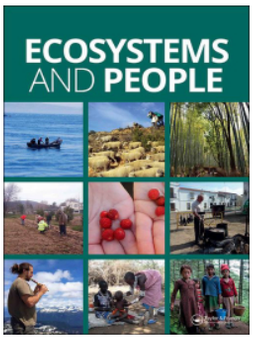

Ecosystems and People

ISSN: 2639-5916 (Online) Journal homepage: www.tandfonline.com/journals/tbsm22

Exploring the factors influencing adoption of adaptive grazing practices in pasture-based beef cattle systems

Morgan MathisonSlee & Jennifer Hodbod

To cite this article: Morgan MathisonSlee & Jennifer Hodbod (2026) Exploring the factors influencing adoption of adaptive grazing practices in pasture-based beef cattle systems, Ecosystems and People, 22:1, 2650194, DOI: 10.1080/26395916.2026.2650194

To link to this article: https://doi.org/10.1080/26395916.2026.2650194

ECOSYSTEMS AND PEOPLE
2026, VOL. 22, NO. 1, 2650194
https://doi.org/10.1080/26395916.2026.2650194

Taylor & Francis
Taylor & Francis Group

RESEARCH

OPEN ACCESS Check for updates

Exploring the factors influencing adoption of adaptive grazing practices in pasture-based beef cattle systems

Morgan MathisonSlee [a] and Jennifer Hodbod [b]

[a]Department of Community Sustainability, Michigan State University, East Lansing, MI, USA; [b]Sustainability Research Institute, University of Leeds, Leeds, UK

ABSTRACT

There is an urgent need to produce food sustainably and minimize negative environmental impacts using practices such as adaptive grazing to reverse the environmental degradation caused by industrial agriculture. Therefore, understanding the factors influencing farmers' adoption of adaptive grazing practices is crucial for encouraging management practices that support ecosystem health and function. This case study was conducted with pasture-based beef farms in Michigan, USA. To understand adoption, we administered an online survey to develop context and inform an interview protocol. Subsequently, we conducted semi-structured follow-up interviews to gather in-depth qualitative information about how social norms, attitudes, perceptions of control and values impact: (1) farmers' decisions to adopt adaptive management practices and (2) farmers' overall wellbeing. Findings revealed that a combination of attitudes, perceptions of control and values significantly influenced farmers' choices to use adaptive grazing practices. Social norms perpetuated by previous generations, attitudes about finances and stewardship, and values related to preserving traditions, played strong roles in shaping the selection of grazing management practices. Further, wellbeing was supported by spending time in nature and farmers generally reported high levels of wellbeing. Understanding these factors is essential for encouraging adoption of adaptive grazing, fostering resilience and environmental regeneration.

KEY POLICY HIGHLIGHTS

- Economic factors are not the only driver of beef farmers' management practices.
- Multi-generational farms face unique information challenges, so targeted outreach is needed to encourage adoption of adaptive management practices.
- Farmers' deep love for their land and animals facilitates using adaptive management choices because these choices benefit the ecosystem.

ARTICLE HISTORY
Received 18 November 2024
Accepted 17 March 2026

EDITED BY
Cristina Quintas-Soriano

KEYWORDS
Nature-based solutions; place-based knowledge; regenerative agriculture; social-ecological systems; Theory of Planned Behavior; Values Beliefs Norms Theory

Introduction

In the United States, the past 50 years have significantly changed livestock production from a focus on animal husbandry to maximizing production regardless of the environmental consequences (Basu et al. 2025). Many common methods of livestock production, such as confined animal feeding and continuous grazing degrade the environment and exacerbate issues, such as broken water and mineral cycles, planetary warming and ecosystem destruction (Campbell et al., 2017; Morais et al., 2025). Grasslands coevolved with grazing animals and the two work synergistically to maintain healthy soil and animals (Frank et al. 1998). Grazing lands, both pastures and rangelands, span millions of acres and constitute approximately 30% of the global terrestrial soil organic carbon stocks (Dondini et al. 2023).

Grazing management practices exist on a spectrum from environmentally degrading to environmentally beneficial (Teague et al. 2013; Roche et al. 2015). When cattle spend the entire grazing season in the same pasture and are returned to the same pasture year after year (i.e. continuous grazing), it results in erosion, compaction, capping and increased percentage of bare soil (Heitschmidt et al. 1987; de Vries et al. 2015; Sanderman et al. 2017; Dondini et al. 2023). The other end of the spectrum, there is evidence that cattle could also be used to heal grasslands (Da Silveira et al., 2025; Martínez-García et al., 2025). We refer to this end of the spectrum as adaptive grazing, where cattle are rotated through multiple paddocks (i.e. subsections of a pasture or field) at a frequency and density that are constantly adapted to the environment to promote soil and ecosystem health. Adaptive grazing practices are known by many names including Mob, Management Intensive, Adaptive Multi-Paddock and Holistic Planned Grazing (Sherren et al. 2022). We chose to use the phrase 'adaptive grazing' to capture the array of

CONTACT Morgan MathisonSlee mathiso9@msu.edu
Supplemental data for this article can be accessed online at https://doi.org/10.1080/26395916.2026.2650194.

practices that promote soil health by minimizing mechanical disturbance, keeping the soil covered, maximizing diversity, building perennial systems and being context specific (Teague et al. 2016; Stanley et al. 2018; Rowntree et al. 2020; Wang and Kreuter 2025). The idea of adaptive grazing aligns with other work on adaptive management that is often discussed in social-ecological system resilience (West et al. 2018; Garmestani et al. 2023).

Farmers are vital to implementing adaptive grazing practices that improve ecosystem health and function across millions of acres of grasslands (Kim et al. 2023; Jacobo et al. 2024; Morris 2024; Monlezun et al., 2024). They are often the first to notice and voice concern about the direction of change in landscapes, often using language related to production rather than explicitly about ecological health (Leitschuh et al. 2022). However, the underlying driver of farmers' management choices are driven by a sense of place (Kreitzman et al. 2021; Paulus et al. 2022; Alarcón-Segura et al. 2023; Ceddia et al. 2024), and the desire to protect and pass on the land in a better condition than it is in currently is often a top priority (Burton 2004; Lavoie and Wardropper 2021; Westerink et al. 2021; Leitschuh et al. 2022).

One of the most common theories for understanding human behavior and decision-making is a pyschological framework – the Theory of Planned Behavior (TPB) (Ajzen 2012), which suggests that attitudes, social norms and perceived behavioral control inform decision-making and behavioral outcomes. Attitudes are affective, emotional and normative evaluations an individual makes about participating in a certain behavior (i.e. do I believe this action is good or bad). Social norms are internalized, normative beliefs about what is right and wrong according to society (i.e. what behaviors are acceptable according to my community). Perceptions of control refer to an individual's control beliefs about whether they will be able to conduct the behavior (i.e. do I have the resources I need to do this).

The TPB has been used extensively in research on environmental conservation behaviors (Fielding and Hornsey 2016; Bartkowski et al. 2023) and has frequently been used to understand the drivers behind farmers' willingness to adopt conservation agriculture practices (Knowler and Bradshaw 2007; Borges et al. 2019; Dessart et al. 2019; Sok et al. 2020). As outlined in a bibliometric analysis of the application of the TPB to pro-environmental behaviors, Si et al. (2019) found that there has been wide application of TPB in the environmental sciences and Sok et al. (2020) conducted a systematic literature review and found limited use of the TPB for understanding grazing management practice adoption.

However, an important aspect that is explicitly missing from the Theory of Planned Behavior is the concept of values. Theories that study the relationships between values and behaviors often build on the Values Beliefs Norms Theory (Stern et al. 1991) which was designed to help understand pro-environmental behaviors. Specifically, the theory states that an individual's values, beliefs and social context will influence what actions they take regarding environmental stewardship. The definition of values used by Stern et al. (1991), and across much of the environmental values literature, states that values are deeply important, life-guiding principles that influence an individual's beliefs and behaviors. Building on this definition, Schwartz (1992) spent decades curating a list of basic human values that are consistent across cultures and people. These values span from self-focused to community-focused and from being open-to-change to risk-avoidant. To facilitate understanding intrinsic human values, Schwartz developed two surveys – the Schwartz Short and Long Values Surveys to facilitate gathering information.

Wellbeing was identified as another important factor for understanding behavior choices (Ryff 1989; Capaldi et al. 2014; Khalil 2018). According to Helne and Hirvilammi (2015), human wellbeing is dependent on the functioning of ecosystems such that they can provide ecosystem services that support healthy, thriving humans who will in turn take care of the environment instead of exploiting natural resources. As it is currently discussed, the role of wellbeing in decision-making is similar to that of norms, attitudes, perceptions of control and values because it can be a driver of behavior, but wellbeing can also be an outcome of behaviors (Brown et al. 2022; Wang F et al. 2024; Souza et al. 2025). Due to this bi-directionality, we chose to include two measures of wellbeing that address slightly different facets: life satisfaction (Diener 1994) and psychological wellbeing (Ryff 1989). Psychological wellbeing is the relationship between real and imagined self (Ryff 1989), which aligns with a eudaemonic approach to studying wellbeing. It requires understanding whether or not an individual is living within their values and/or meeting their goals. Alternatively, social wellbeing is subjective and focuses on the outcome of interactions between positive emotions, negative emotions and long-term life satisfaction (Diener 1994). This sub-field is primarily focused on feelings and emotions, with current definitions addressing happiness, joy and feeling good (i.e. wellbeing is the maximization of pleasure and the decrease of malaise). This model aligns with hedonic approaches to understanding wellbeing. These two measures focus on the long-term facets of wellbeing, such as having stable relationships, self-confidence

and achieving goals. Our goal was to better understand the bi-directional relationship between grazing practices and wellbeing – i.e. how is wellbeing supported by nature and how does caring for nature influence wellbeing (Brown et al. 2021; Thompson et al. 2023; Drescher et al. 2024).

