



Exploring farmers' perceptions of social sustainability

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Abstract

In the farming sector, there is growing awareness of the importance of the social dimension of sustainability and its complex links to environmental and economic sustainability. However, social sustainability is generally the least understood dimension of sustainability. Despite efforts to empirically capture social sustainability, it remains unclear how it is relevant to individual farms and how it depends on their contexts. To generate a comprehensive and contextual understanding of social sustainability, we adopted a mixed-methods approach. We first conducted qualitative interviews with farm managers, which then informed the development of a survey focused on farmers' perceptions and experiences of social sustainability at their farms. In total, 354 Swiss farm managers completed our online survey. First, we identified social aspects relevant to farmers and compared them across the three main production types in Switzerland (dairy, crop, and other livestock production). Second, we assessed farmers' perceptions and experiences of social sustainability and the relationship of these perceptions and experiences with farmer identity (i.e., productivist, conservative, passionate caretaker, and forward-looking). The findings reveal differences in the meaning and importance of social sustainability across production types. Farmer identity appears to influence the experience of social sustainability at farms, with forward-looking farmers reporting better experiences of social sustainability than other farmers. The findings can inform the development and implementation of social sustainability indicators for farms and tailored interventions based on farm contexts and farmer characteristics.

Keywords Agriculture · Social sustainability · Farmer perceptions · Farm contexts · Farmer identity

1 Introduction

Since the 1987 Brundtland report by the World Commission on Environment and Development (1987) promoted the concept of sustainability in agriculture, most scientific research has focused on examining environmental problems and economic viability and has neglected the social dimension of sustainability (de Olde et al., 2016; Janker & Mann, 2020; Schader et al., 2014). To date, social sustainability is the least understood

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sustainability dimension (Boström, 2012; Janker & Mann, 2020; McGuinn et al., 2020; Valiance et al., 2011). However, it is an equally important dimension (Desiderio et al., 2022; Latruffe et al., 2016), and it is of great relevance in analyzing the correlations and trade-offs between the dimensions (Sidhoum et al., 2022; Zhu & Lansink, 2022).

Generally, social sustainability in agriculture implies providing for the basic needs of people working in the farming sector. It demands a supportive social environment for these workers, both now and in the future, and is closely intertwined with the aim of securing positive long-term economic and environmental outcomes for farming activities (Janker et al., 2019). However, the literature shows a lack of consensus on a common theoretical framework and a concrete definition of social sustainability in agriculture (Desiderio et al., 2022; Janker & Mann, 2020; Valiance et al., 2011). This discrepancy has been consequential for the development of social sustainability indicators. Hence, a question arises regarding at which level of the agricultural sector social sustainability should be measured.

Currently, diverse measurements for social sustainability are used (Allen et al., 1991; Chambers & Serra, 2018; Janker & Mann, 2020; Missimer et al., 2010; Rööös et al., 2019) at different levels of the agriculture sector, from the farm level to community and regional levels. A recent review by Sannou et al. (2023) on social sustainability revealed that farm-level indicators are the most prominent, as they make up as much as 66% of the indicators found in the literature. Measures of farm-level social sustainability can be analyzed beyond the farm level and can encompass the regional and local levels (Sannou et al., 2023). However, the appropriate selection of farm-level indicators is difficult, as they include both general and subjective measures (e.g., farmers' job satisfaction; Conigliaro, 2017; Scheurich et al., 2021) as well as specific measures that experts aim to calculate objectively (e.g., farm working conditions; Duval et al., 2021; Hogan et al., 2023; Servièrè et al., 2019; Umstätter et al., 2022). It is unclear to what extent any of these sets of indicators comprehensively capture farmers' social situations. Focusing on measuring certain social aspects while neglecting others can result in insufficient or inadequate information, which can hamper the effective use and interpretation of the indicators and could misinform policies addressing social sustainability in the sector.

A comprehensive and meaningful set of social sustainability indicators should be based not only on experts' perspectives regarding what the social dimension should entail (Boström, 2012) but also on whether and how the different aspects of social sustainability are relevant to farmers (Coteur et al., 2018; de Olde et al., 2016; Eizenberg & Jabareen, 2017; Rööös et al., 2019). The relevance of different aspects of social sustainability to farmers can depend on farming types, the contexts of individual farms, and the farmers' characteristics, such as demographics (Brennan et al., 2022). Insight into such contextual issues of social sustainability is lacking in the farming sector.

Although the literature on the social sustainability of agriculture is gaining momentum, most studies addressing the social sustainability of farms have been based on experts' opinions and not on farmers' perspectives and experiences at their farms (de Olde et al., 2017; Gaviglio et al., 2016; Lebacqz et al., 2013). Case studies have focused on one type of production, with little to no consideration of the different contexts of farms or even farmers' characteristics (Bruma et al., 2021; de Olde et al., 2017; Häberli et al., 2021; Janker & Mann, 2020; Navarrete et al., 2015; Shreck et al., 2006; Van Calker et al., 2005). For example, farmers' values and perceptions are contextual in many dimensions that are relevant to social sustainability and farmers' engagement with sustainability initiatives and alternative farming practices (Božić et al., 2022; McCarthy et al., 2022). In fact, farmers' identities are known to influence their perceptions and attitudes (Cullen et al., 2020). Therefore, it seems plausible that farming identities have implications for farmers' daily experiences at their

farms. Nonetheless, the roles of farmer identity and farm production type in shaping farmers' perceptions and experiences of social sustainability at their farms remain insufficiently accounted for (Burton, 2004; Cullen et al., 2020).

To address these gaps, the present study empirically explores perceptions of social sustainability among Swiss farm managers and examines the contexts of these perceptions in terms of production type and farmer identity. We specifically aim to determine and compare farmers' understandings of social sustainability across three main farm types in Switzerland: dairy, crop, and other livestock farms (Swiss Federal Statistical Office, 2021). Moreover, we examine whether and how farmers' actual experiences of social sustainability and their understandings of its importance differ with regard to its aspects (i.e., social life, labor rights, public relations, and relations with other stakeholders). We also look into how perceptions of social sustainability are linked to different farmer identities (i.e., productivist, passionate caretaker, conservative, and forward-looking).

In what follows, we review the literature on social sustainability definitions and contexts in agriculture to derive an analytical framework. We then introduce the mixed-methods approach we adopted to address our research objectives, followed by a presentation of our results. In the discussion and conclusion sections, we examine and summarize our contribution to establishing the meanings and context dependence of social sustainability from the farmers' perspectives. Such insights are key to guiding the development and application of social sustainability indicators and effective policy interventions that are relevant to farms.

2 Analytical framework

The analytical framework of this study draws on a review of the literature on social sustainability at the farm level. Our framework is appropriate for capturing the diversity of social sustainability's aspects and farmers' subjective perceptions of them. For a more systematic understanding of social sustainability in farming, the framework first allows for a comprehensive coverage of farmers' perceptions of social sustainability. Second, the framework captures potential linkages that the classifications of these perceptions have with the contextual characteristics of farms and farmers' demographics and identities.

