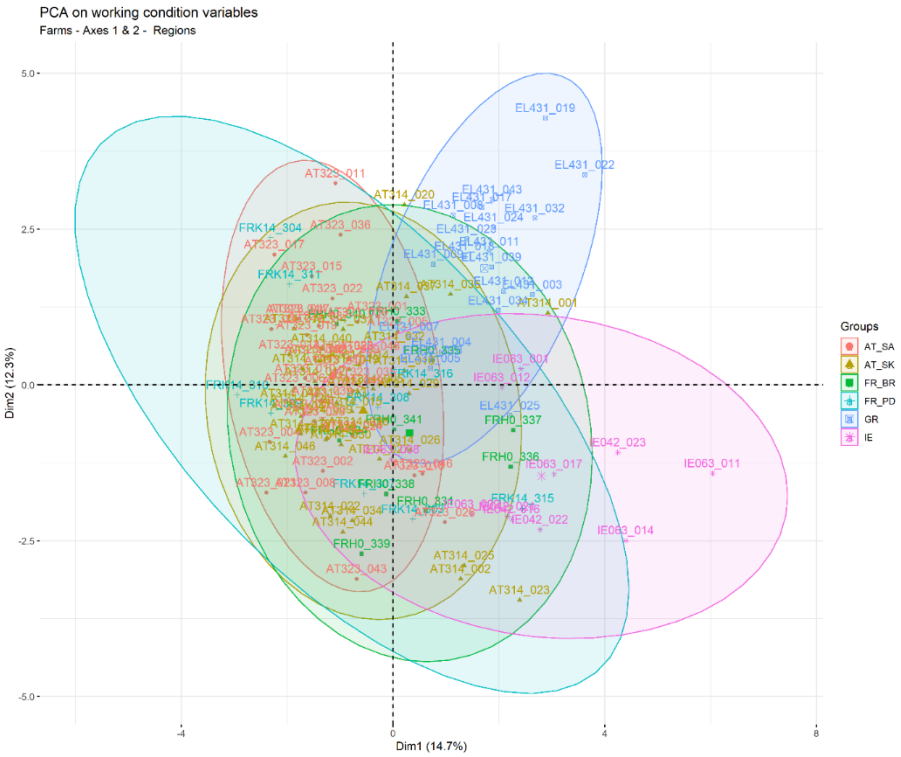

Figure 20. PCA on working condition indicators – Farms vs case study area (Axes 1 & 2)

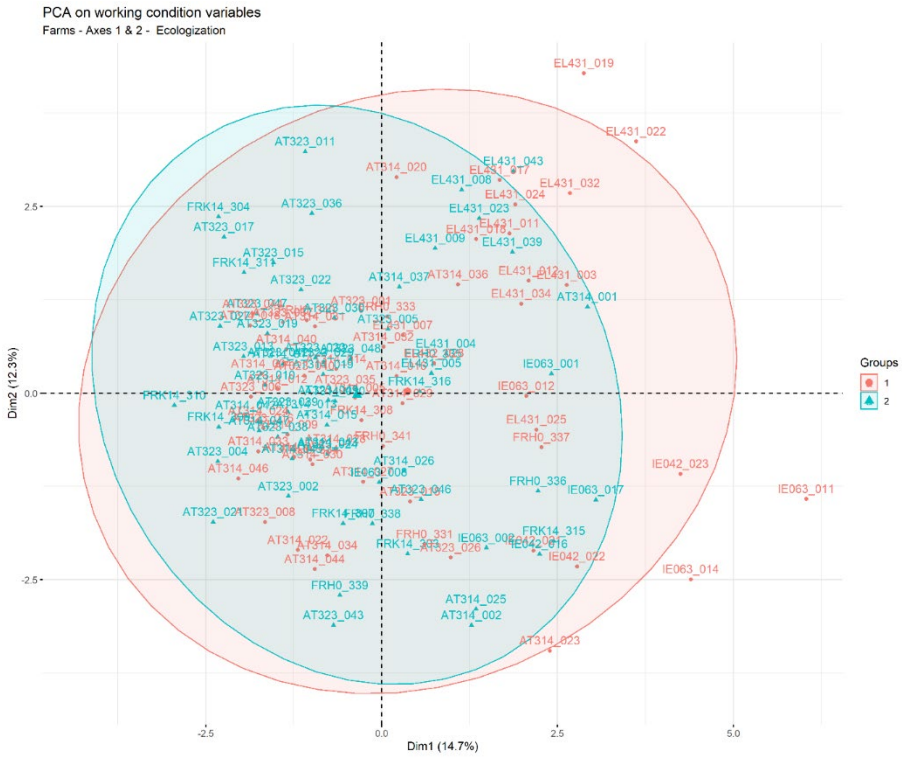

Figure 21. PCA on working condition indicators – Farms vs degree of uptake of ecological practices (organic vs non organic) (Axes 1 & 2)(Organic : 1)/ Non-organic : 0)

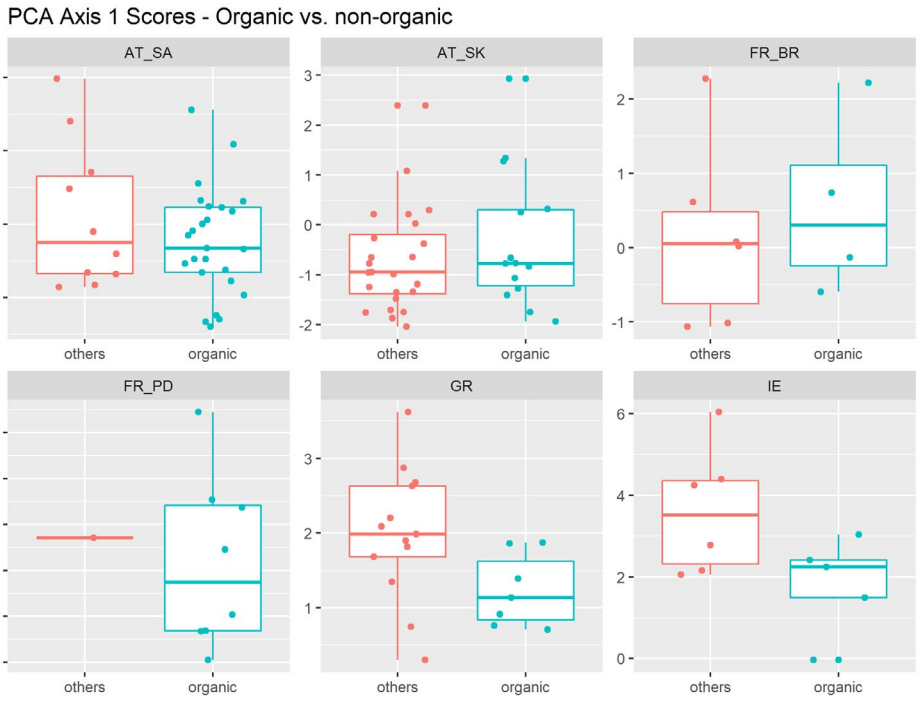

Figure 22. PCA Axis 1 vs degree of uptake of ecological practices by case study area

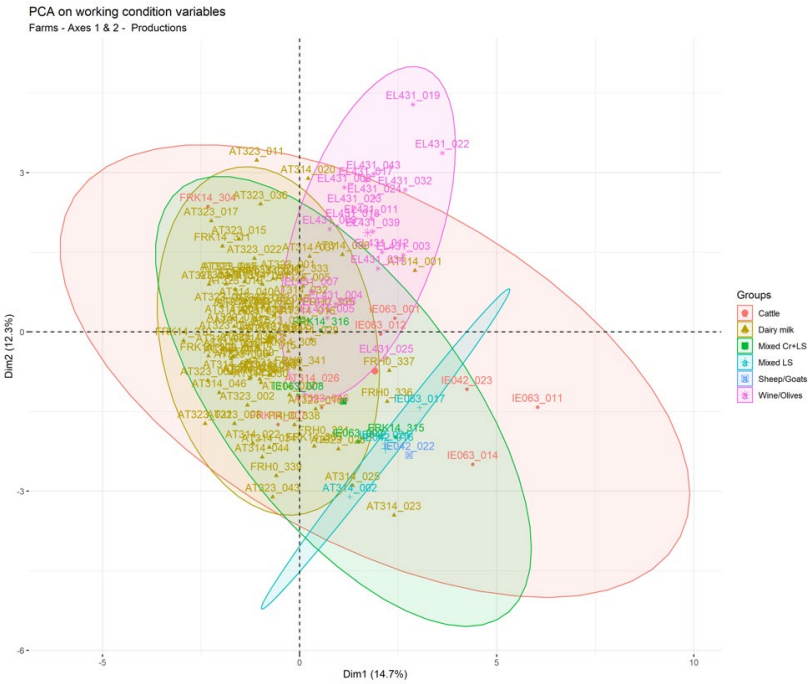

Figure 23. PCA on working condition indicators – Farms vs productions (Axes 1 & 2)

When looking at workforce composition, it can be noticed that the first axis tends to separate farms with no family worker, whereas the second axis tends to separate farms with some hired workers. This is of course partly due to patterns related to case study areas and productions (Figure 24).

Figure 24. PCA on working condition indicators – Farms vs workforce composition (Axes 1 & 2) (combinations of noF/someF: respectively no/some family workers, and noH/some: respectively no/some hired workers, resulting in 4 groups of farms according to the presence or absence of family and hired workers: someF-noH, someF-someH, noF-noH, noF-someH)

When considering a more homogeneous sub-sample: livestock farms (without GR), the first factorial plan of the PCA of working condition indicators on this sub-sample still shows clear pattern related to the different productions (Figure 25). But, when performing the same PCA on a more homogeneous sub-sample of dairy farms only, there is no clustering related to case study areas on first factorial plans (Figure 26) neither to the degree of uptake of ecological practices measured here with the livestock density, namely the number of LU per ha of UAA (Figure 27). We could find other patterns, notably a clear discrimination of farmers with an agricultural university level along the first component (corresponding to high values for quality at work variables) (Figure 28).

