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RESEARCH ARTICLE

Farmer identities and permanent grassland management: Evidence from five European biogeographic zones

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Abstract

1. Permanent grassland (PG) provides multiple ecosystem services. However, there is increasing concern regarding the decreased multifunctionality of PGs, including those located in Europe. The decreased PG multifunctionality has been attributed to the increased intensity of PG management, where decision-making is influenced by farmers' relevant behavioural intentions and self-identities.
2. In order to investigate how farmer identities can translate into future adoption of PG management practices, interviews ($n = 373$) were conducted with farmers from five European biogeographic zones. Their farms are located in Continental/Pannonian (Czech Republic), Mediterranean (Spain), Boreal (Sweden), Alpine (Switzerland) and Atlantic (United Kingdom) biogeographic regions. The data were analysed using a mixed-method approach involving thematic analysis and multinomial logistic regression.
3. The thematic analysis enabled seven farmer 'identity' types to be identified. The results of multinomial logistic regression showed that productivist identity was a predictor of farmers' intention to intensify or extensify PG in future, while land caretaker identity predicted maintenance of current PG management practice. Farmers with a higher dependence on income from agri-environment schemes were more likely to extensify their PG in future, while those with a higher dependence on income from farm production were more likely to maintain current PG management practices. Older farmers were less likely to extensify their PG,

and those having organic and extensive farms were more likely to intensify PG in future.
4. Future policies and interventions that aim to increase PG-related ecosystem-service multifunctionality can be more targeted by considering specific farm attributes, farmer identities and their future PG management intentions, as well as regional differences in these. Financial benefits and risks perceived by farmers should be considered when promoting any management practices, including policy interventions and policy levers.

KEYWORDS
ecosystem service, farmer decision-making, farmer identity, permanent grassland

1 | INTRODUCTION

In Europe, permanent grassland (PG) is land that has grown herbaceous fodder, forage or energy purpose crops for no less than five consecutive years (Eurostat, 2019b), which aligns with international definitions of PG (Food and Agriculture Organization of the United Nations, 2010). The Millennium Ecosystem Assessment (2003) describes ecosystem services (ES) as the tangible and intangible benefits humans obtain from both natural and human-modified ecosystems. PG provides for the existence of multifunctional landscapes as it delivers multiple essential ES, including provisioning services (e.g. feed production for ruminant livestock and human food production), regulating and maintenance services (e.g. carbon sequestration, erosion control, nutrient cycling and pollination) and cultural services (e.g. aesthetic value and recreation) (Bengtsson et al., 2019; CICES, 2023). The ES provided by PG can potentially contribute to achieving the sustainable development goals (SDGs), for example SDG 2 that focusses on ensuring food security and promotion of sustainable agriculture, and SDG 15 that promotes the protection, restoration and promotion of sustainable use of territorial ecosystems as well as the prevention of land degradation and biodiversity loss (United Nations, 2015).

Changes in grassland management practices can be categorised as those resulting in *intensification* or *extensification*. Intensification refers to undertaking activities to enhance the productivity or profitability per unit area of existing lands by, for example, using drainage, irrigation, improved cultivars, fertilisers and pesticides (Martin et al., 2018). While intensification is associated with higher productivity, it may have substantial and detrimental impacts on the environment and ecosystem functioning (Foley et al., 2005). This suggests that intensification may have a negative impact on ecosystem-function (EF) multifunctionality, which objectively represents overall ecosystem functioning without considering human judgement on the values of different ES (Manning et al., 2018). However, when assessing ES-multifunctionality, human preferences and priorities regarding different ES should be considered (Manning et al., 2018). Thus, assessing the impact of intensification on grassland ES-multifunctionality can largely depend on the weightings assigned to different ES by stakeholders. For instance, increased intensification may correlate with higher ES-multifunctionality when higher weights are assigned to provisioning services, while a negative correlation may occur when (for example) regulatory and cultural services are included in the assessment or given a higher weighting (Allan et al., 2015).

In contrast, grassland extensification involves the reduction in inputs and may also involve ecological restoration (e.g. the provision of seed mixtures to enable diverse grasslands) (Schaub et al., 2021; Schils et al., 2022). While it has been suggested that change towards more extensive PG management will secure the delivery of a wide range of essential ES, there are no one-size-fits-all management practices that can be directly promoted to all farms given different local contexts (e.g. soil type, farm locations and socio-economic conditions) (Schils et al., 2022). As for intensification, the extent to which extensification benefits ES is also influenced by the baseline grassland management practices. For instance, if farm management has already resulted in extensification, further extensification may negatively affect biodiversity (e.g. plant species richness in acidic soils) and other related ES on-farm (Fraser et al., 2015; Tibbett et al., 2019). These uncertainties can complicate relevant knowledge exchange with farmers.

The variability of farming systems that rely on PG has been found across different biogeographic zones (including within Europe). An analysis of the Farm Accountancy Data Network (FADN) database, based on 41,926 farms-with-PG located in 1063 NUTS3[1] regions and belonging to 28 European countries, has enabled the characterisation of PG-based farming systems (Enri et al., 2022). The results suggest that alpine farms are currently predominantly used to farm beef cattle, with relatively low stocking rates. Farms in the Atlantic biogeographic zone are associated with higher stocking rates and 'mixed bovine' and 'dairy cow' farming. Thus, farmer decision-making is, to some extent, influenced by biogeographic factors associated with farmland, which may interact with national and regional policies and the characteristics of both the farm and the farmer.

[1]The Nomenclature of territorial units for statistics, abbreviated NUTS, is a geographical nomenclature subdividing the economic territory of the European Union and UK regions at three different levels (NUTS 1, 2 and 3 respectively, moving from larger to smaller territorial units). There are 1166 regions at NUTS 3 level (Eurostat, 2023).

Stakeholders, including citizens, in Europe may demand different grassland ES, although differences in which ES are prioritised can be identified across stakeholder groups and countries (Le Provost et al., 2022; Peter et al., 2022; Tindale et al., 2023). Nature conservation associations, the tourism sector and local heritage associations tend to prioritise cultural ES, while agricultural stakeholders, and hunting and forestry groups mainly prioritise provisioning services (Peter et al., 2022). A survey conducted in the Czech Republic, Spain, Sweden, Switzerland and the UK showed that all categories of grassland ES were perceived to be important by citizens, with regulating and maintenance services being perceived to be most important, followed by cultural services and provisioning services (Ojo et al., 2023). Among the five countries, Spanish citizens perceived the highest benefits for all categories of ES potentially associated with PG. Swiss citizens perceived the lowest benefits to be associated with regulating and maintenance services, and cultural services, whereas UK citizens perceived the lowest benefits to be associated with provisioning services (Ojo et al., 2023). However, there is uncertainty as to whether current PG in Europe can align with stakeholders' preferences regarding ES delivery, given the decline of PG area over the past few decades (Schils et al., 2022). In addition to the reduction in land area, the decreased multifunctionality of PGs has been exacerbated by increased management intensity (e.g. higher livestock stocking rates and manufactured fertiliser application rates), contributing to negative impacts on the environment and associated aspects of human well-being (Schils et al., 2022).

