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High work satisfaction despite high workload among European organic mixed livestock farmers: a mixed-method approach

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Abstract

Organic mixed livestock farming offers a range of potential benefits for the environment. Due to the diversification of enterprises, this farming system can be associated with a high workload, which means that it could be socially unsustainable. The aim of this study was to understand and explain work satisfaction of farmers running an organic mixed livestock farm. Using a mixed-method approach, quantitative and qualitative data were collected from 102 farmers in seven European countries during face-to-face interviews. We showed for the first time that across Europe and different animal species and category combinations, organic mixed livestock farms can provide a high work satisfaction, despite a high workload. By using a mixed-method approach and a clear framework, we aimed at better understanding work satisfaction. Underlying reasons for work satisfaction included the diversity of tasks, opportunities to learn, autonomy in the work schedule, perceived acknowledgement by consumers, and the contribution to sustainable food production. Factors contributing to work satisfaction identified in the analysis of quantitative data included workload, number of livestock units, mental complexity, proportion of work peaks per year, and the match between wanted free time and time taken off work. The combination of qualitative and quantitative data allowed a deeper understanding of farmers' work satisfaction and revealed consistent findings. Future research should investigate the relationship between farmers' work satisfaction and capacity for innovation, flexibility, and adaptation potential.

Keywords Organic farming · Multi-species · Well-being · Job satisfaction · Mental health

Lisa Schanz and Bernadette Oehen contributed equally to this work.

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1 Introduction

Organic mixed livestock farming (OMLF) comprises farms with more than one livestock species or category and thus diversifies farm enterprises (Fig. 1). Moreover, it is a complex system with a high diversity of tasks ranging from production and farm management to product marketing for two or more animal species or categories. Farmers have to account for different feed and reproduction schemes and be aware of possible interactions between species in terms of health and resource use in addition to, e.g., crop farming and establishing connections with professionals for two or more animal species (e.g., veterinarians, feed contractors, and sales personnel). However, outperforming OMLF farms do not maximize diversity of farming activities but keep the level of complexity manageable (Ulukan et al. 2022). Overall, to date, OMLF has received little attention in research (Martin et al. 2020). Additionally, OMLF is not registered for agricultural statistics in European countries,

Fig. 1 Co-grazing cattle and broiler chickens (left) as an example of organic mixed-species livestock farming and the workforce of an organic mixed livestock farm (right).



and the number and diversity of OMLF farms in Europe is thus unknown (Ulukan et al. 2021).

Organic mixed livestock farming can be described as a contrast to specialized livestock farming systems, which are currently most common in the agricultural sector. Specialization in farming has dramatically changed agricultural practices. This development has alleviated the physically demanding work on farms but has potentially created adverse effects, e.g., on the attractiveness of farm activities (Brunori et al. 2013; Dedieu and Schiavi 2019; Malanski et al. 2021), social recognition of farmers (Timmermann and Félix 2015), animal health and welfare (Bellet et al. 2021), and subsequently farmers' well-being and quality of life (Contzen and Häberli 2021).

Even though farmers are essential in agricultural systems, the social dimension of sustainability has been little studied to date compared to the environmental and economic dimensions (de Olde et al. 2018; Truchot and Andela 2018; Rööß et al. 2019; Janker and Mann 2020; van der Linden et al. 2020; Scheurich et al. 2021). More specifically, there is a lack of studies investigating farmers' work satisfaction or well-being. Malanski et al. (2021) reviewed literature published in the years between 2008 and 2019 in the field of work in agriculture, and the topics work satisfaction and well-being were not identified as one of (or part of) the domains in which research had been conducted. However, making agriculture more sustainable requires not only decreasing environmental impact or increasing the economic performance of farming, but also improving social aspects of agriculture and farmers' work satisfaction.

The structural changes in agriculture have resulted in a low attractiveness of the sector due to long working days and physically intense tasks. To successfully alleviate some of this pressure, skills to develop workforce strategies are needed (Nettle et al. 2018; Malanski et al. 2021). In this context of long working days and physically intense work, it is unsurprising that studies across different countries and cultures have shown that farmers compared to any other

occupational group have a higher incidence of mental health issues such as depression (Gregoire 2002; Sanne et al. 2004), mortality (McCurdy and Carroll 2000), and suicidality, (USA: Stallones and Cook, 1992; Gunderson et al., 1993, UK: Hawton et al., 1998, Sweden: Thelin, 1991, France: Bossard et al., 2016; Truchot and Andela, 2018, India: Sundar, 1999, Switzerland: Steck et al. 2020, and Europe: Hostiou et al. 2020).

However, other studies suggest that farmers do not mind increased working hours and workload when the work is rewarding and allows autonomy (Delecourt et al. 2019). And even though diversifying farming practices, e.g., by establishing additional marketing channels or implementing different agroecological principles, may lead to an increased workload, work satisfaction was high (Timmermann and Félix 2015; Dupré et al. 2017; Scheurich et al. 2021) or higher compared to farmers running a specialized farm (Besser and Mann 2015; Magne and Quénon 2021). More specifically for OMLF, Mugnier et al. (2020) found that combining cattle and sheep farming in France leads to more diverse tasks on the farm and thereby to a higher work satisfaction in farmers. Bouttes et al. (2019, 2020) reported a higher work satisfaction of French organic farmers compared to their time as conventional farmers, and Mzoughi (2014) found a higher work satisfaction of organic farmers compared to conventional farmers.

Social indicators such as work satisfaction are often difficult to assess due to the high degree of subjectivity, the lack of theoretical frameworks, and the barriers to precise and affordable tools (Scheurich et al. 2021). Frameworks to assess well-being stem from different disciplines but are only rarely applied in agriculture. For example, the OECD developed a framework to measure subjective well-being (OECD 2013), addressing life evaluation (work satisfaction, health, income), affect (positive, negative feelings), and psychological flourishing (purpose of life, autonomy, competences). The main aim of the framework is to allow a cross-country comparison and inform policy-makers about the satisfaction

level of citizens. Contzen and Häberli (2021) developed a comprehensive approach to quality of life in agriculture, which addresses well-being, but also positive and negative affective states, meaningfulness, comprehensibility, purpose in life, income, housing, health, education, and leisure time. Similar to the OECD framework, the authors connect work satisfaction to well-being. Based on Ryff's work (Ryff 2019, 1989), Ryff and Singer (1996, 2006) and Shir and Ryff (2021) developed a framework for psychological well-being and concluded that the dimensions (i.e., personal growth, positive relations with others, purpose in life, autonomy, environmental mastery, and self-acceptance) describe important personal resources to buffer the challenges and stresses of specific work situations.