Figure 25. Same PCA for livestock farms only (without GR) - Axis 1 vs Productions

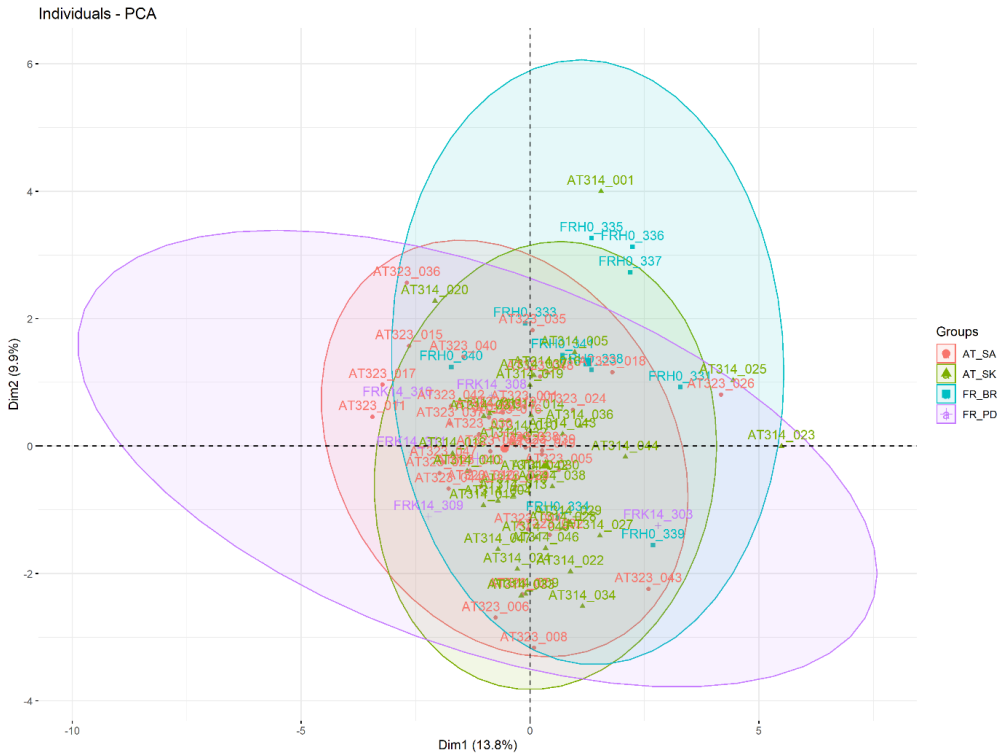

Figure 26. Same PCA for dairy farms only - Axis 1 vs case study areas

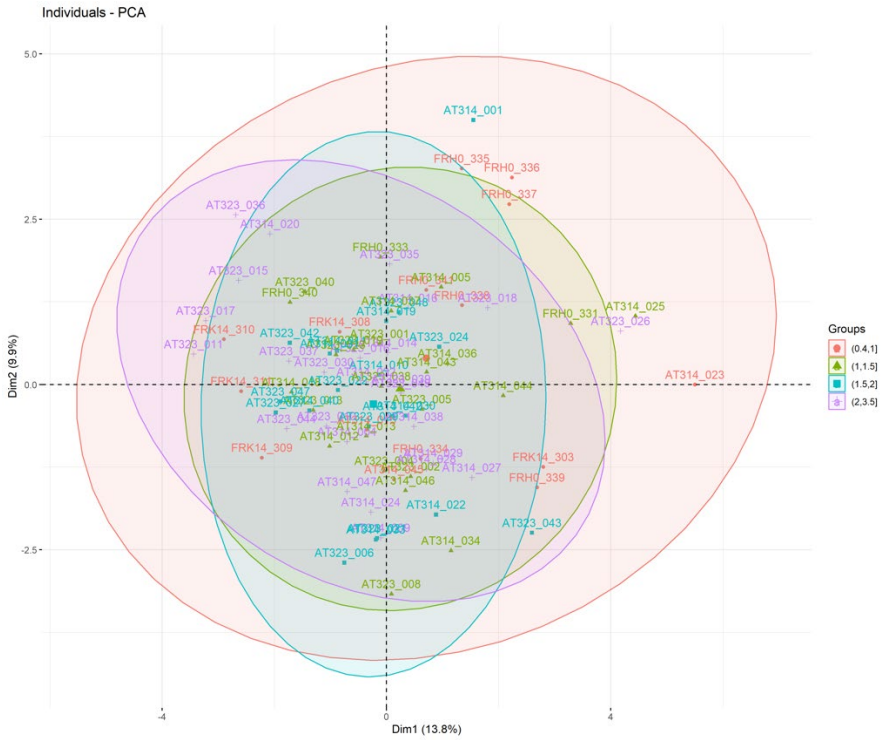

Figure 27. Same PCA for dairy farms only - Axis 1 vs the degree of uptake of ecological practices measured with the livestock density, namely the number of LU per ha of UAA.

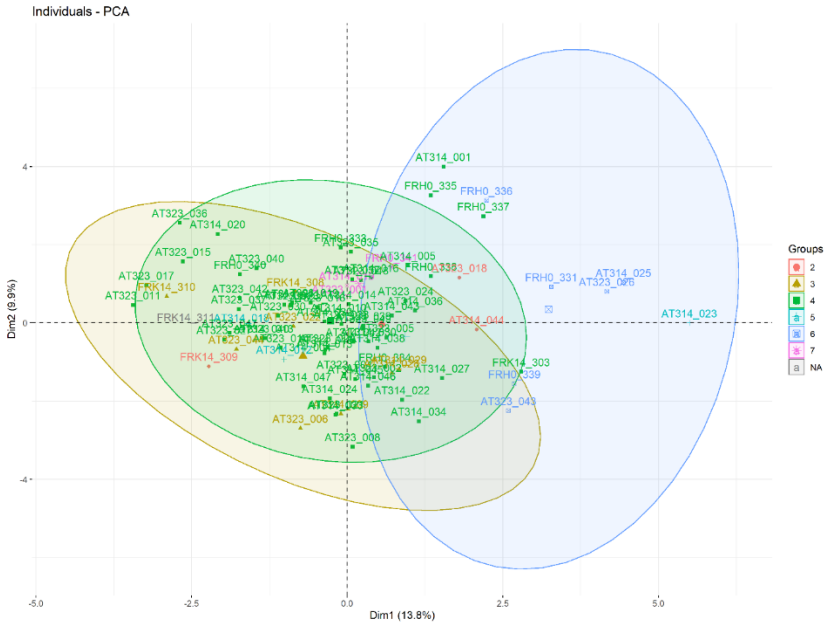

Figure 28. Same PCA for dairy farms only - Axis 1 vs Farmer education level

5 Results of the complementary analysis conducted in the case studies

5.1 French case studies: Puy-de-Dôme and Brittany

Specific analyses were conducted for both French case studies (FR_PD and FR_BR). Main findings, published in peer international journal, in international or national conferences (Duval et al., 2021 a and b; Jacquot et al., 2020) are presented here. These articles showed that all farmers have experienced an impact of the adoption of ecological practices on their working conditions. Farmers claimed various impacts on workload, work organisation and the need for special equipment, depending on the nature of the production systems and the ecological practices adopted. They all expressed a positive effect with an improvement of their workload and their own perception of their job. Depending on the individual situation, a certain dimension was improved in one farm but could deteriorate in another (e.g. the dimension 'time spent at work'). This result showed the importance of a multidimensional framework to analyse interactions between dimensions affecting working conditions.

To complete these results, an international review of the literature was conducted on the impacts of the adoption of ecological practices in livestock farms on farmers' working conditions (Duval et al., 2021c). Concerning the different dimensions determining working conditions, positive as well as negative impacts of ecological practices were observed across and sometimes within different dimensions. For example, an increase of the amount of work was found in some studies, but others identified a decrease. Work organisation was considered to be more complex than in non-ecological systems in some studies and less complex in others. According to some farmers, work organisation tends to be more seasonal in ecological systems. It can imply higher mental workload peaks. The level of experienced complexity might be dependent on the initial level of complexity of the farm system before the adoption of ecological practices. There is a general consensus concerning the fact that the acquisition of new skills, experience and informal and/or formal knowledge is necessary to adopt ecological practices and/ or stimulates their adoption. The adoption of ecological practices can be a source of uncertainty for some farmers or a contribution to the challenging nature of work, which can be a source of pleasure for others. Authors also agreed that the adoption of ecological practices allowed farmers to work in a system that was more in line with their personal beliefs and motivations. Farmers also expressed a reduction of the physical workload in case of implemented ecological practices.

More details (abstracts) for each article are described below.

Duval J., Blanchonnet A., Hostiou N., 2021(a). Agroecological farming practices and French cattle farmers' working conditions. In: 2nd Symposium on Work in Agriculture, Clermont-Ferrand, France, 29th of March - 1st of April 2021. (https://symposium.inrae.fr/workinagriculture-iswa/Abstracts-Papers-Workshops-sessions/Workshop-8-Innovation-and-work-adaptation)

Concerns for the future of the French livestock sector are growing, amongst others due to the decline of people willing or able to become livestock farmers. Contributing to the decline in attractiveness of the profession are for example agricultural crises and difficult working conditions. In France, the transition to agroecological farming systems is seen as a solution to these problems. In addition, agroecology in its search for social sustainability should offer better working conditions to farmers, and thus contribute to a sustainable future for the livestock farming sector. The objectives of this study were; i) to understand whether expected changes in working conditions are taken into consideration when cattle farmers decide to adopt or not agroecological practices and ii) to study the impact of these practices on farmers' working conditions by testing and discussing the use of a multidimensional framework to study working conditions. The designed framework addresses 7 dimensions known to impact

farmers' working conditions, namely 'time spent at work', 'health', 'work organisation', availability of 'equipment' and 'skills', 'intrinsic benefits of work' and 'work related displeasure'. Twenty-two semi-structured interviews were conducted with certified organic and non-organic beef and dairy cattle farmers in the Puy-de-Dôme region (France) who had adopted agroecological practices. Working conditions were taking into consideration by the majority of the farmers when deciding to adopt or not these practices, but were most often not the sole motivation. All farmers, experienced an impact of the adoption of agroecological practices on their working conditions. Across farms, all dimensions were impacted, but not all on each farm. Moreover, depending on the individual situation, a certain dimension was improved in one farm but could deteriorate in another (e.g. the dimension 'time spent at work'). On a farm certain dimensions were improved (such as the 'intrinsic benefits of work' or 'health') whereas others were deteriorated (e.g. 'workload' or 'work organisation'). This was another example showing the importance of a multidimensional framework to analyse interactions between dimensions affecting working conditions. Finally, we also recommend certain improvements of this version of the framework.

Duval J, Blanchonnet A, Hostiou N., 2020 (b). How agroecological farming practices reshape cattle farmers' working conditions. Agroecology and Sustainable Food Systems. In revision.

Concerns for the future of the French livestock sector are growing, amongst others due profession's low attractiveness related to its difficult working conditions. Agroecology in its search for social sustainability should offer better working conditions to farmers. A framework addressing 7 dimensions known to impact farmers' working conditions were used to interview 22 French cattle farmers adopting agroecological practices. All farmers experienced an impact of the adoption of agroecological practices on their working conditions. Although never fully anticipated, across farms, all dimensions were impacted but consequences were farm and farmer specific. This raises the question whether farmers could be counselled differently in the transition towards agroecological farming systems, by better anticipating difficulties and identifying possible positive changes in working conditions to act as a lever in the transition. Finally, we also recommend certain improvements of this version of the framework. For example, farmers considered mental workload as an area that could be improved, but this was not sufficiently addressed in the tested framework.

