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Identifying and implementing regenerative agriculture practices in challenging environments: experiences of farmers in the north of England

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1. Abstract

Regenerative agriculture (RA) encompasses practices including no-till, cover cropping, diversified rotations and the integration of livestock into farming systems. These practices can improve soil quality and may deliver additional benefits such as mitigation of climate change and enhancement of biodiversity. As interest in RA continues to grow in the UK, there is a need for targeted research and knowledge exchange activities that support farmers in their transition to this potentially more sustainable, resilient and economic method of food production. This project's aim was to explore the understanding and level of knowledge about RA among farmers in the north of England and identify barriers to uptake of these practices, with a view to developing future larger scale funding applications and supporting research and knowledge exchange in the region.

The project conducted three workshops with farmers in Cumbria, Northumberland and Yorkshire where there was a free exchange of ideas and opinions about the definition of regenerative agriculture and barriers to its uptake in the north. In parallel, an online survey was used to broaden our understanding about the practices being used in the region and farmer perceptions about challenges to uptake.

Farmers identified regenerative agriculture with a set of practices (as listed above) and with a broad range of outcomes linked to soil health, carbon sequestration, ecosystem services, crop health and water quality. But it was also acknowledged that RA is more than simply a set of practices; farmers in workshops identified with the philosophy or ideology of RA and used terms like circular economy, holistic and organic, when describing RA. The most common RA practices being used were crop diversification, min-till or reduced-till, and cover crops; integration of livestock and pasture-based livestock production were also commonly reported. The most common barrier to uptake was a lack of knowledge, with financial risk and time/labour also cited frequently; environmental conditions in the north (soil/climate factors) were selected less often than expected and seemed primarily related to specific practices (e.g. no-till, cover cropping). A more detailed analysis of barriers resulted in a grouping of practices by key barriers. Category A consisted of practices where a few farmers lacked knowledge, but a majority reported no barriers to uptake; this was the case for crop diversification, no-till/min-till and IPM. Category B consisted of practices where there was an even split between farmers lacking knowledge and those who felt there were no barriers. For Category C, many farmers reported lacking the knowledge about these practices and only a few reported no barriers to uptake. Specific strategies for each of these categories of practices will be needed for design of the most efficient research and knowledge exchange programmes.

Next steps will be to work with local partners including other research institutions, farmer organisations, and individual farmers, to design research and knowledge exchange activities that will effectively allow the development of regenerative agricultural systems in the north of England. This will benefit the farming sector in the north by helping it to be more resilient to future environmental and economic shocks; wider society will also benefit from the development of a farming system that delivers ecosystem services along with a local food supply.

2. Introduction

2.1. Aims and Objectives

There is no widely agreed legal or regulatory definition of the term regenerative agriculture, although some farmers are exploring the possibilities of codifying the term, for example, the Soil Regenerative Agriculture Group.¹ Rather it is commonly used as an umbrella term that includes a wide range of field operations and philosophical approaches which focus on delivering two key principles: restoration of soil health (including the capture of carbon) and reversal of biodiversity loss (Giller *et al.* 2021; Appendix A). In the absence of a widely agreed definition of regenerative agriculture (RA), the project defines it as farming systems and field operations that minimise soil disturbance, use diverse rotations and cover crops, and integrate grazing livestock, to reduce GHG emissions, build soil C, improve soil health and biology, enhance farm-scale nutrient use efficiency (NUE) and promote biodiversity and the ecosystem services that flow from it (Giller *et al.* 2021).

Recognising the burgeoning interest in regenerative agriculture across the country and the region-specific challenges that can emerge when implementing RA in northern regions of England, the overall aim of this project was to generate the preliminary findings necessary to develop a larger scale funding application to UKRI that will support the development of an agroecosystem living lab for regenerative agriculture in the north of England. A linked aim was to investigate the need for a Regenerative Agriculture North (RAN) hub for research and knowledge exchange that will provide and disseminate credible, accessible and practical evidence-based advice on the best strategies to successfully implement regenerative agriculture practices in the north of England.

The following strategic objectives were defined for the project:

1. **To facilitate three workshops in the north of England** to exchange experience and knowledge with the local farming industry on strategies for regenerative agriculture, including: improved farm-scale nutrient use efficiency (NUE), direct-drilling and cover cropping in arable systems, equipment innovations to facilitate the integration of cover crops into rotations, and grazing management for improved system resilience.
2. **To explore the demand for creating a network of farmers** currently using, or interested in adopting, regenerative agriculture practices in the north of England.
3. **To complete a thematic analysis of workshop observations, questionnaires and targeted interviews among local farmers**, including those who currently practice regenerative agriculture, and those who do not, to assess barriers and enablers to taking up regenerative agriculture practices in the north of England.

¹ <https://www.farmingforabetterclimate.org/soil-regenerative-agriculture-group/>

4. To identify and summarise key research knowledge gaps, structural barriers, and practical challenges to implementation of regenerative agriculture in the north of England.

5. To explore ways to create a Regenerative Agriculture North (RAN) hub for research and knowledge exchange should the research show this to be needed on regenerative agriculture for practitioners in the north of England, leveraging current KE-building activity at Newcastle University Farms (NUFarms) and to explore the feasibility of establishing such a network (e.g. along the lines of our Northern Arable Centre) and how it might be maintained post-project.

The outcomes of objective 4 will underpin a series of high-quality, targeted proposals to UKRI funding mechanisms and other appropriate funders that address barriers to the uptake of regenerative agriculture in the north of England, using a participatory, agroecosystem living lab approach, supported through the outcomes of objective 5.

2.2. Context

The field work for this research was carried out in the first three months of 2022. It was a time of considerable uncertainty across the farming sector. Farmers knew Basic Payment Scheme (BPS) payments were to be withdrawn and ended completely in 2028. But the percentage annual reduction was known only until 2024. Details of the Lump Sum Scheme had yet to be announced. Summary farm account data published by Defra (2022) show the dependency of farms on the BPS by farm type. For example, the average Farm Business Income (FBI) for Grazing livestock (Lowland) farms 2021/22 was £18,400, 83% of this was comprised of net BPS payments (Defra 2022). In the same year, the net BPS payment comprised 80% of Less Favoured Area (LFA) Grazing livestock Farm FBI.

Although the government has guaranteed not to reduce the total agriculture budget expenditure until at least the end of its term in office, few details on Environmental Land Management Scheme (ELMS) were available (although two tiers of two Sustainable Farm Incentive (SFI) Soil Standards had been published; see Table 1 and Table 2). As a result, many farmers believed the replacement for the Countryside Stewardship agri-environment scheme would not be ready in time to avoid a “funding gap” in the coming years (Shand 2022).

Negotiations had already agreed changes to the trade arrangements with Australia (Fawshaw et al. 2021) and New Zealand (DTI 2022), and a potential UK/US trade agreement had been the subject of recent intense media scrutiny and speculation (Forshaw and Baker 2022). Although phased in gradually, these changes will allow low-cost overseas producers to undercut UK markets, providing a future threat to livestock farmers’ livelihoods. Even before the war in Ukraine started, input price

inflation had raised fuel and fertilizer prices (AHDB 2022a); these have increased further since 24 February, the day of the invasion.

Therefore, farmers were faced with a combination of immediate pressures and longer-term challenges. Although commodity prices had increased, this benefits only those farmers with goods to sell: many needed to consider how best to reduce fuel and fertilizer costs.

Farmers had been told of the revised details of the Sustainable Farming Incentive Arable and Horticulture and Grassland Introductory and Intermediate Soils Standards for two of the three levels in the previous December (Table 1 and Table 2). Most of these fall within the realm of regenerative agriculture practices, particularly requirements for winter cover, application of organic matter, and an emphasis on monitoring soil organic matter regularly. Only “draft actions” for the Introductory and Intermediate and advanced levels were available for the Moorland and Rough Grazing Soil Standards.

Table 1 Arable and Horticulture Soils Standards (AHDB 2022b)

Level	Introductory	Intermediate
Payment	£22/ha	£40/ha
Requirement 1	Soil organic matter tested (within the last 5 years) across all land entered	
Requirement 2	Soil assessment and production of a soil management plan	
Requirement 3	Winter cover (December to February) in place for 70% of land area included in the Standard	
	Any kind of green cover (including autumn sown crops)	Must include multi-species green cover of 20% of the area included
Requirement 4	Apply organic matter to one-third of the included area	
	Any kind of organic matter	Can include the multi-species green cover listed above
Defra announced plans to add an Advanced Level from 2023 onwards, stating this level was “likely to include the use of no-tillage techniques”.		

Table 2 Improved Grassland Soils Standard (AHDB 2022b)

Level	Introductory	Intermediate
Payment	£28/ha	£58/ha
Requirement 1	Soil organic matter tested (within the last 5 years) across all land entered	
Requirement 2	Soil assessment and production of a soil management plan	
Requirement 3	95% green cover to protect soil (no more than 5% bare ground over winter – December to February)	
Requirement 4		Establish or maintain herbal leys over at least 15% of included land

3. Materials and methods

3.1. Knowledge Exchange Workshops

The project supported three knowledge exchange workshops. The format of all workshops was designed to encourage dialogue and debate, though a slightly different format was used for each event based on organiser preferences and audience.

1. “Challenges and opportunities for regenerative agriculture in the north of England”, 26 January 2022, Cockle Park Farm, Morpeth.

Hosted by Newcastle University, this workshop consisted of informal presentations by Newcastle University staff and invited speakers designed to facilitate discussion and debate (full details of the programme in Appendix A). Attendees were invited through farmer contacts available through Newcastle University with interests in the range of topics under discussion (principally no-till, cover crops, pasture/grazing management). Flip Charts were available in the room for attendees to contribute comments/responses in writing based on the topics being discussed (see Appendix A for discussion facilitation).

2. “Overcoming barriers to regenerative agriculture in northern England – Expert farmers focus group”, 3 February 2022, Melmerby Village Hall, Melmerby.

Hosted by The Farmers Network (TFN) with support from Newcastle University (full details of the programme in Appendix B), this event was organised as focus groups with farmers who are active practitioners of regenerative farming practices (particularly related to grazing management for livestock). The workshop was based around two discussion groups facilitated by TFN and the Pasture For Life Association (PFLA), with Newcastle University researchers documenting responses (see Appendix B for discussion guidance).

3. “Topcliffe Innovation Group Workshop”, 18 February 2022, The Grange, Baldersby Park, Thirsk.

Hosted by Future Food Solutions Ltd (FFSL) with support from Newcastle University (full details of the programme are in Appendix C), the third and final event was organised around a planned meeting of farmers already participating in an Innovation Group with FFSL. The purpose of the meeting was to update farmers on results from growing cover crops and plan for future assessments. To contribute to the regenerative agriculture project, attendees participated in discussion groups led by Newcastle University researchers (Appendix C).

3.1.1. Workshop Analysis

Farmer comments and the discussions from the three workshops were documented on paper (flipcharts, sticky notes etc), as feedback and notes following the meeting, and as video recordings.

The notes and written feedback from farmers were entered into NVivo and coded based on the different practices and barriers to identify common themes and collate ideas.

3.2. Practitioner Surveys

In addition, an online survey of agricultural stakeholders in northern England was distributed using social media channels and contact lists available through NU-Farms (LEAF, NFU North, BASE UK, Coastal Grains Ltd.). This survey was created and managed as a Google Form with regenerative practices and outcomes sourced from Newton et al. (2020) and modified by the project team. The surveys intentionally did not provide a definition of 'regenerative' to encourage respondents to answer based on their own experiences and perceptions. Additionally, attendees of the Knowledge Exchange workshop at Cockle Park (Event 1) completed a questionnaire as part of the online registration process on EventBrite and participants in the Thirsk Innovation Group Workshop (Event 3) completed hard-copies of questionnaires in-person during the event.