To address the limitations of using each of these theories individually, our mixed methods case study used the framework in Figure 1 to understand how social norms, attitudes, perceptions of control, values and wellbeing are related to the adoption of adaptive grazing practices and what impact these decisions have on farmer wellbeing. By integrating the Theory of Planned Behavior (Ajzen 2012), Values Beliefs Norms Theory (Stern et al. 1991) and Human Wellbeing (Ryff 1989; Diener 1994), we created a more robust way to understand why some farmers decide to use adaptive grazing practices, while others do not. Further, understanding the different mechanisms at play will help researchers, educators and service providers tailor their outreach and education in ways that increase the likelihood of a farmer adopting adaptive grazing practices. This is important because adaptive grazing management benefits' soil health and supports ecosystem regeneration (Bagheri and Teymouri 2022; Campbell and King 2022; Githinji et al. 2023; McDonald et al. 2023; Silveira et al. 2024). For example, farmers care deeply about the environment and consider themselves land stewards (Follett et al. 2025), an identity which impacts the management practices farmers adopt (LaCanne and Lundgren 2018; Newton et al. 2020; Bennett et al. 2021; Kenny and Castilla-Rho 2022; McWherter and Sherren 2024). The integration of wellbeing as a factor influencing farmer decision-making is relatively new within the United States, however research from Australia has been studying this for several years under the FarmWell program (Batterham et al. 2022). Results from the FarmWell program suggest that farmer wellbeing is both an outcome and an input for decisions about grazing management practices (Brew et al. 2016; Brown et al. 2021).

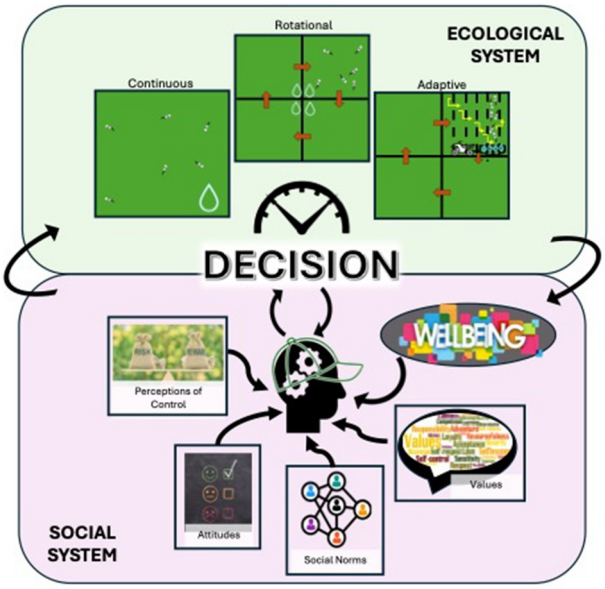

Figure 1. Theoretical framework used to guide this research investigating how the pre-decision-making factors impact grazing management outcomes on pasture-based beef farms. Perceptions of control, attitudes and social norms build on the theory of planned behavior (Ajzen 2012). Values and wellbeing are novel additions.

Methods

Our goal was to investigate how social norms, attitudes, perceptions of control and values are related to the grazing management practices, and how the wellbeing of pasture-based beef farmers in Michigan, USA, is both impacting and impacted by these behavioral choices. All research procedures were approved by the Institutional Review Board (IRB) at Michigan State University (MSU IRB category 45 CFR 46.101(b) 2).

We employed a sequential mixed-methods research design (Ivankova et al. 2006), firstly distributing an online survey followed by an interview with a subset of the survey sample. This approach allowed us to use existing and well-validated quantitative data collection tools for TPB, values and wellbeing, and then supplement those data with a richer understanding of causality from the interviews.

Study site

There are over 100,000 beef cows in Michigan, and the breakdown in herd size indicates that 77% of herds are under 100 head (National Agricultural Statistics Service 2024). Comparatively, the census reports that at the national level only 32% of farmers have herds under 100 head, indicating Michigan's average beef farm is smaller than the national average (National Agricultural Statistics Service 2024). Michigan is in located in the Great Lakes Forest ecoregion (Bailey, 1995) with introduced pasture species comprising cool-season (C3) grasses and legume species, specifically orchardgrass (*Dactylis glomerata*), timothy (*Phleum pratense*), smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), alfalfa (*Medicago sativa*), red clover (*Trifolium pratense*) and white clover (*Trifolium repens*).

Survey development and distribution

The survey was structured into five sections of questions: grazing management practices (four questions; Sherren et al. 2022), behavioral decisions (eight questions), values (10 questions; Schwartz 1992), life satisfaction (five questions; Diener 1994) and wellbeing

(22 questions) (Appendix 1). The wellbeing section included the concepts of physical wellbeing (International Wellbeing Group 2013), psychological wellbeing (Ryff 1989), social wellbeing (Diener 1994) and happiness (Barrington-Leigh 2017; Khalil 2018). The survey protocol is provided in Appendix 1. The questions covered broad topics around grazing-based agriculture (categorical), plus questions about environmental and financial attitudes, motivations behind management decisions and interpersonal relationships (Likert). We chose these topics to explore social norms, attitudes, perceptions of control and values because they are fundamental to all livestock farmers (Rivera et al. 2018; Bruno et al. 2021) and have been found to influence decision-making in conservation agriculture more broadly (Klain et al. 2017; Saxena et al. 2018; Chapman et al. 2019; Sherren et al. 2022).

The questions about management practices were a series of categorical multiple-choice questions that described various grazing management practices to create a spectrum of adaptive practices adoption, which was then used to calculate an adaptive score. These questions were originally developed by Sherren et al. (2022) and are intended to categorize farmers based on their grazing philosophy, cattle movements through different pastures, the length of the grazing period and whether they self-identify as using adaptive practices (i.e. using Holistic Planned Grazing, Adaptive Multi-Paddock, Management Intensive Grazing, etc.).

To address core elements of the framework, the Psychological Wellbeing Survey (Ryff 2014) was utilized to investigate social norms and perceptions of control. The survey also included a series of Likert-style questions we designed about environmental stewardship and financial wellness to gauge farmers' attitudes towards various management practices and their goals. For values, we used the Schwartz Short Value Survey (Schwartz 1992) to assess intrinsic values (Arias-Arévalo et al. 2017). Finally, the General Satisfaction with Life Survey and questions about happiness (Barrington-Leigh 2017; Khalil 2018) were incorporated to assess farmers' wellbeing. Demographic information, such as farm size, gender, age and education level, was gathered in the final section.

The survey was initially piloted with 10 members of the Michigan State University Extension (MSUE) Beef Team, and all feedback was incorporated into the final version. Subsequently, it was distributed through six different electronic mailing lists, potentially reaching 4202 farmers. These lists included:

(1) Michigan Cattleman's Association
(2) Michigan Beef Production Digest
(3) MSUE Grazing Networks

The surveys shared through the Beef Production Digest and the Cattleman's Association were distributed as part of their monthly e-newsletters in October and November 2020. Additionally, the Cattleman's Association sent a final follow-up email 4 days after the November e-newsletter, including a link to the survey and a request for participation. The four mailing lists from the MSUE educators were distributed directly through Qualtrics (2019, 2005).

The survey was first available October 20, near the end of the grazing season for Michigan beef farmers. Emailed individuals received a personalized link in the initial email and received two prompts to complete the survey, which were managed through Qualtrics (2019, 2005). The first prompt occurred 2 weeks after the initial email, and the second was 1 week later (Dillman et al. 2009). The survey closed on 10 December 2020. Upon closing, partially completed responses were included in the dataset, and all identifying information was removed.

Survey analysis

We created an adaptive score to investigate relationships between social norms, attitudes, perceptions of control and values and wellbeing among farmers with a spectrum of adaptive management practice adoption. The four questions used as a proxy for the adaptive management practices each farmer used were (1) Which grazing style is most similar to how you are grazing this year?; 2. How often are cattle moved between pastures?; 3. What is the average length of time cattle spend in each pasture?; and 4. Do you identify as an adaptive farmer?

All four questions were normalized using the min-max normalization equation: $\frac{(max_{new}-min_{new})}{max_{old}-min_{old}} * (x - min_{old}) + min_{new}$ (Singh and Singh 2020) adjusted to a range from zero to two. The normalized scores were then summed to create the adaptive score, which ranged from zero to eight. This range was chosen because it aligns with the ranges of the other variables. A score of zero indicated no adaptive practices were used, while an eight indicated only adaptive management practices were used.

The remaining survey questions about social norms, attitudes, perceptions of control and values were all Likert-style variables with a neutral center. Data cleaning on the General Satisfaction with Life Survey (Diener 2009) and the Psychological Wellbeing Survey (Ryff 2014) was conducted according to the guidelines of those authors. This involved reverse scoring variables to ensure that low scores were correlated with negative responses. The Schwartz Short Value Survey (Schwartz 1992) and motivations questions were not modified.

The data were analyzed using the Kruskal–Wallis *H* test to compare variance in medians and Spearman rho (*r*) correlation analysis. This was because the data were primarily ordinal, the sample size was small and the distribution across the adaptive score was skewed high (Lomax 2000; Kraska-Miller 2013). All survey data were analyzed in IBM Statistical Package for Social Sciences version 28 (IBM Corp 2022).

Interview development and data collection

The interview protocol was written after analyzing survey data to ensure that the interview questions aligned with the context of pasture-based beef production in Michigan (Appendix 2). We used a semi-structured interview approach, as described by Hesse-Biber (2016) and Rubin and Rubin (2005), which facilitated participant expressing themselves in greater depth and specificity (Creswell and Poth 2016; Young et al. 2018).

The interview protocol encompassed six sections: farm details, grazing spaces, grazing management practices, grazing plans and motivations, wellbeing and social networks. The content was tailored to each producer, and we discussed how and why they became a farmer, the land under management, on-farm enterprises and approaches to fencing. We then explored their grazing plans, the number of grazing spaces, animal movement patterns and other factors that influence decision-making. This iterative approach allowed us to understand participants' social norms, attitudes, perceptions of control and values behind management practice choices and to investigate the feedback loop between wellbeing and management practices.