One challenge in examining the social sustainability of farms is the diversity of the social aspects of sustainability, as this limits clarity regarding which social issues should be targeted by social sustainability studies (Gaviglio et al., 2016; McGuinn et al., 2020). Some researchers consider general-level themes, such as job satisfaction, quality of life (Häberli et al., 2021; Sidhoum et al., 2022), health, and well-being (Brew et al., 2016; Hansen et al., 2020; Sabillon et al., 2021), to be proxy measures of farms' social sustainability performance. The relation of such general-level indicators to social sustainability at the farm level is unclear. For instance, the literature often uses well-being interchangeably with social sustainability, which results in confusion between indicators of social sustainability and its definition (Hansen et al., 2020; Rogers et al., 2012).

The subjectivity of social sustainability indicators raises further issues regarding their adequacy (Janker et al., 2019). Thus, to develop indicators, other researchers have focused on specific and objective aspects of social sustainability, such as the workload, work duration, or work organization at farms (Duval et al., 2021; Hostiou et al., 2020; Umstätter et al., 2022), their financial situations (Röös et al., 2019; Sneddon et al., 2006), and time resources (Waney et al., 2014). However, these specific measures

entail certain shortcomings and challenges that the literature has not yet consistently addressed. For example, Desiderio et al. (2022) argued that, even when these indicators show positive attributes, they do not necessarily entail improvement in social sustainability. A study by Mancini et al. (2008) on the social sustainability of cotton farming in India showed that the increase in rates of women's employment in cotton farming did not imply good social or working conditions or empowerment. Instead, the study found that an unequal division of labor between men and women led to increased physical labor and thus a burden for women. Therefore, greater "involvement" in farm work did not reflect the true social and working situation of female farmworkers. Our framework addresses this lack of insight into how farmers experience working conditions and their social dimensions by capturing farmers' perceptions.

A related aspect of social sustainability involves farmers' experiences of social relations. Farmers interact with different stakeholders, from consumers and local communities, food producers, and business partners to regulatory bodies and farmers' unions. It remains unclear how and which of these social interactions affect farmers' social sustainability experiences. Most of the literature addresses social cohesion or the farmer–consumer relationship (Janker & Mann, 2020; Nowack et al., 2021; Wheeler et al., 2021), while little is known about farmers' experiences with other stakeholders and how they are associated with their social situations. Hence, our framework sets no limits on covering views on social relations as part of social sustainability.

The importance of different aspects of social sustainability might vary among farmers. For example, a study with Austrian hay milk farmers showed that they ranked time for family and personal development as more important than time for hobbies (Scheurich et al., 2021). Ultimately, we need to examine which social sustainability aspects are holistically most important to farmers in order to identify meaningful specific and general measures of farm social sustainability that are practically relevant. One approach would be to uncover the aspects that farmers themselves perceive as affecting the social sustainability of farming. Ideally, we would ask farmers open-ended questions about these aspects rather than only presenting them with a list of social aspects, because a list developed by researchers might miss aspects that farmers find important (Röös et al., 2019; Wezel et al., 2018). Although certain aspects could dominate in a population of farmers, we cannot expect farms to have uniform perceptions of social sustainability (Boogaard et al., 2011). Our framework accounts for the diverse aspects of social sustainability that farmers might perceive.

The next component of our framework is the context of farms. Benchmark definitions and operationalizations of farm social sustainability that do not consider farmers' experiences and the contexts of farms can be misleading and inapplicable. The literature acknowledges the context dependence of farm social sustainability, but what this entails has not been settled (Coteur et al., 2018; Nowack et al., 2021). Situational factors, including production type, can provide important context for the social sustainability of farms. For example, livestock farmers appear to have more challenging working conditions than crop farmers because farm animals need daily care (Hostiou et al., 2020; Kling-Eveillard et al., 2012; Reissig, 2019). Dairy farmers, in particular, tend to struggle with workloads and greater financial and health concerns than other producers, especially those with no livestock production (Forney, 2012; Hostiou et al., 2020; Kolstrup et al., 2013). These observations suggest that one important contextual feature of farm social sustainability is the type of farm, defined, for example, by the main enterprises a farm consists of, which our framework captures.

Among personal characteristics, farmer identity might be an important contextual element in social sustainability (Newsome, 2021). Farmers' identities are closely linked to their attitudes and preferences, which guide their behaviors and evaluations of personal situations (Haugen & Brandth, 2014; Iles et al., 2020; Sulemana & James, 2014). Identity represents farmers' salient perceptions of their role (e.g., occupational or within a family), their group affiliations (e.g., gender, race, place, or religion), and their values, beliefs, and commitments, which involve identity standards that guide behavior (Burke, 1980; Letourneau & Davidson, 2022; Rise et al., 2010). Identity can change with context and experiences (Letourneau & Davidson, 2022; Sutherland & Calo, 2020). Farmers' identities can thus differ among farm types, as sketched out above. Our framework captures these relations and allows for associations of identity with aspects of social sustainability that farmers perceive as important.

To sum up, a full understanding of the social sustainability of farms is impossible without considering farmers' perceptions of social aspects (e.g., working conditions, social and professional relations) and differences in farming contexts. Thus, there is a need to determine which social aspects are most relevant to farmers and to comprehensively capture their social situations. Estimations of how farmers' identities and production types influence the importance and experiences of social sustainability are important to clarifying farming contexts and subsequently informing indicator and policy development. To guide our empirical analysis, our framework therefore captures aspects of social sustainability as farmers perceive them and links these perceptions to the contexts of their farms and to their identities as farmers.

3 Methods

Because we aimed to examine farmers' experiences of social sustainability at their farms, we first conducted a short qualitative study to explore, in detail, farmers' contextual perceptions and experiences of social sustainability. The interview questions focused on social aspects built on our literature review on the social sustainability of farms. Aspects that can be captured with specific or general indicators (working conditions, social relationships, and job satisfaction) were considered. Farmers first described their roles as farmers and their daily tasks. They elaborated on their working conditions and the implications for their family and social lives. The interviews continued with questions about relationships and interactions with farming stakeholders, including consumers, the public, other farmers, processors, food companies, and public authorities. The farmers also discussed their overall job satisfaction and quality of life. In addition, they described what came to mind when they thought about the term "social sustainability". They also discussed other aspects not asked about by the interviewer (e.g., access to machinery, infrastructure, and agriculture information). Because our study goes beyond the testable propositions established in the literature, the findings of this qualitative study informed the development of a quantitative questionnaire. With the quantitative survey, we intended to gain more representative insight into the social sustainability of farms and its dependence on context. We chose this approach to generate strong empirical evidence and a better understanding of farmers' perceptions and experiences of social sustainability at their farms (Molina-Azorin, 2016; Tashakkori & Teddlie, 2003). Figure 1 shows an overview of the mixed-method approach adopted for the present study.

