

Exploring the Relationship between Regenerative Grazing and Ranchers' Wellbeing

1. Introduction

Livestock production is facing significant challenges due to declining ecosystem health and increasing reliance on external inputs, which compromises the resilience of farms (i.e., against the market and extreme weather uncertainties) and impacts the wellbeing of producers (Jackson, 2022; Spratt et al., 2021). Saliman & Petersen-Rockney (2022) highlight the adverse effects of climate change and financial and emotional hardships on ranchers in the western United States, resulting in increased distress, anxiety, interpersonal tension, and alcohol consumption which have contributed to a decline in psychological wellbeing among this population. The shift towards conservation paradigms in recent decades has created opportunities for adaptive grazing practices, which offer a promising approach for building and regenerating farms' ecosystem health while also delivering societal benefits (Spratt et al., 2021).

Regenerative grazing, also known as adaptive grazing, is an approach that prioritizes soil health and adaptive livestock management principles to improve both human health - potentially improving nutrition and reducing the use of chemical inputs - and ecosystem health in livestock production systems by bolstering ecosystem functions (Newton et al., 2020; Spratt et al., 2021).

This approach commonly involves maintaining short periods of intense grazing followed by long rest periods to support the paddock's recovery and build on the relationship between livestock and grassland (Teague & Kreuter, 2020). The literature on regenerative grazing has mainly focused on providing empirical evidence of the ecological benefits. Research has shown that regenerative practices can generate significant ecosystem services on and off the farm (Franzluebbers et al., 2012), providing opportunities for greater plant and insect species richness and birds (Goosey et al., 2019; Lwiwski et al., 2015; Lyons et al., 2017); improving soil structure and microbial communities (Glover et al., 2010; Teague & Kreuter, 2020); increasing water retention, water infiltration, improving soil fertility and preventing soil erosion (J. Y. Park et al., 2017; J.-Y. Park et al., 2017). Furthermore, regenerative grazing may significantly reduce a livestock grazing system's carbon footprint when compared with conventional grazing systems (Becker et al., 2022; Gosnell, Charnley, et al., 2020; Stanley et al., 2018; Thompson & Rowntree, 2020) while providing sufficient feed for cattle weight gain (Fruet et al., 2019; Rowntree et al., 2020).

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31 While the ecological benefits have been extensively studied, the societal ones received
32 much less attention (Gosnell, Grimm, et al., 2020; Spratt et al., 2021). The socio-economic benefits
33 have been mainly financial, linked to biophysical benefits that diversified farming operations
34 provide – i.e., the literature suggests that improvement in herd health is likely to reduce veterinary
35 costs (Dumont et al., 2022; Gosnell, Charnley, et al., 2020) and that multi-paddock grazing systems
36 outperform continuous grazing systems in ecological function, which is predicted to feedback
37 positively in ranching profitability (Gosnell, Charnley, et al., 2020; LaCanne & Lundgren, 2018;
38 Teague & Dowhower, 2022). However, the empirical evidence from regenerative farms is mixed.
39 Alfaro-Arguello et al., (2010) show that holistic management (a decision-making framework that
40 includes adaptive grazing management to improve land use, thus considered within regenerative
41 grazing) can improve farms' sustainability but suggest it can be compromised by government
42 assistance, particularly in cases where subsidies for input purchases do not lead to regional changes
43 in the total energy or resources invested in the livestock system. Other research, such as and Franke
44 & Kotzé, (2022); Hawkins et al., (2022); Windh et al., (2020), suggestediscussed that the impact of
45 high-density grazing systems did not affecton farm productivity and profitability is inconclusive
46 or may be negative due to higher labor, time, and infrastructure costs, as well as variability in
47 animal weight. The contested results regarding socio-economic benefits call for research that can
48 further the understanding of the benefits of regenerative grazing.

49 Despite farmers' wellbeing being a concern and motivation for promoting or assessing the
50 effectiveness of regenerative practices, the discussion of the benefits of regenerative grazing has
51 mainly focused on productivity and profitability. Research has shown that farmers adopt climate
52 mitigation management practices, which overlap with regenerative practices, to pursue multiple
53 benefits, such as reducing animal stress, enhancing their farm resilience to financial shocks and
54 environmental conditions, reducing working time, and inheriting a healthy farm for the next
55 generations, reflecting farmers' holistic thinking and how success is defined (Gosnell, Charnley,
56 et al., 2020; Mann & Sherren, 2018). As highlighted by (Gosnell, Grimm, et al., 2020), for
57 regenerative farmers, success is not just about financial gains, but also about improving their
58 overall quality of life. Then, it is imperative to broaden the discourse on regenerative grazing to
59 include its potential impact on the wellbeing of farmers.

60 The concept of human wellbeing has evolved during the last decades to encompass multiple
61 factors, such as health, relationships, meaning, positive emotion, and the absence of anxiety,

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62 depression, and fear, which are viewed as important for optimal human functioning (Adler &
63 Seligman, 2016). Within the regenerative grazing literature, there are some examples that link such
64 factors that can influence farmers' wellbeing with the adoption of these practices. Mann & Sherren
65 (2018) describe that ranchers in the USA, Australia, and Canada report benefits such as quality of
66 life, resilience, and social capital and identified managing crisis and desperation as factors why
67 people were interested in training in adaptive grazing management. Barton et al., (2020) found that
68 holistic management practices improved ranchers' communication with stakeholders and their
69 confidence in handling difficult situations (e.g., droughts). Carien De Villiers et al., (2014)
70 described that adaptive grazing practices enhanced social engagement and learning networks
71 among ranchers in South Africa, and Derner et al., (2021) suggests that the value of adopting
72 adaptive grazing management practices is how it changes the way ranchers manage the
73 complexities of operating a ranch and rethinking their relationship with it. Interestingly, Gosnell
74 et al., (2019) found that mechanisms such as social isolation, a sense of community, public
75 recognition, and enthusiasm among others were influencing long-term commitment to
76 regenerative or holistic management practices in Australian ranchers.

77 ~~There is a growing recognition of the importance of social outcomes such as~~
78 ~~wellbeing including aspects of farmers' life~~ in the assessment of regenerative grazing
79 ~~(citation?) (Spratt et al., 2021) has emphasized the need to examine or identify the wellbeing~~
80 ~~outcomes associated with the adoption of regenerative practices.~~ As previously mentioned, the
81 literature has hinted at how regenerative grazing may impact farmers' wellbeing, however, few
82 studies have explicitly measured the impact of regenerative grazing systems on wellbeing
83 outcomes. In a study with those practicing extensive livestock grazing in Australia (and thus
84 assumed to include those using regenerative practices), Brown et al., (2021) found that extensive
85 practices were significantly correlated with subjective wellbeing measures such as life satisfaction,
86 worthwhileness, the standard of living, personal health, achieving in life, personal safety, and
87 community connectedness. Using the same 'Regional Wellbeing Survey' but from the following
88 year, Brown et al., (2022) found evidence that managing extensive cattle and/or sheep grazing
89 properties can increase farmers' self-efficacy and enhance their wellbeing and thus farmers' self-
90 perception of how they manage their land can also lower their wellbeing. In a comparative study
91 of Adaptive Multi-Paddock (AMP, a type of regenerative grazing), rotational, and conventional
92 Canadian beef producers, Sherren et al., (2022) found that AMP grazers have significantly higher

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93 levels of physical (health) wellbeing, while levels of financial, relational and psychological
94 wellbeing were strong for all sub-groups. These studies certainly provide important insight into
95 the positive relationship between regenerative grazing and wellbeing. ~~U- and suggest that~~
96 ~~understanding farmers' wellbeing outcomes is, therefore~~ crucial to promote the adoption of
97 regenerative practices.