Participants were recruited via the Qualtrics survey. The final question asked if the farmer would be willing to participate in a phone interview. Of the 113 survey respondents, 49 indicated they would be willing to be interviewed. The lead author sent an email to all 49 individuals requesting to schedule an interview, and 20 individuals consented. Interviews were scheduled in a random order determined by a random number generator, and the interview protocol was pilot tested with five farmers to ensure the questions were accurate, precise and well received. The first author conducted individual interviews with the 20 farmers between 24 February 2021 and 5 May 2021. All participants provided verbal consent for their interviews to be recorded and transcribed. Real-time notes were taken during each interview, and detailed memos were written after each interview to capture the unique insights and questions raised by the farmers, as recommended by Rubin and Rubin (2005). Each recording was transcribed using online transcription software (Otter.ai and Temi.com), followed by manual cleaning to ensure accuracy and to correct any textual errors.

To ensure consistency between the farmers' survey results and interview content, we compared opening questions about farm demographics and operation style to the survey results for each farmer. The interview included a narrative of their farming journey, discussions about pastures and the on-farm enterprises they engage in. After gaining a comprehensive understanding of the physical farm landscape (context), we shifted to questions about specific grazing management practices, the number of grazing spaces they utilize and the reasons behind their grazing management decisions. These questions explored the farmers' perceptions of control and attitudes related to management decisions. Additionally, we delved into the farmers' sense of well-being, identified sources of stress and explored sources of joy to capture nuanced insights into the lived experiences of Michigan's farmers. In the final section, we explored social networks, including the farmers' sources of information and support networks.

Interview analysis

The coding process was a multi-step process that began with deductively coding for perceptions of control, attitudes, social norms and values as informed by scholarly literature, and then inductively coded with themes that emerged from the interviews that were expressed by multiple participants. Two transcripts were independently coded by both authors, and the results were compared and discussed to ensure agreement between the coders (Patton 2015). Any discrepancies were resolved through consensus before finalizing the codebook and conducting the analysis (Patton 2015). Following this validation process, the lead author coded all interviews using MaxQDA 2020 (VERBI Software 2019), with a second round of coding for accuracy verification (Patton 2015). The codebook and interview protocol are included in Appendix 3. To protect the identity of the farmers, all quotes were anonymized and gender markers were removed.

Rather than a structured interview format, we opted for semi-structured interviews that allow an open discussion to explore themes pertinent to pasture-based beef farmers, particularly on-farm enterprises, financial and environmental stewardship, and management motivations. We used a multiple iteration, deductive-to-inductive analysis and the resulting code book served as a guide for contextualizing the survey findings (Phillippi and Lauderdale 2018) and investigating the relationship between social norms, attitudes, perceptions of control and values and various grazing management practices. There were eight codes applied to the interviews: enterprises; cattle/animal details; cattle feed; farm details; pastures,

paddocks, fields; coping/adapting; adaptive grazing opinions and motivations.

To ensure that the reasons for adopting different management practices were not solely due to external constraints, we explicitly asked the farmers, 'If you wanted to make changes to your management practices, would you be able to? Why or why not?' Each farmer responded that they could make changes if they wanted to. Accordingly, differences in management practices were treated as active choices rather than externally constrained.

Results

The survey included questions about environmental stewardship and financial wellness to gauge farmers' attitudes towards various management practices. It also included questions about motivations behind management decisions and about farmers' social networks. The analyses consider how social norms, attitudes, perceptions of control and values influence adaptive management practice adoption, and how wellbeing is supported by and influencing behavioral choices (Figure 1).

The survey was accessed by 216 farmers (5.1%) with a total of 173 responses. Of these, 113 surveys were completed and used in the analysis, a response rate of 2.7%. This rate is lower than the average 10% response rate observed in surveys targeting cattle producers, a rate which can exceed 20% with physically mailed surveys (Prokopy et al. 2019; Guo et al., 2023). There were no responses from the Michigan Beef Production Digest, which was the most robust mailing list. The demographics aligned with the findings of the USDA 2017 Agricultural Census (National Agricultural Statistics Service 2024) as well as the 2020 Michigan Beef Industry Report (McKendree et al. 2020) with ages ranging from 25 to 79 and most respondents were male (83%).

Survey adaptive score

The adaptive score was used as a numeric proxy for the number of adaptive management practices being utilized by each farmer (Figure 2). The maximum score was eight, the minimum was zero and the average was 5.51. To be classified as adaptive, the farm needed a score of eight, scores between 1 and 7 indicated rotational management and a score of zero indicated continuous grazing. Rotational farmers move their cattle at a predetermined interval, usually based on days of grazing or forage utilization with a set stocking density, and adaptive grazing is when cattle are rotated through multiple paddocks at a frequency and density that are constantly adapted to the environment to promote soil and ecosystem health.

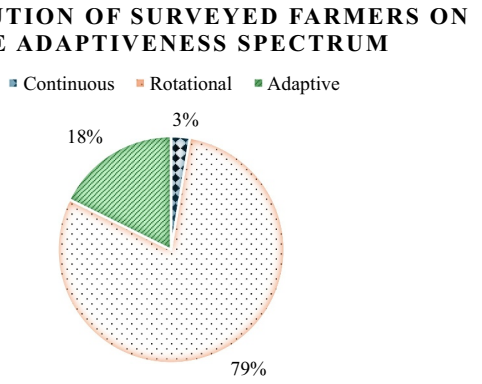

Figure 2. Pie chart showing the groupings of farmers' adaptive scores on the survey as a percentage of the total survey respondents ($N = 113$).

Survey social norms, attitudes, perceptions of control, values and wellbeing

Table 1 presents the questions with notable differences, their corresponding constructs from the theoretical framework, and the results of statistical tests. Responses to the question 'I consider the potential positive impacts of my farm on the environment' exhibited significant differences in the medians across adaptive scores ($p = 0.008$), accompanied by positive moderate correlations ($\rho = 0.394$; $p < 0.001$). Similarly, the question 'I consider the potential negative impacts of my farm on the environment' was moderately correlated with adaptive score ($\rho = 0.299$; $p = 0.001$), and there were differences in the median scores ($p = 0.023$). This indicates farmers with higher adaptive scores were more

Table 1. Table showing the significant differences in survey questions with a column showing which construct from the theoretical framework is being represented.

Questions with significant differences	Theoretical construct	Significance (*p*-value)
I consider the potential positive impacts of my farm on the environment	Attitudes	0.008
I consider the potential negative impacts of my farm on the environment	Attitudes	0.023
Looking at the future, in 5 years I expect my financial situation to improve	Attitudes and perception of control	0.046
I did not give up trying to make big changes in my life	Perceptions of control	0.018
Respect for tradition, humbleness, accepting one's portion in life, devotion, modesty	Values and social norms	0.031
Obedience, honoring parents and elders, self-discipline, politeness	Values and social norms	0.020
National security, family security, social order, cleanliness, reciprocation of favors	Values and social norms	0.019
Compared to 5 years ago, have you become more or less happy?	Wellbeing	0.023

likely to consider both the environmental benefits and costs related to how they manage their cattle.

Regarding financial attitudes, we observed moderate positive correlations between adaptive scores and believing the farm's financial situation will improve in the next 5 years ($p = 0.001$), accompanied by significant differences in the median adaptive scores ($p = 0.046$). These analyses show adaptive farmers are more optimistic about their future financial situation than the rotational farmers. One of the questions investigating self-confidence and perceptions of control, 'I did not give up trying to make big changes in my life', had a moderately positive correlation between the adaptive scores and the question ($p = 0.021$), and there were significant differences in the median scores ($p = 0.018$). This suggests adaptive farmers are more open to making changes and trying new things.

Conversely, the questions about human values from the Schwartz Short Value Survey exhibited moderate negative correlations between adaptive score and tradition ($\rho = -0.357$; $p < 0.001$), conformity ($\rho = -0.270$; $p = 0.004$) and security ($\rho = -0.257$; $p = 0.006$), accompanied by significant differences in the median scores of these values ($p = 0.031$; $p = 0.020$; $p = 0.019$, respectively). These results show that the only statistically significant difference between rotational and adaptive farmers was that rotational farmers were more likely to hold values related to maintaining traditions (tradition), preserving the status quo (conformity) and feeling secure (security) than adaptive farmers. Both groups scored high on values related to independence (self-direction) and caring for others (benevolence).

When examining responses to the survey questions about life satisfaction, psychological wellbeing and happiness, we found moderate positive correlations between the adaptive score and being happier now than in the past ($\rho = 0.354$), accompanied by significant differences in the medians of adaptive scores when comparing current to past happiness ($p = 0.023$). This indicates adaptive farmers consider themselves happier now than 5 years ago.

These survey analyses reveal that the constructs of social norms, attitudes, perceptions of control and values and wellbeing were significantly associated with adaptive management practice adoption. Given the overlap and inclusion of all constructs from our framework, we were confident in proceeding with the sequential interviews to provide contextualization and gain deeper insights.

Interview adaptive score

As depicted in Figure 3, out of the 20 interview participants, 12 scored an eight and will be referred to as adaptive farmers. The remaining eight participants were categorized as rotational farmers because their scores indicate that they incorporate some adaptive practices. Notably, none of the interview participants scored zero on the adaptive score, which limits our ability to offer contextualization for farmers who do not utilize any adaptive management practices.

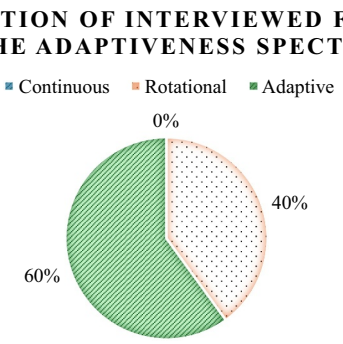

Figure 3. Pie chart showing the groupings of interviewed farmers' adaptive scores as a percentage of the total number of interviewed farmers ($N = 20$).