Jacquot A.L., Duval J., Gerard M., Hostiou N., 2020. Quels effets sur le travail des éleveurs bovins laitiers de l'adoption de pratiques agroécologiques dans l'Ouest de la France ? Rencontres Recherches Ruminants, Paris, décembre 2020, 25, 565-569 (http://journees3r.fr/IMG/pdf/systemes_-_20201205.pdf)

To limit their impacts on the environment, farmers are encouraged to change their practices but it can affect their working conditions. This study aims to explore the effect on farmers' working conditions due to the adoption of agroecological practices. During fall and winter 2019-2020, 17 dairy farmers located in the West of France have been surveyed. The effects on working conditions are investigated throughout different facets: from workload to farmer's identity and their perception of their job. More than thirty agroecological practices were identified. All farmers declared an effect of those on their working conditions. They claim various impacts on workload, work organisation and the need for special equipment, depending on the nature of the production systems and the applied agroecological practices. They all express a positive effect with an improvement of the arduousness, need for skills and farmer's relationship with the society, and their own perception of their job. This survey highlights different effects of the adoption of agroecological practices on farmer's working conditions, leading to further opportunities to bring a better support to farmers to help them towards agroecological transitions.

Duval J., Cournut S., Hostiou N., 2021 (c). Livestock farmers' working conditions in agroecological farming systems- A review. Agronomy for Sustainable Development, 41 (22), https://doi.org/10.1007/s13593-021-00679-y

The livestock farming sector is under stress as fewer and fewer people are willing or able to become livestock farmers. Contributing to the decline in attractiveness of the profession are, among other factors, agricultural crises, higher consumer expectations, and difficult working conditions. Agroecology is a sustainable solution that can maintain livestock production and provide positive contributions to society without negatively affecting the environment. Moreover, in its search for social sustainability, agroecological farming could offer better working conditions to farmers and thus contribute to a sustainable future for the livestock farming sector. Here, we review research on livestock farmers' working conditions in agroecological farming systems. This paper aims to give a comprehensive overview of the available research findings and the dimensions used to describe farmers' working conditions. The major findings are the following: (i) relatively little published research is available; (ii) it is difficult to compare findings across studies as different dimensions are used to study working conditions and, in certain cases, detailed descriptions of the farming systems are not provided; (iii) certain dimensions were rarely addressed, such as farmers' health, or work organisation; and (iv) in general, farmers' work is addressed as a component of environmental and economic analyses of the performance of agroecological livestock farming systems, using most often indicators on labour productivity and/or efficiency. Comprehensive multidimensional approaches to study working conditions are lacking, as are studies on the interactions and trade-offs between dimensions (e.g., workload, fulfilment, work organisation). To study livestock farmers' working conditions in agroecological farming systems, we recommend to use a comprehensive approach assessing different dimensions contributing to working conditions, combined with the description of farmers' activities and work environment.

5.2 Greek case study

Preliminary results reveal some interesting differences and similarities between the two farming systems (i.e., non-organic and organic) (Alebaki et al., 2021). In particular, organic farms have a higher share of female workers and a slightly lower share of seasonal workers than non-organic farms. Family workers in organic farms are younger than in non-organic ones (averages of 43.7 and 53.5 years old, respectively), with a slightly higher level of education and no significant differences in agricultural experience (averages of 25 and 26.7 years, respectively).

The vast majority of the farm managers are male, their average age is 51.3, and they have, on average, 26.1 years of agricultural experience. The average age of farm managers among the organic farms and the non-organic is almost the same, while the average years of agricultural experience seem to be significantly higher for the farm managers of the organic farms (32), in contrast to the farm managers of the non-organic farms (24.5). Organic farmers agree to a greater extent that adopting ecological farming practices leads to spending more time working on the farm than non-organic farmers. Indeed, the average working hours of farm managers and family farm workers were found to be higher in organic farms in respect to the working hours in non-organic farms.

The vast majority of farmers, regardless of whether they have already adopted ecological farming practices or not, stated that the adoption of ecological farming practices increases significantly the labour requirements for the farm and, to a large extent, farm managers' labour. Furthermore, farmers stated that it is quite difficult to replace a worker in case of absence in both farming systems.

In terms of work complexity, approximately half of the organic farmers reported that adoption of ecological practices resulted in a simpler system and work but increased difficulty to find workers with skills for eco-practices, while almost 4 out of 5 of the non-organic farmers stated the exact opposite. In addition, farmers consider that the adoption of ecological practices has changed their observation

and/or monitoring habits, necessitates specific equipment, as well as a slight increase of their skill requirements.

Overall, both organic and non-organic farmers express a relatively high level of stress and a rather high level of satisfaction. However, organic farmers express a slightly lower level of stress than farmers belong to the "other" category and marginally a higher level of satisfaction.

5.3 Scottish case study

Results (Figure 29; Figure 30; Figure 31; Figure 32) provided on the Scottish case study highlighted differences on working conditions, considering the efficiency of two categories on workers, paid and unpaid labour. Results (Figure 29; Figure 30; Figure 31; Figure 32) show a strong difference between how efficiently paid and unpaid labour are used for creation of both environmental/diversification and livestock outputs, with unpaid labour scores consistently higher than paid labour scores. The efficiency of unpaid labour in creation of traditional livestock products as compared to environmental/diversification is, as expected, lower. Both paid and unpaid labour are more efficiently used on sheep farms than cattle farms to produce livestock outputs. It is less surprising that, compared to all other inputs, the use of unpaid labour is the most efficient for creation of environmental outputs, than it is the fact that unpaid labour is still highly efficient for creation of traditional livestock products, e.g., higher than land area and paid labour. This is consistent with the current discussion on distribution of paid and unpaid labour across these types of farms – even more evident following the period of analysis due to recent developments e.g., Brexit.

While there are mostly no significant differences by types defined based on the LIFT typology for the environmental labour models, scores are significantly differentiated under both typology variables for most 'traditional labour' models. Regression findings show subsidies and organic status as consistently significant in a majority of environmental and traditional models, which supports the issues presented in the case study description on subsidies dependence and differences between types of labour. The relationship between farm organic status and efficiency scores of labour used for both 'traditional' and 'diversification' outputs emphasise that organic production is not only environmentally oriented but has a clear economic reasoning.

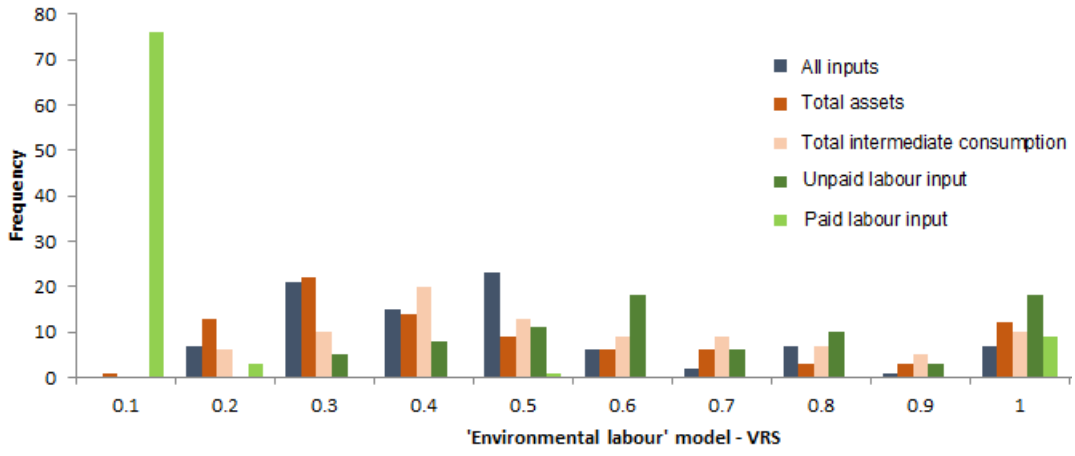

Figure 29. 'Diversification labour' model; variable returns to scale (VRS) efficiency scores; for cattle and sheep farms sample (superimposed histograms)

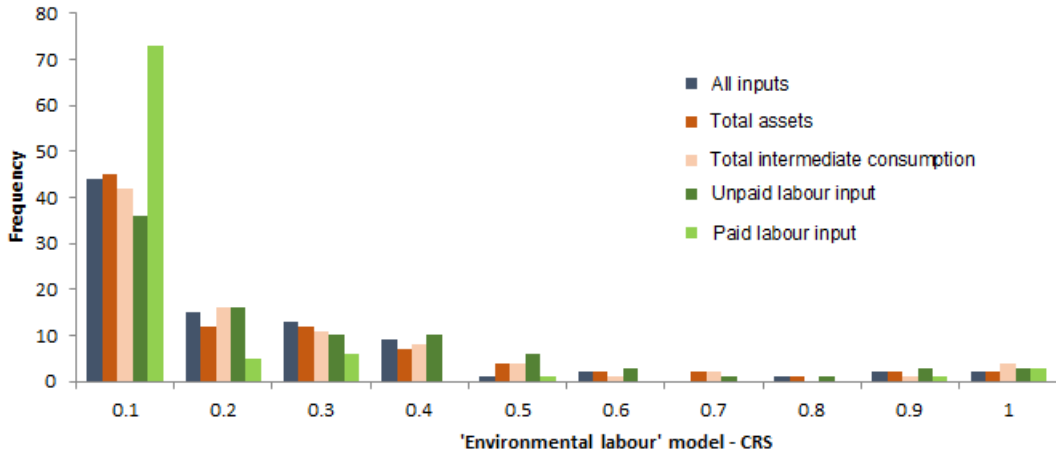

Figure 30. 'Diversification labour' model; constant returns to scale (CRS) efficiency scores; for cattle and sheep farms sample (superimposed histograms)

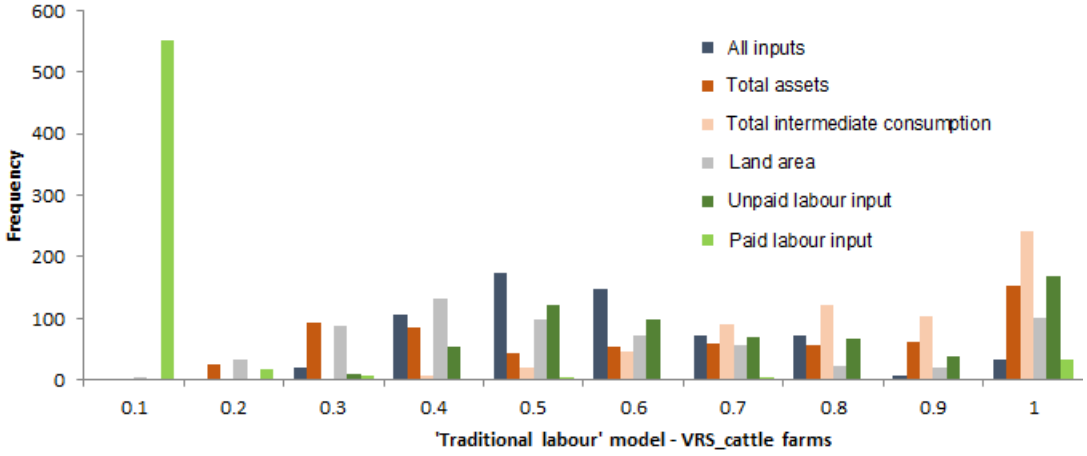

Figure 31. 'Traditional labour' model; VRS efficiency scores; for cattle farms sample (superimposed histograms)

