Good Food Leicestershire
Regenerative produce report
September 2023

Supported by –

- Tomson Consulting Ltd (TCL)
- Leicestershire County Council (LCC) Public Health, Corporate Resources and Environment Departments
- Stanford Hall Community Supported Agriculture
- March House Farm
- Brooksby Agricultural College – SMB College Group
- Ruth Grice

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1 Introduction

Good Food Leicestershire is a partnership across local authorities, food producers, growers, farmers, manufacturers, food banks, community organisations and health organisations. Collectively we work towards a more sustainable food system - this report is focussed on the food growing and supply part of Leicestershire's food system.
There are multiple organisations procuring large volumes of food – whether that be for school meals, hospital meals or catering. The following report aims to look at the positive impacts that could come from procuring higher environmental standard produce. It looks at a number of products used in catering that could be grown/reared on Leicestershire farms, and compares the biodiversity and carbon impacts of UK Average products versus four Leicestershire farms using regenerative agriculture principles.
The example use case in this report references standard catering products used to create school meals in Leicestershire, and so the wider Project Context uses the policy commitments made by Leicestershire County Council to help frame the case for change in food procurement.

The detail in this report came from an internal Leicestershire County Council report completed by Tomson Consulting Ltd (TCL).

1.1 Project Context

LCC's Net Zero Ambitions

Leicestershire County Council (LCC) have net zero ambitions set out on the following webpages https://www.leicestershire.gov.uk/environment-and-planning/net-zero. Climate and biodiversity impacts of local procurement for schools is considered specifically through objective N17 of the 'Net Zero Leicestershire Action Plan 2023-2027':

> *"Explore opportunities to gain a better understanding of the carbon and nature benefits of local food procurement and improved land management and how to measure and monitor improvements, particularly on the council's own farms."*[1]

Council Biodiversity Objectives

In addition to decarbonisation action, LCC have a number of objectives relating to the protection and enhancement of the natural environment and biodiversity. Targets of the LCC Environment Strategy 2018-2030 focus on "Biodiversity, Habitats and the Local Environment":

- Target G: "*Protect and enhance biodiversity as a natural capital asset throughout all our activities*"

Within this target there are specific objectives to improve the biodiversity condition of council managed land (G1), and an objective specific to farming (G3), with a commitment to

[1] Net Zero Leicestershire Action Plan https://www.leicestershire.gov.uk/sites/default/files/2022-12/net-zero-leicestershire-action-plan.pdf

seek to "demonstrate and support environmentally sustainable farming practices on its farms that support the maintenance and enhancement of biodiversity"

Outlining more detailed guidelines for the protection of biodiversity, relevant items in the *Space for Wildlife: Leicester, Leicestershire and Rutland BAP 2016-2026*[2] include:

- Aiming to "increase the area of land managed in a wildlife friendly way in Leicestershire and Rutland"
- Identification of the following habitats to be created: hedgerows, broadleaved woodland, wet woodland, lowland wood pasture, field margins and
- Priority to create habitat on intensively managed land (including agricultural land)

Moving towards a Dynamic Purchasing System

The Dynamic Procurement System (DPS) developed by Bath and North East Somerset Council (BNES) could be a potential model for local food procurement in Leicestershire[3]. This procurement system was established with the aims of (1) providing fresh produce to schools within the region, (2) increasing the sourcing of produce from producers in the region, (3) promoting the supply of products that are healthy and sustainable and (4) making supply chains more transparent by shortening them, allowing a greater level of information to be available to the council over its procurement choices. The case study referenced gives some context of the size of contract (7,000 meals a day) and the savings made through the DPS (6% cost savings and 6 tonnes CO2 per year).

A DPS allows a procurement to be run with competitions for contracts to supply, with 'winners' of contracts selected from a pool of producers who are farming according to sustainability- and health- related criteria determined in advance.

1.2 Project Aims

The aims for this piece of work are –

1. To better understand the climate and biodiversity impact of Business As Usual ingredients using a set of products commonly used in large regional procurement such as the example use case, and UK average impact
2. To model the difference in impact if products were sourced from Regenerative farms using Leicestershire example farms
3. To understand a future Regenerative Procurement process from farm and Local Authority perspectives, and recommend steps towards this.