For our analyses, we focused on the dimensions proposed in the framework by Ryff and Singer (1996) aiming at assessing well-being in terms of work satisfaction, which is of particular relevance in agriculture due to a usually high workload. For the present study, the term work satisfaction comprises, e.g., purpose in life, autonomy, personal growth, self-acceptance, workload, relations to others, and nature. We aimed to explore farmers' work satisfaction on organic mixed livestock farms, i.e., farms where two or more animal species or animal categories are simultaneously pursued, by combining a qualitative and a quantitative approach: on the one hand, by analyzing statements from interviews, extracting reasons of work satisfaction and including descriptive quantitative data and, on the other hand, by statistically analyzing contributing factors for aspects of farmers' work satisfaction.

In the following, we split the description of material and methods, as well as the results, into two separate sections for ease of understanding: (i) analyses of qualitative data with supplementation of visualized quantitative data when available and (ii) analyses of quantitative data to investigate factors contributing to farmers' satisfaction with income, proportion of work peaks per year, perceived mental complexity, and perceived physical severity of work as aspects of farmer work satisfaction. The combined interpretation of both analyses is presented in the discussion.

2 Material and methods

Data were collected via face-to-face interviews with farmers on organic mixed livestock farms in seven European countries (see Sample description below) between autumn 2018 and spring 2019. With the help of organic associations and agricultural consultants, we contacted farmers with more than one livestock species or livestock category (e.g., dairy and beef cattle). Further inclusion criteria were that each animal branch contributed at least 10 % of the farm income (thereby excluding farms with a small number of

one animal species, e.g., for their own consumption) and that the farmers were willing to participate in the approximately 3-h interview. In some countries, farmers received monetary compensation for their participation. As OMLF are not registered in any of the participating countries (Ulukan et al. 2021), we do not know the prevalence of this farming system and could not build a representative sample or assess the representativeness of our sample.

The questionnaire used was jointly developed by the authors and other experts (authors in Ulukan et al. 2021) taking literature and previous research experience into account (e.g., Mzoughi 2014; Bouttes et al. 2020; Magne and Quénon 2021). As described in Ulukan et al. (2021), the questionnaire aimed at collecting data about, e.g., (i) farm structure, (ii) production enterprises (crops, pasture, and livestock), (iii) sale channels for all products, (iv) farm activities, (v) purchased inputs, (vi) economics (including the perceived satisfaction with income), and (vii) human welfare covering perceived workload, farmer work satisfaction, and the reasons for work satisfaction. This complex data collection allowed the calculation of a number of indicators as described in Ulukan et al. (2021), e.g., the proportion of work peaks per year or the ability of farmers to manage their farm resources for production (e.g., feed autonomy).

In total, we interviewed 128 farmers who usually performed (part of) the daily farm work. Out of this sample, 100 farmers provided a rating of work satisfaction, whereas only 84 farmers provided a qualitative explanation for their rating and who were therefore included in further qualitative analysis. For the analysis of quantitative data, responses from up to 102 farmers were included after data validation (e.g., number of offspring consistent with the number of mothers, amount of products sold consistent with the number of animals (Ulukan et al. 2021)). Each farmer replied in his or her native language. The scientists who conducted the interviews wrote down or recorded the answers and transcribed them afterwards. The written answers were translated into English by the scientist who conducted the interview. The collected data were transferred to a database.

The present paper focuses on work satisfaction and combines a qualitative and quantitative approach. In this context, farmers were asked to rate their overall work satisfaction and their satisfaction with income using a scale from 1 (not satisfied) to 4 (highly satisfied), the mental complexity and the physical severity of their work using a scale from 1 (simple/easy) to 4 (often complex/very hard), and the work intensity of 24 half-month periods in a year using a scale from 1 (not work intense) to 4 (very work intensive). The work intensity ratings for the 24 half-month periods were used to calculate the proportion of work peaks per year, counting all periods rated with 4 as a work peak. Additionally, there were open questions addressing (reasons for) overall work satisfaction,

satisfaction with income, management of work peaks, availability of external knowledge sources, and farm organization. Other questions that were used for the present analysis referred to farm location (e.g., country, environmental zone), farm structure (e.g., utilized agricultural area (UAA) (ha), number of workers, percentage dairy or monogastric livestock unit (LU)), farm enterprises (e.g., number of livestock enterprises, on-farm processing, direct selling), farm management (e.g., area grazed by two livestock species in ha), labor (e.g., versatility of workers, workload), and farmers' personal development (e.g., number of training days per year, satisfaction with availability of external knowledge). Different hypotheses could be formed on the relationship of work satisfaction with these other aspects of the farm structure. For example, a high number of workers could be associated with a high work satisfaction since the workload can be distributed among workers, but many workers could also increase workload, thereby decrease work satisfaction, since the management of workers requires additional time and skills. Based on these ambiguous hypotheses, we decided against analyzing the data in the specific context of hypotheses but rather aimed for an unbiased analysis and a comprehensive interpretation.

The answers to the qualitative questions were imported as text into an Excel file for content analysis using the procedure described by Kuckartz (2014). Ryff's dimensions of well-being were used as a starting point. Moreover, they integrate various aspects of satisfaction at work such as (1) self-acceptance, manifested by holding positive attitudes towards oneself; (2) positive relations with others that are warm and trusting; (3) autonomy, which is reflected by qualities such as self-determination, independence, self-regulation of behavior, and an internal locus of evaluation; (4) environmental mastery, defined as the ability to choose and/or create environments suitable to one's psychic condition; (5) purpose in life, or having beliefs that give the individual the feeling that there is purpose in and meaning to life; and (6) personal growth, manifested as developing one's potential, as well as growing and expanding as a person (Shir and Ryff 2021). Statements about a topic were rated as positive (e.g., *I like my job*) or negative (e.g., *sometimes I lack motivation*).

This mixed-method approach of combining qualitative and quantitative data was implemented to develop a comprehensive, contextual understanding of the circumstances of OMLF farmers in Europe with a focus on work satisfaction. As described in the review on mixed methods by Hong et al. (2020), we used qualitative data from open questions as well as quantitative data from closed questions and interpreted the results of both analyses together. The range of questions allowed a deep and diverse understanding of the social dimensions of the investigated farms.