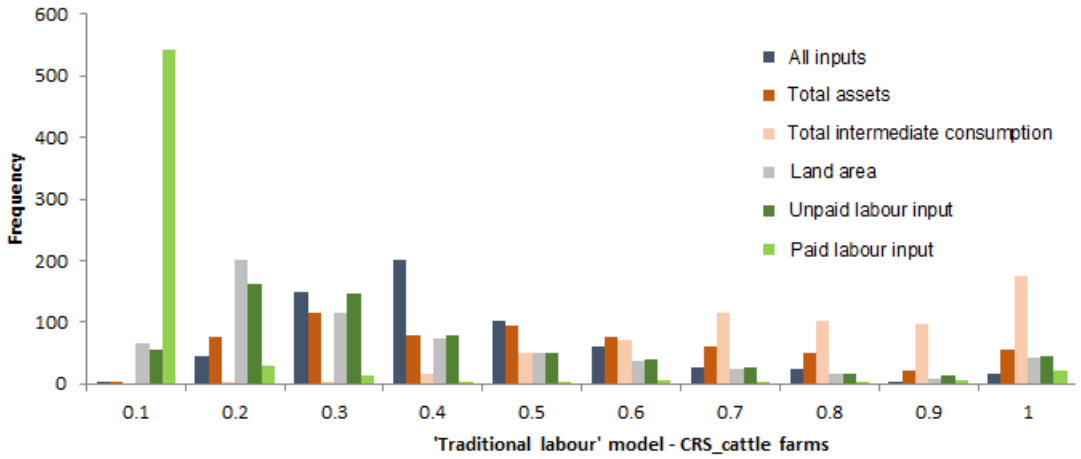

Figure 32. 'Traditional labour' model; CRS efficiency scores; for cattle farms sample (superimposed histograms)

6 Discussion – Conclusion

Working conditions on farms are evolving with tensions on work for some farming production systems. A major obstacle to ensuring continuity is the perceived lack of attractiveness of farming in general and livestock farming in particular, as a profession. Social performance is the pillar of sustainability that is the most often neglected, compared to the evaluation of environmental and economic performances of farming systems. Farmers' working conditions are rarely studied. To understand farmers' working conditions and to assess them, it is necessary to develop a multicriteria approach including not only quantifiable dimensions (e.g., the length of working days) but also dimensions that can explain how working conditions are experienced by workers (e.g., by understanding farmer's reasons for acting). Multiple factors contribute to determine farmers' working conditions such as the composition of the workforce, the region, but also the degree of uptake of ecological practices.

6.1 A difference observed between an overall positive feeling and some difficult working conditions

The comparative analysis on farms on five European countries allowed to identify farmers' working conditions. Some main characteristics were identified such as a high working time for the farm manager, few holidays and day off, a certain difficulty to replace a worker in case of absence, a need expressed by farmers to reduce their physical and mental workload. It reflects major tendencies concerning farmer's expectations regarding their working conditions as Servière et al. (2019) reported it for livestock farmers in France and in Europe, Colnago and Dogliotti (2020) for mixed family faming in developing countries, Joannon et al. (2005) for cropping systems or Navarette et al. (2014) for organic vegetable farming systems.

At the same time, farmers expressed a moderate level of stress and a quite high level of satisfaction of their working conditions. This overall positive feeling may seem contradictory at first sight with some of the results showing long working hours, little time for holidays and day off, etc. It was also identified in other studies (Béguin et al., 2021).

In the five European case studies, workers were mainly men (64.6%), and only 18.75% of farm managers were women. There was a broad diversity among case studies: female farm managers were most

often present in both Austrian and in France Puy-de-Dôme case studies than in France Brittany, Greece and Ireland. We cannot conclude if this result was representative of the concerned regions or a particularly of farm sampling. Nonetheless, in France, the Actif'Agri report (Forget et al., 2019) displayed that 27% of farms are managed by women so this study sample is underneath.

6.2 Working conditions differing according to the European regions

Even if general tendencies from the survey indicate tensions on working conditions with high working time, the comparative analysis on farms on five European countries also highlighted that farmers' working conditions differ across regions. Working conditions in Ireland and Greece differ significantly from farms in other study areas. Farmers in Greece and Ireland had 2.5 lower work duration that in other case studies, and have also more difficulties to replace a worker in case of absence. Farmers in Greece did not take vacation but have more day-off. Greek farmers expressed a higher level of stress. Differences of working conditions in Ireland and Greece compared to the other case studies are probably due to agricultural systems involved, especially in Greece with permanent crops systems. Livestock farmers and crop farmers can have different expectations for their work (Duval et al., 2021c). One other explanation could be that farmers have also other professional activities outside the farm in Greece and Ireland. Howley et al. (2014) reported that the existence of Irish cattle farming system with off-farm labour is due to the willingness of maintaining farming life-style and values and increase their wages

6.3 No strict relation between working conditions and the degree of uptake of ecological practices

The degree of uptake of ecological practices, namely organic practices or the livestock density (expressed by LU/ha of UAA), does not discriminate working conditions in the sample of 123 farms in the five European regions. Two main factors explain the variability observed in farmers' working conditions: the study area and the production system considered in this analysis, as identified in previous studies (Besser and Mann, 2015). Considering a more homogeneous sample - the dairy farms - other factors seem to be related to the variability on farmers' working conditions, such as the level of education, the workforce composition (hired workers vs farms with no hired workers).

The Scottish case study highlighted differences on working conditions, considering the efficiency of two categories on workers: paid and unpaid labour. It showed that the relationship between farm organic status and efficiency scores of labour used for both 'traditional' and 'diversification' outputs emphasise that organic production is not only environmentally oriented but has a clear economic reasoning.

6.4 Farmers experienced an impact of the adoption of ecological practices on their working conditions

The more in-deep analysis conducted in some case studies highlighted that farmers experienced an impact of the adoption of ecological practices on their working conditions. All working conditions were impacted. Farmers claimed various impacts on workload, work organisation and the need for special equipment, depending on the nature of the production systems and the applied ecological practices. They expressed a positive effect with an improvement of the arduousness and their own perception of their job. This is consistent with the nature of ecological practices, relying on the use of ecosystem processes. These contrasting effects are consistent with different studies linking additional pressure on working conditions (Meul et al., 2012) or improvement (Timmermann and Felix, 2015).

Impacts on farmers' working conditions differ across farms depend on the individual situation: some dimensions were improved in some farms, and deteriorated in others (Duval et al., 2021 a and b). Farmers seem to be making trade-offs between different working dimensions (Dumont et al., 2021).

6.5 Proposition of a list of indicators to analyse working conditions in farmers

Another contribution of this comparative analysis in five European case studies is to propose a list of indicators based on different dimensions (work duration, work organisation, quality at work, work complexity, self-identity and attitudes, stress, satisfaction, social relations) to analyse farmers' working conditions (see Table 9). These indicators seem to be enough generic and robust as they were tested in different European countries and agricultural productions (livestock and permanent crops) to be used in other European regions.

6.6 Further analyses to be carried out

Further analyses could be carried out such as a typology of the sample composed of the five European case studies (including all productions systems i.e. livestock and crops farms and countries) to better discriminate groups of farms with different working conditions. A Multiple correspondence analysis could be done using the indicators on working conditions. A second analysis could be carried out such on a more homogeneous sample i.e. the dairy farms, for which the case study area or the production system are not clearly no longer the main clustering factor explaining the variability of working conditions. The selection of indicators should also be pursued. The WP1 protocol that assigns farms to a type of ecological practice (Rega et al., 2021) could be used to perform a finer analysis of the impact of different degrees of uptake of ecological practices on working conditions.

7 Deviations or delays

None

8 Acknowledgements

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10 Appendix

Appendix 1: Closed questionnaire for the specific Task 3.3 survey

Work duration

Peak periods

QA1	How many busy/peak work periods per year in general (over the past 5 years)?
	_____ number of busy/peak work periods per year
QA2	How long is a busy/peak work period (over the past 5 years)?
	_____ length of a busy/peak period (in weeks on average)
QA3	When are the busy/peak work periods occurring during the year in general (over the past 5 years)?
QA3_1	□ Mainly during spring
QA3_2	□ Mainly during summer
QA3_3	□ Mainly during autumn
QA3_4	□ Mainly during winter
QA4	During this/these busy/peak period(s) are you always able to finish the work?
QA4_5	□ Yes, always
QA4_4	□ Most of the time
QA4_3	□ Sometimes
QA4_2	□ Rarely/seldom
QA4_1	□ No, never

Work organisation

Versatility or specialisation of workers

QA5	Are specific activities dedicated/assigned to specific workers in general (over the past 5 years)?
QA5_4	□ Yes, for all workers
QA5_3	□ For most workers
QA5_2	□ For a few workers
QA5_1	□ No
	Please explain why: _____
QA6	How are tasks assigned/distributed among workers (multiple options are possible)?
QA6_1	□ Based upon skills of the worker(s)
QA6_2	□ Based upon worker(s)' physical capacities
QA6_3	□ Based upon interest of the worker(s)

QA6_4	□ Fair division of all tasks among the workers
QA6_5	□ According to the availability of workers
QA6_6	□ Other, please specify: _____

Replacement

QA7	Is it easy to replace a worker in case of absence in general (over the past 5 years)?
QA7_4	□ Very easy
QA7_3	□ Easy
QA7_2	□ Quite difficult
QA7_1	□ Very difficult
QA8	In general (over the past 5 years) how do you organise your work when a worker is absent for multiple days in a row (at least for a week)?
QA8_1	□ Replacement by other workers (associates, employees) from the farm workforce
QA8_2	□ Replacement by voluntary workers
QA8_3	□ Replacement by hiring someone from the outside
QA8_4	□ Other solutions; please specify:_____

Quality at work

Free time

QA9	Do you have days off frequently during which you don't work at all (weekends or other day(s) in the week) in general (over the past 5 years)?
	□ Yes □ No
QA9_1	If yes, how many free days per year: _____

Working days

QA10_1	When your typical working day at your farm starts in general (over the past 5 years)?
	___:___ (24-hour clock)
QA10_2	When your typical working day at your farm ends in general (over the past 5 years)?
	___:___ (24-hour clock)
QA11	Do you work approximately the same amount of working hours each day in general (over the past 5 years)?
	□ Yes □ No
QA12	Do the other workers work approximately the same amount of working hours each day in general (over the past 5 years)?
QA12_3	□ Yes, all of them

QA12_2 QA12_1	□ Yes, some of them but not all □ No
QA13	Do you work with fixed working hours/schedule during the week in general (over the past 5 years)?
	□ Yes □ No
QA14	Do you have days with more working hours in general (over the past 5 years)?
	□ Yes □ No
QA14_1	If Yes: □ Often □ Regularly □ At least one per year
QA15	Is there work at night (after regular working hours or after 8pm) on your farm in general (over the past 5 years)?
	□ Yes □ No

Work flexibility

QA16	Can you arrange to take hours off during working hours for expected/anticipated absences (e.g., meetings, weekends) in general (over the past 5 years)?
	□ Yes □ No
QA17	Can you arrange to take hours off during working hours for unexpected/unforeseen absences (e.g., health problem) in general (over the past 5 years)?
	□ Yes □ No