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98 ~~This study aims to contribute to this emerging body of literature assessing the perceived benefits~~
99 ~~of wellbeing for regenerative grazers in the US, where no similar study has been conducted. We~~
100 ~~highlight social wellbeing as a holistic concept to integrate the multiple societal benefits that may~~
101 ~~originate — e.g., pleasure, self-determination, relationships, and improvements in financial and~~
102 ~~health outcomes.~~

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103 ~~We argue that understanding the social wellbeing outcomes of regenerative agriculture techniques~~
104 ~~is as crucial as understanding the ecological impacts, as we need to ensure these methods don't~~
105 ~~create social harm before scaling up adoption. Therefore, this paper aims to address these concerns~~
106 ~~through a twofold approach: proposing and testing a holistic framework for capturing farmers~~
107 ~~wellbeing complexity (or multidimensionality), and measuring the wellbeing outcomes across~~
108 ~~different grazing management practices for beef producers in Michigan, USA. Once we know that~~
109 ~~regenerative agriculture doesn't erode social wellbeing, we can use insights from livestock~~
110 ~~producers on this topic to further justify the transition to regenerative farming systems that~~
111 ~~withstand environmental stressors while supporting the wellbeing of the farmers (Brown et al.,~~
112 ~~2021). In this study, w~~We first propose a novel framework for assessing social wellbeing (Figure
113 1, explained below) and second, we use the framework to measure the social wellbeing outcomes
114 of beef producers in Michigan, also exploring potential variations among different grazing
115 management practices.

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116 ~~This study aims to contribute to this emerging body of literature assessing the perceived benefits~~
117 ~~of wellbeing for regenerative grazers in the US, where no similar study has been conducted. We~~
118 ~~first highlight social wellbeing as a holistic concept and propose a novel framework for~~ assessing
119 assessing multidimensional wellbeing, that it that integrates 5 key domains of wellbeing: (1) Life
120 Satisfaction, (2) Hedonic, (3) Eudaimonic, (4) Relational, and (5) Physical Wellbeing (see Figure
121 224 in sSection 2.2.1 in methods). Second, we ~~use~~ pilot the framework to measure the social
122 wellbeing.

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123 wellbeing outcomes of beef producers in Michigan, also exploring potential variations among
124 different grazing management practices.

125
126 ~~<insert figure 1 - figure from annual reports?>~~

127
128 We argue that understanding the social wellbeing outcomes of regenerative agriculture
129 techniques is as crucial as understanding the ecological impacts, as we need to ensure these
130 methods ~~maximise~~ maximize equity before scaling up adoption.) andOur results and discussion
131 underscore the significance of relational and eudaimonic domains in the overall wellbeing of
132 farmers and the implication of farmers's values and system thinking for their
133 wellbeing.~~<summarise results>~~ Tools such as ours allow us to ascertain that regenerative
134 agriculture doesn't erode social wellbeing, and we can use insights from livestock producers on
135 this topic to further justify the transition to regenerative farming systems that withstand
136 environmental stressors while supporting the wellbeing of the farmers (Brown et al., 2021).

138 2. Materials and Methods

139 ~~In this study, we first propose a novel framework for assessing social wellbeing and second,~~
140 ~~we use the framework to measure the social wellbeing outcomes of beef producers in Michigan,~~
141 ~~also exploring potential variations among different grazing management practices.~~ Cattle
142 operations in Michigan are relatively small compared to other regions in the United States.
143 According to the Michigan Beef Industry Commission (2023), there were approximately 12,000
144 farms with beef (and dairy) operations that met 33% of the local meat demand and were valued at
145 \$541 million in 2022. While all Michigan cattle start life on pasture, the majority are finished in
146 feedlot systems (>97%, ~~Stanley%, Stanley~~ et al., 2018) which requires large proportions of
147 agricultural land to be used for the cultivation of feed ingredients such as corn or alfalfa, with
148 considerable use of chemical inputs that can lead to soil erosion and reduced productivity in the
149 long term. Interventions to improve the system could include the adoption of regenerative grazing
150 practices and finishing on grass, which can reduce the need for chemical inputs and enhance soil
151 organic matter content and soil health (Teague and Kreuter, 2020).

152 2.1 Study design

153 The study design was adopted from an interdisciplinary longitudinal research project on
154 regenerative grazing of beef cattle in Michigan, USA [redacted for review]. The methodological
155 approach followed two main stages (1) ~~The recruitment criteria and farmers' selection process~~
156 [recruiting participants](#) and (2) the wellbeing survey design and implementation. This research was
157 approved by the [Redacted for review] IRB Board through the Non-Committee Review procedure
158 (STUDY00005404) on December 16th 2020 and all participants provided informed consent before
159 participating.

160 2.1.1 Recruitment and categorization

161 The recruitment and categorization by grazing system were iterative processes based on
162 information from an online recruitment survey, in-person interviews, and on-farm observation as
163 shown in Figure 1. An initial categorization as adaptive or non-adaptive (commonly slow rotation-
164 continuous) was ~~performed after decided on given the interest in the broader project about how~~
165 [practices link to outcomes. Given](#) (Bork et al., (2021); Fenster et al., (2021); Teague et al., (2013);
166 Teague & Barnes, (2017) ~~X et al. (XXXX)~~ [list adaptiveness as a core principle of regenerative](#)
167 [agriculture and a feature that is assessable in a short survey, we focused our categorization of](#)
168 [participating farms around adaptiveness.](#)

169 ~~A~~ an online recruitment survey was distributed widely to pasture-based beef producers
170 during the winter of 2021 and spring of 2022 through the Michigan State University Extension,
171 Michigan Cattleman's Association, and related networks. We received 98 responses, and 61
172 farmers were invited to participate representing a spectrum of grazing management practices
173 ~~ranging from non-adaptive (or continuous) to adaptive. The remaining 37 did not meet wider~~
174 [project needs for one of multiple reasons – no contact details, the herd size was too small \(fewer](#)
175 [than 10\), no cow-calf operation \(required for common enterprise\), and/or they had not been](#)
176 [running a grazing-based beef operation for at least three years. Some farmers also dropped out, so](#)
177 [a final sample of 37 farms remained](#) ~~joined the project active participants.~~

178 ~~Their initial categorization was;~~ based on [four questions, with the first three about practices](#)
179 [\(see Appendix A for full language of responses\);](#)