2.1 Sample description

Interviewed farmers (after data validation, $n = 102$) were from seven European countries (Austria, 14; Belgium, 12; France, 29; Germany, 21; Italy, 7; Sweden, 13; and Switzerland, 6) assigned to one of six environmental zones (Alpine North, 7; Alpine South, 9; Atlantic North, 11; continental, 53; boreal, 13; and other, 9) with a UAA of 78.3 ± 71.5 ha (mean \pm SD), 89.4 ± 72.5 LU, and 3.7 ± 5.2 annual worker units (AWU). Across all farms, dairy cattle were present on 32 %, beef cattle on 60 %, pigs on 30 %, poultry on 33 %, and sheep on 37 % of the farms.

2.2 Analyses of qualitative data

For the analysis, we focused on the answers given to open questions about work satisfaction, strategies for the management of work peaks, and main external sources for information. For the question on work satisfaction, each answer was screened for constructs and deductively coded using Ryff and Singer's (1996) six dimensions of well-being as item categories (Table 1). The answers could contain several items. For items that could not be allocated to Ryff's dimensions, new categories were created. In the Results and Discussion section, direct quotations from participating farmers are given in italics. The scheme of item categories was presented to, and discussed with, the scientists who conducted the interviews. In this way, the categorization scheme was constantly revised during the analysis. For the questions on how work peaks were managed and what the main external sources of information were, the frequencies of the different items were determined.

Beyond the qualitative analysis of farmers' responses, several aspects of work satisfaction which were mentioned in the qualitative data have corresponding quantitative variables. For example, farmers mentioned direct contact with customers and working with animals as aspects of their satisfaction and the corresponding quantitative data (e.g., direct selling and perception of animal welfare) should be explored for a comprehensive analysis. Therefore, we visually explored (i.e., by using bar plots), on the one hand, the relationship of overall satisfaction with workload, satisfaction with income, direct selling, on-farm processing, and perceived animal welfare and, on the other hand, the relationship of satisfaction with income with mental complexity and physical severity as well as the relationship of mental complexity with on-farm processing.

2.3 Analyses of quantitative data

From the quantitative data, we selected five variables, which reflect aspects of work satisfaction (i.e., overall work satisfaction, satisfaction with income, mental complexity,

Table 1 Item categories and constructs identified in the interviews. The items could have different directions, e.g., positive or negative relations, positive appreciation, and feedback or no appreciation.

Item categories	Description	Constructs
Personal growth*	Potential for learning and development	Liking diversity of tasks, no routine, learning
Positive relations *	Having warm, trusting ties to others, caring about the welfare of others	Working and living with family, friends, neighbors, consumers, networks
Purpose in life*	Life has a meaning, direction and goals	Animal welfare, animal health, organic farming, sustainable farming, food production
Autonomy*	Self-determination, independence, resistance to social pressures	Decision making, independence, dependencies, living a vision
Environmental mastery*	Creating contexts suitable to ones own personal needs and values	Making something out of the given resources, income
Self-acceptance*	Attitudes towards oneself	Evaluation of who you are, what you do
Relation to nature	Attitudes towards nature	Working with nature, working with animals
Physical integrity	Physical burden	Workload, workforce, work peaks, stress

Dimensions used by Ryff and Singer (1996) are marked with *

physical severity, and proportion of work peaks per year) as outcome measures for statistical analyses. We aimed to identify contributing factors for these aspects of work satisfaction. As the distribution of answers for overall work satisfaction was skewed and did not allow statistical analyses, we included only the four remaining outcome measures in further analyses. Not all farmers responded to all questions, and the sample size thereby differs between quantitative variables used as outcome measures (see Table 2). A more detailed description of the sample can be found in Ulukan et al. (2021).

Based on assumptions for associations with the four remaining outcome measures, i.e., satisfaction with income, proportion of work peaks, mental complexity, and physical severity, we selected quantitative variables originating from data on other aspects of the farm (e.g., the number of free

days would be lower with a high proportion of work peaks, and a high number of different tasks could contribute to a high mental complexity). A total of 40 quantitative variables with a possible connection to farmer work satisfaction as measured by the four outcome measures were selected, including 23 continuous and 17 categorical variables, to analyze their influence on the outcome measures. Each outcome measure was also included as a possible explanatory variable for the other outcome measures. The original variable levels (e.g., four levels for satisfaction with income) were reduced by merging several of the categorical explanatory variables for a more even distribution across levels. For details on outcome measures and explanatory variables including original and reduced levels for categorical variables, see Table 3 as well as supplementary material, and for the distribution of answers for each outcome measure, see Table 2.

Table 2 Distribution of answers (with merged levels for analysis) for the four categorical outcome measures overall work satisfaction, satisfaction with income, mental complexity, and physical severity and the range for the continuous outcome measure proportion of work peaks per year (0–24 periods in a year rated as very work intensive).

Outcome measure	Levels/range	Number of responses
Overall work satisfaction * ($n = 100$)	Satisfied	93
	Not satisfied	7
Satisfaction with income ($n = 91$)	Poorly satisfied	24
	Rather satisfied	39
	Very satisfied	28
Mental complexity of work ($n = 99$)	Rather simple	27
	Sometimes complex	56
	Often complex	16
Physical severity of work ($n = 99$)	Usually easy	25
	Usually hard	74
Proportion of work peaks per year ($n = 102$)	0.0–1.0 (0–24 half-month periods; median 0.17)	

The distribution of answers of the variable overall work satisfaction (*) did not allow for a statistical analysis

Table 3 Number of answers (sample size), original levels, adjusted levels, mean \pm SD for continuous variables, and variable type for the four outcome measures satisfaction with income, proportion of work peaks per year, mental complexity, and physical severity (including symbol for the respective statistical model) as well as explanatory variables included for the statistical analysis of quantitative data, as indicated by symbols for outcome measures. For example, the variable satisfaction with income and the number of training days per year,

satisfaction with free time, total number LU, on-farm processing, and off-farm income are included in the statistical model of the outcome measure mental complexity (\blacklozenge). For the complete list of explanatory variables initially considered for statistical analyses, see supplementary material. For further details on all variables and their calculation, see Ulukan et al. (2021). *AWU*, annual work units; *UAA*, utilized agricultural area; *LU*, livestock unit