To align the ES delivery by PG with stakeholder preferences, it is important to understand potential changes to future PG management, in which farmers play an important role. There is a growing body of research into farmers' decision-making regarding grassland management. However, the focus has primarily been on grassland in general rather than PG, which typically exhibits a higher level of multifunctionality (Borges & Oude Lansink, 2016; Elahi et al., 2021; McGinlay et al., 2017; Moroder & Kernecker, 2022; Raymond et al., 2016; Schmitt et al., 2021). In addition, farmers' self-identity is increasingly recognised as an important factor influencing farming decision-making but has infrequently been investigated in the context of PG management practices (Tindale et al., 2020). The aim of this research was to address this knowledge gap by understanding farmers' PG management decision-making through the lens of identity. In so doing, three main research questions will be answered:

- What are farmers' identities in regard to attributes they perceive that make a good farmer?
- How do identities relate to other farmer and farm attributes and situational factors?
- Which identities, along with other farmer and farm attributes and situational factors, affect farmers' decision-making regarding future PG management?

Drawing on data collected from 373 farmers across five different European biogeographic zones, this research makes novel empirical contributions to our understanding of farmers' decisions regarding future PG management. To the best of our knowledge, no similar research has been undertaken covering such diverse biogeographic zones considering decision-making in the context of farmer identity. Our research will inform more integrated and targeted policies and strategies aimed at encouraging specific groups of farmers to transition their current PG management towards enhancement of ES-multifunctionality.

2 | LITERATURE REVIEW

2.1 | Farmer identity and decision-making

Identity theory provides a useful framework for understanding farmers' decision-making about future PG management, as it addresses the emergence of norms, values and perceptions associated with farming (Burke & Stets, 2009; Dixon et al., 2022). Identity can be defined as a set of 'meanings' that characterise an individual's role in relation to group membership, or within society (Burke & Stets, 2009). These meanings form identity standards that guide an individual's identity-relevant decision-making and behaviours, which are potentially linked to perceived higher self-worth and esteem (Burke & Stets, 2009; Rise et al., 2010). For instance, having a greater 'environmental identity' positively influenced people's pro-environmental behaviours (e.g. in relation to waste reduction and recycling, and ecological-oriented shopping and food choices) (Whitmarsh & O'Neill, 2010). Identity salience hierarchy, as a complementary line of identity theory, suggests that individuals have different roles in their daily lives but express the salience of identity differently across places and social contexts, leading to distinct role choices (Stryker & Serpe, 1994). For instance, farmers' family and work identities (principle-level identities) coexist, while their work identities could be higher on the salience hierarchy and more likely to be enacted in a farming context. Work identities are underpinned by a more specific set of attributes (programme-level identities) in specific farming contexts, for example regarding different types of farming systems and agricultural policies (Burke & Stets, 2009; Dixon et al., 2022). Hence, a 'good farmer' identity (a principle-level identity) is more likely to be enacted by a farmer when discussing farming issues, in which various attributes that make a good farmer (programme-level identities) will be relatable (Burke & Stets, 2009; Dixon et al., 2022). Farmers' selection of these attributes can be affected by different individual and farm characteristics, representing the construction of programme-level identities through farmers' interactions with farming contexts (Iles et al., 2020; Xie, 2021).

Understanding whether identity has been applied within the agricultural sector can help in gaining better insights into farmers and their decision-making about farm practices. However, there has been little research focussed on farmer identity in the context of PG management practices (Tindale et al., 2020). Two prominent identities, 'productivist' and 'conservationist' (sometimes named as 'environmental orientation' or 'environmentalist'), are often associated

with farmers' prioritisation in decision-making. Productivist farmer identity is associated with decisions focussed on high yields and profit, whereas conservationist farmer identity is associated with decisions that value the natural environment in farming (see e.g. Cullen et al., 2020; Dixon et al., 2022; Howley et al., 2015; McGuire et al., 2015; Sulemana & James, 2014). Productivist identity may have negative, and conservationist identity may have positive, influence on the adoption of environmentally friendly farm practices (Dixon et al., 2022; Sulemana & James, 2014). The conservationist identity can be further categorised in the context of specific issues, such as actions taken in relation to soil and wildlife conservation (Dixon et al., 2022). For example, McGuire et al. (2015) found that farmers with 'soil conservationist' (those who pay attention to minimising nutrient run-off and soil erosion in farming) or 'naturalist' (those who balance farm production with a strong interest in wildlife on the farm) identities are more supportive of farm policy scenarios related to soil and water resource protection. Compared with productivist and environmentalist identities, other identities have been less frequently reported (see Supporting Information Table A), of which some were associated with farmers' decision-making. For example, civic-minded identity was a negative predictor of support for farm policy scenarios related to soil and water resource protection (McGuire et al., 2015). Forward-looking identity was a positive predictor of farmer participation in agri-environment schemes (Cullen et al., 2020).

2.2 | Farmer and farm attributes

Farmer and farm attributes also influence farmers' decision-making. Farmer attributes could include, inter alia, socio-demographic characteristics (e.g. age, educational levels and their personal influential social networks) (Epule & Bryant, 2017; Jin et al., 2022) as well as individual values, beliefs and worldviews associated with farming or the environment in general (Cayre et al., 2018; IPBES, 2019; Wensing et al., 2019). Farm attributes that affect farmers' decision-making may relate to farm type, size, location, land tenure and degree of land fragmentation (Hansson & Ferguson, 2011; Hayden et al., 2021). Location may be associated with regional differences in biophysical features (e.g. climatic conditions and land quality), of which certain features (e.g. drought and sandy soils) limit farmers' adoption of new farming practices (Marescotti et al., 2021; Schroeder et al., 2013). Some situational factors, such as farmers' dependence on farm production or agri-environment schemes as a source of income, may also influence farmers' decision-making about farm management (Herzon & Mikk, 2007; Li et al., 2020).

3 | METHODS

3.1 | Questionnaire design

A questionnaire was developed, informed by the existing literature on farmer identity and grassland management (Dixon et al., 2022; McGuire et al., 2013; Sulemana & James, 2014). There were 12 closed questions included in this analysis, which were intended to gather farm-related information (area of PG on the farm, types of livestock production, types of current farming systems), farmer-related information (age, educational levels, roles in farm management decisions and length of farming experience) and other situational factors (perceived climate- and soil quality-related barriers to PG management on the farm, perceived importance of income from farm production and agri-environment schemes; see Supporting Information Table B). There were two open-ended questions aimed at collecting information about how research participants define a 'good farmer' and their farmer grassland management plans for the next 5 years. When asking the two open-ended questions, interviewers used words such as 'what', 'why' or 'how' to probe for more information from research participants, although these are not shown in Supporting Information Table B. All the questions were developed in English and were translated into local languages for use in non-English-speaking countries (Czech Republic, Spain, Sweden, and Switzerland).

3.2 | Data collection

Data collection was undertaken between October 2020 and October 2021 through online or phone interviews in the five countries due to restrictions on travel and face-to-face meetings during the COVID-19 pandemic. Prior to the interviews, research participants received detailed information about data use, privacy and procedures in case of emergency. All participants signed a letter of consent via email to confirm their agreement to have the interviews recorded and the data processed anonymously. Each interview lasted 30–45 min and was conducted in the local language. Participants were recruited using networks of farmers accessible to the lead partner organisations in each country and using social media (Facebook and Twitter). The interviews were recorded and transcribed in each country, and translated into English (if conducted in another language). Ethics approvals for the interviews in this research were granted by the lead authors' university (Ref: 20-TN-028).

The included countries were selected from different biogeographic zones in Europe (*Continental/Pannonian*: *Czech Republic*, *Boreal*: *Sweden*, *Mediterranean*: *Spain*, *Alpine*: *Switzerland*, *and Atlantic*: *UK*; Figure 1). In the UK, Czech Republic and Switzerland, an attempt was made to achieve a geographical spread of farms across each country, while in Spain and Sweden, there was a focus on key PG areas: the 'dehesa' area of southern Spain, which is a specialist silvopastoral landscape and is recognised as one of the most biodiverse and multifunctional areas in Europe (Olea & San Miguel, 2006); and southern Sweden, where the majority of PG farms are located (Trubins, 2013).