Interview social norms: A recurring theme in the interviews was the need to overcome social norms and previous education regarding cattle management. Among the 12 adaptive farmers interviewed, 7 were first-generation farmers, while 4 of the 9 rotational farmers were also first-generation. One adaptive farmer explained the impacts of social norms when they shared, *'[My spouse] had never been around farming so the Holistic Management was easy [for her]. She didn't have to unlearn anything' (F4).* Interestingly, the impact of management practices passed down by prior generations was not directly related to the grazing practices. Among the multi-generation farmers, there were discussions about the tendency to receive knowledge from parents and grandparents, which often led to less time and effort invested in learning about newer grazing practices. As stated by a rotational farmer, *'I have never actually done much reading or sat in on a seminar. I've heard a little bit about it, but don't know a lot' (F16).* The farmers who were applying adaptive grazing practices expressed this limitation as a need to 'unlearn' ecologically degrading practices that were passed to them; however, they also acknowledge the importance of place-based knowledge and mention receiving support from prior generations about many other aspects of farming. As stated by one adaptive farmer, *'[Older neighbor] farms in a totally different way than us and that's okay. You know, it doesn't prevent us from being friendly or neighborly' (F19).*

Interview attitudes

Adaptive farmers often discussed their attitudes towards the benefits of grazing for soil, plants, animals and humans, which served as a foundation for

their adaptive management decisions. They conceptualized raising cattle as part of a broader farm system, although not always in these terms. For instance, one adaptive farmer explained their attitude toward grazing management as, *'Healthy soil that produces healthy plants, that sustain healthy animals … that really is our motivation. To improve the health of all [parts of] the system including the customers that eat the beef that we produce' (F18).*

One common attitude among rotational farmers was that adaptive grazing 'wasted forage' because adaptive practices encourage leaving residual forage in the pasture to ensure a litter layer to protect bare soil and feed microbes. Additionally, rotational farmers were skeptical of the results described by advocates of adaptive grazing, particularly regarding their ability to reach their animal weight gain goals. They made comments like, *'I don't know if [adaptive grazing] works in the real world where you're managing a bunch of cows, but it's nice to see it on a little/finite scale how things can turn out' (F16).*

When asked why they chose to use adaptive practices, one adaptive farmer said, *'We started out grazing with the idea that it was the plants and the animals, and we never gave a thought to the life below the soil. What goes on below the soil is kind of important and we should be paying attention to it … You can't forget about soil life once you know it's down there' (F13).* Another adaptive farmer shared: *'I think it's unsustainable to grow, to devote so much land to row crops to feed cows grain. I think if we're serious about climate change the only way forward is to be practicing regenerative agriculture' (F19).* This attitude was echoed by another adaptive farmer who emphasized, '*If we don't look after the environment, then nobody does. Farmers are key to maintaining the environment. We've got to protect it as much as we can' (F2).*

However, when asked about the reasons behind their limited adoption of adaptive management practices, the rotational farmers focused on the potential negative impacts of management practices on the health of their cattle. A common belief among rotational farmers was that when cattle are moved more frequently, they will not gain as much weight as a cow who moves less or has less competition for food. One rotational farmer explained, *'We need to keep all the animals that we have on our farm healthy. I think it's responsible farming to do that' (F11)* in response to a prompt about why they do not rotate their cattle through paddocks more frequently.

While all the farmers sought to ensure the economic viability of their farms, there were distinct differences between the rotational and adaptive farmers in their expressions of these attitudes. One rotational farmer shared, *'Financially we haven't had an issue because my husband and I both work off-farm jobs as well. If we had done farming full time, then money would be a huge stressor' (F11).* Another rotational farmer expressed their concern, stating, '*there's way too much labor involved to ever, ever, ever be paid for what you do' (F16).* In contrast, the adaptive farmers said, '*It's been more about the soil health because that makes animal health better, and the animal health turns into profit' (F4).* Another adaptive farmer further emphasized the profitability of regenerating pastures, stating when they reflected on the difference in profits between their old continuous grazing system and their current adaptive system stating, '*Regenerative agriculture is actually the profitable thing to do' (F19).*

Interview perceptions of control

In general, farmers with higher adaptive scores tended to have a stronger sense of agency and believe they have control over their farms. One first-generation, adaptive farmer shared their story of running a dairy farm, explaining the challenges they faced in making a profit using a continuous grazing system. They mentioned that they '*were milking 28 to 30 cows. We were bottling all of it and delivering all of it, and it was just too much. We were making money, but honestly, it wasn't as profitable as what we do now' (F19).* To address these issues, the farmers exercised agency and transitioned to a pasture-based, adaptive grazing system. Another common opinion shared by adaptive farmers was explained as, *'it's something initially that seemed counterintuitive, you know, don't waste the grass. But, if you pull them off [the pasture] and supplement them some hay, you are actually saving yourself money because you get more grazing time off of that property' (F5).*

Interview values

Upon analysis, the interview data revealed that maintaining familial farming traditions held a stronger relationship with generational status than which management practices were used. For example, a rotational farmer shared their experience with what it means to be a multi-generation farmer, stating, *'We inherited the farm from my dad in 1997, and it took us 15 years to crawl out of debt. Most people would have, and most of my friends did, go bankrupt and out of business … . But this was my family farm, and you can't let that happen'. (F6).* Adaptive farmers discussed these inter-generational values as, *'I didn't grow up on a farm, but this farm was in our family. We lived remotely, but we spent a lot of time on the farm because it was my dad's passion. My wife and I came back to the farm in 1984' (F9).* An adaptive farmer shared, *'My dad is still working full time on the*

farm, and he is 87. He was 10 when he moved here. Now, I am the third generation, and the farm has been in the family for over 80 years' (F15). Due to the expectations and traditions of these prior generations, farmers who are inheriting a farm often feel limited to management practices that family members have used in the past.

Interview wellbeing

The interview data also provided insights into the wellbeing of the farmers. The farmers expressed a sense of determination and resilience by overcoming the challenges they faced and a deep commitment to preserving their family farm for future generations. When asked what they do when things on the farm are difficult, frustrating or just generally hard, the consensus was: *'It's not all perfect. There're days where it really sucks. There're some days that aren't great, but there are many more days that are good. And that's my peace, my solace. And so, emotionally I hope to continue to do it until I physically cannot' (F5)*.

Every farmer spoke about how much they enjoy watching cattle and emphasized that raising happy and healthy cattle is important for improving farmers' wellbeing. Interestingly, there were no differences between the rotational and adaptive farmers in how they described the best part of raising livestock. When speaking about wellbeing, a rotational farmer shared, *'Watching cattle out in the field is one of the most relaxing things in the world. When happy, healthy cattle are just lying there chewing their cud, it really doesn't get better than that' (F16)*. Another rotational farmer expressed, *'There's the "de-stressful" aspect of having a farm instead of living in a city. I escaped that world. I'm just literally outside walking around. I found farming and being out here to be a de-stressor' (F8)*.

Another theme that emerged was the role of caretaking as a driver of farmer wellbeing. It is evident and undeniable that many farmers care deeply about their livestock. Regardless of management practices, most farmers expressed a version of, *'I would say we love our cows' (F14)*. Adaptive farmers made comments, such as *'Sometimes the only thing that keeps us going is our love of the land and animals' (F10)* as well as *'I'm really into producing healthy meat that I know was ethically raised. We're super into low-stress cattle handling as well. And we always, always, always want our beef steers treated like kings' (F14)*. The theme of caretaking among the adaptive farmers was captured in the quote, *'I love seeing an animal do what they're created to. I love seeing herbivores graze. I love walking out in the evening, and checking them and seeing everybody super happy, eating the grass, or just digesting it' (F19)*. This theme is related to both the act of caring and the aesthetic value of cattle on the landscape.

Discussion

The results of this study indicate variations in the social norms, attitudes, perceptions of control, and values of farmers across adaptive scores. However, given its exploratory nature and innovative approach to mixed-methods research, there are few comparative studies. Consequently, much of the discussion will draw on broader research on farmer decision-making and motivations to inform our findings. Furthermore, we acknowledge that the adaptive score may need refinement, yet it builds upon the work of McWherter and Sherren (2024), Sherren et al. (2022), and Vivas and Hodbod (2024), who were among the first to categorize farmers based on their responses to questions about the adoption of adaptive grazing management practices.

Our results exhibited a distribution skewed toward farmers implementing many adaptive practices, which could be attributed to an over-sampling of these farmers or indicate the need to refine the questions to better capture the decision-making processes of diverse management styles. However, the interview data provided such depth to the results that we conclude that these results can likely be generalized to small-scale beef grazing farms across the United States, particularly in the Great Lakes region.

Adaptive scores

The demographic composition of our sample was similar to that reported in the 2020 Michigan Beef Industry Report (McKendree et al. 2020), indicating a representative sample. However, we observed a higher-than-expected proportion of farmers adopting adaptive management practices, as evidenced by scores of seven or higher. Whitt and Wallander (2022) reported that the USDA estimated that approximately 40% of cow-calf operations report using some adaptive management practices, not exclusively adaptive grazing. This suggests a national shift towards more sustainable practices in grazing management. This shift, primarily from continuous to rotational grazing, has been observed by other scholars such as Augustine et al. (2024), di Virgilio et al. (2019), McWherter and Sherren (2024), and Sherren et al. (2022). Our adaptively skewed sample may also reflect the nature of our distribution email lists. Individuals who sign up for the MSUE mailing lists tend to be attending courses focused on improving soil health and adaptive management. The Beef Digest and Michigan Cattleman's newsletters targeted a broader range of farmers who adopt a variety of grazing management practices but had limited

engagement, which impacted the generalizability of our results.

In recent years, Ajzen, the creator of TPB, co-authored an article about the use of the TPB in agriculture research, and the authors suggest that one of the most important aspects of using the construct is to ensure there is a pilot study conducted to gain contextual clarity (Sok et al. 2020). This is important for ensuring the right questions are being asked about the behaviors to elicit norms, attitudes and perceptions of control. This study provides unique insights into the factors that influence decisions about grazing management and benefits scholars who aim to use the TPB as a survey for structural equation models. The results discussed below will also help scholars, educators and service providers to better understand, first why farmers use particular management practices, and second how to encourage the use of adaptive, environmentally beneficial management practices.