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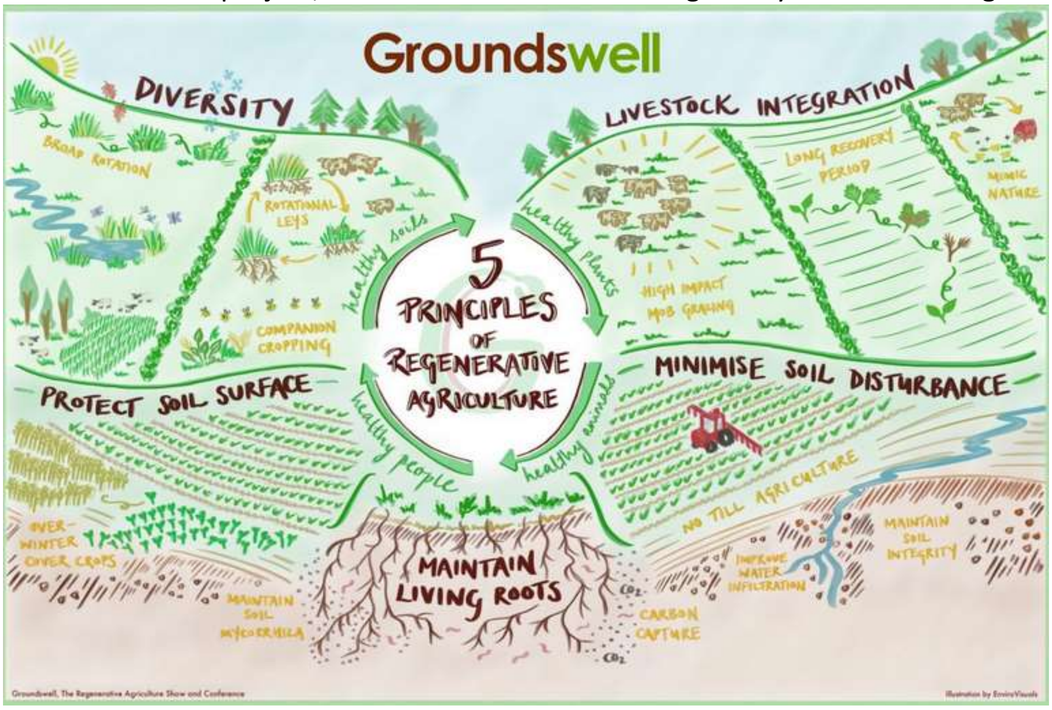
[2] Leicester, Leicestershire and Rutland BAP 2016 – 2026. 2nd Edition. https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2022/10/7/LLR-biodiversity-action-plan-space-for-wildlife-2016-26.pdf

[3] BNES DPS https://www.dynamicfood.org/_files/ugd/6b24d7_55630340ed8140b0b118a2cc04d8b68d.pdf

What is *Regenerative* agriculture? In essence, regenerative agriculture is any form of farming that at the same time improves the environment[1]. In practice, this simple aim can be translated into five 'principles' associated with regenerative farming: (1) **minimising soil disturbance**, (2) **keeping the soil surface covered**, (3) **keeping plants roots in the soil** (4) **maintaining a diversity of crops on the land** and (5) **integrating livestock with crop rotations**. For the purpose of this report the five principles of regenerative agriculture, elaborated by Groundswell and supported by research bodies such as the Allerton project, will be used when discussing this system of farming.



The five principles of regenerative agriculture as illustrated for Groundswell

The aims of this objective are multi-faceted and the need for quantitative data is apparent if decisions relating to changes in food production and procurement are to be realised. Quantitative and qualitative data gained through this feasibility study could be used to inform the development of new procurement policymaking that seeks to strengthen existing procurement frameworks and the ability to score highly in sustainability- and welfare-related accreditations. At the same time, this project investigates the potential for a new standards framework to drive change among farms contracted to the council, through requirements for biodiversity enhancement and carbon management.