All participants in the survey were provided a Study Information Sheet prior to completing the questionnaire (Appendix D). Registration for the first workshop (Cockle Park: Event 1) took place prior to the launch of the full online survey, therefore there are some differences in specific phrasing and terminology between questions. The hard-copies of questionnaires were requested by Future Food Solutions prior to the final workshop (Thirsk: Event 3) and were adapted from the online survey so that terms/phrasing was the same, but simplified. Each of the three versions of the questionnaire are in Appendix F.

Results from all surveys were compiled into a single database and filtered based on respondent type (respondents identifying as farmers were analysed separately). Charts were created in excel to simply represent the data. More advanced analysis will be conducted for publication in peer-reviewed journals.

4. Results

4.1. Summary of Key Outcomes from Workshops

Discussions during the three workshops were lively, engaging, and at times heated! A diverse range of topics and opinions linked to regenerative agriculture were covered in facilitated groups, question and answer sessions with panellists, and anonymous polls (Figure 1). The key themes covered in the workshops are discussed below.

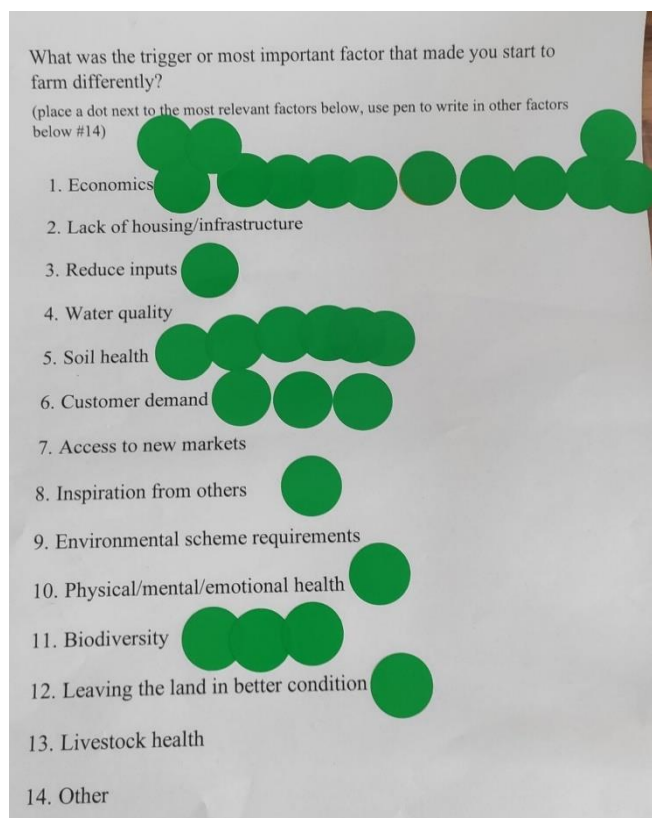


Figure 1 Example of “dot” anonymous voting system used at the Cumbria workshop

4.1.1. Defining regenerative agriculture

Concerning the definition or meaning of the term “regenerative agriculture”, farmers specifically spoke of regenerative as a system/philosophy, with participants at Cockle Park noting that it’s ‘not just using a drill’ and participants at the Cumbria workshop suggesting that it’s also about ‘regenerating ideas’ as a process. The farmers at these two events also expressed concern over alienating ‘mainstream’ agriculture with the term regenerative as it implies that there is a ‘degenerative’ agriculture. There was also an acknowledgement from workshop participants that there isn’t a clear definition or way to measure regenerative agriculture. Specifically, farmers in Cumbria noted that the definition is ‘woolly’ and debated how sustainability of systems is measured in relation to defining regenerative agriculture. There was also some scepticism among workshop participants, with comments like “why call it regenerative when it’s just mixed farming?”.

4.1.2. Integrating livestock

The integration of livestock into regenerative agricultural systems was a contentious topic. Most farmers at the workshops agreed that livestock needed to be included in the system for it to be regenerative, but legitimate concerns about impacts on the carbon footprint were raised e.g. "...the fact that it takes his animals 6 months longer to reach the market destroys his carbon credentials." Farmers at the Cumbria workshop were selected from a well-established grazing management discussion group, so it was not surprising that livestock management was a key theme at this event. As a baseline, the farmers at this event considered integrating livestock to be a key component of regenerative agriculture and highlighted mob-grazing in particular as having a 'direct correlation' with regenerative agriculture.

But how to best integrate livestock into arable production systems was a source of debate. At the Cockle Park event there was a lengthy discussion about using livestock to graze cover crops in arable fields, particularly over the winter. Many farmers present with mixed farming systems did graze cover crops in winter, although this was mostly with sheep. A few of those present overwintered cattle and some of those present questioned the impact of this on soil quality. This group of arable farmers felt that minimal or no disturbance of the soil surface was key to regenerative agriculture and would never consider putting cattle on their no-till land over the winter, questioning why a practitioner would knowingly destroy soil structure built up through no-till practices.

The majority of participants, however, indicated that livestock have an important role in regenerative farming systems, but management flexibility was emphasised with the need to select the right grazing management strategy depending on the farm's soil, climate, livestock and stocking rates. Many farmers who attended the Thirsk event noted that they've started using grazing animals again, with one farmer remarking that they are 'going back to how we used to farm' with livestock on their leys or cover crops. Though each individual's reasoning for these shifts is different, this farmer lost his dairy herd to foot and mouth in 2004 and after remaining solely arable for more than 10 years reincorporated grass/leys into the rotation as a response to a noticeable decline in soil quality.

4.1.3. Cover crops

Cover crops were a key topic discussed at the Cockle Park and Thirsk events with many farmers in attendance already growing them. The Thirsk event in particular was focused on cover crops because the farmers in attendance were participating in a programme with Future Food Solutions to specifically grow and monitor cover crops as a group. These farmers indicated that the primary reason for growing cover crops was to 'improve soil structure' as well as 'for nutrient capture'. The farmers at the Cumbria event also spoke about wanting to integrate more cover crops into mixed farming systems.

4.1.4. Motivations for practising regenerative agriculture

Although the online survey did not explicitly ask why farmers have adopted these practices, the workshops did delve into this topic. The farmers in Cumbria clearly emphasised economic reasons for adopting regenerative practices (Figure 1) not because of any expectation that regeneratively produced products will command a price premium, but rather to reduce costs of production, resulting in better margins. Some of the economic benefits came from: reducing or no longer using fertiliser, stewardship payments, short-supply chains and sometimes value-added products, and/or fewer animals to feed. This was described as a push-pull dynamic, with increased costs pushing change out of necessity and the potential market premium as the pull. Further, many of the farmers at the Cumbria event cited a Wildlife Trust publication called 'Less is More' as helping demonstrate the economic viability of regenerative farming, particularly the beneficial margins available (Clark et al. 2019).

Farmers at the Cockle Park event also noted the lower cost of regenerative agriculture, and there was also a lengthy discussion about the potential for marketing regeneratively produced products for a price premium. The overall view at this workshop was that a standardised method of defining and measuring regenerative practices and outcomes was necessary before it would be possible to gain a premium in the marketplace. However, this was balanced by a recognition that regenerative practices are becoming the standard 'norm' that farmers will need to comply with in the future to access UK markets; this will negate the likelihood of customers paying premiums for RA products. Although the discussion surrounding fertiliser prices has become even more urgent since this event, this was named as one factor shifting farmers towards adopting regenerative practices. The participants noted that changes in farming practices must stack up financially.

4.1.5. The need for knowledge

A lack of knowledge was identified as a constraint to successful implementation of RA in all of the workshops. For example, Farmers at the Cockle Park event noted they were unsure what specific kit is required for direct drilling. Farmers at the Cumbria event acknowledged that most of the useful information they receive is from other farmers or is self-taught. A lot of RA farmers learn via social media channels (e.g. Twitter), YouTube videos (Gabe Brown is particularly popular) and books (e.g. Gabe Brown's *Dirt to Soil*, published in 2018). The farmers in Cumbria specifically mentioned farmer-to-farmer exchange, via social media (including WhatsApp and Twitter), Discussion Groups and some advisory groups (the Farmer Network, Pasture for Life Association and AHDB regional groups) as their primary sources of information.

The need for more locally applicable knowledge was identified. Farmers at the Cockle Park event specifically noted the lack of regional data explaining the effectiveness of cover crops: 'What fits for DEFRA in the South of England doesn't work in the North'. There was also a specific request for

bespoke cover crop mixtures from seed companies to allow farmers to select specific species to generate outcomes most suitable to their farm's climate and soil conditions. Some farmers in Thirsk expressed an interest in growing their own cover crop seeds because of the extremely expensive cost for seeds such as Phacelia. However, they also noted that some seeds are produced in climates very different from the UK (e.g., imported from France).

The regenerative farming knowledge gaps highlighted by farmers at the Cumbria event included: soil and nutrient cycling (as a shift from high fertility inputs) and which were the beneficial species to include in swards to complement changes in grazing management. In discussions of grazing management in particular, farmers noted that a lot of the most useful resources come from outside of the region, specifically citing TEAGASC in Ireland and the many pasture-based grazing advocates in New Zealand (where the climate is similar, but the scale/terrain is different). There was a general feeling that many consultants and agricultural colleges in the UK 'aren't up to speed' because they are paid to share information, but do not actively encourage farming changes and as they are 'not living farming' they are "out of touch". This view was expressed by some at the Thirsk event, though less vehemently, as farmers noted that there is a need for agronomists who aren't incentivised to sell pesticides to help manage beneficial flowering margins.

After the Cumbria event, one farmer in attendance summed up how lack of accessible knowledge about regenerative farming acts as a barrier to adoption:

"I'm sure that many farmers know that things are wrong with their farm finances and their farming system ... whilst they know change is necessary, they have generally known nothing else than the status quo and so when there is no one there to help them develop a vision for change and show them a way out of the predicament, they revert back to the status quo, because it is all that they know."

4.1.6. Economic barriers

It was agreed that economic factors were a limitation to the more widespread uptake of regenerative agriculture practices at all three events, although concerns were framed slightly differently given the different context of each workshop. The cost of equipment and supplies was noted with regard to specific practices at the Cockle Park and Thirsk events, for example, the high cost of precision agriculture equipment demonstrated at Cockle Park. Attendees at the Thirsk event discussed the high cost of seed for cover crops, with some suggestion of reducing seed rates to reduce costs. Production of own seed was considered uneconomic because of the cost of the specialised equipment needed for cleaning some types of seed.

As discussed, the farmers in Cumbria were largely driven toward regenerative practices for economic reasons and ultimately view this shift as beneficial to their financial margins (with reference to Clark et al., 2019). However, they were also clear that farmers not knowing which regenerative practices are financially viable is a barrier to further uptake. One farmer suggested that even if farmers want

to improve their farm finances ‘they actually need to see the figures in front of them’ to realise that they can make a change. Several participants in Cumbria noted that the transition to regenerative farming systems and practices was not financially supported in the way organic conversion is, which further emphasised the message that ‘you have to see it yourself’ to understand the economic possibilities.

This uncertainty around economic viability and the barrier posed by financial risk of adopting new practices was apparent at the Cockle Park event where farmers were specifically concerned about the profitability of regenerative practices. Attendees viewed regenerative farming as being less commercially viable, noting that ‘the commercial world has less to gain’ and questioning if regenerative practices ‘sell in commercial setting and still be profitable?’. Farmers at this event also expressed concern that payment levels for sustainable farming are too low but that regenerative practices are also even less viable without subsidies. It seems like these concerns are what the farmers in Cumbria refer to when emphasising that evidence of economic viability is a barrier to the uptake of regenerative practices.