Social norms

In the interviews, we found that the farm's generational situation was crucial in understanding the variations in social norms. Since this was a theme that emerged in the interviews, we had not included a question in the survey to quantify the differences in generational status, so thus cannot make comparisons between generational situations. This is an area for future research to explore the potential conflation between values and social norms unique to multi-generational operations. The interview data provided rich examples of how generational shifts influenced grazing management practices. This aligns with the findings of Coon et al. (2020) and Maseyk et al. (2021), who concluded that social norms and attitudes have the most significant impact on the adoption and implementation of adaptive management practices by generational farmers. Previous research has highlighted the importance of social connections in encouraging the adoption of adaptive management practices (Eaton et al. 2022; Fernández-Giménez and Wilmer 2024; Berthon et al. 2025). These studies generally suggest that having trusting relationships best facilitates change (Bodin et al. 2020; Pierrette Coulibaly et al. 2021; Joshi et al. 2024; Ranjan et al. 2024). Additionally, it is very important to consider the role of place-based and traditional wisdom and intergenerational learning in sustainable resource management. Many studies have shown that a deep understanding of the natural world, rooted in relational thinking and time-adapted wisdom, have significant potential for combating climate catastrophe (Goralnik et al. 2014; Wyllie de Echeverria and Thornton 2019; Gross et al. 2025).

Attitudes

There is growing research on farmers' attitudes toward adaptive grazing and conservation agriculture, which indicates a strong connection between farmers' attitudes toward nature and the management practices they use (Popovici et al. 2023; Savari et al. 2023; Drescher et al. 2024; Moreno-Perez et al. 2025). The idea that it is important to preserve the health of the pasture and avoid over-grazing, even at the expense of needing to purchase hay and take cattle off of the pasture, is a belief shared by many adaptive farmers. These findings indicate stewardship attitudes and love for nature, a finding similar to Monlezun (2023) and Pascual-Rico et al. (2021), who state that farmers' attitudes toward their cattle greatly impact their management practices. Our findings also align with broader knowledge about the role of environmental attitudes in promoting conservation behaviors (Otamendi-Urroz et al. 2023; Curll et al. 2025). Ultimately, it will be important to appeal to the attitudes farmers have toward caring for the land to encourage the adoption of adaptive management practices.

During the survey and interviews, farmers had varying perceptions of their financial situation, both positive and negative. Some scholars argue that finances are the primary barrier to transitioning to adaptive management (Baumgart-Getz et al. 2012; Reimer et al. 2014; Thompson et al. 2014; Lu et al. 2022), but they also acknowledge the nuances related to perceptions of control and attitudes regarding each farmer's unique context. We found that attitudes toward their financial situation varied across adaptive scores, with adaptive farmers generally having more optimistic attitudes than rotational farmers. The interviewed adaptive farmers did not report more financial security, rather they often discussed how limited they were by their finances. As such, we concluded the financial optimism is an attitude rather than a perception of control. While we could not directly compare financial attitudes to grazing management practices, literature suggests that higher economic performance is associated with the adoption of more conservation practices, particularly in degraded landscapes (Lu et al. 2022; Taramuel-Taramuel et al. 2023).

Perceptions of control

Ensuring that farmers have the confidence and resources required for implementing management changes is crucial for the successful adoption of adaptive grazing practices (Brown et al. 2022; Lu et al. 2022; Lalani et al. 2023). While all interview participants said they would be able to make changes to their management practices if they

desired, different perceptions of the benefits and costs of adaptive management were important considerations for the farmers (Floress et al. 2018; Church et al. 2020; Prokopy et al. 2020), we suggest further investigation to better understand contextual constraints, such as land availability and accessibility, financial capitol and challenges, such as access to water that are commonly cited as factors that limit management changes (Wagner et al. 2023; Kazanski et al. 2025).

Summarizing the constructs from the TPB, we found ample evidence of social norms, attitudes and perceptions of control that both limit and facilitate the adoption of adaptive grazing practices. This confirms the claims made by Ajzen over the years that the three universal drivers of behavioral intentions, what we refer to as decision-making, are necessary for understanding why people behave certain ways (Ajzen 2012; Sok et al. 2020). However, we expanded the construct and included the factors of values and wellbeing in the precursors to better capture the variety of factors influencing behavior choices.

Values

Family traditions emerged as a major influence on farmers' management practices. The survey results revealed that rotational farmers were more likely to prioritize values related to honoring traditions and maintaining the status quo. Interviews further underscored the connection between generational status and choice of grazing management practices. Carrying on tradition was often discussed in the context of passing the farm on to the next generation in the family or to a new farmer. The specific piece of land occupied by the farm was a source of immense pride on multi-generational operations, however there is also genuine fear about not the financial viability of farming and whether or not the farm business will survive for future generations. Hayden et al. (2025) and Żmija et al. (2020) emphasized the importance of generational knowledge transfer and cooperation between retiring and incoming generations in safeguarding small farms during these generational shifts. Additionally, the literature on conservation agriculture practice adoption aligns with these findings, suggesting that new farmers are more likely to adopt conservation farming practices than multi-generation farmers who tend to prioritize maintaining the conventional approaches inherited from prior generations (Baumgart-Getz et al. 2012; Liu et al. 2018; Prokopy et al. 2019).

Wellbeing

There were no differences in the median scores for long-term life satisfaction between management styles, with scores indicating overall satisfaction with life. However, adaptive farmers reported higher levels of happiness now compared to 5 years ago and the interviews consistently highlighted the beneficial effect that spending time in nature has on farmers' wellbeing. The wellbeing benefits of spending time in nature are well established in broader human wellbeing research (Riechers et al. 2021; Benessaiah and Chan 2023; Møller et al. 2023; Reyers and Bennett 2025). Farmers generally had a deep appreciation for nature and found it calming to spend time in their pastures. Throughout the interviews, farmers expressed their love for nature and their care for animals. More research is needed about wellbeing because many farmers emphasized how the animals positively influenced their personal wellbeing, a finding that is echoed in by other wellbeing scholars (Brown et al. 2021; Sherren et al. 2022), particularly in the study of how connecting with nature improves mental and physical health (Sundermann et al. 2023; Farkić et al. 2025; Morris and Morris 2026). However, some research has indicated there is no direct relationship between adaptive practice adoption and farmer wellbeing (Vivas and Hodbod 2024), thus more research is needed.

Implications for adaptive grazing management

Our findings revealed each farmer's attitudes, perceptions of control and values significantly influenced their choice to use adaptive grazing practices, thus, understanding these factors is essential for encouraging adoption. Social norms inherited from previous generations, attitudes about finances and livestock stewardship and values related to preserving traditions played strong roles in shaping the selection of grazing management practices. Lastly, wellbeing was supported by spending time in nature and farmers generally reported high levels of wellbeing. As such, encouraging and increasing the adoption of adaptive grazing management requires educators and service providers use language and examples that align with a variety of farmer values, norms, attitudes, perceptions of control and wellbeing goals. Through this approach, it will be possible to regenerate grazing lands and improve social-ecological wellbeing of livestock farms in Michigan and the United States more broadly due to the increased adoption of adaptive grazing practices.

Conclusions

These results show that when working with farmers who graze beef cattle, helping them see the farm as a system and encouraging them to reflect on why they use certain management practices has the potential to increase the adoption rates of adaptive grazing practices. According to the data, adaptive farmers placed more emphasis on considering environmental impacts, feeling confident when making changes and improving their wellbeing through land–animal relationships. Future research should explore social norms and values related to multi-generation farming, especially as we face the generational shift in agriculture. Current research on overcoming barriers to adoption highlights changes in education, such as language shifts and building social networks across management styles.

While not within the scope of this article, it is important to note that since collecting these data the field of farmer decision-making has exploded and there are many scholars bringing awareness to the different stages and transitions of switching from a continuous to rotational to adaptive grazing system. As with other behaviors, the more practice and exposure a farmer has to a certain behavior the more familiar and comfortable they become. In future analyses, it is worth investigating how the length of time using a given set of management practices influence farmers' attitudes and perceptions of control toward adaptive management and how managing adaptively over longer periods of time influences farmers' wellbeing.

When encouraging behavior changes, highlighting adaptive grazing's role in improving ecosystem health and sustaining personal wellbeing is valuable. By shifting from purely economic discussions to conversations and education about soil–plant–animal–farmer interconnectedness, we can help farmers achieve their goals and support the health of the whole social–ecological system. This research adds to a growing body of literature claiming humans' conservation behaviors are based on social norms, attitudes, perceptions of control and values, as well as to the research specifically about the role of systems thinking in the adoption of adaptive grazing management. In summary, while the specific conservation practice may change, any farmer who is managing an ecosystem adaptively will benefit from considering social norms, attitudes, perceptions of control and values, and wellbeing when making decisions about management practices.

Acknowledgements

The authors acknowledge the use of the Mistral LLM version 0.3. Prompts included requests for grammar corrections, edits for clarity and conciseness and a request for help brainstorming Figure 1. All images were created by the authors, and the generated suggestions were carefully edited to ensure integrity. We have reviewed and edited the final work and take full responsibility for the content. The authors want to acknowledge the following people for their assistance in giving feedback on the survey protocol used in this research: Kable Thurlow, Kim Cassida, Kevin Gould, Frank Wardynski, Phillip Durst, Jerry Lindquist, Dan Buskirk and Melissa McKendree. Additionally, we want to thank Dr. Jason Rowntree and Dr. Matt Raven for providing additional context about regenerative grazing, and Dr. Joao Sacramento and Jonathan Vivas for their assistance and feedback on the methods and results sections. Lastly, we want to send our deepest appreciation to the interview participants who shared their stories and insight into their lives; thank you for being vulnerable and honest with us.

Author contributions

CRediT: **Morgan MathisonSlee:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing; **Jennifer Hodbod:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study. For those who participated in both steps, the survey and the interview, consent was obtained independently for both protocols.