180 ~~(1)~~ 1. ~~The~~ [the grazing management style \(0=not to 2=forage\); \(2\) h](#)

181 [2. How often their cattle moved during a grazing season in an average rainy year, \(0=no](#)
182 [rotation to 7=multiples times a day\)](#)

183 [3. \(3\) h](#) ~~How long the cattle were in a paddock, (0= all season to 7=less than a day).~~

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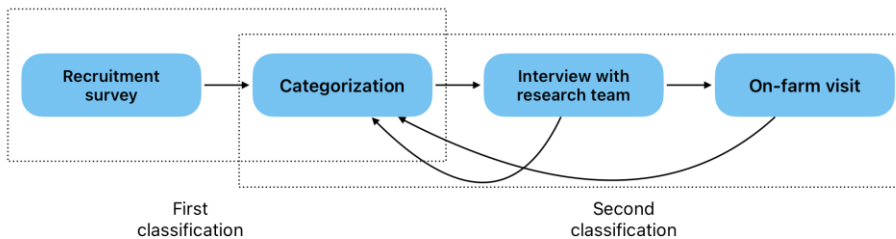
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184
185 The responses to those three questions were summed and the criteria for categorization
186 were defined as adaptive if the score was ≥ 12 and non-adaptive otherwise. The adopting group
187 was defined by a fourth question (4), and whether the farmer considered their practices to be
188 regenerative/adaptive, and had managed the land in such a way for at least 5 years. If a farmer's
189 score was greater than 12 but has less than 5 years, it was classified as adopting, similarly if a
190 farmer's score was less than 12 but they consider their practice regenerative, it was also classified
191 as adopting. A final sample of 37 farms remained active participants.

192 The initial categorization was revised after an in-persona phone or Zoom interview that
193 took place in the spring-Spring of 2022. During the interview, farmers were asked for more details
194 about their grazing management to add context to the initial classification questions collected in
195 the recruitment survey. A final adjustment to the categories was made after in-situ observation of
196 farmers' grazing practices in the summer of 2022.

197 *Figure A.1. Farmers categorization process*



198
199 *Figure 1. Farmers categorization process*

200
201 After the second classification, we categorized 45 farmers from the 37 farms (that were
202 either the sole or joint primary decision makers) into three groups: first, the adaptive group (n=16)
203 which includes those farmers who were practicing regenerative grazing with their beef cattle at the
204 time of the recruitment; second, farmers in a transition process towards regenerative grazing
205 (n=19), and finally a group of non-adaptive farmers (n=10).

206 2.2 Survey design

207 2.2.1 Theoretical considerations for the subjective wellbeing survey

209 The wellbeing survey offered a holistic operationalization of social wellbeing as
 210 subjective wellbeing (SWB). In psychology, SWB refers to people's self-evaluation of the
 211 optimal human experience and functioning (Deci & Ryan, 2008) and is acknowledged
 212 as considered to be an adequate measure of human wellbeing (Frey & Stutzer, 2014). The research
 213 on operationalizing SWB has evolved over the years from a perspective beyond positive and
 214 negative affect to one that considers thriving across multiple domains in life. Therefore, we assume
 215 that consider social wellbeing as a latent variable measurable, which could be measured through
 216 the outputs in multiple domains of subjective wellbeing. We propose a novel measure for social
 217 wellbeing which integrates integrating five existing different domains or constructs (Figure 2): (1)
 218 Life Satisfaction, (2) Hedonic wellbeing, (3) Eudaimonic wellbeing, (4) Relational wellbeing, and
 219 (5) Physical wellbeing. From this perspective, maximizing one's human experience – social
 220 wellbeing – is viewed as maximizing one's experience in all of the five domains mentioned above.

221 Figure 2. Social Wellbeing Conceptual Diagram
 222



223 Figure 2. Social Wellbeing Framework. Our framework identifies five key domains related to wellbeing: (1)
 224 Life Satisfaction, (2) Hedonic, (3) Eudaimonic, (4) Relational, and (5) Physical Wellbeing. An additional
 225 description is offered in the methods section.
 226
 227

228 A central assumption in our framework is that although all domains are intrinsically related,
 229 they are understood as independent constructs that influence the optimal human experience.
 230 Hedonic wellbeing (HWB) was originally described as the affective evaluation of people's lives
 231 as positive or negative (Bradburn, 1969) and the cognitive components of one's life conditions

232 (Cantril, 1965). However, empirical evidence has shown that ~~the affective (hedonic wellbeing) and~~
233 ~~cognitive components (life satisfaction) these dimensions~~ are separable (Davern et al., 2007; Deci
234 & Ryan, 2008). ~~A~~ ~~The process of~~ achieving the optimal human experience goes beyond happiness
235 or positive and negative affect ~~or emotion~~ (Butler & Kern, 2016) ~~and includes including~~ living as
236 one was inherently intended to live, which is best known as eudaimonic wellbeing ~~(EWB)~~ (Deci
237 & Ryan, 2008). Relational wellbeing rests on the premise ~~that the presence or absence of~~
238 interpersonal relationships, such as socializing, ~~giving, or receiving or~~ social support ~~influence,~~
239 ~~has a positive or negative effect on~~ human wellbeing (Adler & Seligman, 2016; Biddle et al.,
240 2019). Hence, what is often evaluated in relational wellbeing is the social network or availability
241 of social interactions ~~(helpful contact)~~ and the satisfaction with received support and giving
242 support to others (Butler & Kern, 2016; Winefield et al., 1992).

243 Within the wellbeing literature, and particularly in economics, there has been an interest in
244 objective indicators of wellbeing. These indicators, ~~often called social welfare indicators,~~ are
245 based on the resources and opportunities people may access and ~~precisely~~ how well people meet
246 their needs (Breslow et al., 2016; de Maya Matallana et al., 2022; Gilbert et al., 2016; Loveridge
247 et al., 2020). Our interpretation of physical factors follows ~~eds~~ Costanza et al., (2007), ~~wherein~~
248 ~~which~~ objective indicators are viewed as a means to potential improvement in ~~SWB~~ subjective
249 ~~wellbeing~~. In our framework, we framed ~~objective indicators~~ ~~them~~ as physical wellbeing and
250 included two sub-categories — an evaluation of the physical and mental health and financial
251 conditions of farmers. The literature suggests that poor physical and health conditions diminish
252 the ~~SWB~~ subjective wellbeing of an individual (Gilbert et al., 2016; Tang et al., 2021);
253 ~~conversely on the other hand, a~~ better financial conditions ~~positively~~ affects the level of subjective
254 wellbeing ~~since it increments by increasing the~~ consumption level and ~~increases~~ the capacity to
255 deal with illness or unemployment (Easterlin et al., 2010; Fernández Domínguez & Hernández,
256 2019; Frey & Stutzer, 2014; Mahendru, 2021; Voukelatou et al., 2021).

257 Although connected, the uniqueness of the domains calls for a holistic measure of
258 wellbeing. Therefore, our novel framework makes a distinction between each of those components
259 and the survey asks ~~eds~~ about four subjective wellbeing domains and for a subjective evaluation of
260 those often called ~~“objective”~~ measures, or physical wellbeing.