This report also looks at the potential definitions and ethics to help focus strategic decision-making regarding land management practices that Local Authorities and others may wish to see on their suppliers' farms.
Because this report uses Leicestershire County Council policies and commitments as a baseline, the report assumes the need to enable the continued engagement of Leicestershire schools with the Food for Life Served Here accreditation alongside any regenerative supply chain.

2 Business As Usual: Identifying a Baseline Footprint

2.1 Ingredients

The list below is an example list of the types of ingredients used in procurement of school meals in Leicestershire. UK farm crops were identified from this list, resulting in a list of fruit and vegetables that could be grown nearby for local procurement. This list included the following:

Apples (Golden Delicious)	Cauliflower	Parsnip
Apples (Green)	Celery	Pears
Apples (Red)	Beetroot	Sweet potatoes
Potatoes	Courgette	Radish
Green cabbage	Cucumber	Rocket
Savoy cabbage	Garlic	Spinach
Red cabbage	Chives	Spring Onion
White Cabbage	Kale	Butternut Squash
Calabrese	Leek	Strawberry
Carrot	Onions (Red & white)	Swede

In addition to fresh fruit and vegetables, certain dairy and meat products were also identified as being suitable for production within Leicestershire:

Organic Minced Beef	Minced Pork	Natural Yoghurt
Farm Assured Pork Lion	Minced Lamb	Free range eggs
Pork Sausages	Back Bacon	Cheddar cheese
Pork Sausages	Back Bacon	Mozzarella
Bacon/Gammon Joint	Streaky Bacon	Halloumi
Pork Meatballs	Beefburgers	Mature Cheddar
Beef & Veg Mince	Diced Beef	Cream Cheese
Minced Beef	Turkey Breast	Semi-skimmed milk
Minced Gammon	Chicken Fillets	Full-fat milk

2.2 Carbon Baseline

To establish a baseline figure for the carbon footprint of ingredients, TCL identified freely available carbon calculator tools online (Table 1) to understand the national averages. The choice of tool for use in this study was determined by the following criteria:

A. Product range: carbon calculator has CO_2e emissions figures for a range of products that is comparable to the school dinner ingredients being assessed. **Contains over 50% of products being assessed.**

B. Country of origin information available: carbon calculator provides information relating to the country of origin of the raw products associated with the school dinner ingredient. **Carbon calculator specifies the country in which the product is being produced.**

C. Reporting methodology accessible: **Carbon calculator has published information regarding its calculation methodology**.

Once the most appropriate carbon footprint calculator tool was decided, all ingredients appropriate for production in Leicestershire were run through the tool. Where the equivalent ingredient was not available on the carbon calculator's database, this is specified below; for meat and dairy products with no product-specific equivalent available through the tool, the closest product available was used (for example, 'pork' was used for the ingredient 'pork sausage').