Work complexity

Complexity of work organisation with the implementation of ecological practices:

QA18	How has the adoption of ecological practices influenced your work organisation? (multiple answers possible):
QA18_1	□ I have more tasks that I have to perform at a specific moment in time
QA18_2	□ I have more tasks that I have to perform at the same moment in time and which cannot be postponed
QA18_3	□ There are more interactions between the different farm activities
QA18_4	□ It is more difficult to anticipate when tasks/farming activities need to take place during the year
QA18_5	□ It is difficult to find workers that have the specific skills needed to work with ecological farming practices
QA18_6	□ My system and my work are simpler

Complexity of operating the farm

QA19	Has the adoption of ecological practices changed your observation and/or monitoring habits (of the herd, crops, farm, etc.) in general (over the past 5 years)?
	□ Yes □ No
QA19_1	If yes, please describe in what way: _____

QA20	Does the adoption of ecological practices require more time spent to observation and monitor activities in general (over the past 5 years)?
	□ Yes □ No

Equipment

QA21	Do you need specific equipment for more ecological practices?
	□ Yes □ No
QA21_1	If yes, where do you obtain this specific equipment?
QA21_1a	□ Machinery sharing organisation
QA21_1b	□ Private equipment
QA21_1c	□ Other farmers
QA21_1d	□ Other; please specify: _____

Stress

QA22	How do you experience your level of stress related to your work in general (over the past 5 years)?
	scale 0-10 (0 not stressful to 10 very stressful)
QA23	Which factors are generating stress (multiple choices possible)?
QA23_1	□ Relations among the workforce
QA23_2	□ Workload
QA23_3	□ Administrative work
QA23_4	□ Unexpected “things” (working in a hurry)
QA23_5	□ Fear of not succeeding
QA23_6	□ Economic situation (salary, cash flow)
QA23_7	□ Unexpected sanitary issues on animals and/or crops
QA23_8	□ Structural constraints (land, etc.)

QA23_9 QA23_10	□ Farm succession □ Others; please specify: _____

Satisfaction

QA24	How do you rate your level of satisfaction concerning your daily work in general (over the past 5 years)?
	1- Very unsatisfied 2- Unsatisfied 3- Neither unsatisfied nor satisfied 4- Satisfied 5- Very satisfied
QA25	How do you rate your level of satisfaction concerning your work life balance in general (over the past 5 years)?
	1- Very unsatisfied 2- Unsatisfied 3- Neither unsatisfied nor satisfied 4- Satisfied 5- Very satisfied
QA26	How do you rate your level of satisfaction concerning being a farmer in general (over the past 5 years)?
	1 Very unsatisfied 2 Unsatisfied 3 Neither unsatisfied nor satisfied 4 Satisfied 5 Very satisfied
QA27	How do you rate your level of satisfaction related to be free to make decisions in general (over the past 5 years)?
	1- Very unsatisfied 2- Unsatisfied 3- Neither unsatisfied nor satisfied 4- Satisfied 5- Very satisfied
QA28	How do you rate your level of satisfaction concerning your quality of life in general (over the past 5 years)?
	1- Very unsatisfied 2- Unsatisfied 3- Neither unsatisfied nor satisfied 4- Satisfied 5- Very satisfied

Social relations

QA29	Do you participate in the local community relating to agricultural activities (e.g., participation in local festivals, local farmers' market, local farming fairs, hosting open day events in the farm) in general (over the past 5 years)?
	□ Yes □ No
QA29_1	If yes, how many events per year (over the past 5 years)? _____
QA30	Do you participate in village/rural area events e.g., voluntary work for associations, church, school, family, local politics (mayor, etc.) in general (over the past 5 years)?
	□ Yes □ No
QA30_1 QA30_1_4 QA30_1_3 QA30_1_2 QA30_1_1	If yes, how frequent is your involvement (over the past 5 years)? □ Daily □ Weekly □ Monthly □ Some days per year
QA31	Do you participate in meetings concerning supply chain-networks / food chain or professional organisations (for example: dairy/beef association, association with retailer, ….) in general (over the past 5 years)?
	□ Yes □ No
QA31_1 QA31_1_4 QA31_1_3 QA31_1_2 QA31_1_1	If yes, how frequent is your involvement (over the past 5 years)? □ Daily □ Weekly □ Monthly □ Some days per year

Appendix 2: Interview guide for semi-structured interview in Task 3.3 (used in the French case studies Puy-de-Dôme, Brittany)

Farmer and farm trajectory:

- What made you decide to become a farmer? Motivation
- Could you describe to me your farm system? General information on the farmer and the farm
- How did your farm evolve over the years? General information on the farmer, farm and the transition. Which new practices have been implemented? Workforce composition evolution, including unpaid workers.
- **How do your farm/practices need to evolve to be able to meet the organic regulation?** General information on the farmer, farm and the transition.
- **Which new practices have been implemented?**
- **Did you meet difficulties to implement these practices?**
  - If yes, how did you manage to overcome them? Skills/knowledge, equipment, others
- **How did your work change over the years?**

Working conditions:

- **How is the work organised on the farm?**
  - Could you describe me a typical working day (one in summer + in winter)? Work duration: number of hours per day, typical work day hours
  - Do you work sometimes at night (after 8 p.m., for the French case)?
  - Do you work more or less the same hours everyday?
  - How is the work organised over the week (market days, free days, etc.)? days per week
  - How do you allocate the work amongst the workforce? Specialisation, reason why and how?
  - Are there periods during which you have more work, peak periods? When, how long, why and able to finish the work
  - Do you take days/weeks-off/holidays?
  - Can you be off for a couple of hours (planned, unplanned absences)
  - How do you organise it when you need to be replaced or a member of the workforce? (simple or not) and how (other workers, unpaid workers, hiring, other)
- **How did your working conditions evolve due to the transition to organic/ due to the adoption on more ecological practices?**

  Are there practices that had particularly an impact on your working conditions?

  - How did the transition/adoption of new practices impact the organisation of your work? More tasks at a specific moment in time, more interactions, more difficult to find people with the right skills, simplification of work, etc.

  - How did it change the way you observe the herd, plants, the plots, the system, etc.? (time spent, what indicators used, the way/ moment to interfere
  - Do you consider that operating your farm is now more complex? Why?
  - Are there still things that you would like to test/ try? Do you feel ready?

- **In your work, are there things that you like/dislike in particular?** How do respondents express their satisfaction and perceive their working conditions?
  - Do you feel isolated because of your work? Why? Interactions with others: sources of information, participation in local community life related to agricultural activities, general participation in regional events, implication in supply-chain networks, professional organisations etc.
  - Do you perceive your work as a source of stress? Why? (physical and mental stress)
  - Are you satisfied of your work? and your working conditions?
  - And what about the balance between your private and work life?

- **Concerning your working conditions, what would you still like to improve?**

- **What is important to you in your work?**

QUESTIONS FARM CHARACTERISTICS→ questions in task 2.2+task 3.3 questionnaire

Closure of the interview

- Do you have other things you would like to add?
- How did you perceive this interview?
- Do you have suggestions on how to improve the next interviews to give me?
- Why did you accept to take part in this interview?

Appendix 3: Five partners' contribution to the comparative analysis: a brief description of the case studies written in October 2020

Partners' contribution to the comparative analysis:
A brief description of the Austrian Case Studies

Laura Eckart, Ludwig Gerner, Lena Schaller, Andreas Niedermayr, Peter Walder, Jochen Kantelhardt

BOKU, Austria

General description of the survey

Number of farms surveyed
92 survey participants completed the questionnaire on the assessment of farm private social performance.

Type of survey
90 interviews were conducted face-to-face, 2 farmers filled in the questionnaire all by themselves. The sample is not representative of all the dairy production systems in the region, but was informed by the chambers of agriculture in both regions, which provided us with a number of farm contacts. These farms where then contacted, while only a part of the farms agreed to contribute. After the first interviews we switched to the pyramid system and got further contacts from the farmers.

Period of research
December 2019 – March 2020

Structural characteristics of the sample

Farms' location
45 of the farms are located in the region of Steyr-Kirchdorf (Upper Austria), 47 in the northern part of Salzburg (Salzburg-Umgebung). The sea level of the farms is between 300 and 800 m and almost all of them have a precipitation of over 1,000 mm per year.

Farms' size:
The size of the farms ranges between 5,95 ha and 110 ha with a mean of 33.5 ha and a median of 36.52 ha. In average the farms keep 36 cows and 32 other cattle. Only three farms have any other significant livestock. One farm has 22 ewes, one farm has 600 laying hens and one farm has 16,500 broilers.

Main production type
89 of the farms are specialised dairy farms, 2 are specialised cattle farms and 1 farm has mixed livestock.
Of all farms, 33 have arable UAA of which one farm had only arable land and no grassland, the rest also have permanent grassland. 58 farms only have permanent grassland.
The production types were quite evenly distributed between the two case studies. Forestry is of high importance in Austria and also in our case study regions. 84 farms are forest owners, who manage an average of 10 ha.

Degree of uptake of practices in the farming system

43 of the surveyed farms participated in European organic certification in 2018, while none of the farms took part in the European Protected Designation of Origin (PDO). Of the organic farms, 25 are located in the region of Salzburg-Umgebung and 18 in the region of Steyr-Kirchdorf. Interestingly, 9 farms did take part in the European organic certification earlier but quit, of which 8 are located in Steyr-Kirchdorf. 63 of the farms participated in other eco labels/standards in 2018. This were mainly Traditional Speciality Guaranteed (TSG), manufacturers' seals of quality (e.g. higher standards for animal welfare. All dairy farms in Austria produce GMO free milk. In both regions all farms participate in further national agri- environmental programs.

Workforce composition

Only on 17 of the 92 farms, non-family workers were employed. Normally, Austrian dairy farms do not recruit non-family labour, so the non-family workers employed on the farms in our sample are mainly prospective farmers who complete their traineeship on the dairy farms.

Production system

89 out of the 92 farms were individual (family) farms/sole holders. The remaining three were partnerships (several business partners manage the farm). On 80 farms decisions are made jointly with the other farm managers or family members.

Number of family members working on the farm in 2018

In addition to the surveyed farmers, between 0 and 6 other family members work on the farms, the mean number being 2.45 and the median 2 family members.

Total farm turnover in 2018 (Euros)

The total farm turnover ranges between 17,956 € and 510,000 € in 2018, the mean being 130,450 € and the median 152,475 €.

Farmers' profile

About one quarter of the respondents (22) are female. The age of the respondents is 21 to 66 years (median: 41 years). The respondents have between 4 and 50 years of experience in agriculture (median: 24.5 years). With 77 of the respondents, the majority of the farmers have a diploma similar to a high school degree, almost all of them (73) visited an agricultural school. 5 respondents have a university degree, of which 3 with specialisation in agriculture. 2 farmers have only completed primary school and 8 have completed middle or secondary school.