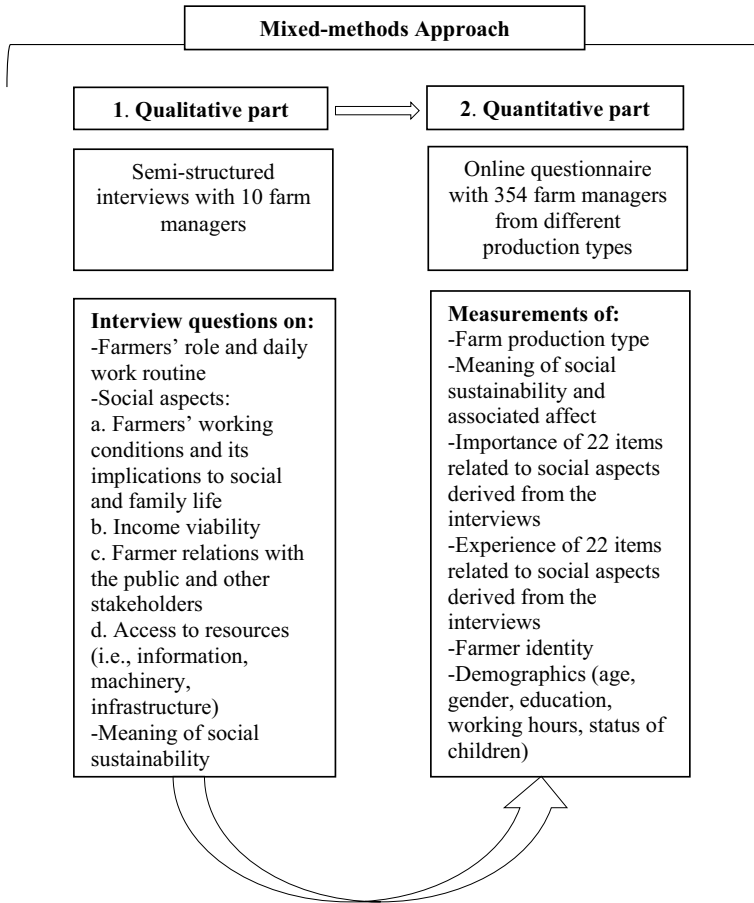


Fig. 1 The mixed-methods approach of the present study

3.1 Qualitative study

We conducted semi-structured interviews with 10 managers (nine male and one female) of Swiss farms of different production types and sizes (20–75 hectares, reflecting typical sizes in Switzerland) to ensure heterogeneity in farming contexts in the sample. Five of the farmers engaged in livestock production (three dairy and two mixed-livestock farmers), and the other five engaged in crop production (three arable and two vegetable farmers). Their farming experience ranged from five to 50 years. The interviews were, on average, two hours in duration and were audio-recorded for accurate transcription and analysis.

Content analysis of the interviews revealed a variety of social aspects relevant to the farmers, namely, their social lives, labor, income viability, access to resources (i.e., information, machinery, and infrastructure), and relations with the public and other stakeholders. The importance of these social aspects varied, with financial aspects being the most relevant to livestock farmers. Moreover, whether farmers generally felt publicly appreciated was a prominent social aspect, particularly for crop farmers. Farmers were also concerned about the lack of recognition by both the public and the authorities of their knowledge,

rights, and efforts, especially since most described themselves as caretakers of nature and farming traditions and as food producers. They felt that this ultimately restricted and demotivated them. The farmers also expressed their needs, attitudes, and the associated importance of social sustainability in farming. They were concerned about its neglect compared to environmental and economic sustainability and had doubts regarding whether there were currently socially sustainable ways to farm. However, farmers with an interest in technology, new farming practices, and public concerns more positively evaluated social sustainability at their farm. These findings informed the development of the questionnaire. Farmers' perceptions of and experiences with the identified social sustainability aspects were summarized and directly translated into survey items.

3.2 Survey

3.2.1 Design

We conducted an online survey with Swiss farm managers in January 2022. After giving their consent, the participants provided free associations with the term "social sustainability in agriculture" and the affective response it evoked with the aim of identifying the spontaneous subjective and most important meanings of social sustainability (Peters & Slovic, 1996; Slovic et al., 1991). Farmers indicated both the importance of and the experiences that they had with a range of farm social sustainability aspects that were derived from both the interviews and the literature (Janker & Mann, 2020). They also revealed their farmer identity and reported their production type. The end of the questionnaire covered demographic questions (age, gender, level of education, having children under 18 years old, civil status, and hours worked on and outside the farm).¹

3.2.2 Participants

A power analysis suggested a sample of at least 235 participants to detect differences in the means between the four identity groups, with a small effect size of $d=0.15$ with a power of 0.80 (Cohen, 1988). We based the effect size on the findings of social studies on peoples' perceptions of different issues (Bearth et al., 2016; Saleh et al., 2020). Therefore, we selected a random sample of French- and German-speaking farm managers ($N=1900$) via the agricultural policy information system of the Federal Office of Agriculture in Switzerland. This system contains structural data, such as farm type, location, active agricultural area, and available workforce, on more than 50,000 farms in Switzerland (Federal Office of Agriculture, 2018).

Farmers received invitation letters and emails to take part in the survey. These did not inform them about the topic but included a link and a QR code redirecting them to the online survey. A lottery with a small financial reward incentivized participation. Fully completed questionnaires were received from 363 farmers, 12 of whom were not included in the analysis due to their short participation time (half the median) and potentially biased responses. The final sample thus consisted of 354 respondents (89.5% male, $M_{age}=48$ years, $SD_{age}=11$ years, age range: 23–67 years), of whom 37.6% were dairy

¹ Another section of the survey asked farmers specific questions about their perceptions and acceptance of farm workloads, which are not part of the present study.

Table 1 Production type, working hours, and socio-demographics of farmer identity groups

		Farmer identity groups			
		Conservative <i>n</i> = 97	Passionate caretaker <i>n</i> = 87	Forward-looking <i>n</i> = 88	Productivist <i>n</i> = 82
Production type	Dairy	32 (32.99%)	30 (34.48%)	40 (45.45%)	31 (37.80%)
	Crop	15 (15.46%)	14 (16.09%)	15 (17.05%)	16 (19.51%)
	Other livestock	50 (51.55%)	43 (49.43%)	33 (37.50%)	35 (39.02%)
Working hours	Part time	35 (36.08%)	28 (32.18%)	18 (20.45%)	27 (32.93%)
	Full time	62 (63.92%)	59 (67.82%)	70 (79.55%)	55 (67.07%)
Age	<i>M^a</i> (<i>SD</i>) ^b	48.72 (10.38)	48.72 (10.96)	47.69 (10.28)	46.07 (10.31)
Gender	Female	11 (11.34%)	7 (8.04%)	11 (12.5%)	5 (6.10%)
	Male	85 (87.63%)	79 (90.80%)	77 (87.5%)	76 (92.69%)
	Prefer not to say	1 (1.03%)	1 (1.14%)	0 (0%)	1 (1.22%)
Education	Unrelated	18 (18.56%)	15 (17.24%)	12 (13.64%)	14 (17.07%)
	Basic	42 (43.30%)	47 (54.02%)	31 (35.23%)	40 (48.78%)
	Advanced	37 (38.14%)	25 (28.74%)	45 (51.14%)	28 (34.15%)
With children	Yes	80 (82.47%)	72 (82.76%)	68 (77.27%)	59 (71.95%)
	No	17 (17.53%)	15 (17.24%)	20 (22.73%)	23 (28.04%)

^aMean, ^bStandard deviation

farmers, 16.9% were crop farmers, and 45.5% engaged in other livestock production, such as pigs or poultry. This is comparable to the distribution of Swiss farm types (Swiss Federal Statistical Office, 2021). Reported working hours ranged from part time (30.5%, < 38 h/week) to full time (69.5%, ≥ 38 h/week). Of the sample, 16.7% had nonagricultural education, 45.2% had basic agricultural education, and 38.1% had advanced agricultural education. Table 1 presents the socio-demographics of the four farmer identity groups.