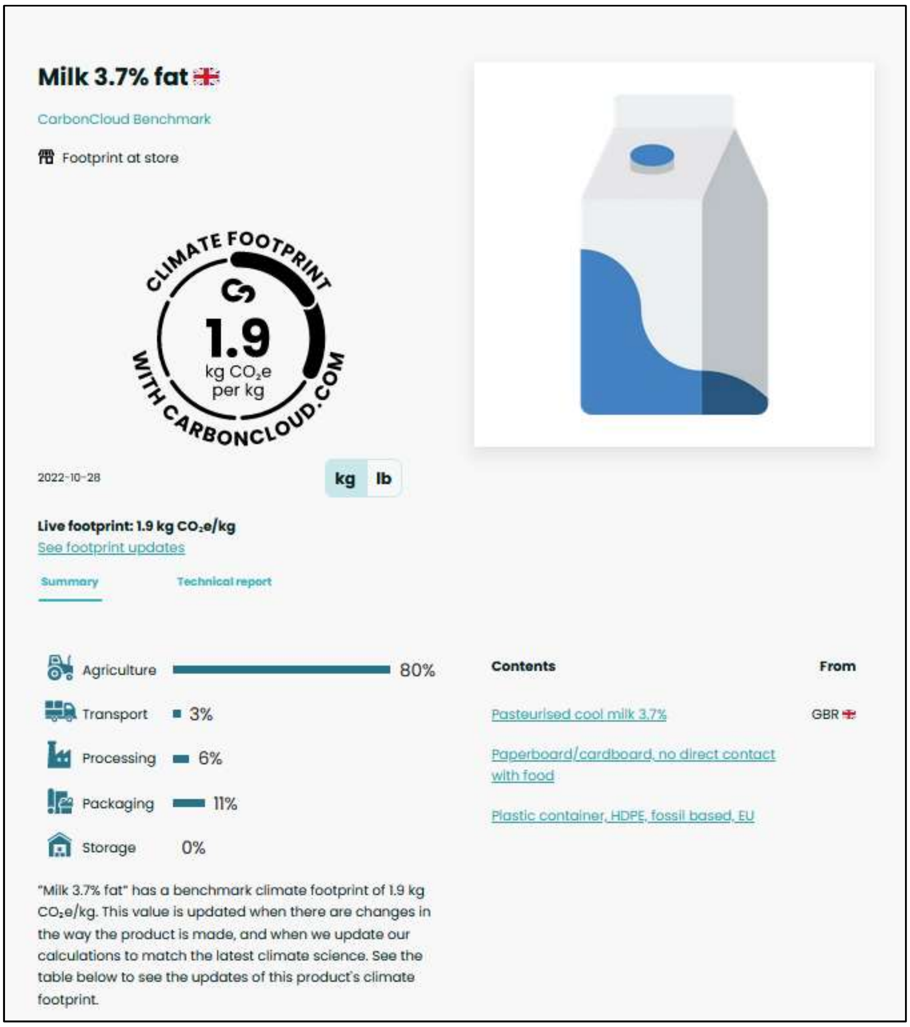
Table 1: Footprint Calculator Comparison

Carbon Calculator	Suitable products included > 50%	Country of Origin Specified	Published methodology	Notes
Plate up for the Planet	Yes	Yes	No	Takes into account the food miles in the values, and also gives the option to choose which country the produce is coming from.
Carboncloud Climate Hub	Yes	Yes	Yes	Fewer range of choices than Plate up for the Planet but more transparency over reporting of figures.
My Emissions	No	No	No	Does not give country of origin options, instead calculates footprint based on 'global average'.
Food Emissions	No	No	No	Food already has a pre-set country of origin, but gives this for every item. Also allows a specific amount of miles of transport to be set, as well as consumer waste percentage.

Following an assessment of the tools to the defined criteria, CarbonCloud was selected to calculate the carbon footprint of ingredients. CarbonCloud uses a model based on IPCC guidelines to calculate the emissions data for products at farm gate, using variables specific to the country of production, such as yield size, fertiliser type, soil and climate. Its methodology is compatible with ISO 14067 and the GHG protocol Product Life Cycle

Accounting and Reporting standards. The data produced through a product's emissions report is freely available. A technical report is generated with each product, providing detailed methodology.

Figure 1: Example of carbon footprint data provided by CarbonCloud



The inclusion of food miles, ingredient break down and wide range of products included within CarbonCloud's catalogue, in addition to the model's transparency and easily-accessible methodology, made it the most suitable calculation tool of the available options.

2.3.1 Emissions of current ingredients

Fruit and Veg

All ingredients listed in section *2.2* were searched on CarbonCloud's database. Results are shown in Table 2. Where information was not available using CarbonCloud, figures associated with Plate Up for the Planet are shown (Table 3). Table 4 shows some ingredients that are grown in the UK and might be considered for use more widely in procurement.

Table 2

Product (currently procured and can be produced in UK)	'in store' footprint (kg CO_2e per kg)	'on farm' footprint (kg CO_2e per kg)

Apple	0.30	0.17
Pear	NA	0.29
Potato	0.26	0.16
Cabbage (green, red, savoy, white)	0.19	0.14
Calabrese	0.36	
Carrot	0.4	0.10
Cauliflower	NA	0.36
Beetroot	0.34	0.10
Cucumber, greenhouse	2.2	2.1
Cucumber, field	NA	1.4
Leek	NA	0.18
Onion (cooking, red)	0.25	0.11
Spinach	0.27 (frozen)	0.15
Spring Onion	NA	0.26
Strawberry	NA	0.13
Pumpkin/squash*	NA	0.24
Garlic*	NA	0.54