Variable name	Number of answers	Original levels/comments	Mean \pm SD/adjusted levels	Variable type	Explanatory variable for
<i>Outcome measures and respective symbol</i>					
Satisfaction with income (\$)	91	Score from 1 not satisfied to 4 high satisfaction	3 levels: not satisfied < quite satisfied < highly satisfied	Categorical, ordinal	\blacklozenge
Mental complexity (\blacklozenge)	99	Score from 1 simple to 4 often complex; perceived complexity of the overall farm management and daily tasks	3 levels: usually simple < sometimes complex < often complex	Categorical, ordinal	\$
Physical severity (\star)	99	Score from 1 easy to 4 very hard; perceived severity of work	2 levels: usually easy < usually hard	Binomial	\$, Δ
Proportion of work peaks per year (Δ)	102	24 half-month periods in a year were rated by the farmer on a scale from 1 not work intense to 4 very work intensive, all periods rated as 4 were considered as a work peak	0.22 \pm 0.22	Continuous	\star
<i>Explanatory variables</i>					
Number of training days per year	80	(Formal) Training courses, lectures or similar events to acquire new knowledge	4.45 \pm 3.88	Continuous	\blacklozenge
Satisfaction with free time	87	Number of objective free days per year/number of free days per year	0.65 \pm 0.37	Continuous	\$, \blacklozenge
% unpaid workers AWU	101		0.11 \pm 0.16	Continuous	\star
Distance between furthest plots (km)	102		11.85 \pm 15.36	Continuous	Δ
Total number LU	96		89.42 \pm 72.48	Continuous	Δ , \blacklozenge
Monogastrics LU / total LU	96		0.20 \pm 0.25	Continuous	\$, \star
Versatility workers	96	Number of highly versatile workers (skills for most or all farm branches)/number of workers	0.29 \pm 0.31	Continuous	\$
Workload	96	Score from 1 light to 4 high	3 levels: rather light < rather high < often high	Categorical, ordinal	Δ , \star
Environmental zone	102	6 categories: Alpine North, Alpine South, Atlantic North, continental, boreal, and other	6 categories	Categorical, nominal	\$
On-farm processing	102	2 levels: no < yes	2 levels: no < yes	Binomial	\$, \blacklozenge
Off-farm income	89	2 levels: no < yes	2 levels: no < yes	Binomial	\blacklozenge

Before investigating statistical relationships between outcome measures and explanatory variables, we tested every possible variable combination for association to avoid overfitting of final models. First, all continuous variables were

correlated using Spearman rank correlations. For pairs with a strong correlation ($r > 0.7$), the one with a lower p value in univariable testing for each outcome measure was retained. Second, a chi-square test between categorical variables with

a Benjamini–Hochberg correction for multiple testing was performed. Statistically significant associated variables were selected based on their p values in univariable testing for each outcome measure and overall informative value. Third, continuous variables and categorical variables were tested for association with a Kruskal–Wallis test. Combinations with a p value lower than 0.05 were post hoc tested with a Wilcoxon rank sum test if the categorical variable had two levels or a Dunn test if the categorical variable had three or more levels. Variables for further investigation for each outcome measure were selected based on univariable testing, where the variable with the lower p value was retained. All remaining variables which reached statistical significance in univariate testing after Benjamini–Hochberg correction (satisfaction with income $p = 0.053$, proportion of work peaks $p = 0.056$, mental complexity $p = 0.034$, and physical severity $p = 0.012$) entered the model for each outcome measure (Table 3). Final model selection was performed using the Akaike information criterion (AIC) and stepwise selection of variables in both directions. For each outcome measure, the model with the lowest AIC was selected as the final model.

For the two ordinal outcome measures, namely, satisfaction with income and mental complexity, we ran ordinal regression cumulative link models (function: `clm`, package: `ordinal` (Christensen 2019)) with the previously selected explanatory variables as fixed effects. For the outcome measure satisfaction with income, the explanatory variable physical severity was additionally entered into the model as a scaled variable to not violate model assumptions. Similarly, for the outcome measure mental complexity, the explanatory variable off-farm income was entered as a scaled variable. To verify model assumptions, the proportional odds assumptions were tested for models including the scaled explanatory variable. Furthermore, we plotted likelihood slices and visually inspected these for quadratic behavior around reported optimum. Model assumptions were not violated, and quadratic behavior was reasonable around the reported optimum. Pairwise t tests and visual inspection were used as post hoc tests to ascertain direction of effect. For the two outcome measures proportion of work peaks per year and physical severity, a logistic regression was run with a quasi-binomial and binomial generalized linear model, respectively (function: `glm`). Models were verified by visualizing deviance residual plots and inspecting for nonlinearity. Outliers could significantly influence model performance and outcome; therefore, we checked for outliers with a distance greater than 0.5 quantitatively and graphically (functions: `influence` and `cooks.distance`), and no data were removed. Pairwise t tests and visual inspection were used as post hoc tests to ascertain direction of effects.

All statistical analyses were performed and all graphs created using the statistical programming language R (R version

4.0.3 (R Core Team, 2020), RStudio version 1.4.1103 (RStudio Team, 2021)). Graphs were created with the package `ggplot2` (Wickham 2016) and regression models conducted with the package `ordinal` (Christensen 2019).

2.4 Ethical considerations

Each participant was informed about the purpose of the study, and informed oral consent was obtained before conducting the interview. Participants were informed about the possibility of skipping questions. Collected data from the interviews were pseudonymized before processing, in accordance with the European General Data Protection Regulation. We adhered to the joint institutional standards of INRAE-Cirad-Ifremer-IRDs Ethics Committee for research concerning human participants.

3 Results

In accordance with the mixed-methods approach, we split the results regarding qualitative and quantitative analyses and jointly interpret all results in the Discussion section.

3.1 Qualitative analysis of farmers' work satisfaction

3.1.1 Overall work satisfaction

The majority of the responding farmers running an OMLF rated their work satisfaction high or very high (Table 2). Since the variability of answers was low, we could not investigate differences with regard to countries or environmental zones. Eighty-four of the 102 farmers explained their work satisfaction by using items connected to the dimensions personal growth, positive relations with others, purpose in life, autonomy, environmental mastery, and self-acceptance (Table 4). In addition to the dimensions proposed by Ryff, two new dimensions (Table 1) were added as they were relevant for the interviewed farmers: connection to nature and physical integrity. The latter was mentioned mostly as something negative, despite a high satisfaction, and was connected to administrative tasks, the complexity of the work, or the changing requirements of the organic regulations. From the remaining 26 respondents who rated their satisfaction at work high or very high, no additional reason for work satisfaction was obtained.