The sample covered three farming types: high input/intensive conventional farms (≥1.0 livestock unit per hectare, LU/ha); low input/extensive conventional farms (<1.0 LU/ha); and certified organic farms (Neumann et al., 2009). The intensive farms are more likely to cause physical damage to grasslands (e.g. soil erosion and nutrient enrichment) and loss of biodiversity compared with extensive

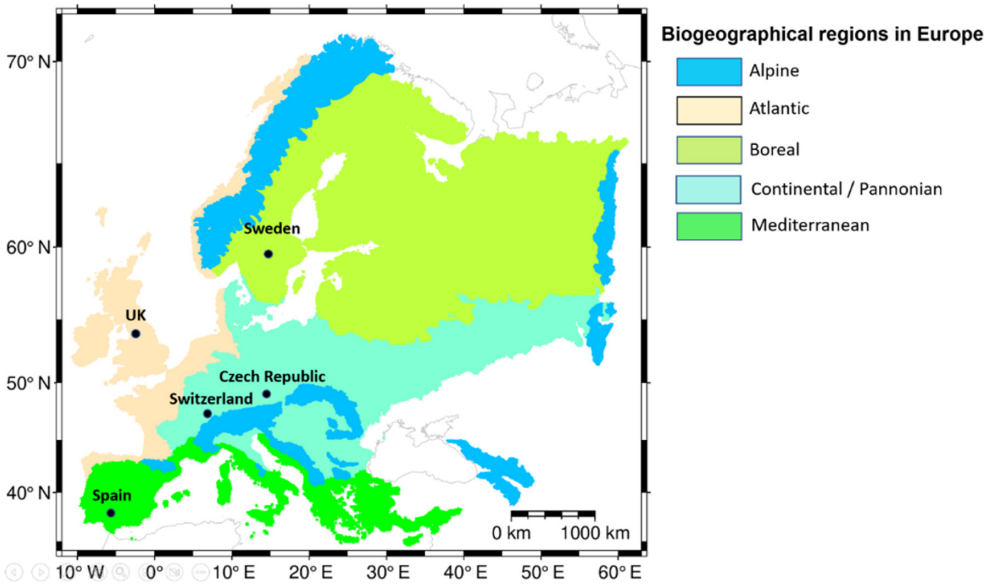

FIGURE 1 Map of biogeographical regions of Europe included in the study. The data are sourced from 'Biogeographical regions in Europe' by European Environment Agency, 2017, (https://www.eea.europa.eu/legal/copyright).

and certified organic farms (Pizzio et al., 2016). In addition to standards related to low stocking rate, certified organic farms need to comply with organic production rules, including limiting the use of artificial fertilisers, herbicides and pesticides, which are more likely to enhance grassland ES and biodiversity compared with intensive and extensive conventional farms (Ostandie et al., 2021). According to the Green Deal, the European Union intends to reach 25% of its total farmland under organic farming by 2030 (Directorate-General for Agriculture and Rural Development, 2023). Farms were selected from each of the three farming types within each country, with the aim of recruiting 25 farmers within each type in each country. In addition, the sampling aimed to cover six main types of livestock production, that is beef, dairy, mixed bovines (dairy and beef), sheep/goats, mixed ruminants, and mixed ruminants and others (Lombardi & Enri, 2021). The participants were primary decision-makers on their farms with more than 5 years of experience in farming.

3.3 | Participants

A total of 373 interviews were conducted in the five countries (73 in Sweden, and 75 in Switzerland, Spain, the Czech Republic and the UK). The average age of participants was 49.7 (Table 1). Those aged under 40 years, 41–64 years, and over 64 years accounted for 23.6%, 64.1% and 12.3% of the sample, respectively, which represented a similar age structure to European farmers' demographic data in 2016 (31.8% under 40 years, 59.2% between 41–64 years and 9% over 64 years; Eurostat, 2019a). About 55.5% of the participants had received higher education. The PG area varied considerably across participants' farms, with three-quarters of the farms having 100 ha of PG or less. Farm production was perceived to be a more important income source than payments from agri-environment schemes. Participants perceived that local climate represented a greater barrier to effective PG management on their farm compared with soil quality. In terms of future PG management, more participants intended to intensify or make no change to their current PG compared to extensification (Table 1). The sample across countries showed similarities regarding the number of different farm system types (with the exception that the UK sample had more extensive farms than organic and intensive farms), the average age, perceived importance of farm production and perceived importance of agri-environment schemes as income sources, and perceived biophysical barriers to PG management (see Table C in Supporting Information).

3.4 | Data analysis

Thematic analysis was used to analyse the data (Braun & Clarke, 2006). The research team members familiarised themselves with the data and relevant literature to inform initial coding and pattern identification. Two members of the research team (SJ and MB) independently coded the answers to the question 'what makes a good farmer'. They also checked whether infrequently reported farmer identities existed in the data set (Supporting Information Table A). Another research team member (OG) coded the answers to the question 'Within the next 5 years what are your plans for PG management on the farm?', and categorised PG management into three main pathways (intensification, extensification and no change) with the help of a soil scientist within the team (PNP). After agreeing on the coded farmer identities and future PG management intentions, SJ and MB independently explored patterns regarding the links between these identities, individual and farm attributes and future PG management intentions, generating different initial themes. Together SJ and MB reviewed, refined and defined themes, reaching

TABLE 1 Interview sample characteristics.

Sample characteristics		Category	Number	Frequency
Farm information	Types of farming system	High-input/intensive conventional farms	115	30.8%
		Low-input/extensive conventional farms	140	37.5%
		Certified organic farms	118	31.6%
	Types of livestock production	Beef	100	26.8%
		Dairy	89	23.9%
		Mixed bovines (dairy and beef)	34	9.1%
		Sheep/goats	69	18.5%
		Mixed ruminants	29	7.8%
		Mixed ruminants and others	52	13.9%
	Area of permanent grasslands (hectare)	Under 20	97	26.0%
		20–50	116	31.1%
		51–100	65	17.4%
		101–300	52	13.9%
		Over 300	43	11.5%
Farmer information	Age	Under 40	88	23.6%
		40–64	239	64.1%
		Over 64	46	12.3%
	Education	Primary education	29	7.8%
		Secondary education	137	36.7%
		Higher education	207	55.5%
Perceived importance of income sources	Farm production		Mean = 4.51	SD = 0.95
	Agri-environment schemes		Mean = 3.68	SD = 1.42
Perceived biophysical barriers to PG management	Climate		Mean = 3.73	SD = 1.34
	Soil quality		Mean = 3.39	SD = 1.39
Future PG management intentions	Intensification		133	35.7%
	No change		150	40.2%
	Extensification		85	22.8%
	Not sure		5	1.3%

Note: SD refers to standard deviation.

agreement on, and recording, the relevant analyses. Another team member (VVM) performed a further quality check of 10% of the cases. The qualitative analysis was conducted using NVivo and the findings are presented in Section 4.1 and 4.2.