261 2.2.2 Scales/instrument selection

263 The literature on wellbeing provides a substantial number of well-developed scales that
264 each measure a particular construct of wellbeing, such as the Satisfaction with Life Scales (Diener
265 et al., 1985), Positive and Negative Affect Schedule (Watson et al., 1988), or the Ryff Scale for
266 eudaimonic wellbeing (Ryff, 1989). There are also a few that integrate multiple constructs, for
267 instance, the PERMA-Profilier (Butler & Kern, 2016), the Warwick-Edinburgh Mental Wellbeing
268 Scale (WEMWBS, (Stewart-Brown et al., 2009), the Flourishing Scale (Diener et al., 2010), or
269 The Stanford WELL for Life Scale (Heaney et al., 2017). A ~~major~~ limitation of these scales is that
270 they focus on either two or three domains of wellbeing, ~~but more practically is that they often~~
271 are of considerable length, ~~like the 160-question Stanford WELL for life scale, requiring~~
272 ~~significant time and risking which can lead to participant fatigue. For example,~~ as is the case for
273 ~~the Stanford WELL for Life Scale which is about 160 questions long and therefore requires~~
274 ~~significant time (x hours) which can lead to participant fatigue.~~ However, these scales offer two
275 main advantages: they are grounded in theory and have been widely validated.

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276 Three validated scales were selected to represent the five elements of social wellbeing in
277 our framework in the survey. The main criteria for selecting the instruments or scales ~~were~~are
278 theoretical validity, statistical reliability, validity, and the time required to complete the instrument.
279 They are described below ~~and the specific questions used are presented in Appendix B, along with~~
280 ~~which wellbeing element they relate to.~~

281 *Life satisfaction – Satisfaction with Life Scales (SWLS)*

282 To measure life satisfaction, this survey ~~relied~~s on the Satisfaction with Life Scale (SWLS;
283 (Diener et al., 1985). This 5-item scale measures the individual cognitive components of subjective
284 wellbeing, ~~such as global life satisfaction, rather than positive or negative emotions.~~ Responses
285 ~~are based on a 7-point Likert scale with scores ranging~~range from 0 (strongly disagree) to 6
286 (strongly agree), where higher scores indicate higher levels of life satisfaction. ~~SWLS; and~~ has
287 been found to be correlated with socio-economic and health variables and has high reliability and
288 validity (Adler & Seligman, 2016; Cheung & Lucas, 2014; Frey & Stutzer, 2014; Tang et al.,
289 2021). ~~SWLS is preferred over single question instruments for life satisfaction since the internal~~
290 ~~consistency of a single-item scale cannot be calculated in cross-sectional data (Cheung & Lucas,~~
291 ~~2014).~~

292 *Hedonic and Eudaimonic Wellbeing – the PERMA-Profilier*

293 ~~Proposed by (Butler & Kern, 2016), the~~ PERMA-Profilers is a multidimensional measure
294 of wellbeing. This scale includes 15 questions that measure five subdomains: Positive Emotion,
295 Engagement, Relationships, Meaning, and Accomplishment (Butler & Kern, 2016). Moreover, the
296 scale includes eight additional questions that assess negative emotions and a subjective evaluation
297 of physical health. The questions are evaluated on a ~~an 11-point Likert~~ scale from 0 (low level) to
298 10 (high level). The ~~subdomain or subdomains scale items~~ have shown cross-time stability, high
299 internal consistency, and a high correlation with other wellbeing scales such as the Ryff scales,
300 which suggest the transtheoretical characteristic of PERMA-profiler and its capability to measure
301 hedonic and eudaimonic constructs of wellbeing (Cobo-Rendón et al., 2020; Giangrasso, 2021).
302 ~~Choosing the~~ PERMA-Profiler allowed us to measure three of the domains of wellbeing in our
303 framework ~~- in a more streamlined way compared to choosing an individual instrument for~~ hedonic
304 (positive and negative emotions), eudaimonic (engagement, meaning, and accomplishment), and
305 relational (relationships) ~~- in a more streamlined way compared to choosing individual instruments~~
306 ~~wellbeing.~~

307 *Physical Wellbeing*

308 To assess the physical health domain of physical wellbeing, we used the PERMA-Profiler
309 as described above. The scale also ~~includes~~ included a set of questions for self-evaluation of
310 physical health, ~~which is consistent~~ aligning with our goal aim to evaluate ~~this such an~~ "objective"
311 domain from a subjective standpoint. ~~To assess,~~ For the subjective evaluation of financial
312 conditions, we included a set of four questions inspired by the work of (Sherren et al., 2022).

314 2.2.3 Social Wellbeing Index

315 ~~An~~ One of the important steps in analyzing social wellbeing is determining how to
316 communicate the results of different scales. Constructing an index ~~could~~ served as a practical
317 approach to presenting the collected data. We combined the scores of the five social wellbeing
318 constructs into a single index, with each construct having equal importance. The construction of
319 the social wellbeing index required normalizing (rescaling) the data, as the instruments in our
320 survey used different response scales. Normalizing the data attempts to give all constructs equal
321 weight. Min-max normalization, also known as min-max scaling, involves linearly transforming
322 the data to fit within a smaller range, such as the [0, 1] range. Following (Han, 2022) min-max

323 normalization rescales x_i , of construct Z to x'_i , in the range of $[new_max_z, new_min_z]$ by
324 computing:

$$325 \quad x'_i = \frac{x_i - min_z}{max_z - min_z} (new_max_z - new_min_z) + new_min_z$$

326 Where x'_i is the normalized value and x_i is the original value for the Z construct. It is
327 important to note that to preserve the scale's original nature, the min and max values correspond
328 to the min and max values of the scale rather than the data recorded for each item in any scale. We
329 then calculated the average of the normalized scores x'_i of each construct to obtain a final index
330 with range $[0, 1]$, where V values closer to 1 indicate denote higher scores in each of the 5
331 constructs of social wellbeing, indicating and thus indicate that one's human experience is being
332 maximized.

333

334 2.2.4 Additional Survey Sections

335 Understanding which factors may accelerate (or block) the adoption of new agricultural practices
336 is extremely important crucial. Previous research on the adoption of regenerative grazing has
337 indicated that aligning agricultural practices with farmers' values and motivations is a crucial
338 aspect of decision-making (Gosnell, Grimm, et al., 2020). Given this perspective, along but with
339 also a framing of wellbeing as living within one's values (Wallace et al., 2021) (citation), we
340 deemed felt it important to assess farmers' values. Additionally, understanding and managing
341 fundamental systems processes play a critical role in enabling effective management to address
342 uncertainty and complexity, especially in practices like regenerative grazing (Gosnell et al.,
343 2020, Mann et al 2019).