ORCID

Morgan MathisonSlee http://orcid.org/0000-0002-0615-6511
Jennifer Hodbod http://orcid.org/0000-0001-8899-6583

References

Ajzen I. 2012. The theory of planned behavior. In: Van Lange PA, Kruglanski AW, & Higgins ET, editors. Handbook of theories of social psychology. Vol. 1. SAGE Publications Ltd. p 438–459. https://doi.org/10.4135/9781446249215.n22

Alarcón-Segura V et al. 2023. Farm structure and environmental context drive farmers' decisions on the spatial distribution of ecological focus areas in Germany. Landsc Ecol. 38(9):2293–2305. https://doi.org/10.1007/s10980-023-01709-8

Arias-Arévalo P, Martín-López B, Gómez-Baggethun E. 2017. Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems. Ecol Soc. 22(4). https://doi.org/10.5751/ES-09812-220443

Augustine DJ et al. 2024. The LTAR grazing land common experiment at the Central Plains Experimental Range: collaborative adaptive rangeland management. J Environ Qual. 53(6):904–912. https://doi.org/10.1002/jeq2.20599

Bagheri A, Teymouri A. 2022. Farmers' intended and actual adoption of soil and water conservation practices. Agric Water Manag. 259:107244. https://doi.org/10.1016/j.agwat.2021.107244

Bailey RG. 1995. Description of the ecoregions of the United States. 2nd ed. Forest Service: United States Department of Agriculture.

Barrington-Leigh CP. 2017. Sustainability and well-being: a happy synergy. Great Transition Initiative.

Bartkowski B et al. 2023. Adoption and potential of agri-environmental schemes in europe: Cross-regional evidence from interviews with farmers. People Nat. 5 (5):1610–1621. https://doi.org/10.1002/pan3.10526

Basu NB et al. 2025. Connecting the past with restoration futures: integrating legacy thinking into environmental decision making. Environ Res Lett. 20(3):030201. https://doi.org/10.1088/1748-9326/ada16a

Batterham PJ et al. 2022. The farmwell study: examining relationships between farm environment, financial status and the mental health and wellbeing of farmers. Psychiatry Res Commun. 2(2):100036. https://doi.org/10.1016/j.psycom.2022.100036

Baumgart-Getz A, Prokopy LS, Floress K. 2012. Why farmers adopt best management practice in the United States: a meta-analysis of the adoption literature. J Environ Manage. 96(1):17–25. https://doi.org/10.1016/j.jenvman.2011.10.006

Benessaiah K, Chan KM. 2023. Why reconnect to nature in times of crisis? Ecosystem contributions to the resilience and well-being of people going back to the land in Greece. People Nat. 5(6):2026–2047. https://doi.org/10.1002/pan3.10546

Bennett EM et al. 2021. Ecosystem services and the resilience of agricultural landscapes. The future of agricultural landscapes, part II. p 1–43. https://doi.org/10.1016/bs.aecr.2021.01.001

Berthon K et al. 2025. Measuring the socio-economic and environmental outcomes of regenerative agriculture across spatio-temporal scales. Phil Trans R Soc B. 380 (1935):20240157. https://doi.org/10.1098/rstb.2024.0157

Bodin Ö et al. 2020. The impacts of trust, cost and risk on collaboration in environmental governance. People Nat. 2(3):734–749. https://doi.org/10.1002/pan3.10097

Borges JAR, Oude Lansink AGJM, Emvalomatis G. 2019. Adoption of innovation in agriculture: a critical review of economic and psychological models. Int J Innov Sustain Devel. 13(1):21. https://doi.org/10.1504/IJISD.2019.096705

Brew B, Inder K, Allen J, Thomas M, Kelly B. 2016. The health and wellbeing of Australian farmers: a longitudinal cohort study. BMC Public Health. 16(1):988. https://doi.org/10.1186/s12889-016-3664-y

Brown K, Schirmer J, Upton P. 2021. Regenerative farming and human wellbeing: are subjective wellbeing measures useful indicators for sustainable farming systems? Environ Sustain Indic. 11:100132. https://doi.org/10.1016/j.indic.2021.100132

Brown K, Schirmer J, Upton P. 2022. Can regenerative agriculture support successful adaptation to climate change and improved landscape health through building farmer self-efficacy and wellbeing? Curr ResEnviron Sustain. 4. https://doi.org/10.1016/j.crsust.2022.100170

Bruno JE, Fernandez-Gimenez ME, Balgopal MM. 2021. An integrated livelihoods and well-being framework to understand northeastern Colorado ranchers' adaptive strategies. Ecol Soc. 26(4). https://doi.org/10.5751/es-12754-260427

Burton RJF. 2004. Seeing through the 'good farmer's' eyes: towards developing an understanding of the social symbolic value of 'productivist' behaviour. Sociologia Ruralis. 44(2):195–215. https://doi.org/10.1111/j.1467-9523.2004.00270.x

Campbell A, King AEH. 2022. Choosing sustainability: decision making and sustainable practice adoption with examples from U.S. Great Plains cattle grazing systems. Animals. 12(3):286. https://doi.org/10.3390/ani12030286

Campbell BM et al. 2017. Agriculture production as a major driver of the earth system exceeding planetary boundaries. Ecol Soc. 22(4). https://doi.org/10.5751/ES-09595-220408

Capaldi CA, Dopko RL, Zelenski JM. 2014. The relationship between nature connectedness and happiness: a meta-analysis. Front Psychol. 5:976. https://doi.org/10.3389/fpsyg.2014.00976

Ceddia MG, Boillat S, Jacobi J. 2024. Transforming food systems through agroecology: enhancing farmers' autonomy for a safe and just transition. Lancet Planet Health. 8(11):e958–e965. https://doi.org/10.1016/S2542-5196(24)00234-1

Chapman M, Satterfield T, Chan KMA. 2019. When value conflicts are barriers: can relational values help explain farmer participation in conservation incentive programs? Land Use Policy. 82:464–475. https://doi.org/10.1016/j.landusepol.2018.11.017

Church SP, Lu J, Ranjan P, Reimer AP, Prokopy LS. 2020. The role of systems thinking in cover crop adoption: implications for conservation communication. Land Use Policy. 94. https://doi.org/10.1016/j.landusepol.2020.104508

Coon JJ, van Riper CJ, Morton LW, Miller JR. 2020. What drives private landowner decisions? Exploring non-native grass management in the eastern Great Plains. J Environ Manage. 276:111355. https://doi.org/10.1016/j.jenvman.2020.111355

Creswell JW, Poth CN. 2016. Qualitative inquiry and research design: choosing among five approaches. Sage Publications.

Curll SL, Stanley SK, Brown PM, O'Brien L V. 2025. Part of or apart from nature? Characteristics, environmental attitudes, and priorities of the nature (dis)connected. Ambio. 54(3):552–565. https://doi.org/10.1007/s13280-024-02096-3

Da Silveira HC et al. 2025. Productive characteristics of integrated agricultural systems with or without winter grazing and different fertilization strategies. Scientia Plena. 21(1). https://doi.org/10.14808/sci.plena.2025.010203

de Vries M, van Middelaar CE, de Boer IJM. 2015. Comparing environmental impacts of beef production systems: a review of life cycle assessments. Livest Sci. 178:279–288. https://doi.org/10.1016/j.livsci.2015.06.020

Dessart FJ, Barreiro-Hurlé J, van Bavel R. 2019. Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. Eur Rev