Inferential statistical analyses were conducted to triangulate some of the findings through thematic analysis and further quantify the effects of different factors on participants' future PG management intentions. First, since descriptive analyses indicated some differences in participants' future PG management intentions by country (Section 4.1), a chi-squared independence test was used to further test whether these differences were significant (where $p < 0.05$ was regarded as being statistically significant). Subsequently, a multinomial logistic regression was conducted to assess the extent to which farmer identities, other individual, farm and situational factors (age, education, current farming types, PG area on the farm, perceived biophysical barriers and perceived importance of income sources) could explain farmers' future PG management intentions. These factors have been reported to influence farmers' decision-making about farming practices in previous research (Marescotti et al., 2021; McGuire et al., 2015; Schroeder et al., 2013; Sulemana & James, 2014). Here, the different types of identity were coded into dichotomous variables, and land management intentions into nominal variables (intensification, no change, and extensification). There were 350 responses included for modelling, after removing 23 responses (5 not sure about future land management, and 18 having not provided their definition of a good farmer which precluded identity classification) from the total sample ($n = 373$). As there was no evidence of data clustering by country/biogeographic zone (the intraclass correlation coefficient below 0.05), an ordinary multinomial logistic regression model was used instead of using a mixed-effects model (Hedeker, 2003). The model evaluation criteria

included the statistical significance of the model ($p < 0.05$) and fit between the model and data (The Pearson's chi-squared and deviance chi-squared tests were non-significant, as the p value was not smaller than 0.05, representing a good fit). All the inferential statistical analyses were undertaken using the IBM SPSS software (Version 27).

4 | RESULTS

4.1 | Future PG management intentions

Information about the different farming practices the farmers intended to undertake in the future was elicited and categorised into three main management pathways, including intensification, extensification and no change. Extensification practices (22.8% of farmers) mainly related to adapting grass sward composition (e.g. using seed mixes to increase sward diversity); lengthening grazing intervals (e.g. expanding or introducing more long rotational or mob grazing); increasing grassland area without increasing farm stocking rate; better monitoring grassland conditions (e.g. soil, botanical composition, temperature changes); improving soil health; and reducing the use of synthetic agricultural chemicals (Schaub et al., 2021). Intensification (35.7% of farmers) mainly related to the intention to increase land productivity by reseeding or overseeding; controlling weeds and pests using agrochemicals; increasing land fertility using fertilisers; and increasing stocking rate (Schils et al., 2022). In addition, 40.2% of farmers anticipated no change to their grassland management practices over the next 5 years. Thus, fewer farmers indicated that they intended to further extensify PG in future compared with those who expressed an intention to either intensify PG or maintain their current management practices.

There were differences in future PG management intentions in relation to the type of current farming system practiced in farms located in different biogeographical zones (Figure 2). Farmers currently managing organic or extensive farms were more likely to adopt PG intensification practices (39.0% for organic farms; 48.6% for extensive farms vs. 35.7% in the total sample) rather than making no change (39.0% for organic farms; 35% for extensive farms vs. 40.2% in the total sample) or adopting PG extensification practices (20.3% for organic farms; 15.7% for extensive farms vs. 22.8% in the total sample), whereas those currently managing intensive farms were more likely to make no change (47.8% vs. 40.2% in the total sample) or adopt PG extensification practices (33.9% vs. 22.8% in the total sample) rather than adopting PG intensification practices (16.5% vs. 35.7% in the total sample; Figure 2). Of those managing intensive conventional farms ($n = 115$), 74 participants (64.3%) intended to either further intensify or make no change to PG on their farm, which could represent a higher risk of damaging PG regulating and maintenance services compared to farms managed by the other participants. These were more frequently observed for Spanish participants ($n = 24$).

Dairy cow and mixed bovine farms accounted for 53.9% of the intensive farms (i.e. farms having relatively high stocking rates, $n = 115$), and for 23.6% of the organic and extensive farms (i.e. farms having relatively low stocking rates, $n = 258$). This is consistent with previous research that shows an association between the dairy cow and mixed bovine farming and higher stocking rates (Enri et al., 2022). Compared with the total sample, dairy cow and mixed bovine farms ($n = 123$) were more likely to extensify ($n = 45$, 36.6% vs. 22.8% in the total sample) their PG and less likely to intensify ($n = 37$, 30.1% vs. 35.7% in the total sample) or make no change ($n = 31$, 33.3% vs. 40.2% in the total sample) to their current PG. For intensive dairy cow and mixed bovine farms ($n = 62$), the percentage of farmers reporting future extensification intentions increased to 40.3%, and intensification intentions decreased to 21.0%. In contrast, in the case of extensive and organic dairy cow and mixed bovine farms, the percentage of farmers expressing intentions to extensify PG decreased to 32.8%, and intensification intentions increased to 39.3% ($n = 61$).

In terms of different countries, more farmers expressed the intention to maintain their current PG management practices in

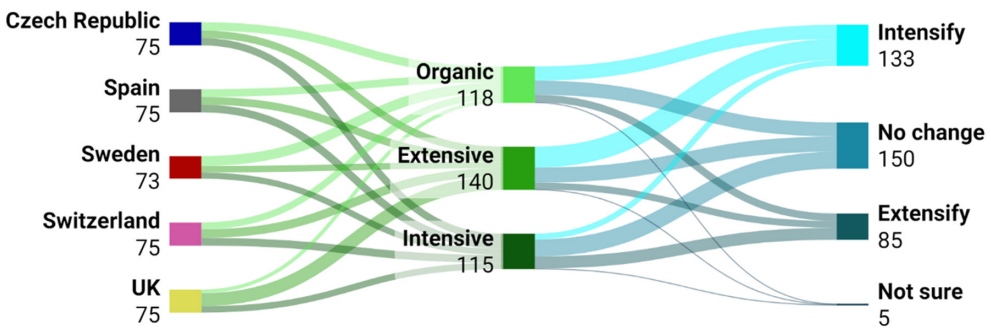

FIGURE 2 Relationship between types of current farming systems and farmers' future permanent grassland (PG) management intentions. The figure shows the composition of different types of current farming systems across the five countries included in our interviews (green lines on the left), as well as the relationship between the types of current farming systems and future PG management intentions (blue lines on the right). The width of the arrows refers to the number of farms having certain types of current farming systems (left side) and the number of farmers having certain future PG management intentions (right side).

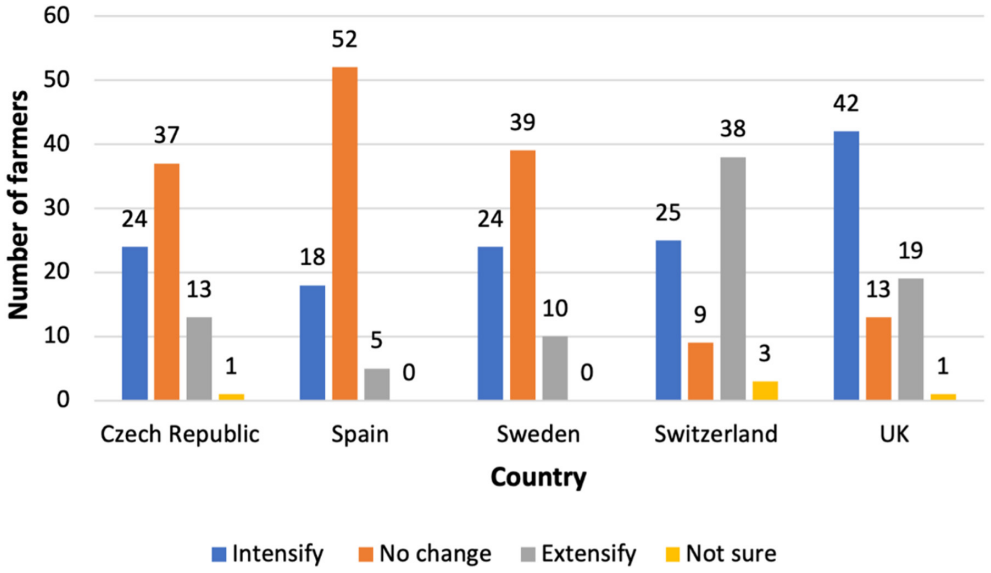

FIGURE 3 Farmers' future permanent grassland management intentions in five European countries.