344

345 *Human Values*

346 Values can be understood as guiding principles that shape the lives of individuals or groups
347 ; influencing that shape individuals or groups their decision-making, attitudes, and behavior
348 (Schwartz et al 2012), and thus they are important to understand the adoption of agricultural
349 practices. Farmers' values were assessed using the Short Schwartz Value Survey (SSVS) with The
350 SSVS is a shortened version of the Schwartz Value Survey (SVS), which consists of 57 items and
351 has demonstrated internal consistency and temporal reliability (Lindeman & Verkasalo, 2005).
352 The SSVS assesses the 10 motivationally distinct values that are theoretically derived from
353 Schwartz's value theory: Power, Achievement, Hedonism, Stimulation, Self-Direction,

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354 Universalism, Benevolence, Tradition, Conformity, and Security. These values can be grouped
355 into two categories ~~based on the relationship between them~~: openness to change versus
356 conservation and self-enhancement versus self-transcendence. Participants were provided with a
357 brief description of each value and asked to rate their importance ~~on a 7-point scale~~ ranging from
358 1 (against my principles) to 7 (of supreme importance).

359
360 *System Thinking*

361 System thinking is often recognized as a crucial competence for understanding how
362 systems work and change. We built upon the work of (Sherren et al., 2022) and included a 9-item
363 System Thinking and Traditional Thinking Scale. Each item was ~~scored on a 5-point Likert rated~~
364 in a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

365 The survey also included questions we created on information support and networking (to
366 supplement PERMA's relationships section), as well as standard demographic questions such as
367 age, educational level, and income (given their influence on wellbeing (Costanza et al., 2007; de
368 Maya Matallana et al., 2022; Gilbert et al., 2016; Jivraj et al., 2014; Kristoffersen, 2018; Tang et
369 al., 2021)).

370
371 2.2.5 Survey-Survey Implementation
372 The survey was designed and implemented using Qualtrics. The questionnaire consisted of
373 closed-ended questions providing respondents with pre-determined answer options. The survey
374 was served online and sent through emails (collected in the recruitment survey) to 45 farmers in
375 Michigan, identified as the main (or joint) decision-makers for the 37 participating farms during
376 the recruitment process, during the spring and summer of 2022. The majority of participants
377 completed the survey by themselves online, with an expected completion time of 17 minutes.
378 Given some technology or connectivity issues, some answered the survey during a phone/Zoom
379 call, where the lead author ran through the questions and entered their answers. All responses were
380 collected in approximately 8 weeks. Data cleaning and statistical analysis were conducted in the
381 software R version 4.2.1. (R Core Team, 2022). Participants received a summary of their individual
382 results that Fall.

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385 **3. Results and Discussion**

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386 This section discusses the [results of the](#) exploratory analysis of the wellbeing survey. ~~The~~
387 ~~survey was served online and sent to 45 farmers in Michigan, identified as the main (or joint)~~
388 ~~decision makers during the recruitment process, during the spring and summer of 2022. The survey~~
389 ~~took approximately 25 minutes to complete, and all responses were collected in approximately 8~~
390 ~~weeks.~~

392 The socioeconomic data collected shows that the farmers' groups are comparable in certain
393 characteristics, such as age, education, race, and marital status. The age of farmers was within the
394 35-44-year-old range for all groups, with a bachelor's or professional (MA, MS, MBA, PhD, JD,
395 MD, DDS, etc.) degree, mostly Caucasian, and 87% of farmers were married. In terms of yearly
396 income, the adaptive group reported the lowest levels but has a bimodal distribution (\$25,000-
397 \$49,999 and \$75,000-\$99,999), the non-adaptive and adopting groups reported considerably
398 higher levels of income, \$75,000-\$99,999 and \$150,000 or more, respectively. However,
399 differences in proportions between groups were not statistically significant.

401 3.1. Wellbeing outcomes

402 Table 1 shows the five domains considered in our multidimensional measure of social
403 wellbeing, along with the ~~classical estimated~~ internal consistency measure [cronbach's alpha](#) for
404 each domain. [Cronbach's alpha is a measure to describe the degree to which items within a scale](#)
405 [measure the same construct, the test score range from 0 to 1 with acceptable scores from 0.70 to](#)
406 [0.95 \(Tavakol & Dennick, 2011\).](#) The life satisfaction, hedonic, eudaimonic, and relational
407 wellbeing domains shown acceptable Cronbach's alpha scores, however, the score for physical
408 wellbeing is questionable. Tavakol & Dennick, (2011) describe that low alpha scores can be due
409 to a limited number of questions, weak connections among items, or heterogenous constructs.
410 When computed independently, Cronbach's alpha scores for physical health and finances
411 questions were 0.859 and 0.70, respectively, which suggest that poor inter-relatedness may be the
412 reason for the low score for physical wellbeing. Since conducting an alternative reliability analysis
413 (such as confirmatory factor analysis) was not possible due to our small sample size we decided
414 to keep both sub-dimensions as part of the physical wellbeing construct and flag this as an areas
415 for further study. Moreover, we did modify the relational wellbeing construct. Originally the
416 PERMA scale measures relational wellbeing using three questions: *to what extent do you receive*

417 *help and support from others when you need it? How satisfied are you with your personal*
 418 *relationships? and to what extent do you feel loved?.* However, we found poor inter-relatedness
 419 between the first and the other two questions and thus we only kept the last two questions to build
 420 the relational wellbeing construct. This suggests that for farmers in this study, relational wellbeing
 421 was more about the support received from their family relationships and less about social networks,
 422 hence we did not integrate social network data from that survey section.

423

424 Table 1. Wellbeing constructs and overall index

Wellbeing constructs	Mean	Sd	Cronbach's Alpha
Life Satisfaction	0.76	0.14	0.79
Hedonic Wellbeing	0.71	0.13	0.82
Eudaimonic Wellbeing	0.80	0.11	0.75
Relational Wellbeing	0.86	0.14	0.79
Physical Wellbeing	0.77	0.11	0.0345
Social WB Index	0.78	0.10	0.84

425

426 As observed in Table 1 overall farmers scored higher in relational wellbeing, followed by
 427 eudaimonic wellbeing and physical wellbeing as the three highest categories. This suggests that
 428 farmers are highly satisfied with their accomplishments, social support, health, and finances. When
 429 farmers were asked in a follow-up question which domains of wellbeing were most important to
 430 them, all groups consistently ranked relationships and purpose and meaning (eudaimonic
 431 wellbeing) as the first and second most important domains.