4.1.7. Uncertainty about land stewardship programmes

The concerns over financial viability overlapped with the challenge of uncertainty about future land (environmental) stewardship schemes. The attendees at the Cumbria event described stewardship schemes as inflexible and unresponsive: ‘they’re meant to help but the rules are so rigid’. Additionally, many expressed strong concern about the risks that new schemes might pose to future land access, a particular issue for the many tenant farmers at the workshop. If landowners receive higher incentives via environmental payments, for example to plant trees, they may take land away from their tenants. The farmers at this event also agreed that there was little to no public/government support for regenerative practices, perhaps because these farmers are viewed as outsiders from mainstream agriculture. One farmer believed the real benefits of regenerative farming were not sufficiently understood by those designing stewardship schemes who ‘are not even able to explain [the benefits] to other farmers, let alone the public’.

At the Cockle Park event, farmers noted that sowing winter cover crops is in conflict with payment schemes for winter stubble, and that ‘DEFRA schemes are not suitable for the North East’. Attendees questioned how the agriculture and environment scheme payments are being designed as the current soil standards require enhancement of soil organic matter² but do not refer to other aspects of soil health. There was also debate about carbon accounting and whether soil carbon sequestration can be effectively measured and paid for in environment management options. Farmers at the Cockle Park event also noted that supermarkets and supply chain demands are likely to drive more

² Note that the current soils standard requires monitoring of soil organic matter levels and additions of organic matter; but does not explicitly require enhancement of organic matter.

changes to reducing greenhouse gas emissions than land stewardship schemes, especially as it's taking so long for these to be amended and established while the commercial market is much more responsive. Some of the farmers present at Cockle Park and Thirsk were already part of private schemes which pay RA farmers for ecosystem services (e.g., The Green Farm Collective <https://www.greenfarmcollective.com/> and Sustainable Futures <https://sustainablefutures.uk.com/>).

4.1.8. The role of research

There were some clear messages from the workshops about the type of research farmers felt would be most useful to support the transition to regenerative agriculture. Farmers in Cumbria were interested in basic research that would baseline the current status of their farms (both ecological and financial indicators) and track changes on a regular basis. They expressed an interest in seeing Universities trying out riskier strategies and being honest and open about mistakes and what didn't work. The livestock farmers in Cumbria were interested in finding out differences between, and building an evidence base, for set stocking versus mob grazing, and were particularly interested in indicators not routinely measured by soil and plant laboratories, such as soil microbial activity and the nutrient density and quality of products. The measurements of carbon sequestration and "true-cost accounting" – i.e., adding the costs of environmental externalities to the farmers production costs, were also mentioned at more than one event.

At Cockle Park the arable farmers in the room were looking for evidence that cover crops "work" in our northern environment. They also expressed an interest in seeing NU-FARMS have a more active role as a true demonstration farm, for example, producing regular reports on financial and environmental outcomes of regenerative agriculture practices. This aligned with the discussions in Thirsk, where farmers expressed a need for field-scale demonstrations of different practices. These farmers felt the University should be prepared to take the risk of testing innovative practices and provide reports on the outcomes to the general agricultural community. They argued that field-scale demonstrations and trials not only provide robust evidence of financial and environmental outcomes, but they also are effective knowledge transfer tools, allowing farmers to see effects "with their own eyes".

4.2. Summary of Survey Results

4.2.1. Respondent Characteristics

The survey results were compiled together across all survey types, with 36 respondents from the online survey, 40 from the Cockle Park event survey, and 11 from the Thirsk event survey (Table 1). Most respondents were farmers (73), with a few responses from researchers (3) and agronomists (10). The surveys and workshops were primarily advertised to farmers and agricultural advisors, though the online survey was circulated to anyone 'working in agriculture in the North of England'.

For this report, we present survey results from farmer respondents only, with additional results for the full dataset available on request.

Table 3 The number and type of respondents to the three different surveys completed as part of the Regenerative Agriculture in the North project.

Source	Total	Farmer	Researcher	Agronomist	Other
Online	36	32	3	1	0
Cockle Park	40	30	0	9	1
Thirsk	11	11	0	0	0
Total	87	73	3	10	1

NB: The agronomist category includes individuals who selected 'Agronomist/advisor', 'Policy advisor' and/or 'Agricultural supply business'.

The purview of the project was focused on the North of England, therefore surveys were specifically distributed regionally to the following counties: Cumbria, Durham, Northumberland, Tyne and Wear and Yorkshire. Most farmer respondents were based in Northumberland (25) and Yorkshire (23), with more representation from Cumbria (8) than Durham (6) or Tyne and Wear (3) (Table 2). 63 of the 73 total farmer respondents identified as conventional farmers, while 5 were organic, and 2 identified as both conventional and organic; 3 respondents did not specify a management type.

Table 4 The county and management type specified by all farmer respondents for all three surveys completed as part of the Regenerative Agriculture in the North project.

Management	Cumbria	Durham	Northumb.	Tyne Wear	Yorkshire	Unknown	Total
Conventional	8	5	25	2	23	0	63
Organic	2	0	2	1	0	0	5
Both	0	0	2	0	0	0	2
Unspecified	0	1	0	0	1	1	3
Total	10	6	29	3	24	1	73

4.2.2. Outcomes of Regenerative Agriculture

Respondents participating in all three surveys were asked to select from a list as many outcomes as possible that they associated with regenerative agriculture. The results were primarily focused on soil and the environment: improving soil health was selected by 72 of 73 farmer respondents, followed by increasing carbon sequestration (68) and improving ecosystem services (67) (Figure 2). The least commonly selected outcomes were for improving food security (31) and improving yield/productivity (35).

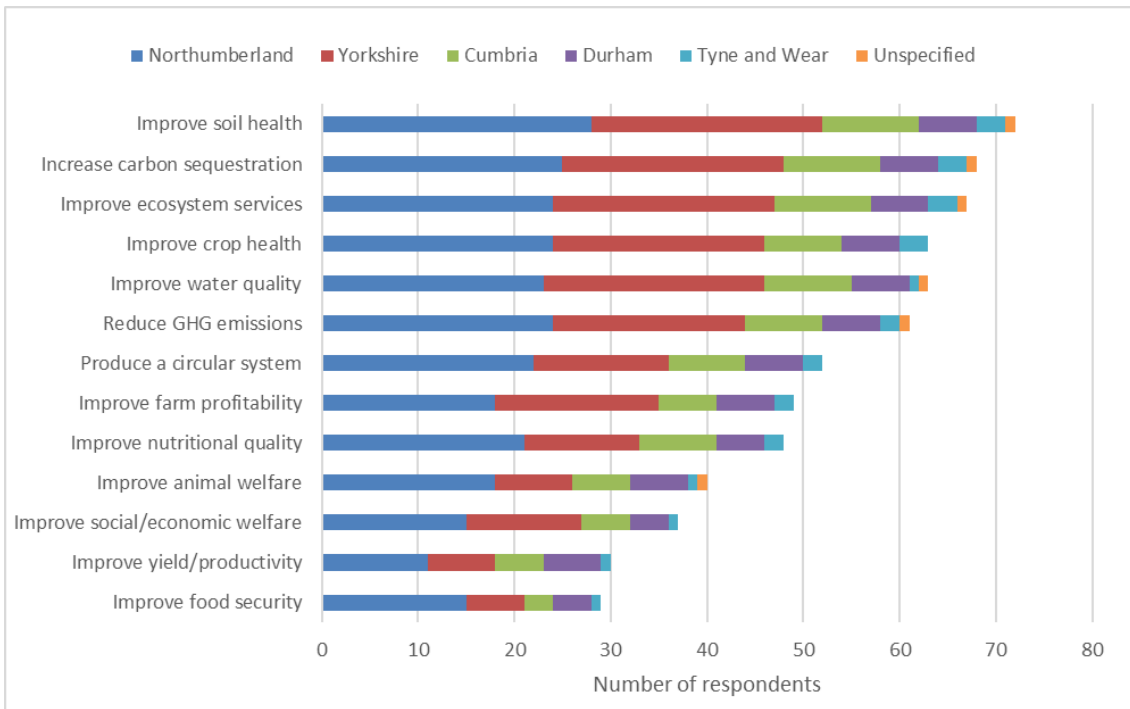


Figure 2 Outcomes that farmer survey respondents associate with regenerative agriculture

At the Cumbria event, we also asked farmers to select what has occurred since they shifted to regenerative practices from a list created with the Farmers Network and the Pasture For Life Association. Increasing biodiversity was the mostly commonly selected outcome, followed by being better off financially, improving soil health, and being happier in farming (Figure 3). Farmers also selected ‘all of the above’ showing the range of changes since first using regenerative practices, including reducing their carbon footprint, improving animal health/welfare, becoming more resilient to climate change and being more in touch with consumers.

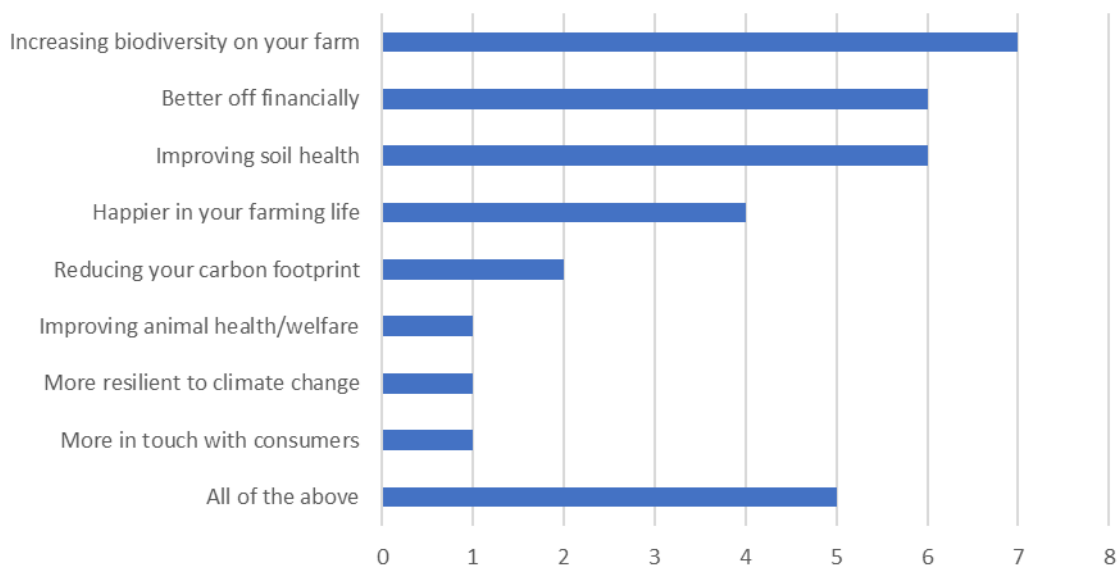


Figure 3 Perceived outcomes selected by farmers attending the Cumbria workshop as taking place after starting the process of shifting to regenerative practices

4.2.3. Regenerative Practices

Respondents to all three surveys were also asked to select from a list all the practices they consider to be regenerative. The main activities considered regenerative by farmers in the North of England were associated with cropping and tillage: 66 out of 73 farmer respondents selected diversified cropping systems, followed by cover cropping (65) and minimum tillage (59) (Figure 4).