The four identities did not significantly differ in farm type ($\chi^2(6, N=354)=5.16, p=0.52$), education level ($\chi^2(6, N=354)=10.72, p=0.10$), working hours ($\chi^2(3, N=354)=4.03, p=0.26$), having children ($\chi^2(6, N=354)=10.72, p=0.10$), or gender ($\chi^2(6, N=354)=3.54, p=0.74$). The age distribution of the four groups ($F(3, 350)=1.22, p=0.30$) was also not significantly different.

3.2.3 Questionnaire

Farmers first indicated their farm type by selecting the main farming activity undertaken at their farm from among 11 categories developed by the Swiss Federal Office of Agriculture (Hoop & Schmid, 2020). Subsequently, they read the following definitions of sustainability in agriculture:

Sustainability in agriculture is the ability to meet present needs using available resources without causing future generations any problems with meeting their own needs. It has three pillars: economic, environmental, and social.

Economic sustainability in agriculture refers to managing a farm in a way that ensures long-term profitability.

Environmental sustainability in agriculture refers to the good stewardship of natural resources to avoid or reduce negative impacts on the environment.

Respondents then entered the first words, phrases, or thoughts that came to mind when they heard the term “social sustainability.” They then evaluated the feelings that their associations evoked using a slider scale ranging from “extremely negative” (0) to “neutral” (50) to “extremely positive” (100).

Next, respondents rated the importance that they accorded to different social sustainability aspects on a 6-point Likert-like scale (1 = not important at all, 6 = very important). They then rated their agreement on actually having experienced these social sustainability aspects at their farm on a 6-point Likert-like scale (1 = do not agree at all, 6 = completely agree). In total, 22 items covered four aspects of social sustainability relating to farmers' 1) social lives (e.g., time for family and friends, time for vacation), 2) labor rights (e.g., viable income and access to machinery and technologies), 3) public relations (e.g., interactions with consumers and public appreciation), and 4) other relations with stakeholders (e.g., farmers' union and cantonal authorities; see Table 2 for items). Two scales (importance and experience) were developed for each of the four social aspects by using principal component analysis (Dunteman, 1989). Factor solutions were extracted for the multi-item scales according to the scree plot and Kaiser's criteria (Cattell, 1966).

For the “social life” aspect, an item on having a farm successor was excluded from the scales due to the low item–total correlation for the importance ($r = -0.09$) and experience ($r = 0.04$) scales. Another item, on farmers' free working schedules, performed poorly on the importance scale ($r = 0.14$) and was therefore excluded from both the importance scale and the experience scale to ensure that the scales were comparable. The low item–total correlations ($r < 0.3$) showed that the two items did not fit well into the importance and experience scales of the social life aspect, indicating that the items did not measure the social life aspect. The final importance and experience scales for “social life” consisted of four items and exhibited excellent Cronbach's alphas of 0.83 and 0.88, respectively (see item–total correlations in Table 2). Higher scores on the importance and experience scales indicate a greater importance of social life in farming and an experience of good social life in farming, respectively.

For the “labor rights” aspect, one reverse-coded item, relating to having a source of income besides farming, was excluded from the importance ($r = 0.11$) and experience ($r = -0.15$) scales due to the low item–total correlation. The final importance and experience scales for “labor rights” consisted of five items and exhibited excellent Cronbach's alphas ($\alpha = 0.83$ and 0.88, respectively; Table 2). Higher scores on the importance and experience scales indicated a greater importance of labor rights in farming and an experience of good labor rights in farming, respectively.

For the “public relations” aspect, a one-factor solution was extracted, in which the scales for the importance of and experiences with public relations consisted of five items, with excellent Cronbach's alphas of 0.83 and 0.88, respectively (Table 2). Higher scores on the importance and experience scales indicated a greater importance of public relations in farming and an experience of good public relations in farming, respectively.

For the “stakeholder relations” aspect, a one-factor solution was extracted in which the scales for the importance of and experiences with stakeholder relations consisted of five items and exhibited excellent Cronbach's alphas ($\alpha = 0.83$ and 0.88, respectively; Table 2). Higher scores on the importance and experience scales indicate a greater importance of relations with stakeholders in farming and an experience of good relations with stakeholders in farming, respectively.

Table 2 Social sustainability aspect importance and experience scales, with Cronbach's alpha (α), item-total correlation (r), item mean (M), and standard deviation (SD)

Social sustainability aspect	Items	Importance		Experience	
		r	M (SD)	r	M (SD)
Personal life	Having time for friends	0.53	4.34 (0.96)	0.72	3.77 (1.27)
	Having time for hobbies or volunteer work	0.46	4.60 (1.21)	0.73	3.88 (1.38)
	Having time for family	0.43	5.33 (1.01)	0.72	3.82 (1.55)
	Having an annual vacation of at least 2 weeks	0.38	3.39 (1.78)	0.51	4.39 (1.30)
		$\alpha=0.68$		$\alpha=0.84$	
Labor rights	Having easy access to markets	0.58	4.59 (0.87)	0.58	3.89 (0.91)
	Having easy access to new technologies & machines	0.56	4.47 (1.28)	0.49	3.90 (1.32)
	Having easy access to agriculture-related information (e.g., information about new farming practices)	0.54	4.10 (1.33)	0.45	4.06 (1.34)
	Having easy access to land	0.45	4.69 (1.23)	0.25	4.59 (1.18)
	Having secure income from the farm	0.30	4.38 (1.40)	0.28	2.71 (1.67)
		$\alpha=0.72$		$\alpha=0.66$	
Public relations	Feeling appreciated by consumers	0.75	5.30 (1.04)	0.71	4.51 (0.87)
	Feeling appreciated by community	0.72	5.35 (0.63)	0.70	4.23 (1.28)
	Having positive relationships with consumers	0.66	5.41 (0.82)	0.71	4.01 (1.30)
	Having positive relationships with local community	0.58	5.25 (0.88)	0.51	4.61 (1.09)
	Feeling satisfied with professional life	0.38	5.18 (0.94)	0.41	4.84 (0.98)
		$\alpha=0.88$		$\alpha=0.81$	

Table 2 (continued)

Social sustainability aspect	Items	Importance		Experience	
		r	M (SD)	r	M (SD)
Stakeholder relations	Maintaining positive relationships with farmers' union and associations	0.66	4.83 (0.78)	0.64	4.27 (0.85)
	Having positive relationships with canton administration	0.64	4.35 (1.27)	0.63	4.13 (1.27)
	Having positive relationships with other local farmers	0.48	4.48 (1.26)	0.45	4.27 (1.26)
	Having positive relationships with processors	0.46	5.25 (0.84)	0.41	4.51 (1.13)
	Opinions and needs being represented in agriculture policymaking	0.41	4.99 (1.00)	0.50	5.02 (0.95)
		$\alpha=0.75$	5.08 (1.02)		3.41 (1.32)
				$\alpha=0.75$	

N = 354, α = Cronbach's alpha for scale reliability

Finally, respondents reported their agreement with 11 identity items adapted from Cullen et al.'s (2020) scale for farmer identities (i.e., farmers' perceptions of themselves in their roles) on a 6-point Likert-like scale (1 = do not agree at all, 6 = completely agree). A factor analysis uncovered four factors (i.e., productivist, conservative, forward-looking, and passionate caretaker; Table 3). The productivist factor was highly loaded with items related to producing more food and a belief in negligible environmental damage caused by farming activities. The conservative factor was highly loaded with items on risk avoidance and cautiousness about new ideas and practices at farms. Items regarding being innovative, finding information and new ideas for farming, maximizing income, caretaking, and protecting the environment were loaded highly on the forward-looking factor. Finally, the passionate caretaker factor had a high loading of items about enjoying farming as a job and a desire for farm continuity and succession. Each respondent had a score for each of the four factors. The highest score among the four was extracted to determine the respondent's farming identity.