432

433

Table 2. Correlation matrix

	Life Satisfaction	Hedonic Wellbeing	Eudaimonic Wellbeing	Relational Wellbeing	Physical Wellbeing	Social WB Index
Life Satisfaction	1.00					
Hedonic Wellbeing	0.64	1.00				
Eudaimonic Wellbeing	0.58	0.50	1.00			
Relational Wellbeing	0.54	0.46	0.39	1.00		
Physical Wellbeing	0.640	0.592	0.560	0.4238	1.00	
Social WB Index	0.87	0.81	0.74	0.73	0.75	1.00

434

435 We then computed a correlation matrix to observe the strength of the relationship between
 436 constructs to assess divergent validity. In general, we observe that the strength of the correlation
 437 between the constructs is low to moderate and in the expected direction considering our theoretical
 438 expectations. Surprisingly, relational, eudaimonic, and physical wellbeing showed the lowest

439 correlation with the social wellbeing index. Despite having similar levels of variability in their
 440 scores, life satisfaction and hedonic wellbeing had the strongest relationship with the index. In
 441 other words, farmers with a high social wellbeing index were more likely to score high in life
 442 satisfaction and hedonic measures, even though the farmers self-identify relational, eudaimonic,
 443 and physical constructs as the main contributors to their wellbeing (see Table 1). Our initial thought
 444 was the effect of the support received from their interpersonal relationships was expressed as the
 445 absence of negative motions (anxiety, sadness, and anger) and the presence of positive ones (joy,
 446 contentment, and positivity) captured through hedonic wellbeing. However, the correlation matrix
 447 does not indicate a strong relationship between the scales used to measure these domains. A more
 448 plausible explanation is that the relationship between relational wellbeing and the social wellbeing
 449 index is not fully captured by our estimation approach, in other words assigning equal weights to
 450 each category to create the index does not reflect the farmer's understanding of "relationships".
 451 Further research with larger sample sizes and alternative reliability analyses could provide
 452 additional insights into the multidimensional nature of social wellbeing.

453

454 **Table 3. Wellbeing and farmers' groups**

	Life Satisfacti on	Hedonic Wellbeing	Eudaimonic Wellbeing	Relational Wellbeing	Physical Wellbeing	Social WB Index
Non-adaptive	0.82	0.74	0.83	0.89	0.83	0.82
Adaptive	0.75	0.69	0.78	0.79	0.76	0.75
Adopting	0.73	0.71	0.79	0.82	0.75	0.77
<i>Pairwise-comparison (p-value -adjusted)</i>						
Adaptive - Adopting	0.44	1.00	0.63	0.79	0.7685	0.44
Adaptive - Non	0.51	1.00	0.22	0.14	0.1725	0.11
Adopting - Non	0.20	0.73	0.38	0.13	0.1223	0.33

455 there is no evidence that differences in mean between groups are statistically significant.

456

457 Table 3 displays the scores for the five constructs and the social wellbeing index, along
 458 with the results of multiple pairwise comparisons. Our objective was to determine whether any of
 459 the groups scored significantly different from the others for any of the wellbeing constructs,
 460 including the social wellbeing index. [It is imperative to acknowledge, however, the inherent
 461 limitations stemming from the small number of participants that limits generalizability of the
 462 findings and increases statistical variability. Further research efforts are encouraged to build upon](#)

463 [these preliminary findings, incorporating larger and diverse samples to enhance the robustness and](#)
464 [applicability of the insights from our study. <However, given the exploratory nature and specific](#)
465 [purpose of this study, our analysis still provide valuable initial perspective for understanding the](#)
466 [relationship of grazing practices and wellbeing. is to ete ete etc...<add one more sentence about](#)
467 [why this is ok though>](#) Considering the limitation of our sample size, we compare the differences
468 among the three groups of farmers using the post-hoc non-parametric Dunn test since it is an
469 appropriate option when the ANOVA assumptions of equal variance or normal distribution are not
470 fulfilled (Dinno, 2015). Moreover, p-values were adjusted to control for the family-wise error rate
471 (FWER, rejecting the null hypothesis when it is true) using Holm's correction.

472 It can be seen from the data that all groups score strongly, indicating high levels of
473 wellbeing across beef produces in Michigan. Non-adaptive farmers generally scored higher in all
474 constructs compared to the adapting and adopting groups, with the largest differences observed in
475 life satisfaction between non-adaptive and adopting (-0.09), relational wellbeing between non-
476 adaptive and adaptive (-0.1), and overall social wellbeing index (-0.07), similar results were
477 observed in Brown et al., (2021) and Sherren et al., (2022). However, despite these differences,
478 none of them were found to be statistically significant, except for the difference in social wellbeing
479 index between the adaptive and non-adaptive groups was borderline significant at 90% level (p-
480 adj = 0.11 < 0.10). Despite there being no statistically significant difference, it is interesting to
481 observe the variation in the ranges of min and max values for each group and discuss this in the
482 view of the theory of subjective wellbeing homeostasis. (Cummins et al., (2003) and; Cummins &
483 Wooden, (2014) suggests "homeostasis" as an analogy to explain why the mean values for
484 subjective wellbeing metrics in the western world are about 75% of the scale score, arguing that
485 subjective wellbeing is "actively controlled and maintained" with a form of steady-state affective
486 set-point. Thus, this implies that we would observe little variation if people's homeostatic systems
487 are normally functioning.

488 Considering Cummins' theory, we could ask what is the "set-point" around which social
489 wellbeing variations are interesting to interpret despite their non-statistical significance. Looking
490 at the prior cited literature, we observe that subjective wellbeing scores for farmers in Brown et
491 al., (2021, 2022); Sherren et al., (2022) were in a range of 70 to 80% of the scale's maximum scores
492 used on those studies. Such values are consistent with what we observed for the adaptive and
493 adopting groups but not for the non-adaptive ones. There could be two possible scenarios, the first

494 one is that the non-adaptive farmers' higher scores in all constructs reflect their current homeostatic
495 state, where they have adapted to their existing circumstances and have found a way to maintain
496 their overall social wellbeing, presumably linked to a long-term consistency in grazing technique,
497 given they are using 'traditional' practices and have not or are not adopting new agricultural
498 practices. Conversely, an alternative scenario may suggest that the adaptive and adopting groups
499 may be going through a period of adjustment due to the adoption of new practices. We assigned
500 farmers to the adaptive group if they had been using such practices for at least 5 years, but
501 realistically this is a short period to adopt new practices in agriculture. Therefore, participants in
502 these groups may well still be undergoing temporary disruption of their homeostatic equilibrium.
503 This suggests that there may be some differences in social wellbeing between the adaptive and
504 non-adaptive groups relate to the adoption of regenerative grazing, but more data would be needed
505 to confirm this.

506 Given the purpose of this study, it is important to highlight that our results indicate that the social
507 wellbeing of all groups of farmers falls within a range typically associated with a healthy state of
508 wellbeing. Moreover, while adoption of new practices may be influencing social WB, it is not
509 significantly eroding it and thus we encourage the continued scaling up of regenerative grazing
510 practices in Michigan's beef sector.