The 10 farmers who rated their satisfaction at work very low or low referred to administrative tasks (1 respondent), poor profit (2 respondents), high workload (1 respondent) but also lack of appreciation by the society (2 respondents) or lack of motivation (1 respondent), wanting to quit (1 respondent) and management issues (2 respondents).

Table 4 All answers to the open questions about reasons for farmers' work satisfaction, including the number of mentions for item categories and example statements for each category.

Item categories	N	Positive statements	N	Negative statements	N
Personal growth*	25	<i>-Never the same type of work -There is something different to do every day -No monotonous work, for example, not having to milk or sorting eggs for hours, or being on the field for days -This is not a job with routine</i>	25		0
Positive relations with others*	17	<i>-Very satisfied because of direct feedback from the customers, and loyal customers -Work as a team -Allows me to meet a lot of people</i>	16	<i>-It's depreciated by the society and the consumer</i>	1
Purpose in life*	12	<i>-Good to see the value in what I do -Sustainable food production -Because of producing food for people</i>	12		0
Autonomy*	28	<i>-Own boss -Independent entrepreneur -Liberty -Flexibility -Realize own ideas -I get to do what I always wanted to do</i>	27	<i>-We are always inspected (3 inspections last month)</i>	1
Environmental Mastery*	44	<i>-The farm works and we are well organized -I try to do as much as I can with machines to reduce the hard, physical work -Each year we try to improve some aspect and usually we succeed -Success is based on our own work -Working in agriculture as a farm manager has always been my desire, including having different animal species -Our system works, there are no major issues -Success is based on our own work</i>	22	<i>-Managing a highly diversified structure is complex -Good, except the administrative work -Difficulties in personnel management -Poor profit in relation to complexity of work -I am fine, I have quality of life, but financially it could be better -I like my job, (...) but there is too much instability -Too little money</i>	22
Self-acceptance*	39	<i>-We like what we do -I like to be a farmer -Agriculture has always been my desire and having different animal species</i>	338	<i>-Sometimes lack of motivation -I want to quit</i>	2
Relation to nature	24	<i>-I work with living animals and plants -Work with nature -Being outside -Work follows the animals and seasons -Nature experience</i>	24		0
Physical integrity	10		0	<i>-Too much work for one person -Stress and too much work -Except for the work peaks it is pretty good -Age -I am tired of the cows sometimes, of being tied to the milking schedule</i>	10

N: Number of mentions; *dimensions used by Ryff and Singer (1996) and Shir and Ryff (2021). Direct quotations from participating farmers are given in italics.

Among those farmers, there was one who explicitly said that he/she liked the work. Farmers with low or rather low work satisfaction were also less satisfied with their income (Fig. 2b). However, income and workload do not seem to be the main reasons for work satisfaction (Fig. 2a, b). These findings are supported by the qualitative data, where income (as item in environmental mastery) and workload are less often mentioned in a positive or negative way as reasons for

work satisfaction. More relevant are the other dimensions (Table 4). Moreover, we found that keeping a higher percentage of monogastric animals caused less physically severe work than having a higher percentage of ruminants. There might be a connection between workload and satisfaction with income (Fig. 3b). As there were no reasons given for the rating of satisfaction with income, no deeper analysis was possible.