3.2.4 Analysis of survey data

We started the analysis of the survey with associations with the term "social sustainability." They were originally given in German or French by the respondents and were translated into English for consistent analysis. A total of 301 meaningful associations were assigned to the 18 categories listed in Table 4. The associations were coded independently by the two authors, and the inter-rater reliability (Cohen's kappa) was $\kappa=0.93$. Most disagreements in coding between the two raters were related to respondents' associations of social sustainability with multiple social aspects, which made extracting one major association per respondent potentially biased. We resolved this issue by adding a category for these associations named "multiple aspects." However, affective responses to these associations cannot be interpreted due to the variety of associations.

The associations and evoked affective responses were put in a two-way contingency table, with associations in columns and the combination of affect and farm type in rows. A correspondence analysis (CA; Weller & Romney, 1990) provided factor scores for every column and row category of the contingency table (Greenacre, 2010; Sourial et al., 2010). These scores are coordinates of the row and column categories, which are all visualized as points in one low-dimensional graphical map. Points close in distance represent categories with similar scores, while points distant in space represent those with different scores (Clausen, 1998). Hence, the distances between points represent associations between the row and column variables. The CA was applied only to the 17 association categories with distinct meanings, and only those associations with $n > 10$ were included. Farm type was taken into account because it can be an important contextual element of social sustainability (Coteur et al., 2018).

Chi-square tests were performed to evaluate the groups' differences in gender, education, hours worked on the farm, and farm type. They controlled for potentially influencing variables and ensured that the four identity groups were similar and comparable. A one-way analysis of variance (ANOVA) was conducted to examine the age differences between the groups. Subsequently, a two-way mixed ANOVA with one repeated-measure factor (the four social sustainability aspects) and one between-group factor (the four farmer identities), along with Bonferroni's post-hoc tests, were conducted to compare the individual differences between the four identity groups on the four social sustainability aspects, with

Table 3 Farmer identity factor loadings and eigenvalues

	Forward-looking	Conservative	Productivist	Passionate caretaker
I am good at finding different types of information to help me run my business	0.67	-0.04	-0.01	0.13
I think farmers are good caretakers of the countryside	0.63	0.20	0.29	-0.02
I think farmers should be allowed to maximize their income	0.61	-0.16	0.02	-0.17
I believe that farmers have a strong positive role to play in protecting the environment	0.59	0.19	-0.04	0.30
To be successful in farming, it is important for me to adapt and use new technologies	0.46	-0.40	0.34	0.18
I do not think it is a good idea to take too many risks when it comes to farming	0.09	0.76	-0.08	0.07
I am cautious about applying new ideas on my farm	-0.04	0.70	0.38	0.07
I believe that the environmental damage caused by farming activities is negligible	0.04	0.16	0.85	-0.05
We need to produce more food to feed the population	0.14	-0.18	0.56	0.46
I have to keep my farm running to ensure that I have something to pass on to my children	-0.18	0.26	0.15	0.75
I enjoy farming much more than I would other potential sources of employment	0.36	-0.08	-0.09	0.62
Eigenvalue	20.39	10.67	10.11	10.03

The factor loadings (> 0.3) of items constituting each farmer identity are in bold

Table 4 Frequencies and examples of main categories of respondents' associations with "social sustainability in agriculture"

Main category (examples of associations)	Frequency of association	Percent
Social security and pension (e.g., sufficient old-age provision, spouse coverage, pension plan)	38	12.6
Living off the farm (e.g., for the income of a medium-sized farm to suffice for the support of an entire family, too little room for maneuver with low wages, income situation of family farms, to be able to live decently from one's work)	34	11.3
Public relations (e.g., respectful interactions with consumers, provide information to people about Swiss farming practices, urban-rural)	28	9.3
Family farms (e.g., family cooperation, working as a team and as a family, family spirit, generational project, multigenerational farm, a farm should be big for 1–3 generations)	25	8.3
Work-life balance (e.g., enough time to take part in social life such as clubs and hobbies, afford a holiday sometimes; not easy to run the farm, work outside it, and look after the family; put the family last, finding a balance between work and family; difficult to take time for other things outside of the farm)	25	8.3
Discouragement (e.g., no point, complicated, uncertainty, social sustainability is not provided for those working in agriculture, complicated for the future)	21	7.0
Environmental care (e.g., to care for the soil, ecological and social issues, sustainable cycle of animals and nature)	21	7.0
Lack of public appreciation (e.g., farmers are blamed, respect from consumers, recognition of work)	18	6.0
Farm succession (e.g., type of succession, farm transfers, hand over a viable farm to successors, must find a way of farming that enables coming generations to lead a life with as few negative consequences as possible)	18	6.0
Caretaking (e.g., feed the population, respectful handling of resources)	13	4.3
Farm-farm relationships (e.g., support each other, purchase machinery jointly, exchange with farmers)	12	4.0
Employee work conditions (e.g., fair dealings with employees, consistency with employees' wages, attractive positions for trainees)	8	2.7
Importance of social sustainability (e.g., urgently necessary, very important)	7	2.3
Regionalization (e.g., produce and market regionally, buy locally)	5	1.7
Health (e.g., health and well-being, mental and physical health, maintaining health)	4	1.3
Education (e.g., environmental education, receiving the best possible education)	3	1.0
Satisfaction (e.g., enjoyment of the work, pleasure)	3	1.0
Multiple*	18	6.0
Total	301	100.0

* Indicates associations not included in the analysis due to their multiple meanings

importance and experience as dependent variables. We used SPSS version 25.0 for the data analysis and visualization.