Working conditions and work organisation

Number of non-family hired workers on the farm in 2018:

In 2018, 17 of the 92 farms employed non-family workers. The number of non-family workers ranged from 1 to 12 persons, with the majority of the farms employing only 1 non-family worker.
As indicated before, most of these non-family workers are prospective farmers who have to complete their traineeship. As regards seasonal workers, of the 17 farms with non-family labour force, only 5 farms employed seasonal workers with the number ranging between 1 and 4.

Average number of weeks worked per seasonal worker, in 2018:

Only 3 out of the 5 farms employing seasonal workers indicated how many weeks these workers worked on average per year. The numbers range between 6 and 12 weeks.

Farmer's time spent working on the farm

Respondents worked between 5 and 100 hours per week (including weekends) on their farm. Mean: 62.82 hours, median: 65 hours.
Their number of weeks (including weekends) vacation ranged between 0 and 5 weeks, with a mean of 0.742 weeks and a median of 0.5 weeks.

Share of non-family workers per gender

Out of overall 22 non-family workers, 17 where male and 5 where female.

Intensity of workload peaks

It was difficult to answer the question about when most work peaks occur during the year. Although only one response option should be chosen, the farmers indicated that they have work peaks throughout the year and the lowest workload in winter. Difficulties were also encountered in replying to the questionnaire regarding the duration of peak workloads. However, this was also due to different interpretations of the question among the interviewers. The answers to this question varied widely, ranging from 25 weeks to 2 days (median: 0.5 weeks). The number of emerging work peaks is between 1 and 25 (median: 7). There were two farmers who reported having only one work peak, but it lasted 21 and 25 weeks, respectively. Still, more than 80% of the respondents stated, that they were able to finish their work during work peaks always or at least most of the time.
When asked whether in general certain activities are divided among certain persons, 86 of the 92 respondents answered that this applies to most or all workers. When asked why, most respondents answered that this was more efficient and suited the qualifications of the workers. Tasks are mainly divided according to the abilities, availability, interests and physical possibilities of the persons.
In the case of shortfalls of working staff, 51 of the respondents reported that it is rather difficult to find a replacement, another 18 find it very difficult and only 23 of the respondents find it easy. If workforce is absent for at least a week, most farmers find replacement among other workers from the farm workforce.
The answers to this question show one of the major problems for Austrian dairy farmers: mostly, only one person has to do the whole work at the farm. For many farms it is almost not possible to find suitable workers in times of need.

Complexity of work organisation with the implementation of ecological practices

The most prominent answers to this question were "There are more interactions between the different farm activities" (47 times), "I have more tasks that I have to perform at a specific moment in time" (37 times) and "I have more tasks that I have to perform at the same moment in time and which cannot be postponed" (29 times).
For 42 of the respondents, the adoption of ecological practices in the past has changed their habits of observations and assessments (of the herd, crops, etc.). They often stated that they now observe and assess more in general, more intensively and more consciously. Some stated that they were paying more attention to animal welfare and biodiversity and some indicated that they were trying new things like homeopathy. 56 out of the 92 respondents stated that the application of ecological practices usually requires more time for observation and recording of activities.
18 out of 92 farmers need more equipment to apply ecological practices. Most of the respondents can use equipment from their private household (10 out of 18), 8 via the machinery ring or similar and 7 from other farmers.

Quality of work

The working day for most farmers starts between 5 and 6 a.m. and usually ends between 6 and 8 p.m. The majority of respondents (54 out of 92) normally work the same number of hours each working day. Half of the respondents indicated that all or at least some of the other workers on the farm also

work the same number of hours each day. Only a quarter of the farmers regularly work at night (after 8 p.m. or their usual working hours).
Only 14 out of the 92 respondents said that they regularly had days off on which they did not have to work at all. Among those who have regular days off, the median number of days off is 15 (minimum = 5 days, maximum = 200 days).
Half of the farmers have fixed working hours or a fixed work schedule. All but one of the respondents stated that there were usually days with more working hours and 74% of the respondents said that this is the case regularly.
For foreseeable absences, the vast majority of respondents can normally take time off, for spontaneous absences (e.g. illness), 67 out of the 92 respondents said they could take time off.

Other social variables explored

Level of stress (scale 0-10)

The stress level of the respondents is generally rather high, but not very high. Only 5 of the respondents indicated that their stress level, on a scale of 0 to 10, was 9 or 10. Most indicated a stress level between 5 and 8, the median is 6 and the average is 5.6.
When asked, which factors caused stress, the most prominent answers were: “Unexpected sanitary issues on animals and/or crops” (80 times), “Unexpected ‘things’ (working in a hurry)” (78 times), “Workload” (54 times) and “Administrative work” (42 times). Furthermore, many respondents added weather or weather-related factors (e.g. drought) as stress-causing factors.

Satisfaction

In general, the respondents are satisfied. Farmers are particularly satisfied with their daily work (81 respondents are at least satisfied) and the quality of life in general (76 respondents are at least satisfied). Only with regard to the relationship between work and leisure time only less than half of the respondents are satisfied.

Social relations

Farmers in the Austrian case studies seem to have quite intense social relations. Out of 92 respondents, 82 participate in the local community relating to agricultural activities, the median of the number of events in which they participated is 4. 78 respondents participate in village/rural area events e.g., voluntary work for e.g. associations or similar. If so, they mostly engage at least monthly. 81 respondents participated in meetings concerning supply chain-networks / food chain or professional organisations and most of them did this for some days per year.

Deviations or delays

Q2 was initially interpreted differently by the interviewers. When asked about the duration of work peaks, some farms were erroneously asked about the duration in days and not in weeks. For the farms concerned, the answers were converted into weeks accordingly. In Q3 multiple answers were often given, although this was actually not possible, so that answers had to be adjusted at this point afterwards. Otherwise there were no deviations or delays and a very high number of 92 respondents could be reached.

Acknowledgements

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Partners' contribution to the comparative analysis: A brief description of the Greek Case

Maria Alebaki, Vasilia Konstantideli, Irene Tzouramani

Agricultural Economics Research Institute (AGRERI) – DEMETER, Greece

Summary

A general overview of fieldwork conducted in the island of Crete (Greece) is provided. In addition, some key variables are analysed, including, inter-alia, the respondents' socio-economic characteristics, working conditions and work organisation; degree of uptake of ecological practices, etc. The following sections present some preliminary results.

General description of the survey

Number of farms interviewed

In total, 31 interviews were conducted. However, one questionnaire has been removed as invalid. Thus, the total sample includes 30 farmers surveyed.

Type of interviews

5 out of 30 were face-to-face interviews and 25 were conducted by phone.

Period of research

November 2019 – July 2020

Structural characteristics of the sample

Farms' location

Most of the farms (29/30) are located in the Prefecture of Heraklion (Crete). 1 out of 30 is located in the Prefecture of Lasithi (Crete).

Farms' size (Q11 in questionnaire of the LIFT large-scale farmer survey, see Tzouramani et al., 2019):

Min= 0.9; Max=19 (hectares)

Main production type

11 out of 30 farms include only olive groves; 10 out of 30 cultivate vines exclusively; and 9 out of 30 have both vineyards and olives.

Degree of uptake of ecological practices in the farming system

11 out of 30 respondents have participated in organic agri-environmental scheme (AES) in 2018. 13 reported having participated in European Protected Designation of Origin (PDO), while 8 stated that they had adopted other eco labels/standards in 2018 (i.e., PGI, integrated management, and AGRO 2).

Workforce composition
Very low contribution of non-family hired workers or voluntary work.

Production system
Management structure: Individual family farms (29/30). 19 out of 30 are sole decision-makers, with the remaining 11 stating that they jointly manage the farm with other family members.

Number of family members working on the farm in 2018
Min=0; Max=4; Median=1

Total farm turnover in 2018 (Euros)
Min= 5,260; Max= 110,000

Farmers' profile

The vast majority of the respondents were male (27), aged between 25 and 85 years old. With respect to their level of education, it is important to note that 7 respondents have a university degree. 11 are high school graduates, while 4 of them have only received primary education. Their agricultural experience extends between 10 and 85 years (several respondents declared being involved in agriculture since their childhood).

Working conditions and work organisation

Number of non-family hired workers on the farm in 2018:
Min = 0; Max = 20 (in most of the cases, workers were seasonal)

Average number of weeks worked per seasonal worker, in 2018:
Min = 0.14; Max = 20.57

Farmer's time spent working on the farm
Number of hours per week (including week-ends) working on farm on average in 2018:
Min = 1; Max = 60
Number of free days per year in general (over the past 5 years): Min = 10; Max = 100

Share of non-family workers per gender
The majority of workers were male.

Intensity of workload peaks
Since a large number of the farms included mixed crops, respondents declared it was difficult to define a specific busy/peak work period or season. In particular, both viticulture and olive growing have high demands with respect to human working time. However, respondents stated that -in most of the cases- they were always able to finish the work. The large majority of the respondents reported 3 busy/peak periods per year, with each of them lasting on average 3.9 weeks (Min=1, Max=10, Median=4). In most of the cases (17), autumn was mentioned as the busiest period of the year. 17 out of 30 respondents stated that they are always able to finish work during this period.
With respect to the question "Are specific activities dedicated/assigned to specific workers in general (over the past 5 years)?" 12 out of 30 respondents reported "for most workers", with another 11 stating "Yes, for all workers".

In terms of work organisation, tasks are usually carried out by different workers, based upon their skills or their physical capacities. Workers' replacement in case of absence is in most of the cases easy, with workers being usually replaced by family members or other seasonal from the farm workforce.

Complexity of work organisation with the implementation of ecological practices

The most prominent answers included "I have more tasks that I have to perform at a specific moment in time" and "I have more tasks that I have to perform at the same moment in time and which cannot be postponed".

Other social variables explored

Level of stress (scale 0-10)

In this question, respondents' attitudes were rather negative, with most of them reporting high levels of stress due to the variety of threats they constantly have to deal with.
Most prominent factors generating stress included workload and economic situation (salary, cash flow).

Satisfaction

In general, respondents reported higher than medium levels of satisfaction.

Social relations

In most of the cases, respondents stated that they tend to participate in supply chain-networks (e.g. task forces on a special topic, exhibitions, competitions, media). Nevertheless, community integration in village/rural area is low.

Deviations or delays

Due to the emergency situation caused by the coronavirus pandemic lockdown, we have experienced practical difficulties in reaching the study population. However, the survey was successfully completed by the end of July 2020. With respect to the interviews, no particular problems or issues have been recorded.

Acknowledgements

The authors would like to thank the Association of Cretan Winemakers (Wines of Crete) and the Agricultural Cooperatives of the selected regions for their support in carrying out the field research, as well as all the farmers for taking the time to participate in this research.

Partners' contribution to the comparative analysis: A brief description of the Irish Case Studies

Kevin Kilcline, Elaine Leavey, Dan Clavin, Mary Ryan

Teagasc, Ireland

Summary

A general overview of fieldwork conducted in the Irish case study area of the Republic of Ireland is provided. In addition, some key variables are analysed, including, inter-alia, the respondents' socio-economic characteristics, working conditions and work organisation; degree of uptake of ecological practices, etc. The following sections present some preliminary results.

General description of the survey

Number of farms surveyed

10 survey participants completed the questionnaire on the assessment of farm private social performance.