Agric Econ. 46(3):417–471. https://doi.org/10.1093/erae/jbz019
di Virgilio A, Lambertucci SA, Morales JM. 2019. Sustainable grazing management in rangelands: over a century searching for a silver bullet. Agr Ecosyst Environ. 283. https://doi.org/10.1016/j.agee.2019.05.020
Diener E. 1994. Assessing subjective well-being: progress and opportunities. Soc Indic Res. 31(2):103–157. https://doi.org/10.1007/BF01207052
Diener E. 2009. Assessing Well-Being. Diener E, Glatzer W, Moum T, Sprangers M, Vogel J, Veenhoven R, editors. Vol 39. Springer Science+Business Media. https://doi.org/10.1007/978-90-481-2354-4
Dillman DA, Smyth JD, Christian LM. 2009. Internet, mail, and mixed-mode surveys. 3rd ed. John Wiley & Sons.
Dondini M et al. 2023. Global assessment of soil carbon in grasslands: from current stock estimates to sequestration potential. https://hal.inrae.fr/hal-04020739
Drescher M, Hannay J, Feick RD, Caldwell W. 2024. Social psychological factors drive farmers' adoption of environmental best management practices. J Environ Manage. 350:119491. https://doi.org/10.1016/j.jenvman.2023.119491
Eaton WM et al. 2022. Advancing the scholarship and practice of stakeholder engagement in working landscapes: a co-produced research agenda. Socioecol Pract Res. 4(4):283–304. https://doi.org/10.1007/s42532-022-00132-8
Farkić J, May C, Pomfret G, Sand M, Shahvali M. 2025. Restoring 'love of life' through outdoor adventures: a biophilic approach. Int J Multiling Tour Res. 27(2). https://doi.org/10.1002/jtr.70023
Fernández-Giménez ME, Wilmer H. 2024. Towards a theory of pastoralist and rancher identity: insights for understanding livestock systems in transformation. Agric Hum Values. 42(2):845–862. https://doi.org/10.1007/s10460-024-10641-9
Fielding KS, Hornsey MJ. 2016. A social identity analysis of climate change and environmental attitudes and behaviors: insights and opportunities. Front Psychol. 7:121. https://doi.org/10.3389/fpsyg.2016.00121
Floress K et al. 2018. Measuring farmer conservation behaviors: challenges and best practices. Land Use Policy. 70:414–418. https://doi.org/10.1016/j.landusepol.2017.11.030
Follett E, Davis L, Wilson C, Cable J. 2025. Working for the environment: farmer attitudes towards sustainable farming actions in rural Wales, UK. Environment, Development and Sustainability 27(6): 13545–13564. https://doi.org/10.1007/s10668-024-04459-y
Frank DA, McNaughton SJ, Tracy BF. 1998. The ecology of the earth's grazing ecosystems. BioScience. 48(7):513–521. https://doi.org/10.2307/1313313
Garmestani A, Allen CR, Angeler DG, Gunderson L, Ruhl JB. 2023. Multiscale adaptive management of social–ecological systems. BioScience. 73(11):800–807. https://doi.org/10.1093/biosci/biad096
Githinji M, van Noordwijk M, Muthuri C, Speelman EN, Jan Hofstede G. 2023. Farmer land-use decision-making from an instrumental and relational perspective. Curr Opin Environ Sustain. 63. https://doi.org/10.1016/j.cosust.2023.101303
Goralnik L, Dobson T, Nelson MP. 2014. Storytelling morality: Ecofeminism, agrarianism, and pigs in the field. The Trumpeter. 30(1):15–32.
Gross M et al. 2025. Broadening the justifications for inclusive conservation: values associated with Nature's contributions to people. Conserv Lett. 18(5). https://doi.org/10.1111/conl.13129
Guo T, Marquart-Pyatt ST, Robertson GP. 2023. Using three consecutive years of farmer survey data to identify prevailing conservation practices in four Midwestern US states. Renew Agric Food Syst. 38. https://doi.org/10.1017/s1742170523000364
Hayden MT, Shin MW, Kinsella A, McNally B. 2025. Evidence from the ground: insights into collaborative farming for generational renewal. J Educ Chang Rural Stud. 113:103481. https://doi.org/10.1016/j.jrurstud.2024.103481
Heitschmidt RK, Dowhower SL, Walker JW. 1987. Some effects of a rotational grazing treatment on quantity and quality of available forage and amount of ground litter. Rangel Ecol Manag. 40(4):4.
Helne T, Hirvilammi T. 2015. Wellbeing and sustainability: a relational approach. Sustain Dev. 23(3):167–175. https://doi.org/10.1002/sd.1581
Hesse-Biber SB. 2016. In-depth interviewing. In: Hesse-Biber SN, editor. The practice of qualitative research: engaging students in the research process. 3rd ed. SAGE Publications. p 104–129.
IBM Corp. 2022. IBM SPSS Statistics for Macintosh. Vol. Macintosh. IBM Corporation.
International Wellbeing Group. 2013. Personal wellbeing index: 5th ed. In D. U. Centre on quality of life editor. Melbourne.
Ivankova NV, Creswell JW, Stick SL. 2006. Using mixed-methods sequential explanatory design: from theory to practice. Field Method. 18(1):3–20. https://doi.org/10.1177/1525822X05282260
Jacobo EJ, Martínez Ortiz UJ, Cotroneo SM, Rodríguez AM. 2024. Adaptive grazing of native grasslands provides ecosystem services and reduces economic instability for livestock systems in the flooding pampa, Argentina. Sustainability. 16(10):4229. https://doi.org/10.3390/su16104229
Joshi A, Diaz J, Kumar Chaudhary A, Jayaratne KSU, Galindo S. 2024. Enhancing effectiveness of extension program evaluations by validating the trustworthiness of self-reported measures of extension program outcomes. Adv Ag Dev. 5(4):59–71. https://doi.org/10.37433/aad.v5i4.519
Kazanski CE et al. 2025. Context is key to understand and improve livestock production systems. Global Food Secur. 45:100840. https://doi.org/10.1016/j.gfs.2025.100840
Kenny DC, Castilla-Rho JC. 2022. What prevents the adoption of regenerative agriculture and what can we do about it? Lessons from behaviorally attuned participatory modelling exercise in Australia. Land. 11(9). https://doi.org/10.3390/land11091383
Khalil EL. 2018. Wellbeing and happiness. J Value Inq. 53(4):627–652. https://doi.org/10.1007/s10790-018-9678-1
Kim J et al. 2023. Evaluating the impacts of alternative grazing management practices on soil carbon sequestration and soil health indicators. Agr Ecosyst Environ. 342. https://doi.org/10.1016/j.agee.2022.108234
Klain SC, Olmsted P, Chan KMA, Satterfield T. 2017. Relational values resonate broadly and differently than intrinsic or instrumental values, or the new ecological paradigm. PLOS ONE. 12(8):e0183962. https://doi.org/10.1371/journal.pone.0183962
Knowler D, Bradshaw B. 2007. Farmers' adoption of conservation agriculture: a review and synthesis of recent

research. Food Policy. 32(1):25–48. https://doi.org/10.1016/j.foodpol.2006.01.003
Kraska-Miller M. 2013. Nonparametric statistics for social and behavioral sciences. 1st ed. Chapman and Hall/CRC. https://doi.org/10.1201/b16188
Kreitzman M, Chapman M, Keeley KO, Chan KMA. 2021. Local knowledge and relational values of Midwestern woody perennial polyculture farmers can inform tree-crop policies. People Nat. 4(1):180–200. https://doi.org/10.1002/pan3.10275
LaCanne CE, Lundgren JG. 2018. Regenerative agriculture: merging farming and natural resource conservation profitably. PeerJ. 6:e4428. https://doi.org/10.7717/peerj.4428
Lalani B, Gray S, Mitra-Ganguli T. 2023. Systems thinking in an era of climate change: does cognitive neuroscience hold the key to improving environmental decision making? A perspective on climate-smart agriculture. Front Integr Neurosci. 17:1145744. https://doi.org/10.3389/fnint.2023.1145744
Lavoie A, Wardropper CB. 2021. Engagement with conservation tillage shaped by "good farmer" identity. Agric Hum Values. 38(4):975–985. https://doi.org/10.1007/s10460-021-10205-1
Leitschuh B, Stewart WP, van Riper CJ. 2022. Place-making in the corn belt: the productivist landscapes of the "good farmer". J Educ Chang Rural Stud. 92:415–424. https://doi.org/10.1016/j.jrurstud.2022.05.002
Liu T, Bruins RJF, Heberling MT. 2018. Factors influencing farmers' adoption of best management practices: a review and synthesis. Sustainability. 10(2):432. https://doi.org/10.3390/su10020432
Lomax RG. 2000. Statistical concepts: a second course for education and the behavioral sciences. 2nd ed. Lawrence Erlbaum Associates.
Lu J et al. 2022. A meta-analysis of agricultural conservation intentions, behaviors, and practices: insights from 35 years of quantitative literature in the United States. J Environ Manage. 323:116240. https://doi.org/10.1016/j.jenvman.2022.116240
Martínez-García V, Martínez-Paz JM, Alcon F. 2025. Sustainability assessment of agricultural practices integrating both LCA and ecosystem services approaches. Ecosyst Serv. 72:101698. https://doi.org/10.1016/j.ecoser.2025.101698
Maseyk F et al. 2021. Managing and protecting native biodiversity on-farm – what do sheep and beef farmers think? New Zealand J Ecol. https://doi.org/10.20417/nzjecol.45.1
McDonald SE et al. 2023. Grazing management for soil carbon in Australia: a review. J Environ Manage. 347:119146. https://doi.org/10.1016/j.jenvman.2023.119146
McKendree MGS et al. 2020. Needs assessment of the Michigan beef industry. Michigan State University Extension. p 51.
McWherter B, Sherren K. 2024. Exploring mental systems within regenerative agriculture: systems thinking and rotational grazing adoption among Canadian livestock producers. Agric Hum Values. 42(1):213–226. https://doi.org/10.1007/s10460-024-10597-w
Møller V, Cocks M, Vetter S. 2023. Nature-connectedness and well-being experienced during best and worst times of life: a case for safeguarding biocultural diversity. Soc Indic Res. 165(3):1053–1089. https://doi.org/10.1007/s11205-023-03063-3
Monlezun AC. 2023. Why we should consider cattle partners. Rangelands. 45(1):12–16. https://doi.org/10.1016/j.rala.2022.10.001
Monlezun AC, Jones KW, Rhoades R, Lynn SJ. 2024. Seeking common ground: a pluralistic valuation of rangeland ecosystem services. Rangelands. 46(3):72–87. https://doi.org/10.1016/j.rala.2024.03.003
Morais TG, dos Santos MP, Barão L, Domingos T, Teixeira RFM. 2025. Grazing or confining — decoding beef's environmental footprint. Environ Impact Assess Rev. 112:107846. https://doi.org/10.1016/j.eiar.2025.107846
Moreno-Perez C, Mora-Motta D, Ortiz-Morea FA, Blesh J, Silva-Olaya AM. 2025. Transitioning from extensive pastures to silvopastoral systems improves multiple soil ecosystem services in Colombian Amazon. Sci Total Environ. 974:179185. https://doi.org/10.1016/j.scitotenv.2025.179185
Morris B, Morris K. 2026. Psychological factors that influence the nature-health relationship in the agricultural industry; insights for providing more effective mental health support to farmers. J Educ Chang Rural Stud. 121:103934. https://doi.org/10.1016/j.jrurstud.2025.103934
Morris CD. 2024. From forage to multifunctionality: shifting perceptions of rangeland ecosystem services in the journals of the Grassland Society of Southern Africa. Afr J Range Sci. 42(1):1–12. https://doi.org/10.2989/10220119.2024.2356674
National Agricultural Statistics Service. 2024. Quick Stats.
Newton P, Civita N, Frankel-Goldwater L, Bartel K, Johns C. 2020. What is regenerative agriculture? A review of scholar and practitioner definitions based on processes and outcomes. Front Sustain Food Syst. 4. https://doi.org/10.3389/fsufs.2020.577723
Otamendi-Urroz I et al. 2023. The role of emotions in human–nature connectedness within Mediterranean landscapes in Spain. Sustainabil Sci. 18(5): 2181–2197. https://doi.org/10.1007/s11625-023-01343-y
Pascual-Rico R et al. 2021. Usually hated, sometimes loved: a review of wild ungulates' contributions to people. Sci Total Environ. 801:149652. https://doi.org/10.1016/j.scitotenv.2021.149652
Patton MQ. 2015. Qualitative research & evaluation methods: integrating theory and practice. Sage Publications.
Paulus A et al. 2022. Landscape context and farm characteristics are key to farmers' adoption of agri-environmental schemes. Land Use Policy. 121:106320. https://doi.org/10.1016/j.landusepol.2022.106320
Phillippi J, Lauderdale J. 2018. A guide to field notes for qualitative research: context and conversation. Qual Health Res. 28(3):381–388. https://doi.org/10.1177/1049732317697102
Pierrette Coulibaly T, Du J, Diakité D, Abban OJ, Kouakou E. 2021. A proposed conceptual framework on the adoption of sustainable agricultural practices: the role of network contact frequency and institutional trust. Sustainability. 13(4):2206. https://doi.org/10.3390/su13042206
Popovici R et al. 2023. The social factors influencing cover crop adoption in the Midwest: a controlled comparison. Environ Manage. 72(3):614–629. https://doi.org/10.1007/s00267-023-01823-y
Prokopy LS et al. 2019. Adoption of agricultural conservation practices in the United States: evidence from 35 years of quantitative literature. J Soil Water Conserv. 74(5):520–534. https://doi.org/10.2489/jswc.74.5.520

Prokopy LS et al. 2020. The urgency of transforming the Midwestern U.S. landscape into more than corn and soybean. AgricultureHum Values. 37(3):1–3. https://doi.org/10.1007/s10460-020-10077-x

Qualtrics. 2019, 2005. Qualtrics xm 2019. Qualtrics.