4 Results

4.1 Content and affective ratings of free associations

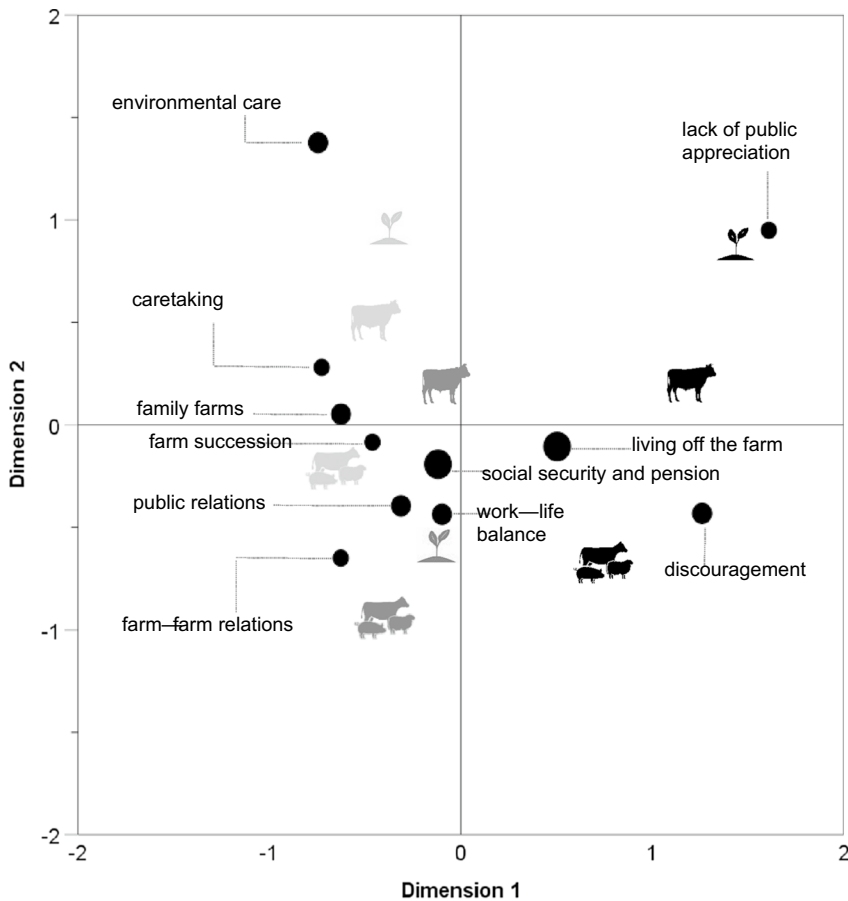
The most prevalent categories of associations with “social sustainability in agriculture” were “social security and pension,” “living off the farm,” and “public relations,” followed by “work–life balance” and “environmental care” (Table 4).

Only the affective evaluations of the most prevalent associations (mentioned at least 20 times) are presented. The affective rating for “living off the farm” was negative ($M=46.32$, $SD=28.92$), whereas the affective rating for “social security and pension” ($M=59.84$, $SD=22.57$) was positive. Respondents also positively rated “public relations” in terms of urban–rural connection ($M=61.11$, $SD=21.88$), whereas they negatively rated “lack of public appreciation” ($M=32.44$, $SD=20.72$). The “work–life balance” ($M=53.04$, $SD=25.74$), “environmental care” ($M=84.71$, $SD=18.62$), and “family farming” ($M=72.84$, $SD=21.53$) associations were rated as neutral, negative, and positive, respectively. Respondents rated social sustainability as “important” and negatively rated feelings of “discouragement” regarding its potential implementation in farming ($M=31.00$, $SD=17.72$). There were some associations with “farm succession,” “farm–farm relations,” and “caretaking.” Only a minority of respondents associated social sustainability with “farm employees’ working conditions,” “education,” and “regionalization.” Even fewer (<5) respondents associated social sustainability with “health” and “satisfaction.” Overall, the affective ratings of the associations in relation to the term “social sustainability in agriculture” were positive ($M=58.29$, $SD=26.88$). However, the respondents’ affective rating of the associations differed significantly from the scale’s midpoint (50), based on a one-sample t -test ($t(300)=5.35$, $p<0.001$).

4.2 Correspondence analysis

The two-way contingency table, with the association categories as columns (11 columns) and farm type (dairy, crop, and other livestock) combined with the affective reaction to the association (1=[0–45] as negative, 2=[46–54] as neutral, 3=[55–100] as positive) as rows (nine rows), had an overall chi-square of $\chi^2(90)=134.10$, $p<0.001$, while the total inertia was $\lambda G=0.53$. As the first two dimensions explained most of the total variance ($>60\%$) and the scree plot was flattened out, a two-dimensional solution was used for the interpretation (David, 2017). Figure 2 presents a graphical display of the CA output.

The first dimension illustrates the differences between the contents of the associations in relation to the respondents’ affective responses (49%). The respondents with positive affective responses mentioned associations similar to those with neutral affective responses. They were often related to “family farm,” “farm succession,” and “public relations,” “farm-to-farm relations,” “pension,” and “caretaking.” “Environmental care” was generally mentioned with positive affective responses. In contrast, most respondents with negative affective responses expressed associations related to “discouragement,” “living off the farm,” and “lack of public appreciation.” “Work–life balance” was mentioned with both neutral and negative affective responses.



***Groups [Production type x Affect]**

Affect	Light grey: Positive	Dark grey: Neutral	Black: Negative
Production type	Crop farm	Dairy farm	Livestock farm
*Associations	n = 30–40	n = 20–30	n = 10–20

Fig. 2 Correspondence analysis of associations by farm type and affect

The second dimension (18%) illustrates the differences between dairy, crop, and other livestock farmers. All farm types mentioned “work–life balance,” “pension,” and “public relations.” Both dairy and livestock farms mentioned “caretaking,” “family farming,” and “farm succession,” while both crop and livestock farmers mentioned “farm–farm relations.” The crop farmers also associated a “lack of public appreciation” with social sustainability. Dairy farmers and livestock farmers associated “living off the farm” with “discouragement.”

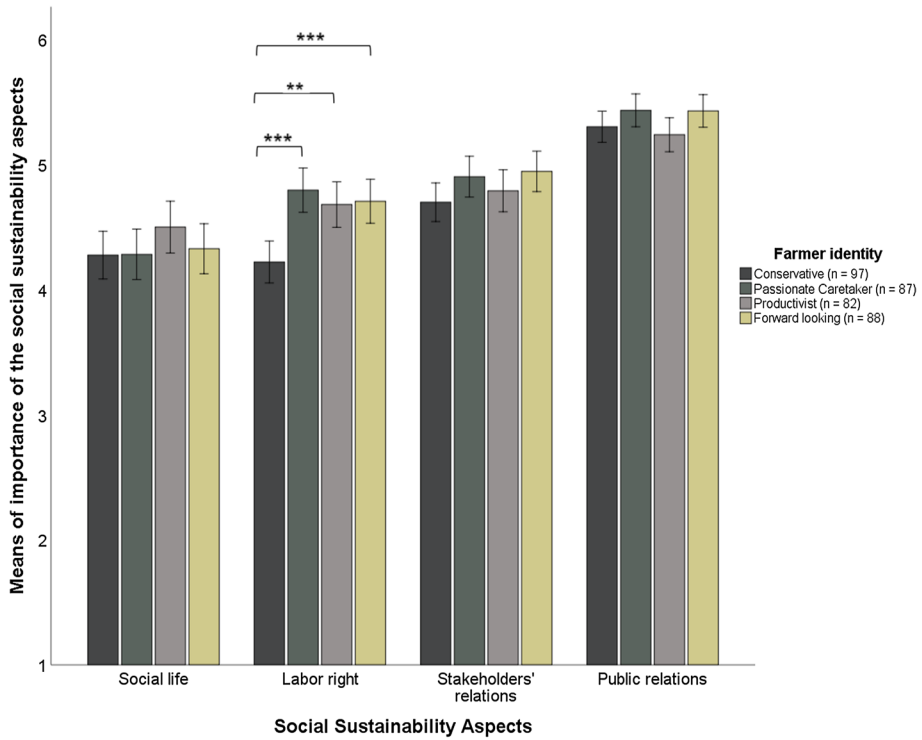


Fig. 3 Importance of aspects of social sustainability by farmer identity, with 95% confidence intervals and post-hoc test significance levels. To ease the legibility of the post-hoc test results depicted in the graph, we report only the significant differences. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.3 Importance of social sustainability aspects