Type of survey

All answers were collected face to face by a surveyor from research staff. The sample is not representative of the diversity of all the production systems, and primarily takes in drystock farms in the West and Midland NUTS3 regions. The farmers were contacted through Teagasc extension officers.

Period of research

December 2019 - June 2020

Structural characteristics of the sample

Farms' location

3 of the farms are located in the NUTS3 West region, 6 in the Midlands region and 1 in the South-West. The sea level of all farms is below 300m. Six of the farms a have a precipitation level of between 800 and 1,000 mm and 4 a precipitation level of over 1,000 mm per year.

Farms' size:

The sizes of the farms range between 13 ha and 162 ha with a mean of 53 ha and a median of 46 ha. Half the farms were certified organic and kept on average 38 sucklers and 95 other cattle for fattening. The non-organic farms in the system did not keep sucklers but had on average 41 other cattle for fattening. Half of the farms have other significant livestock categories. Four have sheep with 168 head on average; one farm has 300 dairy cows.

Main production type

1 of the farms is a specialised dairy farm, 5 are specialised cattle farm, 2 are mixed livestock (cattle and sheep) and 2 mixed livestock crops and livestock. All the farms are predominantly grass based. Only 1 farm grew a fodder crop.

Degree of uptake of ecological practices in the farming system

Half of the surveyed farms participated in European organic certification in 2018, while none of the farms took part in the European Protected Designation of Origin (PDO). Of the organic farms, all are located in the midlands NUTS2 region. 9 out of 10 farms participated in other eco labels/standards in 2018, namely the Bia Bia (Irish food marketing board) quality assurance scheme. The scheme requires certification and inspection to ensure adoption of farm best practice standards. All farms participated in further national agri- environmental programs in 2018, namely the GLAS (Green Low Carbon Agri Environmental Programme).

Workforce composition

On only on 2 of the 10 farms, non-family workers were employed. Irish farms typically rely on family labour.

Production system

9 out of 10 were individual (family) farms/sole holders while one farm operated as a limited company. The interviewed farmer was the sole decision maker on 9 of the 10 farms in the sample.

Number of family members working on the farm in 2018

In addition to the surveyed farmers, between 0 and 2 other family members work on these farms. However on 8 out 10 of the farms no other family member worked on the farm

Total farm turnover in 2018 (Euros)

The total farm turnover ranges between €10,000 and €800,000 in 2018, the mean being €149,228 and the median €68,640.

Farmers' profile

The entire sample was male. The age of the respondents ranged from 33 to 52 years (average: 40; median: 41 years). The respondents have between 16 and 34 years of experience in agriculture (average 22; median: 23 years).
5 out of 10 farmers interviewed had a university degree of which 3 had a specialisation in agriculture. 1 had a secondary school qualification and 1 has an agriculture diploma from an agriculture college similar to a high school degree.

Working conditions and work organisation

Number of non-family hired workers on the farm in 2018:

In 2018, only 2 out 10 of the farms employed non-family workers. These farms employed 1 and 2 non family persons each and these employees were employed throughout the year.

Average number of weeks worked per seasonal worker, in 2018:

None of these farms employed seasonal workers.

Farmer's time spent working on the farm

Respondents worked between 5 and 70 hours per week (including weekends) on their farm. Mean: 30.28 hours, median: 27 hours.
Their number of weeks (including weekends) vacation ranged between 4and 6 weeks, with a mean of 4.57 weeks and a median of 4 weeks.

Share of non-family workers per gender

All non-family workers employed by farms in the sample were male.

Intensity of workload peaks

Most of the farms surveyed are part time farms operating a cattle system as the main enterprise. However there are significant differences in the systems operated, from suckler to finish, suckler to weaning and fattening enterprises. There are also different calving dates and thus while these farms have different work patterns throughout the year, winter appears to the period with the lowest workload in general (not a peak work period on any of the sample farms).
The number of busy work peaks is between 1 and 5 (average: 3; median: 3). Farmers reported these busy work periods range between 2 to 8 weeks (average:3.75; median: 4). 70 % of the respondents stated, that they were able to finish their work most of the time, 20% all of the time and 1 respondent answered sometimes.
For most of these farms there is no employees outside occasional farm contractors (2 farms with employees) therefore the division of labour among workers is not an issue on these farms.
This highlights that on Irish drystock farms often there is only one person to do all the work at the farm. For many farms it is almost not easy to find suitable workers in times of need.

Complexity of work organisation with the implementation of ecological practices

The most prominent answers included "I have more tasks that I have to perform at a specific moment in time" and "I have more tasks that I have to perform at the same moment in time and which cannot be postponed".
For 80% of respondents, the adoption of ecological practices has changed their habits of observations and assessments (of the herd, crops, etc.). 40% of farmers need more equipment to apply ecological practices.

Quality of work

The working day for most farmers starts at approximately 8 a.m. and usually ends at 7 p.m. 60% of respondents do not normally work the same number of hours each working day. Only 2 farmers report working regularly after 8 p.m.
80% of respondents said that they regularly had days off on which they did not have to work at all. As many of the farmers have an off farm job and farming is part time, the number of days off for some farms appears quite large although there is large spread. (minimum = 10 days, maximum = 300 days).
Less than half of the farmers have fixed working hours or a fixed work schedule. All but one of the respondents stated that there were usually days with more working hours.
For both foreseeable absences and for spontaneous absences all respondents said they could take time off.

Other social variables explored

Level of stress (scale 0-10)

The stress level of the respondents is generally rather low (weighed average score of 6, on a scale of 0 to 10).

When asked, which factors caused stress, the most prominent answers were: “Unexpected ‘things’ (working in a hurry)” (70% of responses), and “Administrative work” (70% of responses).

Satisfaction

In general, the respondents are either satisfied (6 responses), or very satisfied (3) concerning their general daily work. In general this is reflected in all questions concerning the level of satisfaction with farm activities.

Social relations

Irish case study farmers are highly active in voluntary work for associations (90% participation) while 80% participate in the local community relating to agricultural activities. The median of the number of events in which they participated is 8 and the average 7.5. Only 50% of respondents participated in meetings concerning supply chain-networks / food chain or professional organisations and most of them did this for on a monthly basis.

Deviations or delays

No specific issues were encounter during the interview.

Acknowledgements

The authors would like to thank all the farmers for taking the time to participate in this research.

Partners' contribution to the comparative analysis: A brief description of the Brittany case study (France)

Anne-Lise Jacquot, Maxence Gérard

INRAE and Agrocampus Ouest, France

Summary

A general overview of fieldwork conducted in the French case study area Brittany is provided. In addition, some key variables are analysed, including, inter-alia, the respondents' socio-economic characteristics, working conditions and work organisation; degree of uptake of ecological practices, etc. The following sections present some preliminary results.

General description of the survey

Presentation of criteria to select the farms

The aim of the case-study was to investigate the effects on dairy farmer's working conditions due to the adoption of ecological practices. The survey was performed in the western part of France, in Brittany and Pays-de-la Loire regions. A high density of livestock production, especially dairy production, characterises these regions.

Dairy farms were selected and recruited based on precise criteria:

- Dairy farming systems (specialised or mixed crop and dairy systems) but with no other animal production
- At least one practice has recently been chosen and implemented on the farm, aiming to reduce environmental impacts
- Workforce composition of the farm based on individual or couple managers (less than three annual labour unit) or based on several partnership managers (family or non-family) (more than three annual labour units)
- A diversity of forage system (from zero-grazing to full grazing system)
- A diversity of production system (non-organic system and organic system).

Extension services and private local network helped to identify and recruit the farmers.

Number of farms surveyed

17 farms were surveyed but only 11 participants completed the quantitative questionnaire on the assessment of farm private social performance. The other 6 only answered the qualitative questionnaire only, there was no time left for the quantitative questionnaire.

Type of survey

The 17 interviews were conducted face-to-face. The questionnaire was made up with a first part dedicated to qualitative questions and a second part to quantitative questions. The quantitative data will only be presented in this report.

Period of research

November 2019 – January 2020

Structural characteristics of the sample

Farms' location

All farms are located in the Brittany and Pays de la Loire NUTS2 regions in France. (NUTS3 sub-regions: Côte d'Armor: 1; Finistère: 4, Ille-et-Vilaine: 5; Mayenne: 1)

Farms' size:

On average, 2.8 workers (total annual worker units) made up the workforce, with a minimum of 1 worker to a maximum of 6.5 per farm. The median is 2 workers per farm.
The size of the farms (UAA) ranges between 33 ha and 190 ha with a mean of 111.9 ha and a median of 118 ha.
On average, the farms have 111 dairy cows. The size of the herd ranges from 24 to 180 dairy cows, with a median of 100 dairy cows). The milk production is on average 865,455 litres per year (sold) from a minimum of 150,000 to 1,800 000 litres per year (with a median of 830,0000).
The farms rely on an average of 57 ha of grasslands (temporary and/or permanent grasslands) (from 12 to 125 ha, and a median of 50 ha). Grasslands represent on average 55% of UAA with a minimum of 17% to a maximum of 100%, with a median of 45%.

Main production type

All farms are producing milk, some are specialised in dairy production (n=4) or mixed crop and dairy (n=7).

Degree of uptake of ecological practices in the farming system

All farms (n=11) have implemented one or several practices with the aim to reduce environmental impacts. There was no judgment to discriminate the nature of the practices, as long as it was chosen and declared by the farmer as an ecological practice. On average, 5.4 ecological practices have been declared by the farmers (from a minimum of 1 practice to a maximum of 13 practices), with on average 3 practices on crop system (from 1 to 7), 2 on animal system (from 0 to 6) and 0.3 on landscape management (from 0 to 1). 4 farms are involved in an organic certification.

Workforce composition

On average, 2.8 workers (total annual worker units) made up the workforce, with a minimum of 1 worker to a maximum of 6.5 per farm. The median is 2 workers per farm.

Working conditions and work organisation

Number of non-family hired workers on the farm in 2018:

No "non-family" hired workers ware declared during the survey.

Average number of weeks worked per seasonal worker, in 2018:

No answer (no seasonal worker)

Farmer's time spent working on the farm

Respondents worked on average 57 hours per week on their farm (including weekends) (from 30 and 75 hours per week) on their farm (median: 60 hours).
Their number of weeks (including weekends) vacation ranged between 0 and 1.33 weeks, with a mean of 0.56 weeks and a median of 0.5 weeks.

Frequency and intensity of workload peaks

Surveyed farmers answered that on average, they have to cope with 2.8 busy / peak work periods during the year (over the past 5 years) (from 1 to a maximum of 5 peaks). One farm (not in the previous calculation) declared 365 days, meaning that they are busy all the year along.
On average, those peaks lasts 2.9 weeks (from 1 to 5 week), 6 farms declared that those peaks mainly occurred during autumn, 3 during spring, and 3 during summer. They are mainly able to finish their work during these periods (6/11) and most of the time (5/11).