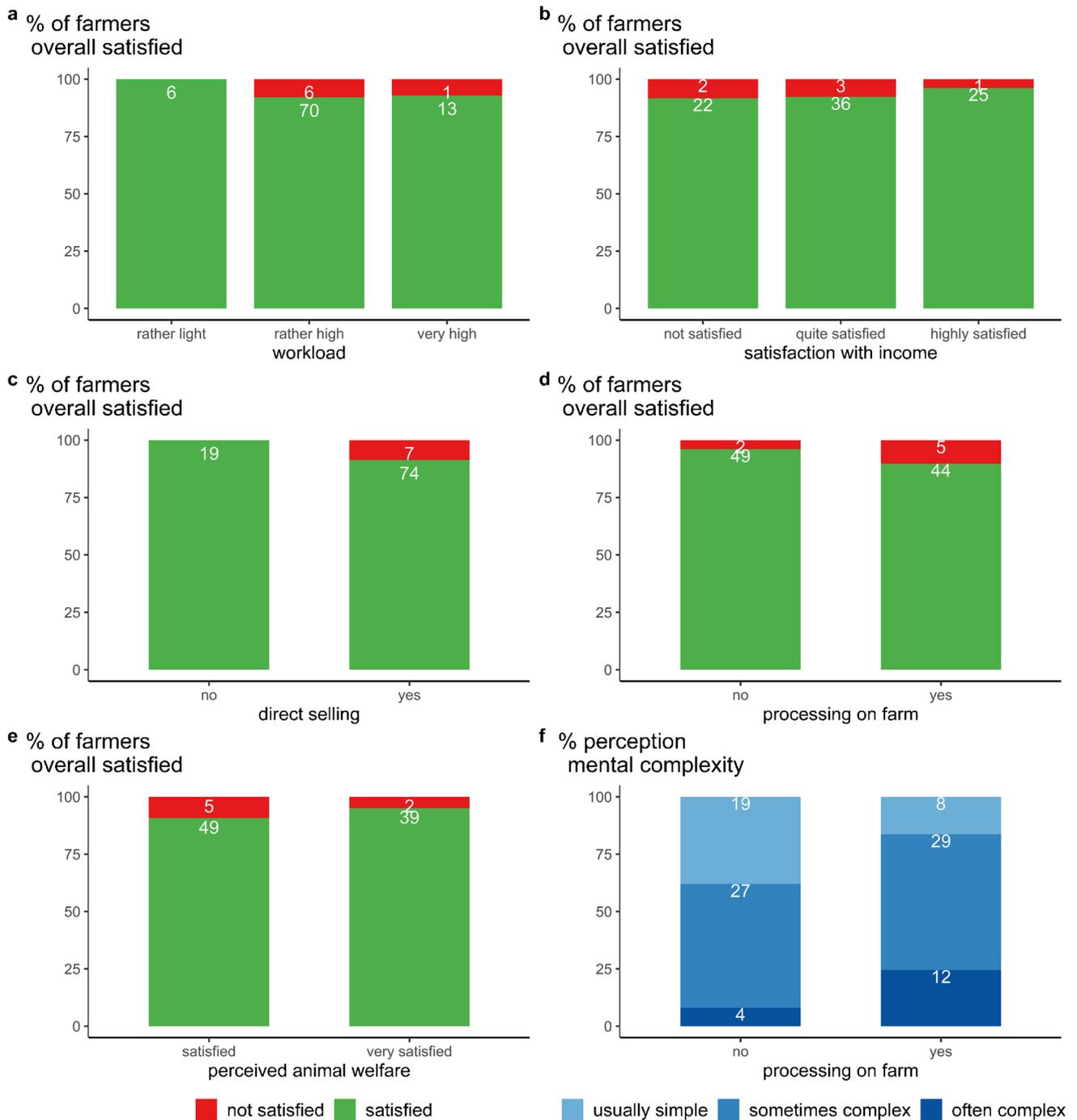


Fig. 2 Stacked bar plots with the number of answers per category (white number on bar) to visualize relationships and distribution of answers concerning: **a** overall work satisfaction and workload. **b** overall work satisfaction and satisfaction with income. **c** overall work

satisfaction and direct selling. **d** overall work satisfaction and on-farm processing. **e** overall work satisfaction and perceived animal welfare. **f** mental complexity and on-farm processing.

The interviewed farmers perceived animal welfare on their farms to be high, and there could be a connection between high perceived animal welfare and work satisfaction (Fig. 2e). One farmer with low work satisfaction explained that he works with living animals and plants,

which is complex but it's depreciated by the society and the consumer.

Six farmers mentioned mental complexity of the work as a challenge. As a relevant number of farms (59) were involved in on-farm processing, the perceived complexity

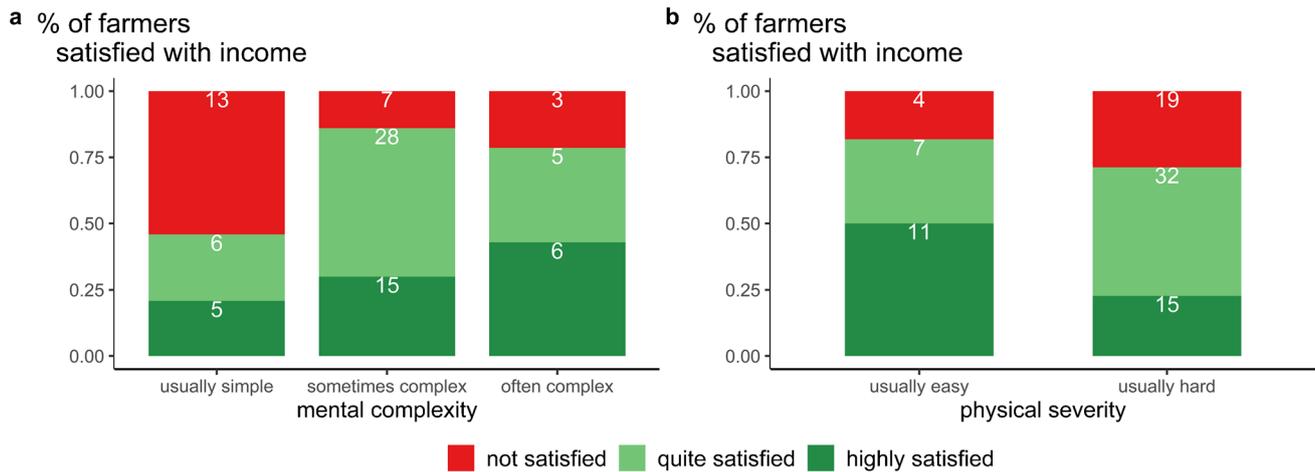


Fig. 3 Stacked bar plots with the number of answers per category (white number on bar) to visualize relationships and distribution of answers concerning: **a** satisfaction with income and mental complexity. **b** satisfaction with income and physical severity.

could be connected to on-farm processing (Fig. 2f). On-farm processing is also connected to farmers' work satisfaction but more ambiguously, as farmers with both low and high self-assessment for satisfaction were involved in on-farm processing (Fig. 2d). More farmers with no on-farm processing rated work complexity more frequently as usually simple compared to farmers with on-farm processing (Fig. 2f).

In our sample, 101 farmers were involved in direct selling. The interaction with consumers and the direct recognition and appreciation for what farmers are doing might contribute to the observed work satisfaction. Some farmers have regular consumers and, in some cases, consumers are also involved in farm work. Some mentioned that the proximity to urban areas facilitates the marketing of the products. Other farmers spoke more about the relationship to the partners working on the farm, farm workers, neighbors, or family members. For one farmer, the interaction with others was even more relevant than farming itself: *When I have good people [around me] I am satisfied. Agricultural demands do not make me satisfied.* However, even if these activities have the potential to contribute to a higher work satisfaction, this is not true for all farmers in our sample (Fig. 2c, d). There is the example of an unsatisfied farmer who stated that he *would like to do more by himself, but it does not seem possible.*

Based on the answers to the question about managing work peaks, we can assume that such networks are of crucial relevance when there is a need to manage work peaks and organize free time or holidays. Of the interviewed farmers, 35 mentioned that they can distribute the workload on several shoulders, share work, get help from associates, family members, and friends but also students or interns. Another 31 farmers relied on their management skills and focused on planning and hiring employees and temporary workers. Farmers mentioned

other farmers and the internet as their main sources for new information, and the majority of interviewed farmers were satisfied with the availability of knowledge and the quality of information obtained.

3.1.2 Satisfaction with workload and income

Farmers who mentioned a rather high or very high workload (83) were often overall satisfied with their work. However, some farmers in our sample reported the workload or work peaks as challenging (Fig. 2a). Participating farmers mentioned a range of strategies to manage workload, e.g., *good planning, hiring personnel, help from family and friends*, but also *long working days*. The perception of the physical severity and mental complexity seems to be associated with the perception of workload. More farmers who were not satisfied with their income (13 out of 23) reported the mental complexity as usually simple, compared to farmers quite or highly satisfied with their income (Fig. 3a). More farmers who reported their work as usually hard were not satisfied with their income, compared to farmers who reported their work as usually easy (Fig. 3b). Additionally, farmers who reported their work as usually physically easy had on average a higher percentage of monogastric LU than those reporting their work as more physically demanding. For the seven percent of farmers with a low overall work satisfaction, different levels of satisfaction with income were reported, from very poor to highly satisfied. Farmers with overall low satisfaction but (high) satisfaction with income mentioned the *management of personnel* and *the lack of recognition by society or consumers* as reasons for their low overall work satisfaction.