Spain (69.3%), Sweden (53.4%) and the Czech Republic (49.3%). More farmers intended to intensify or extensify future PG management practices in Switzerland (33.3% for intensification; 50.7% for extensification) and the UK (56.0% for intensification; 25.3% for extensification; Figure 3; see Supporting Information Table C). The results of a chi-squared independence test showed that the percentage of farmers' future PG management intention differed by country, $\chi^2(12) = 101.17$, $p < 0.001$. Post hoc tests with a Bonferroni Correction indicated that, across all five countries, the percentage of farmers who intended to undertake PG intensification practices was significantly higher for UK farmers; the percentage of making no change was significantly higher for Spanish farmers but significantly lower for Swiss and UK farmers; the percentage of intention to undertake PG extensification practices was significantly higher for Swiss farmers but significantly lower for Spanish farmers (Supporting Information Table D). Moreover, compared with Swiss and UK farmers, a higher percentage of Spanish, Swedish and Czech farmers intended to intensify or make no change to PG on their intensive farms, and make no change on their organic and extensive farms. A higher percentage of UK farmers intended to intensify PG, while a higher percentage of Swiss farmers intended to further extensify PG on organic and extensive farms.

4.2 | Identities, individual and farm attributes and PG management intentions

The research participants defined a good farmer by describing different actions, behaviours and personal characteristics of farmers, which have been categorised into seven main types of farmer identity, including 'good livestock management', 'land caretakers', 'productivist', 'farming skills-centred', 'environmentalist', 'soil management' and 'lifestyle' identities. Overall, the good livestock management, productivist and land caretaker identities were most prominent, with 37.8%, 33.2% and 31.4% of the participants indicating these identities, respectively, while the fewest participants (9.4%) indicated a lifestyle identity. Of all participants, there were 228 participants (accounting for 61.1% of all participants) having at least two identities. These identities were linked with different individual and farm attributes and situational factors, as well as participants' future PG management intentions. Of the included countries, the most prominent identity among the Swiss and the UK participants was productivist identity, accounting for 48% and 44% of the sample, respectively; among the Spanish participants, the land caretaker identity (49.3%) was the most prominent; among the Swedish participants, the farming skill-centred identity (35.6%) was the most prominent; and the good livestock management identity (57.3%) was the most prominent among the participants from the Czech Republic (details see Supporting Information Table E).

4.2.1 | Good livestock management

Good livestock management was regarded as being an important element of being a good farmer by 141 participants (accounting for 37.8% of the sample). Some specific aspects of good livestock management were mentioned, including adopting appropriate stocking rates, ensuring livestock health, and securing animal welfare.

> The first thing would be not to abuse too many animals, to try to couple the livestock load to the land because not all land is the same.
>
> (Participant 12, Spain)

> Good care for cattle, striving for high milk and meat productivity while maintaining all welfare conditions.
> (Participant 185, Czech Republic)

> Being aware of the health needs of animals and being able to interpret and tune the management to maintain them as best as can be done.
> (Participant 189, UK)

> Respect for the environment and animals. Therefore, it is very important to take into account the welfare of the animals, cleanliness, 'good' treatment of the animals, medical treatment so that they are free of diseases. We should all do this.
> (Participant 243, Spain)

The good livestock management-oriented participants tended to be younger (mean age = 48.6 years vs. 49.7 years for the whole sample), Czech farmers ($n = 43$, accounting for 30.5% vs. 20.1% in the total sample), and have farms with low stocking rates (73% vs. 66.8% in the total sample). These participants were more likely to intensify (42.6% vs. 35.7% in the total sample) and less likely to extensify (17.0% vs. 22.8% in the total sample) their PG in the future.

4.2.2 | Productivist identity

Productivist identity ($n = 124$, accounting for 33.2% of participants) related to participants defining a good farmer as having the knowledge and/or skills for accessing the market, reducing costs, and increasing productivity and profit.

> When he is active, when it keeps up with trends, when he aligns to the market. And of course, somehow the means of production he has, namely, the ground, buildings, animals… so just that he does not also forget them.
> (Participant 18, Switzerland)

> Knowing business inside out, cost control especially production and being open to new ideas to reduce costs.
> (Participant 85, UK)

> That he operates profitably. Exactly, it is a business, it must be profitable.
> (Participant 86, Switzerland)

> One has to be able to make money and still be able to live a life worth living.
> (Participant 342, Sweden)

In addition, some participants described the importance of considering consumer preferences in order to increase profit (e.g. through producing high-quality food).

> Somebody who produces a quality product (could be anything—bales of straw, sugar beet, livestock, or a service), profitably…
> (Participant 62, UK)

> Good quality of production, efficient use of resources, soil care.
> (Participant 214, Czech Republic)

Those who identified with the orientation towards production tended to be younger (mean age = 48.8 years vs. 49.7 years for the total sample), farmers in Switzerland and the UK (accounting for 29% and 26.6% vs. 20.1% in the total sample), and more engaged in dairy cow and mixed bovine farming (40.3% vs. 33% in the total sample). These participants were more likely to intensify (38.9% vs. 35.7% in the total sample) or extensify (29.8% vs. 22.8% in the total sample) their PG in future, but less likely to make no change (29% vs. 40.2% in the total sample).

4.2.3 | Land caretaker

There were 117 participants regarding taking good care of the land on farm ('land caretakers') as an important element of being a good farmer (accounting for 31.4% of the sample). In addition to mentioning taking good care of land in general, some participants pointed out the drivers of undertaking good land management, for example, to achieve higher yields, greater sustainability, and to maintain a satisfactory landscape (e.g. keeping it tidy and clean).

> Protect the pastures, do not put too much stocking rate on them and look after them.
> (Participant 88, Spain)

> Look after the land to maximise yields.
> (Participant 104, UK)

> In my case, because my farm area is small, however, I believe that what makes a good farmer who manages land is sustainability. In extensive farming, sustainability is fundamental…
> (Participant 76, Spain)

> The landscape is a little bit maintained, the paths are a little bit clean, exactly.
> (Participant 45, Switzerland)

> High yield and productivity of cattle and milk components, as well as order in the field and meadow.
>
> (Participant 155, Czech Republic)

> He/She takes care of the land in the best way possible. Keeping it nice and tidy around the farm is also important.
>
> (Participant 354, Sweden)

Land caretakers tended to be younger (mean age = 48.7 vs. 49.7), from the Czech Republic and Spain (accounting for 33.3% and 31.6% vs. 20.1% in the total sample), perceive a relatively high level of climate-related barriers to the use of PG management on the farm (mean = 3.93 vs. 3.73 in the total sample), and perceive the income from both farm production (mean = 4.61 vs. 34.51 in the total sample) and agri-environmental schemes (mean = 3.85 vs. 3.68 in the total sample) to be important. These participants were more likely to make no change in their current land management practices (55.6% vs. 40.2% the whole sample) and less likely to intensify (30.8% vs. 35.7%) or extensify (13.7% vs. 22.8%) PG on their farm in the future.

4.2.4 | Farming skill-centred identity

Farming skill-centred identity ($n = 113$; 30.3% of the participants) was associated with having the knowledge, skills and a long-term perspective to enable good farming practices to be used, without mentioning specific farming activities or objectives (e.g. productivity and profitability).