Specialisation of the workforce

6/11 farms declared that specific activities are dedicated or assigned to a specific worker for all their workers, 2/11 for most of their workers, 3/11 answered no to this question (including one farmer who is working alone).
The farm surveyed displays a diversity of situation for the distribution of the different activities among the workforce:

- some specific tasks are dedicated to one worker and their other tasks are shared as those examples:
  crop and machine management is dedicated to one worker and the two others work more around the herd (1 farm)
  the farmer works with his/her wife and the administrative tasks are dedicated to her (1 farm)
  the employee chooses the activities he/she prefers and for which he/she is skilled. The farmer-owner does the other activities (1 farm)
- Most of the tasks are dedicated to a specific worker but some (usually related to the dairy herd) are shared
  crop management is dedicated to a worker and herd management to another. Machine maintenance and repairs are dedicated to the third one. Even though the three are specialised, all of them milk, look after the calves and harvest (1 farm).
- Most of the tasks are split between workers
  the two workers are interested in different activities on the farm (1 farm)

The distribution of the activities is mainly based on workers' skills (7/11), workers' interests (6/11), and physical capacities (2/11). Only 2/11 respondents declared that there is a fair division of all the tasks among the workers, 3/11 according the workers' availability.

Replacement among the workforce

8/11 farmers declared that it is easy or very easy to replace a worker in case of absence (3/8 are replaced by a worker among the farm workforce and 5/8 by a worker from outside the farm workforce. 3/11 farmers declared that is difficult or very difficult to replace a worker (1/3 outside the farm; 2/3 inside the workforce)

Quality of work

The working day for most farmers starts around 7:25 a.m. (between min. 5:00 a.m. and max. 9:30 a.m.) and ends around 6:50 p.m. (min 6 p.m. and max 8 p.m.). 6/11 farmers normally work the same number of hours each day and 9/11 work with a fixed work schedule (but 10/11 declared some days can be with more working hours in general. 6/11 farmers considered to generally have night work (after 8 p.m.).
All the farmers (100%) declare that they are able to take hours off during working hours for expected / anticipated absences, or for unexpected events.

Effects on working condition of the implementation of ecological practices

Farmers declare that the implementation of ecological practices have influenced their work:

i) For 7/11 of them, by having more tasks to perform at a specific moment in time,

ii) For 5/11 of them, by having more interactions between different farm activities

iii) For 4/11 of them, by having more tasks to perform at the same moment in time and which cannot be postponed

iv) For 4/11 of them, by finding more difficulties to find workers that have specific skills needed to work with ecological farming practices

v) For 3/11 of them, by thinking it's more difficult to anticipate when tasks/farming activities need to take place during the year

vi) For 3/11 of them, by thinking their system and their work is more simply

Complexity of work organisation with the implementation of ecological practices

For 8 of the respondents, the adoption of ecological practices has changed their habits of observations and assessments (of the herd, crops, etc.). Those 8 farmers declared that they need more time dedicated to the observation of their system and to anticipate their action or intervention to be conducted at an earlier stage or the way animal are observed has changed. 8/11 farmers reported that they spend more time on observation and monitoring activities. 9/11 said that they need specific equipment for more ecological practices (and for 5 of them they find it with machinery sharing organisation or similar organisation, 8/9 owns their special equipment and 1/9 with other farmers).

Other social variables explored

Level of stress (scale 0 – very stressful to 10 not stressful)

The stress level of the respondents is generally medium with an average score of 6.2 (median: 6, min. 5 and max. 8). No farmers indicated to have no stress at all or more than a score of 8. No farmer declares him/herself by being much stressed. They all declare being between 5 and 8.
When asked, which factors caused stress, the most prominent answers in chronological order were "economic situation" (9) , "unexpected "things" and working in a hurry" (9), "administrative work" (7) , "workload (5), "fear of not succeeding" (4), "Relations among the workforce" (3), "unexpected sanitary issues on animals and/or crops" (3),"farm succession" (3), "structural constraints" (2). Furthermore one farmer added climate change as stress-causing factors.

Satisfaction

In general, the respondents are satisfied with their daily work (10/11), work-life balance (5/11) being a farmer (8/11). All are very satisfied with the freedom related to decision-making and general quality of life (8/11).

Social relations

8 of 11 the farmers in Brittany case study participate in different social interactions. Only one farmer stated that at present they neither participate in local community life nor in interaction with the supply chain. The other two are involved in local events or associations.

Acknowledgements

The authors would like to thank all the farmers for taking the time to participate in this research.

Partners' contribution to the comparative analysis: A brief description of the Puy-de-Dôme case study (France)

Julie Duval, Nathalie Hostiou

INRAE, France

Summary

A general overview of fieldwork conducted in the French case study area Puy-de-Dôme is provided. In addition, some key variables are analysed, including, inter-alia, the respondents' socio-economic characteristics, working conditions and work organisation; degree of uptake of ecological practices, etc. The following sections present some preliminary results.

General description of the survey

Number of farms surveyed

16 survey participants completed the questionnaire on the assessment of farm private social performance.

Type of survey

The 16 interviews were conducted face-to-face. The sample is not representative of livestock production in the area, as only organic beef and cattle farmers were selected.

Period of research

November 2019 – March 2020

Structural characteristics of the sample

Farms' location

All farms are located in the Puy-de-Dôme NUTS3 region in France.

Farms' size:

The sizes of the farms range between 40 ha and 197 ha with a mean of 113 ha and a median of 70 ha. On average the farms have 45 adult cows (46 dairy cows and 45 beef cows). The size of the herd ranged from 20 to 75 dairy cows, and from 10 to 100 beef cows.
The farms have 25 ha of temporary pasture (from 0 to 62 ha, and a median of 20 ha) and 59 ha of permanent pasture (from 0 to 167 ha, and a median of 49 ha). Four farms do not have temporary pasture, and four farms do not have permanent pasture.

Main production type

All farms are specialised in dairy production (n=8) or beef production (n=7).

Degree of uptake of ecological farming practices in the farming system

All farms (n=16) are engaged in organic production.

Workforce composition

Only 2 farms have non family employees (one employee on one farm, 2 employees – 1 male and 1 female- in one farm). All the other farms are based on family workers.

Production system

In the sample we have 7 individual farms, 6 partnerships and 2 companies (not partnership) with profit objective.

Number of family members working on the farm in 2018

The workforce (farmer interviewed + other family workers) is made of only one worker in 4 farms, 2 family workers in 7 farms, 3 family workers in 3 farms and 4 family workers in 1 farm. In our sample we have 29 workers in total (18 men and 11 women).
Between 0 and 3 other family members are working on the farms, the mean number being 1.07 (from 0 to 3) and a median of 1.

Total farm turnover in 2018 (Euros)

We have the data only for 9 farms. The total farm turnover ranges between 80,000 € and 300,000 € in 2018, the mean being 146,027 € and the median 125,000 €.

Farmers' profile

The farmers interviewed were men in 11 farms and women in 4 farms.
The age of the respondents is 23 to 65 years (median: 46.5 years, average: 46.4 years). The respondents have between 3 and 38 years of experience in agriculture (median: 20.4 years, average: 20.5 years). 2 farmers have only completed primary school, 4 have completed middle or secondary school. 5 have a diploma similar to a high school degree, of which 2 with specialisation in agriculture.

Working conditions and work organisation

Number of non-family hired workers on the farm in 2018:

In 2018, only 2 farms have non family employees (one employee on one farm, 2 employees – 1 male and 1 female- in one farm). All the other farms are based on family workers.

Average number of weeks worked per seasonal worker, in 2018:

Only 2 farms, no data

Farmer's time spent working on the farm

Respondents worked on average 77 hours per week on their farm (including weekends) (from 35 and 100 hours per week) on their farm (median: 87.5 hours).
Their number of weeks (including weekends) vacation ranged between 0 and 5 weeks, with a mean of 1.27 weeks and a median of 1 week.

Share of non-family workers per gender

Out of overall 3 non-family workers, 2 are male and 1 are female.

Intensity of workload peaks

It was difficult to answer the question about when most work peaks occur during the year. Although only one response option should be chosen, often farmers indicated that they have several work peaks

throughout the year. Work peaks occur most often during spring and summer. Work peaks last between 2 and 16 weeks (median: 6.5 weeks). Still 100% of the farmers' interviewed stated to always be able to finish the work.
Three farmers worked alone, so no specialisation of the farm work was possible. In the other cases (n=11), except one who does not want a specialisation, all other cases certain activities/tasks are in some way attributed to a specific worker. Tasks are mainly divided according to workers' interest (n=6), physical capabilities (n=3), workers' skills (n=2) or availability (n=1).
In the case of shortfalls of working staff, 71% find it "easy" or "quite easy" to find a replacement. Most often replacement is done by other workers (n=6).

Complexity of work organisation with the implementation of ecological practices

For 9 of the respondents, the adoption of ecological practices has changed their habits of observations and assessments (of the herd, crops, etc.). The time spent observing can be increased, interventions are conducted at an earlier stage or the way animal are observed has changed.
Seven respondents declared to have more tasks that have to be performed at a specific moment in time and two farmers stated to have more task that have to be performed at the same time that cannot be postponed. Two farmers also answered that they find it more difficult to find workers that have the skills needed to work with ecological farming practices.
Seventy-three percent of the farmers need specific equipment to apply ecological practices. Most of the respondents can use their own equipment (10 out of 16), 3 via the machinery ring or similar and 1 from other farmers.

Quality of work

The working day for most farmers starts around 7 a.m. (between min. 5.15 a.m. and max. 9 a.m.) and ends around 8 p.m. (min 5 p.m. and max 9 p.m.). All farmers normally work the same number of hours each day and work with a fixed work schedule. Sixty-four percent of the farmers considered to generally have night work (after 8 p.m.). Three out of the 16 respondents said that they regularly had days off on which they did not have to work at all.
For foreseeable absences, all respondents can normally take time off, for spontaneous absences (e.g. illness), 86% of the respondents said they could take time off.

Other social variables explored

Level of stress (scale 0-10)

The stress level of the respondents is generally rather low (median: 2.5, min. 0 and max. 10). Six farmers indicated to have no stress at all and one farmer experienced the highest level of stress.
When asked, which factors caused stress, the most prominent answers were "economic situation" (n=6) and "administrative work" (n=4). Furthermore, many respondents added weather or weather-related factors (e.g. drought) as stress-causing factors.

Satisfaction

In general, the respondents are satisfied with their daily work, work-life balance, being a farmer, the freedom related to decision-making and general quality of life (all median score of 4).

Social relations

About half of the farmers in the Puy-de-Dôme case study participate in different social interactions. Only three farmers stated that at present (but they could have in the past) they neither participate in local community life nor in interaction with the supply chain.

Deviations or delays

Regarding some questions (see Appendix 2):
QA3 often multiple periods in time were considered with work peaks, but only one answer was possible to register in the LimeSurvey frame.
QA14 is difficult to interpret: some farmers considered an occasional late calving for example in this question and others did not.
QA10: workday duration only gives an idea of the amplitude of the day, not about the number of hours worked (we did not describe in detail breaks).
QA19: it would have been useful to have on option “other, please describe”, because not all possible answers were available as options to check.

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The authors would like to thank all the farmers for taking the time to participate in this research.