The next grouping of practices includes livestock management, with 56 respondents selecting integration of livestock into farming systems and Integrated Pest Management (IPM) while 40 respondents selected pasture-based livestock as regenerative. The least commonly selected practice was local/small food supply chains, selected by only 16 respondents, followed by biologicals/biostimulants (21), grazing management strategies (27) and organic practices (27). Less than half of respondents also selected no-tillage (34) and agroforestry (33) as regenerative (Figure 4).

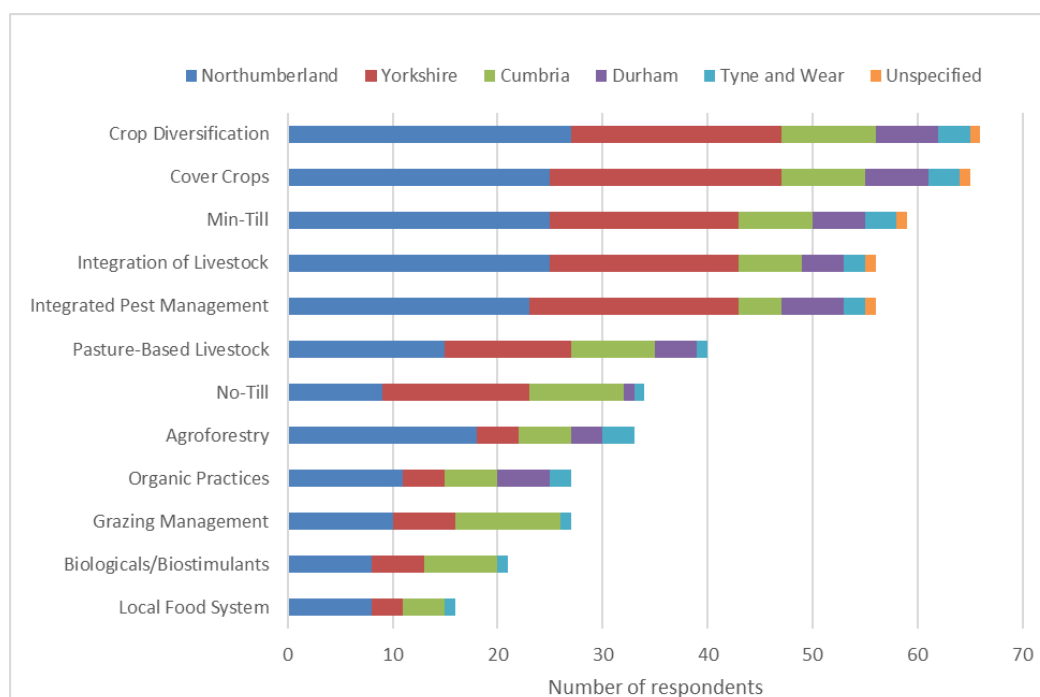


Figure 4 Practices that farmer survey respondents associate with regenerative agriculture

The online and Cockle Park survey respondents were asked which types of practices they are currently utilising. Out of 62 farmer respondents, 51 use min-till, no-till and/or direct drilling and 50 use some form of alternative cropping (diversified cropping systems, cover cropping and/or intercropping) (Figure 5). More than half of farmer respondents currently use organic practices (37) and integrate livestock into their farming systems (37), 31 use biologicals/biostimulants and 30 use pasture-based livestock while very few use a local food system (6).

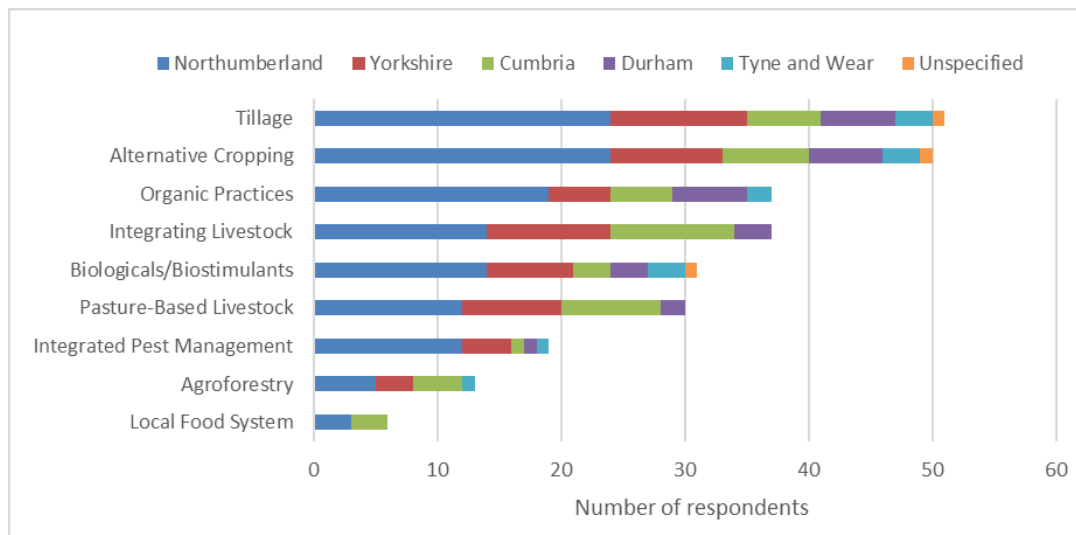


Figure 5 Types of practices³ that farmer respondents selected that they currently use

Respondents to the online survey were also asked more specific questions about their current and previous use of different field operations and practices that are typically included under the regenerative agriculture umbrella (e.g see (Newton et al. 2020), and to indicate the likelihood they would use them in the future. Responses for practices relating to cropping and tillage are shown in Figure 6. The most common practice that respondent farmers are using currently is crop diversification (22); cover crops (16), minimum tillage (17), and no-till (16) were also used by many respondents. It is interesting to see that a relatively large number of respondents are not using no-till practices, but would like to.

³ NB: Alternative cropping includes: cover cropping, diversified cropping systems and/or intercropping. Tillage includes: no-till, min-till and/or direct-drilling. Attendees at the Cockle Park event were asked about: organic management, permaculture and/or compost/green manure; these have been grouped as “organic practices” in this figure. Integrating livestock includes mixed farming, holistic livestock management, pasture-based livestock, rotational grazing and/or mob grazing. Pasture-based livestock includes pasture-based livestock, rotational grazing and/or mob-grazing.

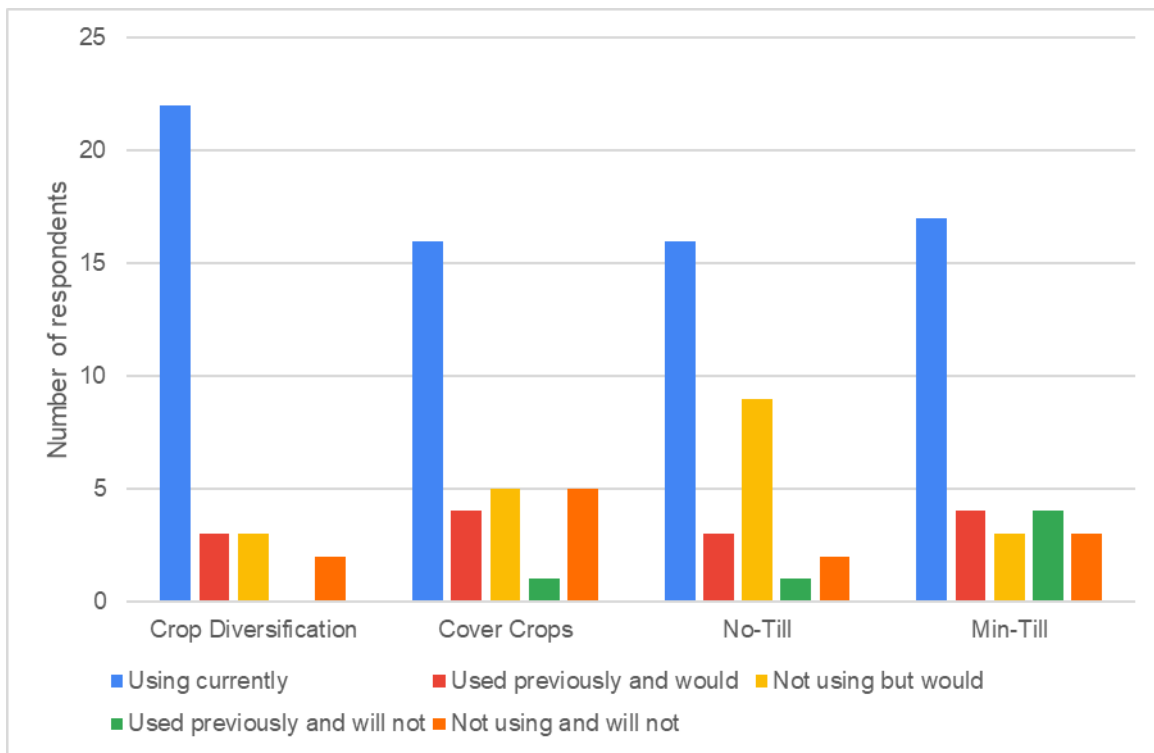


Figure 6 Use of cropping and tillage practices reported by farmer respondents to the online survey

Integrating livestock (17) and pasture-based livestock (17) are also used by more than half of respondents (Figure 7). Grazing management practices were selected by a relatively high proportion of respondents as something that they were not using and would not use.

IPM was used by a relatively high number of respondents (Figure 8). Notably, agroforestry had more respondents saying they do not and will not take up the practice (12) than those saying they currently use agroforestry (11), and the same number of farmers said they use organic practices (12) as do not and will not (12). Responses towards local food system were variable. Only six respondents currently participated in a local food system (6). Nine said they do not supply their local food system and have no immediate intention to do so, but eight who also indicated they do not currently do so but would in the future (8). This was the practice least often selected as regenerative and the fact that five farmers selected that they don't know what this is indicates that this may not be seen as relevant to regenerative agriculture and/or misunderstood.

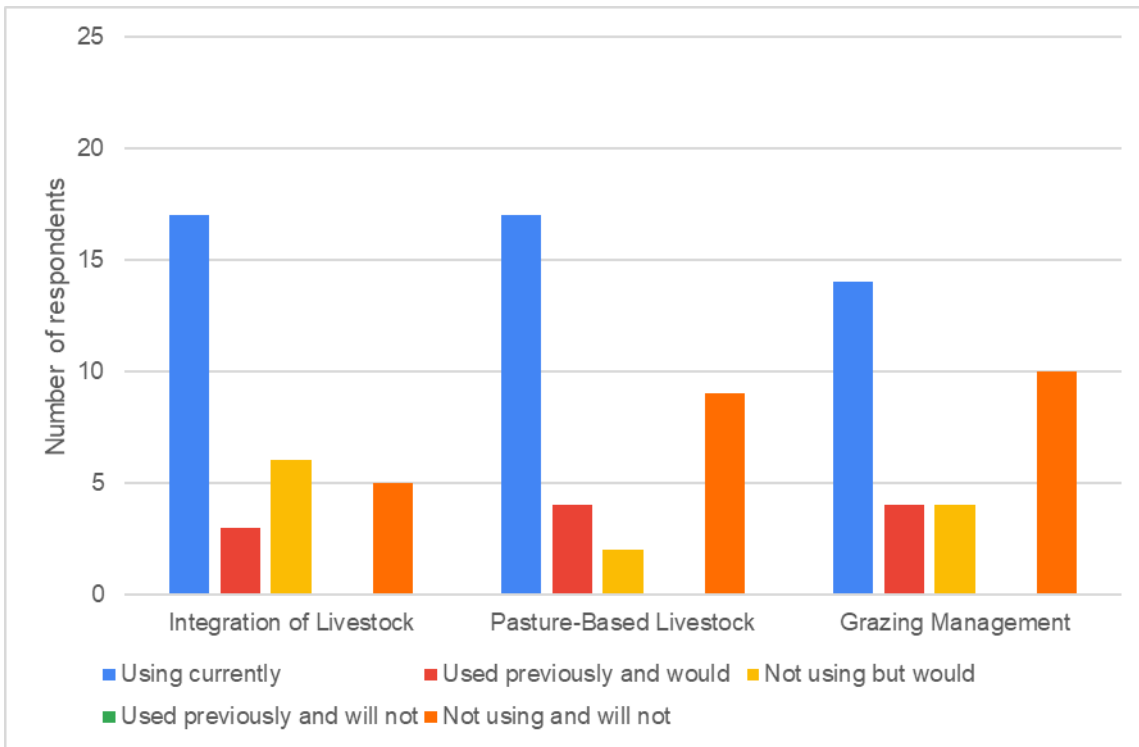


Figure 7 Integration of livestock and management practices reported by farmer respondents to the online survey