Ranjan P et al. 2024. Exploring the role of 'intermediaries' between non-operating landowners and tenant farmers in promoting conservation on rented farmland. Environ Manage. 73(4):713–724. https://doi.org/10.1007/s00267-024-01936-y

Reimer A et al. 2014. People, place, behavior, and context: a research agenda for expanding our understanding of what motivates farmers' conservation behaviors. J Soil Water Conserv. 69(2):57A–61A. https://doi.org/10.2489/jswc.69.2.57A

Reyers B, Bennett EM. 2025. Whose conservation revisited: how a focus on people-nature relationships spotlights new directions for conservation science. Philos Trans R Soc Lond B Biol Sci. 380(1917):20230320. https://doi.org/10.1098/rstb.2023.0320

Riechers M, Martín-López B, Fischer J. 2021. Human–nature connectedness and other relational values are negatively affected by landscape simplification: insights from Lower Saxony, Germany. Sustain Sci. 17(3):865–877. https://doi.org/10.1007/s11625-021-00928-9

Rivera M et al. 2018. Rethinking the connections between agricultural change and rural prosperity: a discussion of insights derived from case studies in seven countries. J Educ Chang Rural Stud. 59:242–251. https://doi.org/10.1016/j.jrurstud.2017.07.006

Roche LM, Cutts BB, Derner JD, Lubell MN, Tate KW. 2015. On-ranch grazing strategies: context for the rotational grazing dilemma. Rangel Ecol Manag. 68(3):248–256. https://doi.org/10.1016/j.rama.2015.03.011

Rowntree JE et al. 2020. Ecosystem impacts and productive capacity of a multi-species pastured livestock system. Front Sustain Food Syst. 4. https://doi.org/10.3389/fsufs.2020.544984

Rubin HJ, Rubin IS. 2005. Qualitative interviewing: The art of hearing data. 2nd ed. SAGE Publications, Inc. https://doi.org/10.4135/9781452226651

Ryff CD. 1989. Happiness is everything, or is it? Explorations on the meaning of psychological well-being. J Pers Soc Psychol. 57(6):1069–1081. https://doi.org/10.1037/0022-3514.57.6.1069

Ryff CD. 2014. Psychological well-being revisited: advances in the science and practice of eudaimonia [article]. Psychother Psychosom. 83(1):10–28. https://doi.org/10.1159/000353263

Sanderman J, Hengl T, Fiske GJ. 2017. Soil carbon debt of 12,000 years of human land use. Proc Natl Acad Sci U S A. 114(36):9575–9580. https://doi.org/10.1073/pnas.1706103114

Savari M, Damaneh HE, Damaneh HE, Cotton M. 2023. Integrating the norm activation model and theory of planned behaviour to investigate farmer pro-environmental behavioural intention. Sci Rep. 13(1):5584. https://doi.org/10.1038/s41598-023-32831-x

Saxena AK, Chatti D, Overstreet K, Dove MR. 2018. From moral ecology to diverse ontologies: relational values in human ecological research, past and present. Curr Opin Environ Sustain. 35:54–60. https://doi.org/10.1016/j.cosust.2018.10.021

Schwartz S. 1992. Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. Adv Exp Soc Phychol. 25:1–65.

Sherren K, Hodbod J, MathisonSlee M, Chappell E, King M. 2022. Adaptive multi-paddock grazing and wellbeing: uptake, management practices and mindset among Canadian beef producers. Agroecol Sustain Food Syst. 46(9):1304–1329. https://doi.org/10.1080/21683565.2022.2107597

Si H et al. 2019. Application of the theory of planned behavior in environmental science: a comprehensive Bibliometric analysis. Int. J. Environ. Res. Public Health. 16(15). https://doi.org/10.3390/ijerph16152788

Silveira ML et al. 2024. Opportunities to increase soil carbon sequestration in grazing lands in the Southeastern United States. Grassland Res. 3(1):69–78. https://doi.org/10.1002/glr2.12074

Singh D, Singh B. 2020. Investigating the impact of data normalization on classification performance. Appl Soft Comput. 97:105524. https://doi.org/10.1016/j.asoc.2019.105524

Sok J, Borges JR, Schmidt P, Ajzen I. 2020. Farmer behaviour as reasoned action: a critical review of research with the theory of planned behaviour. J Agric Econ. 72(2):388–412. https://doi.org/10.1111/1477-9552.12408

Souza PO et al. 2025. Are stakeholders aware of the contributions of ecosystem services for their well-being? A case study of a UNESCO Geopark project in Brazil. Hum Ecol. 52(6):1203–1216. https://doi.org/10.1007/s10745-024-00558-6

Stanley PL, Rowntree JE, Beede DK, DeLonge MS, Hamm MW. 2018. Impacts of soil carbon sequestration on life cycle greenhouse gas emissions in Midwestern USA beef finishing systems. Agric Syst. 162:249–258. https://doi.org/10.1016/j.agsy.2018.02.003

Stern P, Dietz T, Abel T, Guagnano G, Kalof L. 1991. A value-belief norm theory of support for social movements: the case of environmentalism. Hum Ecol Rev. 6(2):81–97.

Sundermann M, Chielli D, Spell S. 2023. Nature as medicine: the 7th (unofficial) pillar of lifestyle medicine. Am J Lifestyle Med. 17(5):717–729. https://doi.org/10.1177/15598276231174863

Taramuel-Taramuel JP, Montoya-Restrepo IA, Barrios D. 2023. Drivers linking farmers' decision-making with farm performance: a systematic review and future research agenda. Heliyon. 9(10):e20820. https://doi.org/10.1016/j.heliyon.2023.e20820

Teague R et al. 2016. The role of ruminants in reducing agriculture's carbon footprint in North America. J Soil Water Conserv. 71(2):156–164. https://doi.org/10.2489/jswc.71.2.156

Teague R, Provenza F, Kreuter U, Steffens T, Barnes M. 2013. Multi-paddock grazing on rangelands: why the perceptual dichotomy between research results and rancher experience? J Environ Manage. 128:699–717. https://doi.org/10.1016/j.jenvman.2013.05.064

Thompson AW, Reimer A, Prokopy LS. 2014. Farmers' views of the environment: the influence of competing attitude frames on landscape conservation efforts. Agric Hum Values. 32(3):385–399. https://doi.org/10.1007/s10460-014-9555-x

Thompson B, Leduc G, Manevska-Tasevska G, Toma L, Hansson H. 2023. Farmers' adoption of ecological practices: a systematic literature map. J Agric Econ. 75(1):84–107. https://doi.org/10.1111/1477-9552.12545

VERBI Software. 2019. MAXQDA 2020. In VERBI Software. maxqda.com.

Vivas J, Hodbod J. 2024. Exploring the relationship between regenerative grazing and ranchers' wellbeing.

J Educ Chang Rural Stud. 108:103267. https://doi.org/10.1016/j.jrurstud.2024.103267

Wagner M, Waterton C, Norton LR. 2023. Mob grazing: a nature-based solution for British farms producing pasture-fed livestock. Nat-Based Sol. 3:100054. https://doi.org/10.1016/j.nbsj.2023.100054

Wang F, Shi X, Fan Y. 2024. Factors influencing the relationship between perceptions of ecosystem services and well-being of farmers in the Ore-Agriculture Zone, China. Ecol Indic. 166:166. https://doi.org/10.1016/j.ecolind.2024.112350

Wang T, Kreuter U. 2025. Revisiting the rotational grazing dilemma: the role of terminology in system comparison outcomes. Rangel Ecol Manag. 98:246–255. https://doi.org/10.1016/j.rama.2024.06.015

West S et al. 2018. Stewardship, care and relational values. Curr Opin Environ Sustain. 35:30–38. https://doi.org/10.1016/j.cosust.2018.10.008

Westerink J et al. 2021. Can a 'good farmer' be nature-inclusive? Shifting cultural norms in farming in the Netherlands. J Educ Chang Rural Stud. 88:60–70. https://doi.org/10.1016/j.jrurstud.2021.10.011

Whitt C, Wallander S. 2022. Rotational grazing adoption by cow-calf operations. US Dept. of Agriculture.

Wyllie de Echeverria VR, Thornton TF. 2019. Using traditional ecological knowledge to understand and adapt to climate and biodiversity change on the Pacific coast of North America. Ambio. 48(12):1447–1469. https://doi.org/10.1007/s13280-019-01218-6

Young JC et al. 2018. A methodological guide to using and reporting on interviews in conservation science research. Methods Ecol Evol. 9(1):10–19. https://doi.org/10.1111/2041-210X.12828

Żmija K et al. 2020. Small farming and generational renewal in the context of food security challenges. Global Food Secur. 26:100412. https://doi.org/10.1016/j.gfs.2020.100412