> A good farmer is a well-educated farmer, either by an education at a school, or he has taught himself something. In any case, he has a great deal of specialized knowledge, and commitment.
>
> (Participant 3, Switzerland)

> Knowing what to do at any given moment, knowing how to deal with the sowing, how to put the animals in, etc.
>
> (Participant 238, Spain)

Farming skill-centred participants perceived relatively low importance of the income from farm production (mean = 3.44 vs. 4.51 in the total sample). These participants had a slightly higher probability of intensifying (38.1% vs. 35.7% in the total sample) or extensifying (26.5% vs. 22.8% in the total sample) PG on their farm, but a lower probability of making no change (33.6% vs. 40.2%) compared with the whole sample.

4.2.5 | Environmentalist identity

Environmentalist identity ($n = 90$, accounting for 24.1% of participants) included farmers who considered that environmental issues in farming decision-making were an important element of being a good farmer. Environmental issues included concerns about the negative impacts of farming on the natural environment and ecosystems in general, as well as more specific negative influences (reduced biodiversity, depletion of natural resources, and greenhouse gas emissions).

> That you handle the nature carefully and that you work up-to-date. So, you should be informed and continue training programmes.
>
> (Participant 38, Switzerland)

> A good farmer takes nature into account as such and is not ignorant of his surroundings and nature.
>
> (Participant 134, Czech Republic)

> Enriching the soil, maintaining biodiversity and without being aggressive.
>
> (Participant 138, Spain)

> One should be careful with the diesel consumption, be careful with Co2 emissions and cherish the land as well as the farm produce.
>
> (Participant 306, Sweden)

The environmentalist participants tended to be older (mean age = 53.4 years vs. 49.7 years for the total sample), have farms with low stocking rates (75.6% vs. 66.8% in the total sample), and perceive there to be a relatively lower level of soil quality-related barrier to PG management on the farm (mean = 3.14 vs. 3.39 regarding the total sample). No obvious difference in future PG management intentions was observed among these participants when compared with the total sample (37.8% vs. 35.7% for intensification, 37.8% vs. 40.2% for no change, and 23.3% vs. 22.8% for extensification).

4.2.6 | Soil management identity

Soil management identity ($n = 75$; 20.1% of the participants) was associated with farmers expressing intentions to improve soil fertility, combat soil erosion and enhance soil health through, e.g., crop rotations.

> Well, he looks after his soil, he looks after his animals, he looks after the fact that in 10 or 20 years you still have yields on your soil and we manage it sustainably in this sense.
>
> (Participant 110, Switzerland)

> The priority for us is to maintain soil fertility and prevent soil erosion, maintaining water in the landscape.
>
> (Participant 183, Czech Republic)

> I would start with soil. Soil conservation. Good fertilisation or sowing and good crop rotation or using grassland at the optimum moment.
>
> (Participant 256, Spain)

Soil management identity was more frequently observed for Czech participants (42.7% vs. 20.1% regarding the total sample) and was associated with perceptions of relatively higher levels of local climate-related (mean = 4.00 vs. 3.73 regarding the whole sample) and soil quality-related (mean = 3.60 vs. 3.39 in the total sample) barriers to PG management, At the same time, lower perceived importance of income from agri-environmental schemes was reported (mean = 3.55 vs. 3.68 in the total sample). These participants were more likely to make no change to their current PG management practices (45.3% vs. 40.2% in the total sample) and less likely to extensify (16% vs. 22.8%) PG on their farm. No difference in the intention to intensify PG in the future (37.3% vs. 35.7%) was observed.

4.2.7 | Lifestyle identity

Lifestyle identity ($n = 35$; 9.4% of the participants) referred to treating farming as an important and enjoyable part of one's life and linking it to the farming family and future generations.

> A good farmer enjoys what he does. From my perspective. And this is ultimately reflected in what comes out of it.
>
> (Participant 22, Switzerland)

> A good farmer sees the possibilities on the farm and make use of them, and later pass it on to the next generation.
>
> (Participant 324, Sweden)

Lifestyle-oriented participants tended to be older (mean age = 51.1 years vs. 49.7 years in the total sample), Swiss participants (45.7% vs. 20.1% in the total sample), and perceived there to be a relatively lower level of local climate-related barrier to PG management. These participants were more likely to extensify (35.3% vs. 22.8% in the total sample) and less likely to intensify (23.5% vs. 35.7% in the total sample) PG on the farm in future. No difference was observed in making no change to current PG management (38.2% vs. 40.2% in the total sample).

4.2.8 | Multiple identities

There were 228 participants showing more than one identity, accounting for 61.1% of all participants. One reason for having multiple identities was that farmers often needed to consider various aspects related to farming decision-making and sometimes make trade-offs between those, for example balancing productivity and environmental considerations.

> This is one who takes into account several factors in life. That is, he has a farm, the family and the environmental thought always in mind, and works to the best of his ability. And he is honest. The rational and financial aspects must not be the only things in the foreground.
>
> (Participant 42, Switzerland)

> Efficient and productive, making good use of resources they have, managing animal welfare and health appropriately, having livestock that suit their farm.
>
> (Participant 287, UK)

Another reason was that some attributes perceived to make a good farmer can be interlinked. For example, proper livestock management can benefit the management of soil health and production.

> The first thing would be not to abuse too many animals, to try to couple the livestock load to the land because not all land is the same. And secondly, to find the optimum time to farm the land in order to make it profitable.
>
> (Participant 12, Spain)

> I would describe a good farmer as a manager with a good ability to take care of his or her animals and land, in order to achieve growth in the company.
>
> (Participant 105, Sweden)

Most multiple identities included good livestock management combined with land caretaker identities ($n = 63$), productivist identities ($n = 46$) or soil management identities ($n = 42$). Good livestock management combined with either land caretakers or soil management identities showed similar patterns in terms of future PG management intentions, that is a higher probability of intensifying and a lower probability of extensifying PG on the farm. Those having a productivity identity had a higher probability of extensification (29.8% vs. 22.8% in the total sample), which slightly decreased to 28.3% when combined with good livestock management identity. In contrast, a synergy occurred when it came to participants having both productivist and environmentalist identities ($n = 35$), which was associated with a higher probability of extensification (34.3% vs. 22.8% in the total sample, 29.8% for those with a productivist identity and 23.3% for those with an environmentalist identity).

4.3 | Quantifying effects of factors on future PG management intentions

The multinomial logistic regression model was statistically significant, $\chi^2(34) = 93.80$, $p < 0.001$, indicating a significant

improvement in fit over the null model. Both Pearson's chi-squared ($\chi^2(656) = 692.37$, $p = 0.158$) and deviance chi-squared tests ($\chi^2(656) = 643.33$, $p = 0.631$) showed non-significance, indicating that the model fits the data well. This model has correctly classified 54.3% of cases. Future intended intensification was correctly predicted 56.8% of the time, with no change being 63.4% and extensification being 32.9%.

The results of the multinomial logistic regression are presented in Table 2. Older participants were significantly less likely to decide to undertake extensification compared with no change in future. Educational levels showed no significant effects on PG management intentions. Those who perceived higher importance of income from their current farm production were more likely to make no change. Those who perceived higher importance of income from agri-environmental schemes were more likely to undertake extensification compared to no change. Those managing organic or extensive farms were more likely to undertake intensification compared to no change. The area of PG and climatic and soil quality had no significant effects on farmers' management intention. Those identifying with good livestock management-orientation were more likely to undertake intensification compared to no change. Participants who indicated with production/profit identity were more likely to make decisions resulting in future intensification or extensification compared to no change. Farmers who identified as good land-caretakers indicated that they were more likely to make no change to their grassland management.