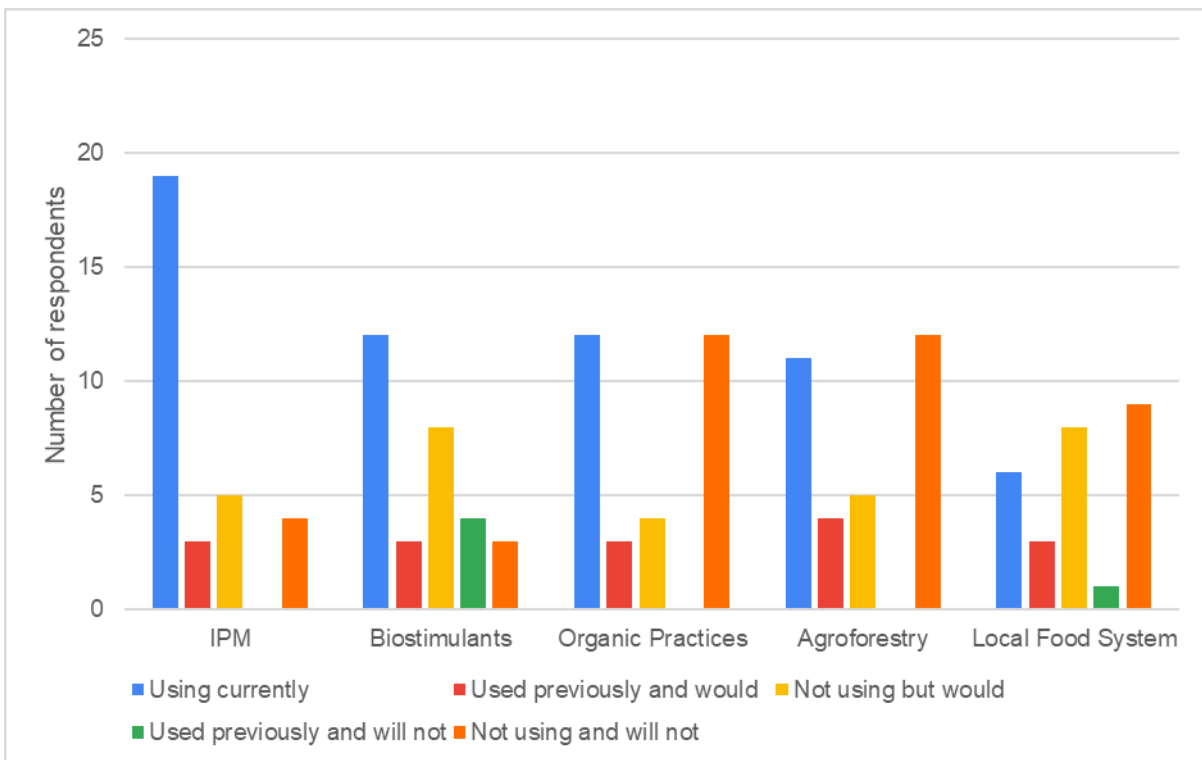


Figure 8 Use of alternative management practices and strategies reported by farmer respondents to the online survey. IPM=integrated pest management; biostimulants included biologicals

4.2.4. Barriers to Regenerative Practices

In the online survey and at the Thirsk Event, farmers were asked to select barriers to adopting regenerative agriculture practices. Out of 43 farmer respondents, 33 selected lack of knowledge as a barrier, followed by financial risk (29) and too much time/labour (26) (Figure 9).

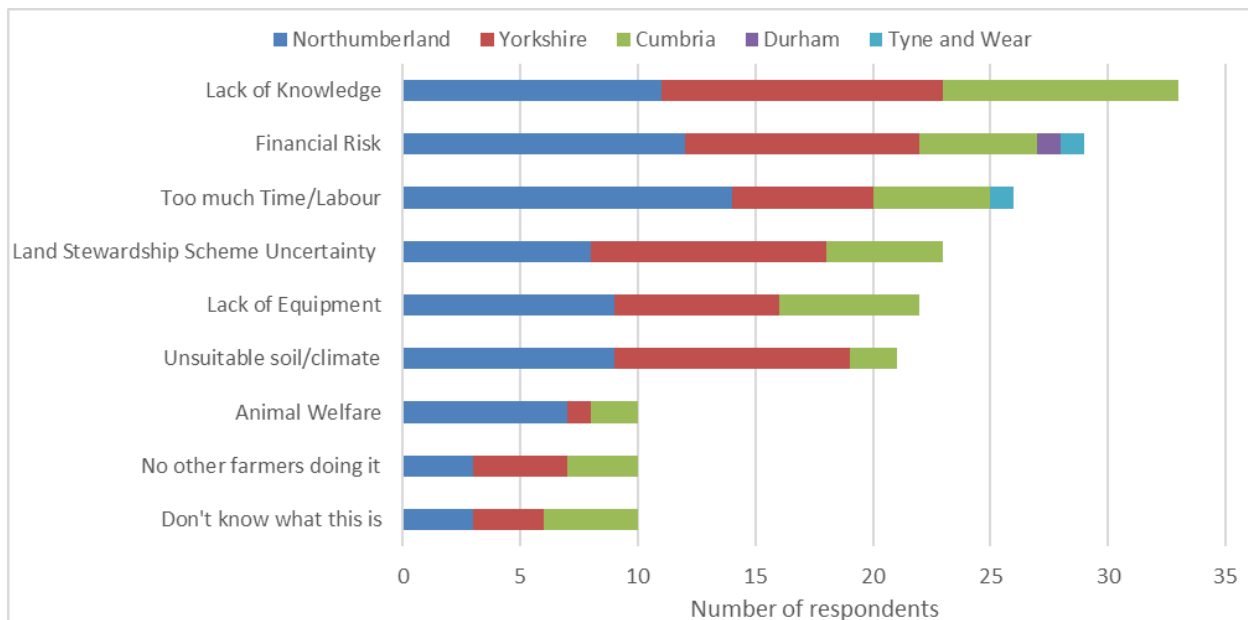


Figure 9 Farmer responses selecting barriers to adoption of regenerative agriculture in the North of England

Figures 11, 12 and 13 present responses to the online survey where farmers were asked which barriers exist for specific practices, including noting when they did not believe barriers existed and if they don't know about a particular practice. They are separated into three categories. Figure 10 shows the online survey findings for four widely recognised regenerative agriculture techniques - crop diversification, minimum tillage, integrated crop management (IC) and no-till. The large number of responses which say there are no barriers to using these field operations suggest there is a good deal of experience and expertise in these practices across the sector, confirming the responses shown in Figures 6, 7 and 8. A potential strategy to address barriers to these practices would be to connect those farmers who lack knowledge and are looking for information with those farmers currently using these practices.

The key barriers farmer face are also shown. For example, key concerns for moving to No-Till include the financial risk, lack of equipment and soil/climate limitations.

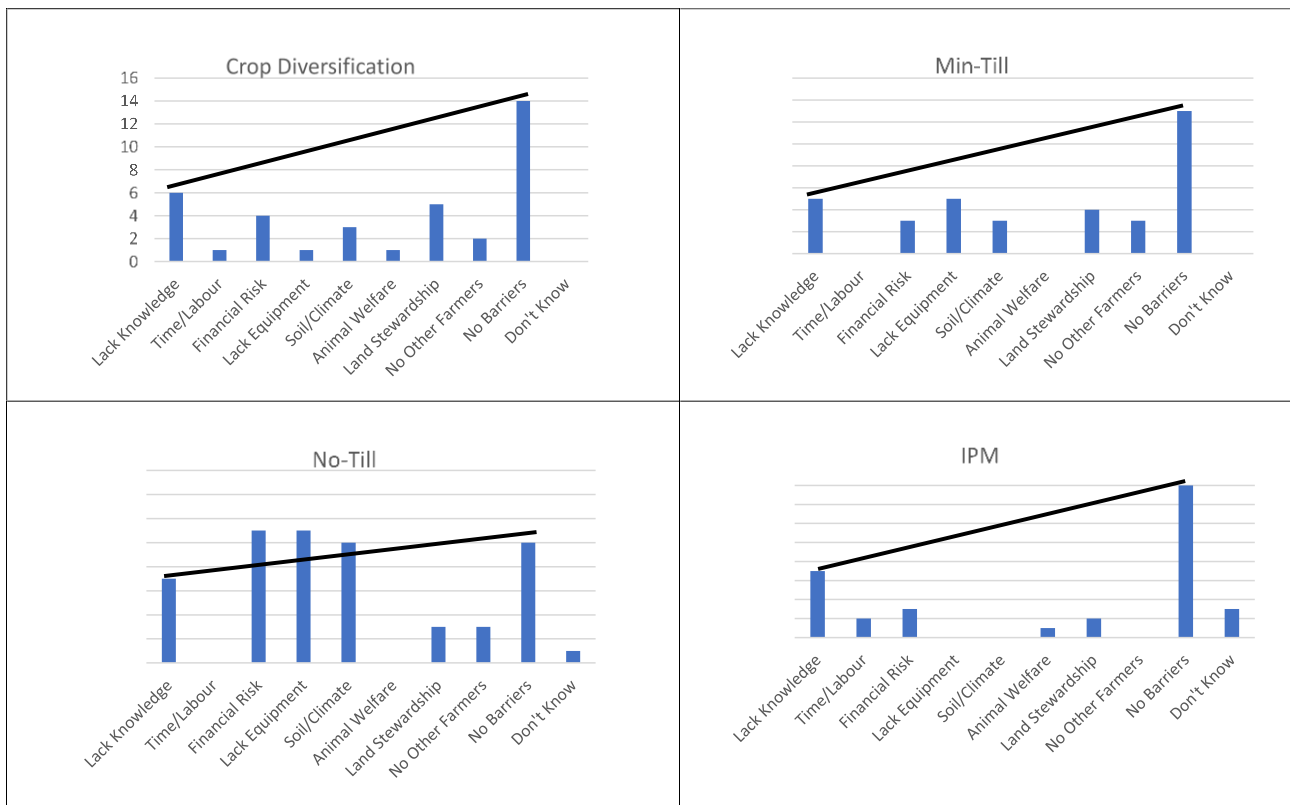


Figure 10 Online survey responses - barriers to regenerative agriculture – the need to share knowledge

Figure 11 shows the online survey findings for barriers to using cover crops, integration of livestock, organic practices and biological/biostimulants. Responses are equally split between those with experience and expertise (“No Barriers” responses) and those lacking knowledge. Barriers to the more widespread take up of these activities may be related to how farmers can best integrate them into current farming systems. The principal barrier highlighted for these operations is Financial Risk; a mixture of whole farm and partial budget advice and guidance may be appropriate. Additional common barriers include Soil/Climate limitations and Stewardship agreements for cover crops, and Time/Labour and Lack of Equipment for integrating livestock. Bespoke on-farm advice and grant funding to purchase equipment may address these barriers. The numbers of respondents indicating no barriers suggests there may be sufficient experience within the sector to draw on to generate financial and farm system advice to help overcome these barriers.