*UK on-farm data missing; average taken of on-farm emissions results from 13 European countries

Table 3

UK farm emissions Missing from CarbonCloud database	PUFTP results (in store, within 50 miles of farm) (kg CO2e per kg)
Squash	3.92
Celery	0.49
Garlic	0.97
Courgette	3.92
Kale	1.72
Chives	1.23

Table 4

Not in 'standard' procurement list but suitable for growing in UK	'in store' footprint (kg CO_2e per kg)	'on farm' footprint (kg CO_2e per kg)
Asparagus	NA	0.96
Green beans	NA	0.33
Broad beans	0.88	0.79
Green peas	0.77 (frozen)	0.54
Lettuce	0.57	0.5
Mushrooms	NA	0.12
Wheat	0.85 (flour)	0.55 (grain)

Meat, Dairy, Eggs

TCL searched CarbonCloud for all lamb, beef, pork, chicken and dairy products for which an emissions benchmark has been calculated for a UK-produced product. CarbonCloud holds data for meat and dairy products which are a close match to those used in procurement in the example use case, a selection of these products is listed in Table 5. Plate Up for the Planet was used to estimate the carbon footprint of UK eggs, as this was not available on CarbonCloud (Table 6).

Table 5

Product	'in store' footprint (kg CO_2e per kg)
Pork, UK average	6.1
Beef, UK average	32
Lamb, UK average	32
Chicken carcass, UK	2.4
Chicken breast, boneless and skinless	4.0
Chicken drumstick	1.9
Chicken nuggets, frozen	4.5
Pork Loin	7.3
Pork Sausages, 68% pork	5.9
Pork, boneless shoulder	6.2
Minced meat 50/50 beef & pork	10
Fresh ham (pork)	5.1
Pork bacon (dry cured)	7
Pork, salami	10
Beef, flank steak	56
Beef burger, raw	22
Beef meatballs	21
Beefburgers	22
Ground beef, 15% fat	16
Yoghurt, 3% fat	3.1
Blue Cheese	14
Cheddar, 28% fat	14
Milk, 1.8% fat	1.6
Milk, 3.7% fat	1.9
Mozzarella	9

Table 6

Product	PUFTP footprint (kg CO2e per kg), within 50 miles of farm
Egg	4.72
Egg, free range	5.25

2.3.2 Limitations

It is important to note that product footprinting tools use different, and in some cases unpublished, methodologies. The results presented by the two most robust tools we came across (CarbonCloud and Plate Up for the Planet) sometimes differed in the results provided for the same ingredient by a margin of 5 to 1.

2.4 Biodiversity Baseline

Establishing a baseline for biodiversity is difficult, many common accreditations including Red Tractor and Food for Life Catering Supplier don't directly account for the enhancement of biodiversity through farming practices or active conservation management on-farm.

There are important questions over biodiversity reporting that need to be answered before a figure can be determined to equate to this factor. Attempts to quantify the biodiversity impact of a product are relatively novel, with some farm carbon calculators only now beginning to factor in biodiversity impact of farming by scoring farms on different biodiversity indices based on reported farming data (see section 3.4 for more information). Without tracing a product to its origin farm, it is not possible to make observations concerning how the farming practices associated with an ingredient's production affect biodiversity.

Therefore TCL has presented some information on the UK agricultural sector's overall impact on biodiversity, by investigating species and habitat trends in farmed landscapes:

Soil: Soil carries an abundance of life, some research estimating that there are 11 million species of soil organisms. Mainstream agricultural practices like monocropping, tilling and the application of chemicals disrupt the complex food webs present in the soil. Evidence of this is seen through soil invertebrate surveys; 42% of UK fields assessed in one study contained few or no earthworms. Both national soil invertebrate surveys that have been conducted to date showed that soil invertebrate numbers are significantly lower in arable areas that they are in other habitats[4].