3.2 Analyses of quantitative data for factors contributing to satisfaction with income, proportion of work peaks in a year, mental complexity, and physical severity

The *satisfaction with the income* was influenced by the *satisfaction with free time* ($\chi^2_{1,87} = 6.68, p = 0.009$) and the *versatility of workers* ($\chi^2_{1,96} = 4.11, p = 0.04$). The more the amount of desired free days matched or exceeded the actual vacation days, the higher was the satisfaction with the income. Satisfaction with the income was higher when the versatility of workers was lower. None of the other explanatory variables reached statistical significance (Table 5).

The proportion of *work peaks over one year* was influenced by the *workload* ($\chi^2_{88,96} = -51.73, p = 0.01$) and the *total number of LU* ($\chi^2_{86,96} = -23.14, p = 0.04$) (Table 5). A higher workload entailed a higher proportion of work peaks in a year, whereas a higher number of total LUs meant a lower proportion of work peaks in a year. Additionally, the proportion of work peaks tended to be higher when the physical severity was rated high ($\chi^2_{87,99} = -21.41, p = 0.05$).

The *mental complexity* was influenced by the *number of training days per year* ($\chi^2_{1,80} = 10.06, p = 0.002$), the *total number of LUs* ($\chi^2_{1,96} = 8.03, p = 0.005$), and the *satisfaction with the income* ($\chi^2_{2,91} = 6.28, p = 0.04$) (Table 5). The mental complexity was rated high when the number of training days per year, the total number of LUs, and the satisfaction with income were high(er).

The *physical severity of work* was influenced by the *proportion of work peaks in a year* ($\chi^2_{85,99} = -6.19, p = 0.01$) and the *percentage of unpaid workers AWU on a farm* ($\chi^2_{85,99} = -9.84, p = 0.002$). With a higher proportion

of work peaks in a year and a higher percentage of unpaid workers AWU, physical severity was rated high. None of the other explanatory variables reached statistical significance (Table 5).

4 Discussion

This is the first study addressing farmers' work satisfaction on organic mixed livestock farms. Overall, most farmers interviewed were satisfied or very satisfied with their occupation, often despite a high workload which could be expected in a diversified farming system such as OMLF. This is in line with findings from other authors, e.g., Scheurich et al. (2021), who also found a high work satisfaction among hay milk producers despite perceived stressors like high workload, bureaucracy, or limited time for family and partnership. In contrast, Truchot and Andela (2018) found that high workload is often associated with low work satisfaction. However, this is not the case for most farmers in our sample, who were satisfied despite a high workload.

The reasons for work satisfaction given by the farmers in the present study cover a wide range of aspects (e.g., autonomy, personal growth, environmental mastery, positive relations with others) and are mostly consistent with reasons given by Austrian hay milk farmers (Scheurich et al. 2021). The dimensions used in Ryff's framework for psychological well-being (Ryff 1989; Ryff and Singer 1996; Shir and Ryff 2021) were applicable for most reasons given by farmers in our sample. By using the framework for the first time in an agricultural context, we showed that it is suitable for analyzing farmers' work satisfaction but that two additional

Table 5 Statistical model, explanatory variables included in the final model, and results for the four outcome measures.

Outcome measure	Model	Selected explanatory variables	Test statistic	p value
Satisfaction with income	Cumulative link model	Satisfaction with free time (+)	$\chi^2_{1,87} = 6.68$	0.009
		Versatility of workers (-)	$\chi^2_{1,96} = 4.11$	0.043
		Physical severity of work	$\chi^2_{1,91} = 2.62$	0.106
		Environmental area	$\chi^2_{4,91} = 7.74$	0.102
Proportion of work peaks	Generalized linear model	Workload (+)	$\chi^2_{88,96} = -51.73$	0.011
		Total number LU (-)	$\chi^2_{86,96} = -23.14$	0.044
		Physical severity of work	$\chi^2_{87,99} = -21.41$	0.053
Mental complexity of work	Cumulative link model	Number of trainings per year (+)	$\chi^2_{1,80} = 10.06$	0.002
		Total number LU (+)	$\chi^2_{1,96} = 8.03$	0.005
		Satisfaction with income (+)	$\chi^2_{2,91} = 6.28$	0.043
Physical severity of work	Generalized linear model	Proportion of work peaks (+)	$\chi^2_{85,99} = -6.19$	0.013
		Percentage of unpaid workers AWU (+)	$\chi^2_{85,99} = -9.84$	0.002
		Percentage monogastrics	$\chi^2_{85,96} = -2.46$	0.117
		Workload	$\chi^2_{86,96} = -2.60$	0.272

LU, livestock units; AWU, annual work unit. Statistically significant variables are marked in bold and the direction of the relationship is indicated in parentheses

dimensions were relevant for the farmers interviewed in the present study: relation to nature and workload. While the relation to nature could be something specific to the agricultural sector, workload could be applicable to other sectors.

Due to the skewed distribution of the answers for the farmers' overall work satisfaction, we were unable to statistically analyze factors contributing to it. Conversely, we could perform such analyses for satisfaction with income, assessment of work peaks in a year, mental complexity, and physical severity. The few farmers speaking about a low work satisfaction mentioned poor profitability, difficulties in personnel management, high administrative work load, or missing appreciation for their work, which is in line with aspects of dissatisfaction discussed in Duval et al. (2021).

In the present paper, we can corroborate previous findings on farmers' work satisfaction from different authors: (i) the diversity of tasks (personal growth, enhancing learning, and development) on OMLF contributes to work satisfaction, which is in line with findings by Besser and Mann (2015), Mugnier et al. (2020), Dupré et al. (2017), Navarrete et al. (2015), and Ryff (1989), (ii) Positive relations with others are on the one hand perceived as appreciation by customers in direct selling situations, which is in line with findings by Scheurich et al. (2021), and on the other hand, positive relationships with family members, friends, customers and colleagues are perceived as support, which is similar to findings by Bouttes et al. (2019, 2020), and (iii), similar to findings by Nettle et al. (2018), the interviewed farmers have the personal resources to manage work peaks, e.g., in terms of procuring skilled and unskilled helpers. But the results from the analysis of quantitative data show that a high percentage of unpaid workers was associated with a high physical severity of work, which could be due to unpaid workers helping with specific tasks and possibly not performing the physically demanding work, which leaves this type of work to the farmers themselves. It could also be that farmers with a large amount of physically demanding work have to rely more on help from unpaid workers.