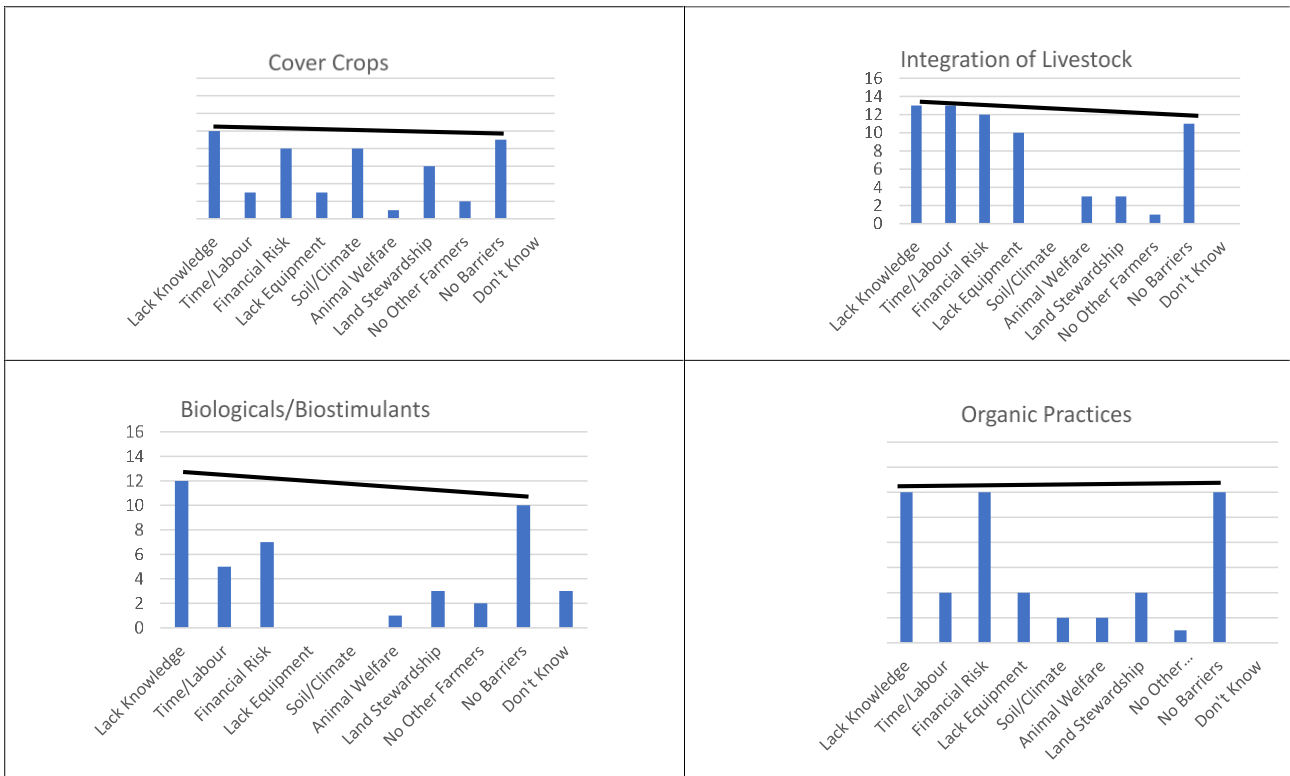


Figure 11 Online survey responses - barriers to regenerative agriculture – system related analytical issues

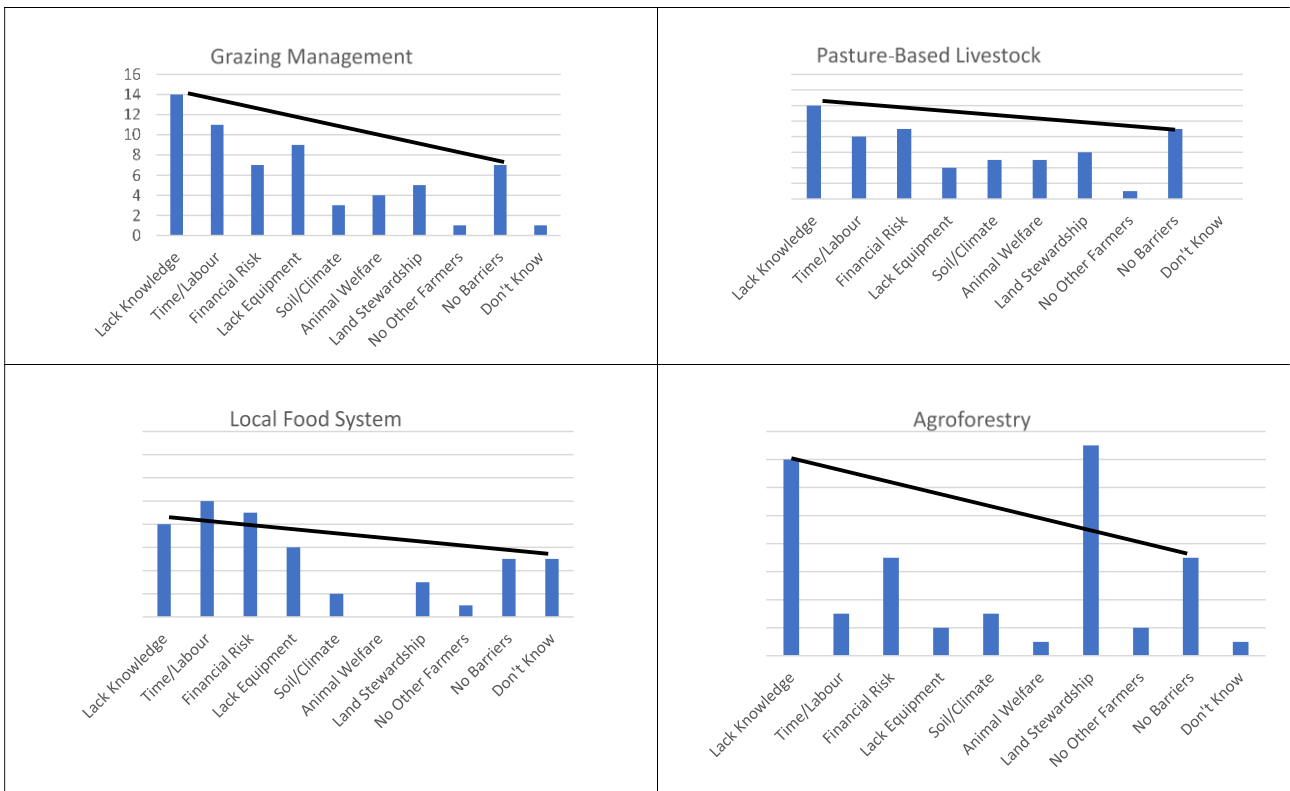


Figure 12 Online survey responses - barriers to regenerative agriculture – sector wide lack of knowledge and experience

Figure 12 shows the online survey findings for grazing management, pasture-based livestock, agroforestry and local food systems. There appears to be a widespread lack of knowledge about these field operations, with only a small number of respondents believing there are no barriers to their uptake. This suggests there is substantial sector wide demand for further research and dissemination of outcomes for these activities. This might be realised by providing advice for farmers to establish, manage and record their own on-farm trials, making the outcomes widely available. Perhaps an approach modelled on the Practical Farmers of Iowa, which aims to equip farmers to “build resilient farms and communities” by advising on how to generate “healthy soils, healthy food, clean air, clean water, resilient farms and vibrant communities” could be employed (<https://practicalfarmers.org/about/history/>). It is also notable that concerns about Stewardship agreements are particularly high for agroforestry.

5. Discussion

5.1. Key Messages

The survey results show that farmers employ both practice-based and outcome-based definitions of regenerative agriculture. Survey respondents associated regenerative agriculture with diversified cropping systems (as well as cover cropping) and reduced tillage practices (min-till and no-till), and linked RA to beneficial outcomes related to soil health, carbon sequestration and ecosystem services. However, many workshop participants also emphasised that RA did not just describe individual practices, but that it is a state of mind, akin to a philosophy, describing it with words such as “holistic”, “organic” and “circular”.

There were differences in definitions principally reflecting the dominant cropping system of each region. This was particularly evident when considering survey responses and discussion around livestock integration and pasture-based management, with farmers in Cumbria citing animal integration more often as a core RA practice than the farmers in Northumberland, Tyne and Wear or Yorkshire.

The survey responses for outcomes reflected commonly reported benefits of RA on social media and in the farming press. This was particularly evident for the Cumbria workshop where respondents reported benefits on their own farms including increased biodiversity and soil health, and systems “more resilient to climate change”. It was not clear from these responses whether these were true, measurable effects, or if they were perceived changes/benefits influenced by conversations with peers, the media and print press.

Some workshop participants expressed reservations about the claims being made about regenerative agriculture on social media and in the farming press, including this email received following one of the events:

“The problems that I have with the term Regenerative Agriculture are:

- 1) What are we regenerating - soil, plants, animals, biodiversity or mindset?
- 2) If we are regenerating something, then to have integrity we need to be able to measure it...and with soil carbon I know for a fact this is extremely difficult, if not impossible to do accurately.
- 3) I am uncomfortable with the implied association between Regenerative Agriculture, Mob Grazing and Carbon sequestration.”

These concerns reflect unease in the academic press around a) the potential to offset greenhouse gas emissions through long-term storage of C in the soil (e.g. see (Berthelin et al. 2022; Baveye et al. 2018; Poulton et al. 2018)), and b) the potential to increase sequestration of C in soils through grazing management, e.g. mob grazing as advocated by some RA practitioners (Garnett et al. 2017).

From the surveys, a lack of knowledge was the main barrier to practicing regenerative agriculture in the North of England, followed by financial risk, time/labour requirements, land stewardship uncertainty, lack of equipment and unsuitable soil/climate conditions (Figure 7). A lack of knowledge does not appear to be an insurmountable barrier for those practices that many farmers are currently using, such as diversified cropping systems, cover cropping and minimum tillage, but may be for those practices relatively few farmers have current experience with, such as how to integrate livestock enterprises, which pasture-based management and grazing management systems to use, and the merits of agroforestry and organic practices (Figure 8).

There was a high degree of uncertainty evident in the on-line survey and expressed in the workshops. For example, how ELMS would develop, and what environmental management options it may offer were unknown at the time of the survey. For many, these uncertainties combined with difficulties affording fertilizer and fuel, have created a “perfect storm” of conditions requiring a re-examination of how they farm. These factors cannot be underestimated as drivers for the recent surge in interest in regenerative agriculture.

Analysis of the barriers to RA practices in the online survey demonstrated a need for different approaches dependent on the practice. This is illustrated in Table 5 which groups practices based on level of knowledge and expertise in the farming community.