The different aspects of social sustainability significantly affected farmers' perceptions of importance ($F(2.42, 847.40) = 142.02$, $p < 0.001$, $\eta_p^2 = 0.29$). Farmers perceived "public relations" ($M = 5.35$, $SD = 0.67$) as the most important aspect of social sustainability, followed by "stakeholder relations" ($M = 4.83$, $SD = 0.78$), "labor rights" ($M = 4.59$, $SD = 0.87$), and "social life" ($M = 4.34$, $SD = 0.96$). The associations with identity were also significant ($F(3, 350) = 3.56$, $p = 0.02$, $\eta_p^2 = 0.03$). The importance of social sustainability was significantly rated lower by conservative farmers ($M = 4.63$, $SD = 0.63$) than by forward-looking farmers ($M = 4.85$, $SD = 0.72$) and passionate caretakers ($M = 4.85$, $SD = 0.76$) but not by productivist farmers ($M = 4.80$, $SD = 0.87$). There were no significant differences among productivists, caretakers, and forward-looking farmers. The interaction between identity and the different aspects of social sustainability significantly affected perceptions of importance ($F(7.26, 847.40) = 3.46$, $p = 0.001$, $\eta_p^2 = 0.03$). However, post-hoc tests showed no significant difference in the importance of "public relations," "stakeholder relations," and "social life" among the identity groups. Only "labor rights" were significantly less important for conservative farmers than for forward-looking, passionate caretaker, and productivist farmers (Fig. 3).

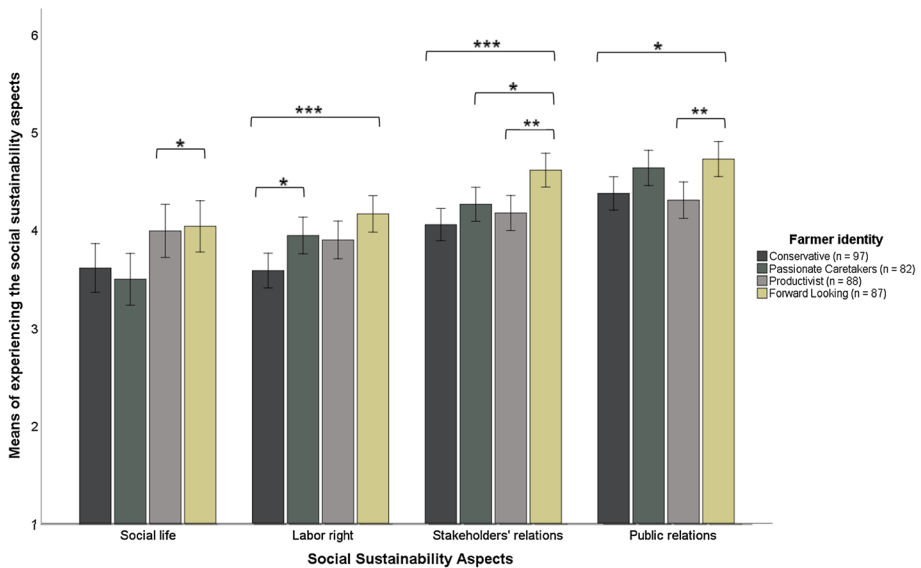


Fig. 4 Experience of aspects of social sustainability by farmer identity with 95% confidence intervals and post-hoc test significance levels. To ease the legibility of the post-hoc test results depicted in the graph, we report only the significant differences. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

4.4 Experience with social sustainability aspects

The different aspects of social sustainability were significantly associated with farmers' experiences ($F(2.29, 803.01) = 67.07, p < 0.001, \eta_p^2 = 0.16$). Farmers experienced "labor rights" ($M = 3.89, SD = 0.91$) and "social life" ($M = 3.77, SD = 1.27$) significantly less than "public relations" ($M = 4.51, SD = 0.87$) and "stakeholder relations" ($M = 4.27, SD = 0.85$). The effect of farmers' identities on experience ratings was also significant ($F(3, 350) = 7.23, p < 0.001, \eta_p^2 = 0.06$). Forward-looking farmers ($M = 4.38, SD = 0.80$) had significantly better experiences with most social sustainability aspects than conservatives ($M = 3.90, SD = 1.00$), passionate caretakers ($M = 4.08, SD = 0.99$), and productivist farmers ($M = 4.09, SD = 1.01$). However, there was no significant difference among productivists, caretakers, and conservatives.

The interaction between identity and the different aspects of social sustainability was significantly linked to experiences ($F(6.88, 803.01) = 3.43, p = 0.001, \eta_p^2 = 0.03$). Post-hoc tests revealed that forward-looking farmers experienced more "social life" than passionate caretakers and had more "labor rights" than conservatives. Forward-looking farmers had significantly better "stakeholder relations" than the conservative, passionate caretaker, and productivist groups. They also experienced better "public relations" than conservative farmers and productivist farmers (Fig. 4).

5 Discussion

This study uncovered the context dependence of social sustainability in agriculture based on farmers' perspectives and experiences. The adopted mixed-methods approach suggested that socio-economic (e.g., financial security, social security, and pension), socio-relational

(e.g., public and professional relations, family farming, caretaking), and socio-functional (e.g., work–life balance) issues are the aspects of social sustainability that are most relevant to farmers (Coteur et al., 2018; Rööös et al., 2019).

Health and well-being aspects, including job satisfaction, were not frequently associated with social sustainability. This finding contradicts their previous categorization as social aspects of social sustainability in farming (Brew et al., 2016; Conigliaro, 2017; Dillard et al., 2009; Sabillon et al., 2021). Health and well-being seem to be part of a different area of concern for farmers. A general consideration of health and well-being as proxies of social sustainability can therefore be misleading, which is exacerbated by its context dependency. This implies that indicators focusing on these aspects might not realistically reflect the social situation of farmers and the social sustainability of farms.

Focusing social sustainability indicators on a combination of specific socio-relational, socio-economic, and socio-functional aspects of social sustainability in agriculture seems more relevant to farmers and could capture their social situation more accurately. However, the comparability of these aspects and their applicability to different farm types requires careful attention, especially since social sustainability connotations differ by farm type. Dairy and livestock farmers, on the one hand, specifically emphasized socio-economic (e.g., stable financial situation) and socio-functional (e.g., securing the family farm, farm succession) aspects as the most important aspects of social sustainability. This reflects the income situation and remuneration of animal production farmers highlighted in the literature (Hostiou et al., 2020; Kolstrup et al., 2013). Crop farmers, on the other hand, were more concerned with the socio-relational aspect, in particular, regarding public appreciation. This divergence between the different production types implies that social sustainability goals should be defined together with farmers. Moreover, the selection of social aspects to measure social sustainability should be based on farm production types. These implications of our findings resonate well with previous studies that suggest a need to determine the purpose of the assessment and expected outcome of the evaluations before selecting indicators of social sustainability (Hammond et al., 2021; Lebacqz et al., 2013). To achieve meaningful and effective comparisons of social sustainability across different production types, a combination of relevant social aspects (i.e., socio-relational, socio-economic, and socio-functional) should, for example, be considered and weighted according to farm types.