Insects: Data concerning insect population trends has been difficult to obtain, however there is broad recognition of the impact that intensive agriculture has had on insect abundance. Neonicotinoids, applied widely across Europe as pesticides, have been linked with a 75% decline in flying insect biomass in Germany[5]. In the UK, the destruction of key

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[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805926/State_of_the_environment_soil_report.pdf

[5] Balfour, V. 2019. Bringing biodiversity back into farming. Sustainable Food Trust. https://sustainablefoodtrust.org/news-views/bringing-biodiversity-back-into-farming/

habitats for butterflies – wildflower meadows and other species-rich grassland types – have been linked to a near 40% decline in butterfly abundance (figure 2, below)[6].

Birds: Farmland bird abundance has declined by approximately 54% since 1970 (Figure 2)[5]. This decline is associated with a range of farming practices, including the increased use of pesticides and fertilisers, changes in cropping patterns, reduction in habitat diversity, greater mechanisation and the removal of nature friendly features such as hedgerows[5].

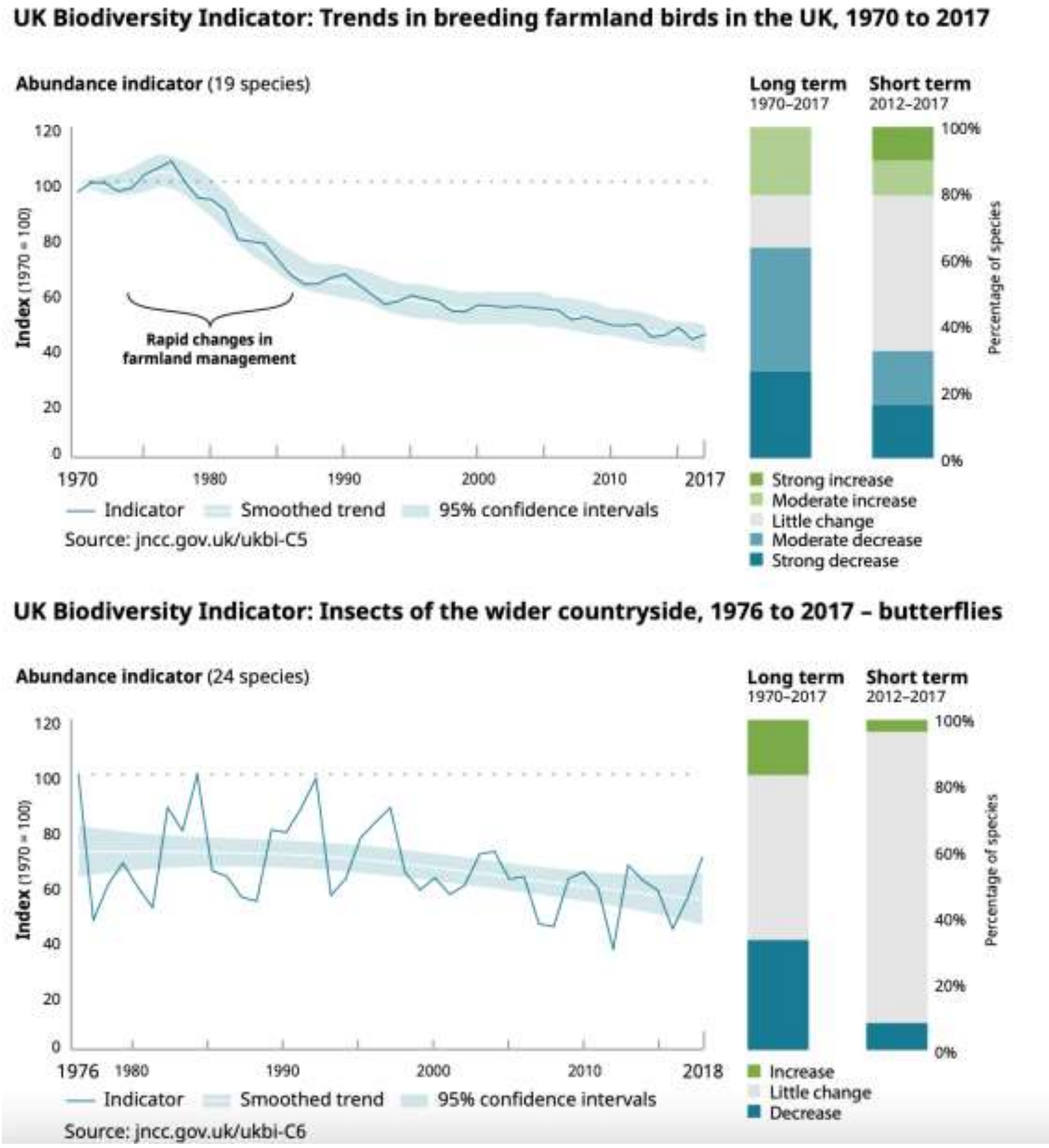

Figure 2. Taken from State of Nature Partnership, 2019.