5 | DISCUSSION

5.1 | Identities and individual, farm and situational factors

Seven farmer identities were elicited from the research participants, representing the aspects of farming that they perceived to be important in relation to being 'a good farmer'. Besides the two prominent identities (productivist and environmentalist identities), which have been identified in previous research (see e.g. Cullen et al., 2020; Howley et al., 2015; Sulemana & James, 2014), five less frequently reported identities were also identified. These identities were linked with different individual factors (e.g. age), farm characteristics (e.g. the current types of farming system) and situational factors (e.g. perceived biophysical barriers to PG management). Experience in managing farms with low stocking rates (i.e. extensive conventional and organic farms) was particularly related to the good livestock management and environmentalist identities. Furthermore, regional differences in farmer identities existed, for instance, good livestock management and soil management identities more often found among Czech farmers, implying a combined influence of social and biophysical factors on farmer identities (McGuire et al., 2015).

5.2 | The role of farmer identities in PG management intention

Farmers with productivist identity in the sample were more likely to either intensify or extensify PG on their farm, potentially representing two different types of productivist farmers. Some productivist farmers might primarily focus on production, emphasising the major role of rural areas as a site for food production. This focus could negatively relate to farmers' adopting sustainable farming practices (see e.g. Dixon et al., 2022; Howley et al., 2015; Morton et al., 2017). Other productivist farmers (sometimes called post-productivist), however, might place increased emphasis on rural areas (including farm lands) as a place that provides regulating and maintenance services and cultural services, and perceive that using more sustainable practices to produce food of good quality was important (see also Burton & Wilson, 2006; Xie, 2021). This distinction could partly explain why the participants with both productivist and environmentalist identities in this research were more likely to extensify PG compared with the whole productivist/environmentalist group. As such, productivist and post-productivist farmers may exist simultaneously in Europe, although some productivist farmers may potentially transform into post-productivist farmers in the future (Burton & Wilson, 2006).

Farmers having a land caretaker identity were more likely to maintain their current PG management practices in the future, potentially contributing to their 'lock-in' to these practices (Meynard et al., 2018). This suggests that these farmers are satisfied with their current land management practices, making them more likely to resist any changes. In addition, some farmers with this identity preferred 'tidiness' and 'clean' land. Intensifying or extensifying PG in future may compromise this sense of tidiness and cleanness, which could be perceived as important signs of skilled farming to these farmers and the broader farming community (Burton, 2012). This finding is consistent with other studies focused on European farms, where the 'tidy farm' ideal remains prominent, despite a growing awareness of the need to conserve and promote biodiversity (Birge & Herzon, 2019; Westerink et al., 2021).

5.3 | The role of farm and farmer attributes in PG management intention

Farmers who perceived a higher dependence on income from agri-environmental schemes were more likely to extensify PG on their farm, while environmentalist identity had no significant effect on farmers' management intentions. This highlights the potentially important role of financial policy levers in promoting extensification beyond farmers' environmentalist motivations (Gatto et al., 2019). Perceived income dependency on farm production was associated with no change in future decisions regarding farm management practices—this might relate to farmers' concerns about uncertain consequences caused by management changes, and resonates

TABLE 2 Results of multinomial logistic regression.

			95% CI for odds ration		
		B (SE)	Lower	Odds ratio	Upper
Intensify versus no change					
Farmer attributes	Intercept	1.175 (1.132)			
	Age	−0.013 (0.011)	0.966	0.987	1.008
	Primary education	−0.275 (0.531)	0.268	0.760	2.151
	Secondary education	−0.364 (0.290)	0.393	0.695	1.228
Farm attributes	Area of PG	0.000 (0.000)	0.999	1.000	1.001
	Organic farm	1.008 (0.378)**	1.307	2.740	5.745
	Extensive farm	1.187 (0.354)***	1.638	3.277	6.554
Biophysical barriers	Climatic condition	−0.005 (0.114)	0.795	0.995	1.244
	Soil quality	−0.050 (0.112)	0.779	0.966	1.197
Importance of income source	Farm production	−0.356 (0.162)*	0.510	0.701	0.962
	Agri-environmental scheme	0.040 (0.102)	0.852	1.041	1.272
Identities	Livestock management	0.561 (0.280)*	1.012	1.753	3.036
	Productivist	0.660 (0.314)*	1.045	1.935	3.583
	Land caretakers	−0.650 (0.317)*	0.280	0.522	0.971
	Farming skills-centred	0.388 (0.328)	0.776	1.474	2.803
	Environmentalist	−0.035 (0.320)	0.516	0.966	1.808
	Soil management	−0.039 (0.342)	0.492	0.962	1.880
	Lifestyle	−0.454 (0.500)	0.238	0.635	1.691
Extensify versus no change					
Farmer attributes	Intercept	1.399 (1.288)			
	Age	−0.029 (0.014)*	0.946	0.971	0.997
	Primary education	0.187 (0.558)	0.404	1.205	3.598
	Secondary education	−0.043 (0.335)	0.497	0.958	1.846
Farm attributes	Area of PG	−0.002 (0.001)	0.996	0.998	1.000
	Organic farm	−0.604 (0.401)	0.249	0.547	1.199
	Extensive farm	−0.621 (0.384)	0.253	0.537	1.141
Biophysical barriers	Climatic condition	0.138 (0.136)	0.879	1.148	1.500
	Soil quality	−0.047 (0.126)	0.745	0.954	1.222
Importance of income source	Farm production	−0.402 (0.187)*	0.464	0.669	0.966
	Agri-environmental scheme	0.253 (0.119)*	1.020	1.288	1.626
Identities	Livestock management	−0.178 (0.337)	0.432	0.837	1.621
	Productivist	1.119 (0.358)**	1.520	3.063	6.174
	Land caretakers	−0.752 (0.395)*	0.217	0.471	1.022
	Farming skill-centred	0.696 (0.391)	0.756	1.959	5.081
	Environmentalist	0.316 (0.375)	0.657	1.371	2.861
	Soil management	0.128 (0.428)	0.491	1.136	2.627
	Lifestyle	0.673 (0.486)	0.756	1.959	5.081

Note: 'No change' was used as a reference category, which led to two comparisons within the analysis ("Intensify versus No change" and "Extensify versus No change"); higher education is used to compare with other educational levels; intensive farm is used to compare with other types of farming systems.

Abbreviations: 95% CI, 95% confidence interval; B, unstandardized beta; PG, permanent grassland; SE, standard error.

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

with previous research, in which European farmers have been reported to be highly risk- and loss-averse and pay undue attention to unlikely negative fiscal outcomes of farm management decisions (Bonjean, 2022; Rommel et al., 2022). Farmers having organic or extensive farms indicated that they were more likely to intensify PG in the future compared to making no change to current PG management. This could be attributed to these farmers perceiving no further benefits from increased extensification, at the same time perceiving income from farm production to be more important than that derived from agri-environment schemes. Additionally, many of these farmers identified with good livestock management-oriented identity, who often used reseeding or overseeding for livestock feed production and believed that increasing stocking rates is a feasible choice for existing organic or extensive farms. Therefore, future changes in organic and extensive farms may introduce uncertainties regarding their impact on the delivery of ES by PG on these farms, which can be influenced by the current farming practices and the types of intensification practice to be adopted (Martin et al., 2018).