The findings also imply that the weighing of social aspects should not be solely based on general policy goals. Instead, it should be based on the importance that farmers attribute to the social aspects, while taking into account the environmental and economic sustainability goals and other farm features (e.g., type of livestock or crop production, area of land farmed, etc.). This would help measure social sustainability more realistically and generate information on the social challenges that farmers face within these contexts at their respective farms. The question that remains is how to operationalize the weighing of social aspects. This question requires future studies to focus on practical uses of this approach through case studies of different farm types measuring social sustainability.

Our analysis suggests that farmer identity is not linked to perceptions of the importance of the socio-relational and socio-functional aspects of social sustainability. Although conservative farmers indicated a lower importance for technical aspects (i.e., access to markets, etc.) than other farmers, similar patterns of importance regarding the socio-relational and socio-functional aspects emerged across the four identities. These aspects of social sustainability are therefore important to all farmers, regardless of their identity. However, there was a divergence in the levels of importance within the investigated aspects, with public appreciation having the highest importance. Farmers were most concerned with social recognition, which is in line with the existing literature (Brodth et al., 2006; Contzen

& Haberli, 2021; Griffin & Frongillo, 2003; Mzoughi, 2014; Wheeler et al., 2021). Social recognition can ensure social support and acceptance of new agricultural policies, initiatives, and farming practices. In addition, recognizing farmers' efforts to sustain food supply in the midst of environmental and health challenges helps build resilience to overcome them and strengthen social cohesion, trust, and urban–rural bonds (Schreiber et al., 2023; Sharp & Smith, 2003). Our findings more generally imply that facilitating urban–rural exchange through bringing the public closer to agriculture and farmers and improving public knowledge on the benefits and risks of farming practices could improve the public appreciation of farmers and, thus, support for farmers. This would ultimately enhance the socio-relational aspect of social sustainability for farmers.

Identity appeared to affect farmers' experiences of social sustainability in agriculture. Forward-looking farmers who were open to new ways of farming and technologies had greater experiences of social sustainability at their farms compared with other farmers. This compares to findings in farm entrepreneurship research (Fitz-Koch et al., 2018) highlighting that entrepreneurship can enhance farmers' quality of life by operating the farms in a way that aligns with farmers' personal values, interests, and identities. In addition, this finding could imply that innovation adoption itself supports social sustainability in agriculture (Cullen et al., 2020; Häberli et al., 2021). Mechanization, learning, and adopting new ways of farming have been suggested to improve both farmers' quality of life and their satisfaction (Bondy & Cole, 2019; Häberli et al., 2021; Hansen et al., 2020). If this holds true, the question arises of how to transfer farming practices (e.g., technological and organizational) and mindsets from forward-looking farmers to other farmers to ensure better social sustainability experiences among all farmers. It also seems worthwhile to explore whether any other factors influence farmers in terms of whether they are forward-looking. However, an alternative interpretation is that farmers with better experiences of social sustainability are more forward-looking. Hence, the causalities extracted from these findings require further scrutiny.

5.1 Limitations and future research

The present study has some limitations to address. First, farmers' employees and family members could have different perceptions and experiences of social sustainability at farms, as their work conditions, pay, and responsibilities differ from those of the farm managers covered in our study. Further explorative research on employees' and families' social situations at farms is needed to establish a holistic understanding of what influences the experiences of social sustainability at the farm level. Second, the public initiative and voting on pesticide bans in Switzerland, which took place in June 2021 (Swiss Federal Council, 2021), could have led crop farmers to feel unappreciated and villainized. This experience may have led them to emphasize social recognition more than they normally would. However, it is not clear whether public appreciation will remain the most critical aspect of social sustainability for farmers in the future. In fact, recent findings by Sannou et al. (2023) also emphasize the importance of accounting for the temporal dimension when selecting social sustainability indicators. The authors found that the prioritization of the social topics related to social sustainability emerged in the literature after the introduction of sustainable development goals that shifted researchers' focus to aspects related to food security, social cohesion, and access to water. Likewise, the prioritization of social aspects among farmers could also change across time and events (e.g., public votes and changes in policy and media coverage of farming).

The need for further research arises from the implications and limitations of our study. The use of machine learning techniques in future research to examine the evolution of the meaning of social sustainability over time is recommended (Sannou et al., 2023). However, to account for farmers' perceptions, it seems worthwhile for future research to conduct longitudinal studies to track farmers' attributed importance to social aspects. Such tracking would help determine which social aspects are the most constant in terms of importance across time, which, in turn, would more reliably reflect farmers' primary social needs and expectations (Lee & Jung, 2019). Finally, the findings of our study and the capabilities of its research design also suggest that there is a need for further research into the causalities between lived experiences of social sustainability, farmer identities, and farm contexts. Ultimately, the identified aspects of social sustainability in farm-level contexts could then be used to develop indicators of social sustainability at the farm level.

6 Conclusions

Social sustainability is generally the least understood dimension of agricultural sustainability. To generate a comprehensive and contextual understanding of social sustainability, this study adopted a mixed-methods approach consisting of qualitative interviews that then informed a survey of farmers' perceptions and experiences of social sustainability in Switzerland. It identified social aspects relevant to farmers and compared them across production types (dairy, crop, and other livestock production). In addition, farmers' perceptions and experiences of social sustainability and the relationships that these perceptions and experiences have with farmer identity were assessed. The findings contribute to the clarification of the meaning and context dependence of farm-level social sustainability from farmers' perspectives.

The study corroborates the notion that social sustainability encompasses different aspects—socio-relational, socio-economic, and socio-functional. However, these social aspects are of varying importance to farmers in Switzerland. This merits attention since an aspect that is irrelevant to farmers but used as a social sustainability indicator could be inaccurate and misleading. Therefore, a key policy recommendation is to join with farmers to define which social sustainability goals to prioritize and to determine which social aspects are most relevant to farmers before incorporating the goals and aspects of social sustainability into sets of social sustainability indicators for policymaking.

Moreover, our study goes beyond looking at how production types relate to farmers' ratings of the importance of aspects of social sustainability. We identify how farmers' perceptions of social sustainability link to their personal identities. The findings suggest that extending the practices and mindsets of forward-looking farmers to other farmers could help improve the social sustainability of farms. A policy recommendation to improve social sustainability in farming would then be to facilitate the transfer of farming practices and technologies of forward-looking farmers to farmers who are not forward-looking. However, policy interventions should be sensitive to the causalities between lived experiences of social sustainability, farmers' identities, and farm contexts, which still require further research.

Overall, the findings of this study suggest that involving farmers and considering context are essential for the development of valid social sustainability indicators and policy interventions that target farms. Indicators need to be adaptable and tailored to production

type, accounting for different levels of importance and for farmers' experiences of social sustainability.

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Data availability The datasets generated and/or analyzed during the current study are not publicly available due to privacy restrictions (i.e., they contain information that might compromise the privacy of the research participants) but are available from the corresponding author upon reasonable request.

Declarations

Competing interests The authors declare that they have no conflicts of interest.

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