Table 5 Grouping of practices based on level of knowledge and expertise and suggested strategy

Category	Practices	Strategy
A: few farmers with lack of knowledge; lots of experienced farmers	Crop diversification, no-till, min-till, IPM	Farmer to farmer knowledge exchange
B: even split between farmers with a lack of knowledge and those with some expertise	Cover crops, integration of livestock, biostimulants, organic practices	System-level appraisal, capital investment
C: high numbers of farmers lack knowledge; a few have expertise	Grazing management, pasture-based livestock, local food system, agroforestry	More applied research and knowledge exchange

The principal form of assistance farmers require depends on the category a particular RA field operations falls into. For example, spreading expertise about Category A field operations can be facilitated by linking farmers without knowledge to farmers with suitable expertise and experience. Category B field operations appear to need larger system changes to farming systems, which would require careful financial appraisal (either partial or whole farm budgets), and most likely capital for investment. There appears to be a lack of knowledge and understanding about Category C field operations, at least in the North of England. This can be addressed by designing on-farm field trials, organising informed seminars on each topic, and wider trips to farms outside the region where these practices are better understood and utilized.

Livestock appear to be a key component to the successful integration of RA field operations but not exclusively so. Arable farmers are still able to “pick and mix” RA operations for specific purposes, particularly to reduce fuel use and expenditure on fertilizer, and to increase soil organic matter. However, the successful operation of many RA operations imposes higher demands on management time and requires greater managerial flexibility. The need to adopt a more adaptive management approach is a barrier to hard pressed farmers with time/labour constraints.

The majority of farmers consider cover cropping as a core RA activity. Many already use this RA field operation, many more are exploring it from the perspective of the cost and benefits of entering land into the SFI Soil Standards.

There was some discussion among the workshop participants of developing a RA produce marque. It was supported by a committed minority of farmers. It is an area, together with developing value added through local supply chains, that bears further examination.

Many farmers said they simply could not find any financial appraisals of RA field operations. This demand for local, regionally specific information can be addressed by

- Organising field trials on strategic farms, along the lines of the AHDB Strategic Farms
- Advising farmers how to design, manage and analyse their own on-farm trials, with professional advice provide, perhaps along the lines used by the Practical Farmers of Iowa.

It is our view that NUFARMS could be one of the strategic farms in the North of England and, with financial support, organise advice on trial design, management and analysis. The research suggests many farmers require assistance understanding and using farm financial data. It appears many need additional assistance to convert their financial accounts into useful management accounts. Many were interested in the potential for generating income from private finance through environmental markets, e.g. voluntary carbon markets for soil carbon sequestration. There was considerable interest in the possibilities of payment for sequestration of carbon in soil, less so in sequestration of carbon in trees, either forests or agro-forestry. One barrier to this is the current tenancy agreement. There was little discussion of possible income generated by possible markets from “biodiversity net gain”.

5.2. Next Steps

This project has successfully identified barriers and challenges to the uptake of regenerative agriculture practices in northern England. The original premise of the project was that environmental (soil/climate) factors were major barriers to the development of regenerative agriculture practices in the north. However, this was only highlighted for a limited number of practices (primarily no-till and cover crops), with a lack of knowledge identified as a primary barrier.

Several areas for the development of future research and knowledge exchange activities have been identified. Discussions are now ongoing within Newcastle University and with external partners⁴ to determine the best strategy to develop regenerative agriculture activities in the north of England using Newcastle University as a hub. A database of survey respondents and workshop participants has been created and will form the initial members list for the Regenerative Agriculture North (RAN) hub for research and knowledge exchange in the north of England.

Over the summer months farm events at NU-FARMS badged as regen ag and promoting the farm’s commercial and experimental activities on regenerative agriculture are planned. The survey and workshop results have provided a wealth of qualitative and quantitative data on the current state of farmer experience and interest in regenerative agriculture. More in-depth analysis and interpretation for future publication in peer-reviewed journals is planned.

⁴ Newcastle and Leeds University are in discussions about how to take their interests in regenerative agriculture forwards and have offered to co-present a workshop on their projects at Groundswell 2022. Newcastle is a member of CHAP which has broadened its remit to include activities linked to soil health and regenerative agriculture. The Farmer Network has expressed a keen interest in future collaborations linked to knowledge exchange and regenerative agriculture.

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Appendix A

On-farm activities commonly recognised as core regenerative agriculture activities (adapted from Giller et al. 2021)

Zero-till (less than 10% of soil moved)
Reduced tillage (Defra define as up to 5 inches of soil cultivated, essentially no ploughing)
Controlled traffic
Mulching (organic residues spread around or over plants to enrich or insulate the soil)
Cover crops / green manures
Biochar
Use of farm animal manures/compost
Use of farm animal slurry
Compost tea (a nutrient rich liquid made by combining compost with water)
Inoculation of soils and composts
Agroforestry / silvo-pasture (integrating trees, forage, and the grazing of domesticated animals in a mutually beneficial way)
Tree crops
Maintain diverse crop rotations
Rotational grazing
Mob grazing (rotational grazing BUT with longer "rest" periods and removing stock with grass less severely grazed)
Herbal rich leys

Appendix B

Knowledge Exchange Event 1 (Cockle Park)

Event Title: Challenges and opportunities for regenerative agriculture in the north of England

Event Location: Cockle Park, Morpeth

Event Date/Time: 26th January 2022, 9:00-13:30

Event Programme:

9:00-10:00: Event Registration, Breakfast and CHAP Regen-Ag Equipment Tour

10:00-12:00: Panel Discussions and Engagement on regenerative agriculture practices (direct drilling, cover cropping, herbal leys, mob grazing and N management)

12:00-12:45: Summary of Discussions, Research Questions and Future Actions

12:45-13:30: Lunch and Event Close

(please note that coffee/tea/comfort breaks will be included throughout the programme)

Discussion Facilitation

Flip Chart sheet for each topic:

1. Direct Drilling/ No Till
2. Cover Cropping
3. Herbal Leys
4. Mob Grazing

[Topic]	
Do you consider this practice to be regenerative? Why?	What are the barriers/challenges of using this technique?
Is this practice particularly relevant/difficult in the North? Why?	What opportunities are there to increase the use of this practice? What interventions would help adoption?

Regenerative Agriculture	
What words/phrases do you associate with 'Regenerative Agriculture'?	Do you describe yourself as regenerative? How interested are you in regenerative practices?

Appendix C

Knowledge Exchange Event 2 (Melmerby)

Event Title: Overcoming barriers to Regenerative Agriculture in Northern England

Event Location: Melmerby Village Hall, Melmerby

Event Date/Time: 3rd February 2022, 11:00-15:00

Event Programme:

10:45-11:15: Registration and Welcome (coffee/tea/biscuits)

11:15-11:30: Quick introduction to the day and wider project

11:30-11:45: Scene-setting for discussion groups

11:45-13:00: Discussions and activities on: What Regen Ag techniques are you doing/not doing and why?

13:00: Lunch

13:45-14:30: Discussions on: What are barriers and how do we overcome them? Interest in research topics and support networks.

14:30-15:00: Discussion Summary, Next Steps and Event Close

Discussion Questions for Event 2

Discussion 1: What are you doing/not doing and why?

1. What do you consider regenerative? What does the term mean to you? What other terminology would you use?
2. What 'regenerative' practices do you use now? What have you stopped doing? What do you want to do?
3. Why are you regenerative? Is your farm more financially viable?
4. What are the opportunities for regenerative agriculture that currently exist? How are regenerative practices promoted?

Discussion 2: What are barriers and how do we overcome them?

1. What are the challenges preventing adopting of regenerative farming practices?
2. How have you overcome these challenges? Where can interventions be made to overcome challenges?
3. Where do you find information to help with regenerative techniques? Who encourages you and provides support?
4. How can universities/governing bodies assist in promoting regenerative agriculture (can they)?
5. What types of research/information would be beneficial?

Appendix D

Knowledge Exchange Event 3 (Thirsk)

Event Title: Topcliffe Innovation Group Workshop

Event Location: The Grange, Baldersby Park, Thirsk

Event Date/Time: 18th February 2022, 9:15-13:30

Event Programme:

9:15-9:30: Tea, coffee & biscuits

9:30-9:45: Update on Sustainable Landscape's Innovation Groups activities

9:45-10:30: Cover Crop feedback and Nutrient Dashboard Presentation

10:30-10:45: Biodiversity trials, nature-based solutions & NSL options for the coming year

10:45-12:00: Group Regen Ag discussion with Newcastle University

12:30: Lunch

Regenerative Agriculture Discussion Guidance

1. Why cover crops? What has led to this change?
2. What specifically are you doing and why? (how are you managing cover crops?)
3. What barriers were there to first growing cover crops and how did you overcome them?
4. Do you identify as 'regenerative'? How else would you describe this type of farming? What would you consider 'regenerative'?
5. What other aspects of regen ag are you interested in and what do you need to do it?
6. Where do you find information to help with adopting new techniques? Who encourages you and provides support?

Appendix E

Study Information Sheet



STUDY INFORMATION SHEET

Title: Identifying and implementing regenerative agriculture practices in challenging environments: experiences of farmers in the north of England

Project contact details: Dr Amelia Magistrali, Agriculture Building, Newcastle University, Newcastle, NE1 7RU, UK, amelia.magistrali@newcastle.ac.uk

Invitation and Brief Summary

You are being invited to take part in a research study. Please read this information carefully. If you do decide to take part, you will be asked to confirm an acknowledgement of consent. However, you are free to withdraw at any time, without giving any reason.

What is the purpose of the research?

This research is part of a study called: "Identifying and implementing regenerative agriculture practices in challenging environments: experiences of farmers in the north of England". Regen Ag in Challenging Northern Environments is an AHDB-BBSRC funded research and knowledge exchange project running from December 2021 until March 2022. The project will lay the groundwork for establishment of a network of regenerative agriculture practitioners in the area (Regenerative Agriculture North; RAN) who will be invited to participate in an agroecosystem living lab in the 2022-23 growing season.

The project includes a survey to identify the challenges and successes associated with regenerative agriculture in northern England. We are contacting all agricultural stakeholders in the region to find out people's perceptions of regenerative agriculture, as well as what people think would encourage or discourage further adoption of regenerative agriculture practices.

What does taking part involve?

If you agree to take part, you will participate in an anonymous survey, which should take no more than 20 minutes. You have the right to stop completing the questionnaire at any time.

What information will be collected and who will have access to the information collected?

The questionnaire responses will be reviewed and collated by Dr Amelia Magistrali and post-graduate students working on the project. The collated data will be analysed by Dr Magistrali and access to this information will be limited to Dr Magistrali and Newcastle University colleagues/researchers collaborating on the project.

Anonymised information will be shared with AHDB as a component of the final report and may be used for additional knowledge exchange and dissemination activities supporting the establishment of the RAN hub. You will be asked to consent prior to the project contacting you for any additional information and will complete additional confirmation forms prior to further participation.

Appendix F

Northern England Regenerative Agriculture Survey⁵

Please complete the following questions as a component of the Newcastle University Regenerative Agriculture in Challenging Northern Environments project. All responses are anonymous, though you will have an opportunity to receive additional information about the project and/or enter a raffle prize draw by sharing an email address after completing the survey.

* Required

Please confirm your agreement to participate below: *

Please read the study information sheet before confirming your participation below. All responses will be anonymous. Depending on your browser, you may need to scroll down/across to view the full sheet. Alternatively, use this link to view the info sheet online:

https://drive.google.com/file/d/1yZQY9GTYfXPFULs55Le4of8Aqj_xqhf5/view?usp=sharing

Mark only one option.

- I confirm my anonymous participation in the study
- I do not want to participate in the study (*Skip to question 25*)

Respondent Information

1. In which county are you based (if split between counties, state county with most land)? *Mark only one option.

- Cumbria
- Durham
- Northumberland
- Tyne and Wear
- Yorkshire
- Other:

2. Please select the option that best describes your role *

Mark only one option.

- Farmer
- Agronomist/advisor (*Skip to question 15*)
- Researcher (*Skip to question 15*)
- Policy advisor (*Skip to question 15*)
- Agricultural supply business (*Skip to question 15*)
- Other:

Farmer Survey

3. How many hectares do you farm? *

4. Is your farm conventional, organic or both? *

Mark only one option.