511 512 **3.1. Values and System Thinking Results.** 513

514 Previous research has described how farmers who embrace regenerative approaches often
515 exhibit distinct values and perspectives towards farming, and the importance of systems thinking
516 in the adoption of regenerative grazing practices (Sherren et al., 2022; Gosnell et al 2019). The
517 results of Schwartz's value scale in Table 4 show that across the sample, farmers rated more highly
518 for the values of [self-direction](#), benevolence, ~~self-direction~~, universalism, and conformity, while
519 the lowest ratings were for power and hedonism. These findings are consistent with what (Sherren
520 et al., (2022) observed in Canada. [The self-direction scores suggest that farmers generally trust
521 their own abilities.](#) The high scores in benevolence and universalism, which belong to the self-
522 transcendence dimension, suggest that farmers show a high concern for others' wellbeing. This can
523 be linked to the results of relational wellbeing discussed earlier. When we asked farmers what they
524 considered to be the main measure of success on their farms, family ranked first, while
525 participating in the community ranked last. ~~These~~ [We interpret the results highlight the importance](#)

526 of family relationships in the lives of farmers as a reflection of the socio-cultural structure within
 527 US agriculture, where success is deeply intertwined with familial bonds, i.e. that the intrinsic role
 528 of family and relational wellbeing supports their overall wellbeing. and how their values are
 529 connected to their wellbeing, particularly relational wellbeing. But the survey results also show
 530 that cConsistent with the high self-transcendence scores, the low scores in power and hedonism
 531 values, (, which are part of self-enhancement), indicate that farmers focus less on themselves,
 532 perhaps because they focus more on the family unit. Simultaneously, self direction scores suggest
 533 that farmers generally trust their own abilities, while conformity scores indicate that traditional
 534 values (e.g., honoring parents) are highly regarded among farmers. ~~These results highlight the~~
 535 ~~importance of family relationships in the lives of farmers and how their values are connected to~~
 536 ~~their wellbeing, particularly relational wellbeing.~~ Of course, this intricate relationship between
 537 values, relational wellbeing and the overall wellbeing of farmers is difficult to understand with
 538 only statistical information, so further qualitative exploration is required to understand further how
 539 values are connected to wellbeing.

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541 Table 4. Values and system thinking

Scales	Mean	SD
<i>Schwartz's Values</i>		
Social power, authority, wealth - Power	3.044	1.313
Success, capability, ambition, influence on people and events - Achievement	4.933	1.1436
Enjoyment in life, self-indulgence, gratification of desires - Hedonism	4.0767	1.6245
Daring, a varied and challenging life, an exciting life - Stimulation	4.7878	1.2659
Creativity, freedom, curiosity, independence, choosing one's own goals - Self-direction	5.8989	0.8659
Broad-mindedness, beauty of nature and arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection - Universalism	5.714	1.124
Helpfulness, honesty, forgiveness, loyalty, responsibility - Benevolence	6.2767	0.58
Respect for tradition, humbleness, accepting one's portion in life, devotion, modesty - Tradition	4.9656	1.384
Obedience, honoring parents and elders, self-discipline, politeness - Conformity	5.2767	1.0109
National security, family security, social order, cleanliness, reciprocation of favors - Security	4.9656	1.1547
<i>System Thinking</i>		
I like to have a well-defined goal for my operation, and make decisions that bring me closer to it	4.24	0.68

I try to make management decisions so that my operation can mimic nature as much as possible	4.36	0.88
A healthy farm is self-sustaining and needs few inputs to be profitable	3.89	0.98
My management decisions have a big impact on the local ecosystem and community	3.86	1
Everything on my operation is connected, and even small decisions can have cascading effects in unpredictable way	4.29	0.76
<i>Traditional Thinking</i>		
A successful farmer concentrates on production and is not sidetracked by outside interests or activities	2.36	1.17
At a landscape level, decisions are made elsewhere, so my choices don't have a huge effect	1.78	0.77
Economic viability overrides all other farming considerations	2.42	0.99
We may not be able to solve every problem yet, but science and technology will eventually offer a solution for every problem	2.44	0.97

Human values can be grouped in four categories: (1) Self-enhancement: Power, Achievement, Hedonism; (2) Openness to change: Hedonism, Stimulation, Self-direction; (3) Self-transcendence: Universalism, Benevolence; (4) Conservation: Tradition, Conformity, Security. (See Schwartz et al., (2012))

Table 5 shows the Cronbach's alpha results for values and system thinking constructs. The results indicate that only the self-enhancement category had an acceptable Cronbach alpha. Considering that our sample size (n=45) is sufficient for a reliable estimation of Cronbach's alpha¹, (Bonett, 2002) we argue that the lower score for the other construct may be attributed to the small sample size rather than the items in the scales. Therefore, the low internal consistency does not necessarily rule out unidimensional in the values items, and further examination with a larger sample size and factor analysis may be necessary to assess the issues with the reliability and dimensionality of the other constructs for the Michigan beef population. Nevertheless, the results in Table 5 support the previous discussion and underscore the significance of values such as benevolence, which emphasizes the importance of closer relationships to farmers.

Table 5. Values and system thinking constructs.

	Cronbach alpha
<i>Group of Values</i>	
Self- enhancement (group 1)	0.63
Openness to change (group 2)	0.47
Self-transcendence (group 3)	0.43
Conservation (group 4)	0.54

¹ See Bonett (2002) for a discussion on sample requirements.

Thinking framework

System thinking	0.53
Traditional thinking	0.47

558

559 The result in Table 6 shows that, as expected, the adaptive and adopting group of farmers
560 score lower in self-enhancement and conservation values at the aggregated level, suggesting
561 farmers' motivation to challenge traditional practices (Schwartz & Ciecuch, 2021). The pairwise
562 comparison for the self-enhancement reveals that only the difference between the adopting and
563 non-adaptive groups was statistically significant ($P\text{-adj} = 0.05$). These results imply that farmers
564 transitioning to regenerative grazing are less motivated than non-adaptive farmers by the desire to
565 gain wealth, social power, or personal success.

566 The results of the pairwise comparison of system thinking and traditional thinking scales
567 were also expected (given similar results in Sherren et al. (2022) and reflect regenerative grazing's
568 philosophy of holistic management (Gosnell et al 2019, Mann et al 2019) or natural resource
569 management (Brown et al. 2022) and of managing 'the system'. As seen in Table 6, the average
570 scores for system thinking were higher for the adaptive and adopting group although only the
571 difference between adaptive and non-adaptive groups was found to be statistically significant ($p\text{-adj} = 0.09 < 0.1$, applying Holm's adjustment). On the other hand, the non-adaptive farmers scored
572 statistically significantly higher than the adaptive ($p\text{-adj} 0.03 < 0.05$) and adopting groups ($p\text{-adj} = 0.01 < 0.05$) for traditional thinking. Given, how those questions were framed (see Sherren et
573 al., (2022)), these results suggest that non-adaptive farmers may focus on individuals or segmented
574 components of their operations, while farmers that adopt or are using adaptive or regenerative
575 grazing practices are more likely to consider the complex interrelationship between various
576 components of their farming systems when making management decisions.