5.4 | Implications for future PG management

In order to align future PG management in Europe with citizens' preferences for ES, in particular regulating and maintenance services, multiple issues need to be considered when developing relevant management and policy strategies. First, interventions aimed at optimising PG-related ES delivery need to be more targeted by considering the heterogeneity of farmer and farm attributes and regional differences. Farmers intending to intensify PG, or make no change on existing intensive farms will result in increased risk of further eroding PG-related regulating and maintenance services. These results indicate that this is more likely to occur on farms in Spain, Sweden and the Czech Republic. EU farmers receive green direct payment if they comply with three mandatory practices that benefit the environment (crop diversification, maintaining PG and dedicating 5% of arable land as ecological focus areas) (European Commission, 2023). However, more efforts are still needed to target intensive farms (especially those intending to further intensify PG) and promote PG extensification practices, in order to achieve the objectives of the European Green Deal. Different interventions may be needed in Switzerland and the UK, where more farmers intend to intensify or extensify PG on organic or extensive farms. In addition to direct payments from local agri-environment schemes (e.g. the biodiversity payment scheme in Switzerland and environmental land management schemes in the UK), resources should be made available to assist farmers in selecting feasible PG management practices for their farms.This should take into account existing practices, biogeographical attributes and other contextual factors. Farm-specific actions are needed to improve PG multifunctionality, which involve working towards the optimal point between intensification and extensification (Allan et al., 2015).

Second, future changes in existing schemes that result in farmers perceiving a loss of income might discourage their extensification intention. Financial benefits and risks perceived by farmers should always be considered when promoting any management practices, including through policy interventions and policy levers. This implies the need to consult extensively with potentially impacted stakeholders early during the policy development process in order to establish how their perceptions of the policies will affect them in the future. Also, the aging farmer population and farm succession challenges may act as barriers to changes in farm management practices towards sustainable PG (Fischer & Burton, 2014). This issue may be particularly pertinent if older farmers intend to maintain their current PG management practices instead of extensification, given the positive relationship between farmers' age and risk aversion (Gómez-Limón et al., 2003). Policy can usefully focus on encouraging younger people to enter farming via monetary and non-monetary incentives, such as using digital communication tools and providing online interactive consultancy (Unay-Gailhard & Brennen, 2022).

Farmers having both productivist and environmentalist identities were more likely to extensify PG in the future. Interventions, such as providing environmental education and information related to consumers' demand for sustainably produced food and ES related to agricultural practices, can potentially facilitate productivist farmers' transformation into post-productivist farmers and motivate them to increase sustainable food production and protect PG for delivering multifunctional land and ES (Burton & Wilson, 2006; Xie, 2021). Farmers who identified as land caretakers were more likely to make no change to their existing PG management practices. Interventions can potentially reshape land caretakers' image of optimal farm conditions over and above the 'tidiness' of the farm, in particular in relation to mutiple ES delivery and land multifunctionality. Thus, there is a need to align scientific knowledge (e.g. practices that enhance the delivery of diverse land ES) with regional farmers' preferences regarding ES delivery when designing tools for supporting farmers' decision-making about PG management (EIP-AGRI SUPPORT FACILITY, n.d.; Martin et al., 2018). In addition, a broader group of stakeholders could contribute to co-developing PG decision support processes to better accommodate regional differences in agricultural systems (related to SDG 2 that focusses on agriculture) and local ecosystems (related to SDG 15, focusing on ecosystem protection). Nevertheless, land use conflicts may arise from the varying preferences of stakeholder groups with respect to grassland ES, e.g., some stakeholders (e.g. agricultural stakeholders) may prioritise provisioning services, while others (e.g. citizens) prioritise regulating and maintenance services (Peter et al., 2022). It is therefore important to resolve these potential land use conflicts when aiming to effectively advance both SDG 2 and SDG 15.

5.5 | Research limitations and future research

The sample size of this research is sufficient for the qualitative analysis as a high level of topic saturation for the identification of the seven farmer identities has been reached. However, the findings are not entirely representative of the whole of Europe as the sample has

a relatively small size for the quantitative analysis and covers only five European biogeographic zones relevant to PG. Despite having addressed some differences across these biogeographic zones, caution is still needed when generalising the findings to wider European PG management. Further, the analysis assessed future changes but did not address current PG management practices on the farms included in the research, which, together with farmers' planned changes to these specific practices, should be considered in future research. It is also important to further investigate why farmers managing extensive and organic farms were more likely to intensify PG to inform developing interventions aimed at encouraging these farmers to change current farming practices towards a right direction. Regional biophysical features should be addressed to a greater extent in future research into farmers' PG management, for example the terrain features in which a farm is located, as they might represent natural and technological barriers to specific grassland management practices (Marescotti et al., 2021). Given that farmers' decisions regarding PG management are influenced by a complex interplay between multiple factors, it is important to systematically identify influencing factors and consider how these factors, and their interactions, act as drivers for farmer decision-making, including the trade-offs made between different perceived outcomes (e.g. income derived from agri-environment schemes vs. income from food production). The understanding will enable more directed policy development aimed at maintaining, or changing, specific farming practices.

In addition, as our data were collected during the COVID-19 pandemic, farmers could be more risk-averse than prior to, and after, the pandemic and less likely to make long-term farming plans, given the pandemic-induced uncertainties which shocked agri-food systems globally (Coluccia et al., 2021). The situation could be further complicated in the UK due to post-Brexit production, market and policy uncertainties, which might have made it even harder for farmers in the devolved UK nations to develop long-term plans for their future PG management (Vigani et al., 2021). Longitudinal analysis is therefore needed to predict future trends, given the potential impacts of social and cultural changes in farming practices and associated decision-making.

6 | CONCLUSION

This research contributes to the understanding of European farmers' PG management in several ways. First, a total of seven main types of farmer self-identity, along with their associations with other individual, farm attributes and situational factors, have been identified from European farmers, with some identities being consistent predictors of farmers' future choices of PG management pathways. Second, the effects of farmer identities, farm attributes and other situational factors on European farmers' choices of future PG management have been estimated. By integrating qualitative and quantitative findings, it is possible to identify strategies to promote sustainable PG management practices and deliver a diversity of PG-related ES in line with citizens' preferences in Europe in the future. Specifically, more integrated and targeted policies and strategies are needed to encourage specific groups of farmers to change their current farming practices towards a right direction in consideration of both farmers' and other stakeholders' preferences and priorities regarding ES, as well as scientific knowledge.

AUTHOR CONTRIBUTIONS

Shan Jin and Lynn J. Frewer conceived the idea and designed the methodology; Victoria Vicario-Modroño, Pedro Sánchez-Zamora, Rosa Gallardo-Cobos, Martina Spörri, Simona Miškolci, Samantha Outhwaite and Erik Hunter collected the data; Shan Jin, Yiying Cao, Michael Burd, Sophie Tindale, Olivia Green, Victoria Vicario-Modroño and Natasha Alonso analysed the data; Shan Jin led the writing of the manuscript; Shan Jin, Yiying Cao, Paul Newell-Price and Lynn J. Frewer contributed to the interpretation of the data; Yiying Cao, Zhiming Feng, Paul Newell-Price, Victoria Vicario-Modroño, Gabriele Mack, Pedro Sánchez-Zamora, Rosa Gallardo-Cobos, Martina Spörri, Nadja El Benni and Lynn J. Frewer contributed to the review of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest either personal or financial that has influenced preparation of this manuscript.

DATA AVAILABILITY STATEMENT

The data underlying the results presented in this paper will be archived using Zenodo repository (https://zenodo.org/uploads/12946964).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information Table A. Examples of infrequently reported farmer identities.

Supporting Information Table B. Interview questions.

Supporting Information Table C. Farmer and farm information of five countries.

Supporting Information Table D. Results of Chi-square post hoc analysis regarding future PG management across biogeographic regions.

Supporting Information Table E. Farmer identities of five countries.

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