Additionally, the quantitative data showed that for the farmers in our sample, a high satisfaction with free time is relevant, which could be interpreted as farmers taking time off work to recover from periods with high workload. This could be made possible by farmers sharing responsibilities for farm work with co-farmers or employees, as mentioned in the qualitative answers.

Moreover, the analysis of quantitative data revealed that aspects of work satisfaction were influenced by the workload, the number of LU, the proportion of work peaks per year, and the possibility to take time off as much as wanted. A high proportion of work peaks (work intensive periods) in a year was associated with a high workload rating in the statistical analyses, which is in line with the diversity of additional labor intensive and complex tasks mentioned by the farmers in the interviews, e.g., direct marketing, on-farm processing, or fencing.

When pursued, direct selling could be a reason for increased workload, but also increased work satisfaction, as contact with customers and their appreciation can have positive effects.

With these findings in mind, it can be pointed out that workload and income are not the only or the most important factors contributing to farmers' work satisfaction (in our sample). Work satisfaction, as measured and analyzed in the qualitative part of this study, contributes to individual and subjective well-being dimensions. However, it should not be ignored that due to enthusiasm and high work satisfaction, farmers often continue with their farming system, even though the circumstances are difficult.

The mixed-method approach used in this study proved effective to gain insights into the individual situation of a broad variety of farmers pursuing OMLF in seven European countries. On the one hand, aspects of work satisfaction, for example, with regard to the connection to nature, autonomy, purpose of life, positive relation with others, and personal growth, were reflected in both qualitative and quantitative data. On the other hand, if we had used either a qualitative or a quantitative approach, instead of a mixed-method, we could have overlooked essential aspects of farmers' circumstances and associated work satisfaction. For example, we could have reported that organic farmers with mixed livestock have a high work satisfaction but would not have known the reasons for this high satisfaction or vice versa. Similarly, we could have reported the proportion of work intensive periods (work peaks) but would have missed the importance of social networks in strategies for the management of work peaks. To our knowledge, this approach using quantitative and qualitative data collection and analysis is quite original. It provided a deeper understanding of farmers' work satisfaction that goes beyond the use of indicators in sustainability assessments such as income and workload, which only present a limited perspective on the farmer's circumstances. Based on this approach, new aspects of the social dimension of sustainability could be identified in both qualitative and quantitative data, thereby indicating their relevance for future sustainability assessments. These include autonomy, personal growth, meaningful work from the qualitative assessment, and proportion of work peaks or satisfaction with free time from the quantitative assessment.

As we do not know the total number of OMLF in any country, we were not able to interview a representative sample or assess the representativeness of our sample. This may have introduced a bias in our dataset towards farmers who were inclined to share information. Therefore, our results need to be interpreted cautiously and to be verified in a larger and possibly more representative sample of OMLF. In addition, our results are specific to organic farms and are not transferable to work satisfaction on conventional mixed livestock farms. A comparison between organic single- and mixed livestock farmers could yield further insights into possible reasons for work

satisfaction on farms with multiple livestock species. Future studies should involve life partners and farm workers to access new perspectives on farmers' work satisfaction. Additionally, here we demonstrated that autonomy, environmental mastery, and personal growth were dimensions linked to farmers' high work satisfaction. As previously shown for dairy crossbreeding by farmers (Magne and Quénon 2021), using multi-species livestock farming could be a way for farmers to regain autonomy over the dominant agricultural knowledge and innovation system which is focused on specialized livestock systems and to reacquire situational knowledge that enables them to rebuild an individual identity and satisfaction at work. Additionally, further research is necessary to understand the relationship between farmers' work satisfaction and their capacity for innovation, flexibility, and adaptation potential.

5 Conclusion

The current study presents deeper insights into work satisfaction of organic mixed livestock farmers in seven European countries. Overall work satisfaction and satisfaction with income were generally high in our sample of farmers, often despite a high proportion of work peaks in a year and a perceived high workload. OMLF are complex systems, and farmers in our sample seem to thrive on learning and managing complex systems, as the satisfaction with income was higher for farmers who perceived their work as more mentally challenging. OMLF farmers are more satisfied with their income when the number of days off matches their expectations, which could be because scheduling their work according to their preferences and taking time off is important, especially in terms of autonomy. For them, OMLF is not only a strategy to efficiently use the given resources (environmental mastery); it also meets their visions of farming and work satisfaction in terms of appreciation by consumers, autonomy, personal development, and being connected to nature.

Our mixed-methods approach, i.e., quantitative and qualitative data collection and analyses, was successful in yielding insights into the high work satisfaction in OMLF, and this combined approach should be applied in future research. Further research is however necessary to verify the current findings in a representative sample and to apply new approaches for assessing social sustainability with a focus on work satisfaction of farmers.

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Authors' contributions All authors contributed to the conception and design of this study. Bernadette Oehen analyzed the qualitative data and Lisa Schanz the quantitative data. Bernadette Oehen and Lisa Schanz

wrote the first draft of the manuscript. All authors commented on previous versions of the manuscript and approved the final manuscript.

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Data availability The data is available at <https://doi.org/10.15454/AKE05G>, and details on the data are provided in Ulukan et al. (Ulukan et al. 2021).

Code availability The details on the data analyzed for this study and the respective repository can be found in the data report by Ulukan et al. (2021). The codes and data on the qualitative analysis are available from the corresponding author on reasonable request.

Declarations

Ethical approval Each participant was informed about the purpose of the study, and informed oral consent was obtained before conducting the interview. Participants were informed about the possibility of skipping questions. Collected data from the interviews was pseudonymized before processing in accordance with the European General Data Protection Regulation. We adhered to the joint institutional standards of INRAE-Cirad-Ifremer-IRDs Ethics Committee for research concerning human participants.

Consent to participate Informed consent was obtained from all farmers who participated in the study prior to interviews.

Consent for publication The participants provided informed consent for the anonymized publication of quotes.

Conflict of interest The authors declare no competing interests.

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