579

580

581

582 Table 6. Comparison of values and system thinking among groups of farmers.

583

	Self- enhanceme nt	Openness to change	Self- transcende nce	Conserv ation	System Thinking	Traditional Thinking
Non-adaptive	4.77	4.97	6.00	5.53	3.76	2.75
Adaptive	3.98	4.81	5.97	4.96	4.29	2.19

Adopting	3.65	4.96	6.00	4.89	4.20	2.04
<i>Pairwise comparison (p-value adjusted)</i>						
Adaptive - Adopting	0.33	1.00	1.00	0.91	0.50	0.53
Adaptive - Non	0.26	0.91	1.00	0.21	0.09	0.03
Adopting - Non	0.05	1.00	0.96	0.16	0.21	0.01

584
585 As suggested by Sherren et al., (2022) in order to understand farmers' management
586 choices, it is important to understand how they interact with their farms. The results of our
587 exploratory analysis suggest that adopting regenerative grazing practices may encourage farmers
588 to rethink their relationship with their farms (also discussed by Sherren et al., (2022)) for instance,
589 the statement "*I like to have a well-defined goal for my operation and make decisions that bring*
590 *me closer to it*" was the highest rated among adopting farmers. These changes in farmers' thinking
591 may ultimately lead to better management decisions that can positively impact their wellbeing.
592 However, further research is needed to determine whether adopting regenerative grazing practices
593 leads to a shift in farmers' thinking or whether farmers who are already inclined to think more
594 holistically are more likely to adopt regenerative grazing practices in the first place. A further
595 investigation of farmers wellbeing over time could shed light on the complex relationship of
596 regenerative grazing and social wellbeing outcomes.

597 598 **4. Conclusions**

599
600 Regenerative grazing practices offer a promising approach to enhancing the ecological health of
601 farms while also providing societal benefits. This study contributes to the literature by emphasizing
602 the significance of examining the social wellbeing outcomes among regenerative pasture-raised
603 beef producers in the United States. By adopting a holistic approach to social wellbeing, we
604 developed and tested a novel framework to investigate the differences between regenerative and
605 non-regenerative farmers in Michigan, USA. Our findings reveal high levels of wellbeing among
606 all beef producers in our sample, with relational wellbeing and eudaimonic domains playing a
607 pivotal role in farmers' overall wellbeing. Although we didn't find differences between groups of
608 farmers, we argue that even small differences observed in social wellbeing are important and
609 further research should delve deeper into these differences, considering the [theory of the](#)

610 homeostatic state of wellbeing in Western countries (Cummins et al., 2003), ~~(Cummins et al., 2003)~~,
611 particularly within farmer populations.

612 Additionally, we examined the link between values and wellbeing and found that adopters
613 of regenerative grazing scored higher in values that prioritize caring for the family as a guiding
614 principle influencing decision-making. Moreover, consistent with previous research and
615 regenerative grazing philosophy, regenerative farmers demonstrated a strong inclination towards
616 system thinking, this seems to indicate that managing regeneratively by understanding ‘the whole’,
617 requires certain values. However, to uncover the causal relationship between values, system
618 thinking, and the decision to adopt regenerative grazing, future studies should consider
619 longitudinal approaches.

620 The insights derived from this research ~~support~~ can help tailor extension programs and
621 policy development supporting the transition towards regenerative practices. For example,
622 extension programming can be tailored for those with different values, perhaps focusing on
623 relational values for those whom maintaining the farm for future generations is important.
624 Additionally, policy could encourage the long-term monitoring of social and ecological wellbeing,
625 acknowledging the importance of both for a resilient farming system., which contribute to the
626 resilience of farming systems and support the overall wellbeing of farmers. It is imperative to
627 acknowledge, however, the inherent limitations stemming from the small number of participants
628 that limits generalizability of the findings and increases statistical variability. Further research
629 efforts are encouraged to build upon these preliminary findings, incorporating larger and diverse
630 samples to enhance the robustness and applicability of the insights from our study.

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Appendix A.

Table A.1 Recruitment Questions – re. Adaptiveness

Question	Response Set
Which grazing style is most similar to how you graze your beef cattle?	The cattle have access to all available pasture(s) throughout the year (0); The cattle are moved between different pastures throughout the grazing season based on time (1); The cattle are moved between different pastures throughout the grazing season based on forage health and recovery (2)
In a fairly average rain year, how often are the cattle moved during the grazing season?	Blank (0); Every 2-3 months (1); Once a month (2); Twice a month (3); Once a week (4); Two or three times a week (5); Every day (6); Multiple times each day (7)
On average, once cattle are moved to a particular grazing unit (i.e., paddock), how long are they there for?	All season (0); Multiple months (1); A month (2); Multiple weeks less than a month (3); A week (4); Multiple days but less than a week (5); A day (6); Less than a day (7)

<TBD>

Commented [JH1]: TO BE DONE

Appendix B.

Table B.1 Wellbeing construct and questions.

Construct	Question	Response Set	Reference
Life Satisfaction	In most ways my life is close to my ideal	0 (strongly disagree) to 6 (strongly agree)	SWLS (Diener et al 1985)
	The conditions of my life are excellent		
	I am satisfied with my life		
	So far, I have gotten the important things I want in life		
Hedonic Wellbeing	If I could live life over, I would change almost nothing	0 (Never) to 10 (Always)	PERMA - Profiler (Butler & Kern, 2016)
	In general, how often do you feel joyful?		
	In general, how often do you feel positive?		
	In general, to what extent do you feel contented?		
Eudaimonic Wellbeing	In general, how often do you feel anxious?	0 (Never) to 10 (Always)	PERMA - Profiler (Butler & Kern, 2016)
	In general, how often do you feel anxious?		
	In general, how often do you feel sad?		
	In general, how often do you feel sad?		
Eudaimonic Wellbeing	How often do you become absorbed in what you are doing?	0 (Never) to 10 (Always)	PERMA - Profiler (Butler & Kern, 2016)
	How often do you lose track of time while doing something you enjoy?		
	In general, to what extent do you feel excited and interested in things?		
	In general, to what extent do you lead a purposeful and meaningful life?		

	<u>In general, to what extent do you feel that what you do in your life is valuable and worthwhile?</u>		
	<u>To what extent do you generally feel you have a sense of direction in your life?</u>		
	<u>How much of the time do you feel you are making progress towards accomplishing your goals?</u>		
	<u>How often do you achieve the important goals you have set for yourself?</u>	0 (Never) to 10 (Always)	
	<u>How often are you able to handle your responsibilities?</u>		
<u>Relational Wellbeing</u>	<u>To what extent do you receive help and support from others when you need it?</u>	0 (Not at all) to 10 (Completely)	
	<u>To what extent do you feel loved?</u>		
	<u>How satisfied are you with your personal relationships?</u>		
<u>Physical Wellbeing</u>	<u>In general, how would you say your health is?</u>	0 (Terrible) to 10 (Excellent)	
	<u>Compared to others of your same age and sex, how is your health?</u>		
	<u>How satisfied are you with your current physical health?</u>		
	<u>How satisfied are you with your current mental health?*</u>	0 (Not at all) to 10 (Completely)	
	<u>Compared to 5 years ago, I am financially better off now</u>		
	<u>Looking at the future, in 5 years I expect my financial situation to improve</u>		
	<u>My financial situation is a constant source of worry</u>	0 (strongly disagree) to 6 (strongly agree)	Sherren et al 2022
	<u>Regardless of what happens, I have made choices that will help me be financially</u>		

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Note: * The mental health question is an addition inspired by the physical health question in PERMA-profiler

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