- Conventional
- Organic
- Both

⁵ The online survey was shared as a Google Form, which is available at [this link](#). The version in the appendix has been formatted for suitability within this report.

5. How engaged are you with regenerative agriculture? *

1 = Not Engaged 5 = Very Engaged

Mark only one option.

	1	2	3	4	5	
Not Engaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fully Engaged

6. Please select the types of practices from this list that you associate with regenerative agriculture

*

Check all that apply.

- No-till/direct drilling
- Reduced tillage/min-till
- Cover cropping
- Diversified crop rotations (Diversification)
- Integrating livestock into the farming system (Mixed)
- Pasture-based livestock production
- Grazing management strategy (e.g. mob grazing)
- Integration of trees into agricultural landscapes (Agroforestry)
- Using organic methods
- Integrated Pest Management (IPM)
- Biologicals/biostimulants
- Small-scale/localised production systems
- Other:

7. If there are other practices/principles of regenerative agriculture that you do not believe are captured in the list in question 6, please describe these below.

8. Which of the following outcomes do you associate with regenerative agriculture? *

Check all that apply.

- Improve ecosystem health/services
- Improve water quality
- Improve soil health
- Increase carbon sequestration
- Reduce greenhouse gas emissions
- Improve animal welfare
- Improve farm productivity/increase yields
- Improve farm profitability
- Improve crop health/resilience
- Improve food access/security/safety
- Improve nutritional quality/human health
- Improve social/economic wellbeing
- Produce a circular system/reduce waste
- Other:

9. Select the option that best describes your use of the following practices on your farm *

Please scroll up/down and across to ensure your browser shows all options

Mark only one option per row.

	Using currently	Used previously and would like to use in future	Used previously and will not in future	Not using but would like to in future	Not using and will not in future	I don't know what this is
No-till/direct drilling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced tillage/min-till	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cover cropping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversified crop rotations (Diversification)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrating livestock into the farming system (Mixed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pasture-based livestock production	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grazing management strategies (e.g. mob grazing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integration of trees into agricultural landscapes (Agroforestry)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using organic methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrated Pest Management (IPM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biologicals/biostimulants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Small-scale/localised production systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. When did you/your farm start using these practices (please state practice and approximate year first applied)?

11. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	No-till/direct drilling	Reduced tillage/min-till	Cover cropping	Diversified crop rotations
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	Integrating livestock into the farming system	Pasture-based livestock production	Grazing management strategies	Integration of trees into agricultural landscapes
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	Using organic methods	Integrated Pest Management	Biologicals/biostimulants	Small-scale/localised production systems
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. If there are other barriers to regenerative agriculture adoption in the North of England not listed in questions 11-13 above, please describe these below.

Skip to Question 25

Survey Questions (Non-Farmer)

15. How engaged are you with regenerative agriculture? *

1 = Not Engaged 5 = Very Engaged

Mark only one option.

	1	2	3	4	5	
Not Engaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fully Engaged

16. Please select the types of practices from this list that you associate with regenerative agriculture *

Check all that apply.

- No-till/direct drilling
- Reduced tillage/min-till
- Cover cropping
- Diversified crop rotations (Diversification)
- Integrating livestock into the farming system (Mixed)
- Pasture-based livestock production
- Grazing management strategy (e.g. mob grazing)
- Integration of trees into agricultural landscapes (Agroforestry)
- Using organic methods
- Integrated Pest Management (IPM)
- Biologicals/biostimulants
- Small-scale/localised production systems
- Other:

17. If there are other practices/principles of regenerative agriculture that you do not believe are captured in the list in question 6, please describe these below.

18. Which of the following outcomes do you associate with regenerative agriculture? *

Check all that apply.

- Improve ecosystem health/services
- Improve water quality
- Improve soil health
- Increase carbon sequestration
- Reduce greenhouse gas emissions
- Improve animal welfare
- Improve farm productivity/increase yields
- Improve farm profitability
- Improve crop health/resilience
- Improve food access/security/safety
- Improve nutritional quality/human health
- Improve social/economic wellbeing
- Produce a circular system/reduce waste
- Other:

19. Select the option that best describes your willingness to recommend the following practices to farmers *

If you do not work directly with farmers, please answer based on how these practices are discussed in your work (e.g. if practices are discussed positively, select recommend currently, etc.). Please scroll up/down and across to ensure your browser shows all options

Mark only one option per row.

	Recommend currently	Recommended previously and would in the future	Recommended previously but will not in the future	Not recommended yet but would like to in future	Not recommending and will not in future	I don't know what this is
No-till/direct drilling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced tillage/min-till	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cover cropping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversified crop rotations (Diversification)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrating livestock into the farming system (Mixed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pasture-based livestock production	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grazing management strategies (e.g. mob grazing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integration of trees into agricultural landscapes (Agroforestry)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using organic methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrated Pest Management (IPM)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biologicals/biostimulants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Small-scale/localised production systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. When did you start discussing these practices as 'regenerative' (please state practice and approximate year)?

21. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	No-till/direct drilling	Reduced tillage/min-till	Cover cropping	Diversified crop rotations
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	Integrating livestock into the farming system	Pasture-based livestock production	Grazing management strategies	Integration of trees into agricultural landscapes
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. What do you see as the challenges/barriers to implementing the following practices in the North of England (select all that apply for each practice)?

Please scroll up/down and across to ensure your browser shows all options

Check all that apply.

	Using organic methods	Integrated Pest Management	Biologicals/biostimulants	Small-scale/localised production systems
I don't know what this is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too Time/Labour Intensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High financial risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack knowledge/advice on subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of suitable equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil/climate not suitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk to animal health/welfare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Uncertainty about land stewardship programmes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't know any farmers using this practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. If there are other barriers to regenerative agriculture adoption in the North of England not listed in questions 21-23 above, please describe these below.

Further Information

25. I am interested in receiving additional information from Newcastle University about the following: *

If you would like to be more involved in regenerative agriculture in the North of England, please select all options below that interest you. Please share your email address in question 27 below unless you opt to not receive any additional information.

Check all that apply.

- In-person workshops on Regenerative Agriculture
- Virtual workshops on Regenerative Agriculture
- Participating in trials/experiments on my own farm
- Joining a knowledge exchange network on Regenerative Agriculture
- Quarterly newsletter about research at Newcastle University Farms
- Please do not contact me in the future

26. Please indicate whether or not you are willing to be contacted regarding the Regenerative Agriculture in Challenging Northern Environments project in the future. *

Mark only one option.

- Yes, I am willing to be contacted again and will provide my preferred email address
- No, please do not contact me in the future

27. If you selected any of the options in question 25 above to receive additional information or responded yes to question 26, please provide your email below:

28. As a thank you for participating in this survey, we would like to offer a free ticket to Groundswell 2022. If you would like to enter the draw, please provide your email address below

Note that providing your email here is only for the raffle draw and will not affect your responses to questions 25 and 26 in this section.

Cockle Park Knowledge Exchange Workshop 1 Questionnaire

1. How would you describe yourself?
 - Farmer
 - Agronomist/advisor (*Skip to Question 5*)
 - Researcher (*Skip to Question 5*)
 - Policy advisor (*Skip to Question 5*)
 - Other (please specify)
2. In which county do you farm? (if split between counties, please state county with most land)
3. How many hectares do you farm?
4. Is your farm conventional, organic or both?
5. How many miles will you travel to attend this workshop?
6. Please select the types of practices from this list that you associate with regenerative agriculture
 - Integration of trees into agricultural landscapes
 - Pasture-based livestock production
 - Reduced tillage
 - Using organic methods
 - Integrating livestock into the farming system
 - Diversification of cropping systems
 - Cover Cropping
 - Integrated Pest Management
 - Small-scale/localised production systems
 - Other (please specify)
7. Please select all the outcomes from this list that you associate with regenerative agriculture.
 - Improve ecosystem health/ecosystem services/biodiversity
 - Improve water quality
 - Improve soil health
 - Increase carbon sequestration
 - Reduce greenhouse gas emissions
 - Improve animal welfare
 - Improve farm productivity/increase yields
 - Improve farm profitability
 - Improve crop health/resilience
 - Improve food access/security/safety
 - Improve nutritional quality/human health
 - Improve social/economic wellbeing
 - Produce a circular system/reduce waste
 - Other (please specify)
8. How would you categorise your current level of engagement with regenerative agriculture?
 - Fully engaged, aware of regenerative agriculture approaches and employing these across the business

- Partially engaged, aware of regenerative agriculture approaches and employing these in some areas of the business
- Interested - aware of regenerative agriculture approaches. Not yet employing these in the business, but aiming to do so soon
- Curious - not very aware of regenerative agriculture approaches, but wanting to learn more about them

9. Which of the following practices do you currently use/promote? (please select all that apply)

- Permaculture
- Agro-forestry
- Rotational-grazing
- Mob-grazing
- No-till
- Min-till
- Direct drilling
- Cover cropping
- Organic fertiliser
- Compost/Green manures
- Intercropping
- Relay cropping
- Biologicals/biostimulants
- Holistic livestock health plans
- Other (please specify)

10. This event is part of an AHDB-funded project and responses may be used (anonymously) in project reporting. Please opt out below if you do not wish for your responses to be used.

- Do not use my responses

11. As part of the Newcastle University Regenerative Agriculture project, we may wish to contact you with additional questions or information following this event. Please opt out below if you do not wish to be contacted about this project in the future.

- I do not wish to be contacted by the Regenerative Agriculture Project in the future

Topcliffe Knowledge Exchange Workshop 3 Questionnaire

1. How many hectares do you farm?

2. Is your farm conventional, organic or both?

- Conventional
- Organic
- Both

3. How engaged are you with regenerative agriculture? (please circle the most appropriate answer)

Not Engaged	Curious	Engaged	Very Engaged	Fully Engaged
1	2	3	4	5

4. Please select the types of practices from this list that you associate with regenerative agriculture (select all that apply)?

- No-till/direct drilling
- Reduced tillage/min-till
- Cover Cropping
- Diversified crop rotations (Diversification)
- Integrating livestock into the farming system (Mixed)
- Pasture-based livestock production
- Grazing management strategies (e.g. mob-grazing)
- Integration of trees into agricultural landscapes (Agroforestry)
- Using organic methods
- Integrated Pest Management (IPM)
- Biologicals/biostimulants
- Small-scale/localised production systems
- Other (please specify):

5. What do you see as challenges/barriers to implementing regenerative farming practices in the North of England (**select top three**)?

- Too time/labour intensive
- High financial risk
- Lack of knowledge
- Lack of suitable equipment
- Soil/climate not suitable
- Risk to animal health/welfare
- Uncertainty about land stewardship programmes
- Don't know any farmers that are 'regenerative'
- Other (please specify):

6. Which of the following outcomes do you associate with regenerative agriculture (select all that apply)?

- Improve ecosystem health/ecosystem services
- Improve water quality
- Improve soil health
- Increase carbon sequestration
- Reduce greenhouse gas emissions
- Improve animal welfare
- Improve farm productivity/increase yields
- Improve farm profitability
- Improve crop health/resilience
- Improve food access/security/safety
- Improve nutritional quality/human health
- Improve social/economic wellbeing
- Produce a circular system/reduce waste
- Other (please specify):

7. Please indicate whether or not you are willing to be contacted regarding the Regenerative Agriculture in Challenging Northern Environments project in the future.

- Yes, I am willing to be contacted again

Please enter a valid email address:

- No, please do not contact me in the future