[6] State of Nature Partnership, 2019. State of Nature 2019. National Biodiversity Network Trust. Found online at https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf [Accessed 16.02.2023]

3.0 Modelling a Regenerative Procurement Scenario

3.1 Farmer engagement

Suitable regenerative, Leicestershire-based farmers were identified by council officers and their contact details were forwarded to the TCL team. A workshop was hosted by TCL on the 30th November, 2022, with attendees representing local environmental policy and sustainable food partnership work, local farmers, and regenerative agriculture specialists. Whilst the farmers were selected in order to represent regenerative practice and to help with understanding the potential impacts of regenerative produce versus UK average, the scale of production would not be sufficient to allow supply into large food producers. Further research is needed into how this work could scale, what the price differences would be and therefore what the achievable impacts would be – this is covered in the next steps.

3.2 Farmer profiles

Amy Janina, Stanford Hall CSA

Amy is a grower from Stanford Hall Community Supported Agriculture (CSA). The CSA is a 13-acre site. It is a bio-intensive growing system run by volunteers. A range of crops are grown on the CSA site, with members of the CSA benefitting from the produce, and income generated through the sale of veg boxes and salad bags. The low intensity farming style employed by Stanford Hall and CSAs in general comes with a bounty of environmental benefits and provides gains for soil health and biodiversity. In addition, the CSA provides social value. School pupils participate in 'gleaning' events (when fallen, edible produce that has been deemed uneconomical to collect is gathered for free by visitors) and the site is used as an education centre for permaculture. Certain products, for example apples, were not entirely harvested this year because it was deemed uneconomical to do so.

Dan Belcher, March House Farm

Dan is a mixed farmer who runs a 50/50 split between grassland and arable. His livestock include 2800 ewes, 200 suckler cattle and 50 sows. He is also running a Christmas poultry operation. The regenerative methods Dan employs include cutting down inputs by 50% and implementing biodiversity-friendly wildflower and pollinator strips. His farm is in a mid-level countryside stewardship agreement. From a business perspective, Dan sells meat produce directly to local butchers. On the farm there is a farm shop and local butchery. His objective is to provide customers with nutrient-rich, high-quality food and to become 100% self-sufficient in terms of material inputs and outputs.

Alex Gray, Brooksby College

Alex is a lecturer and land manager at the Brooksby campus of SMB College Group. The college specialises in a range of land-based, trade, creative and technical courses, with the Brooksby campus catering to students studying land-based and sports courses. On the campus grounds, Alex is responsible for managing a farming field trial, teaching principles for regenerative agriculture and habitat restoration. He produces a small amount of arable and livestock produce, mob grazing sheep and cattle among agroforestry. Experimentally, he is trialling the production of different fruits and beans. He is interested in engaging with income generation mechanisms through natural capital and is partnered with a biodiversity net gain (BNG) broker, managing the regenerative operation partly through the income earned through habitat provision for developers.

Ruth Grice, dairy farmer and member of Long Clawson Dairy

TCL can also share some information on Long Clawson, a cooperative of dairy farmers in Leicestershire who specialise in the production of cheeses. Ruth Grice, a dairy farmer and member of Long Clawson, farms using the five principles of regenerative agriculture outlined in Section 1. She works to ensure soil is covered year round, uses grazing rotations where appropriate and engages in minimum ploughing. She has also increased hedgerow coverage across her farm by 2km in the last years. Along with the entire Long Clawson farmer base, she has conducted a carbon audit of her milk enterprise and land use for the past two years and can report a carbon footprint per kg of milk product that is 16% below the national average.

3.3 Workshop aims

The following aims were outlined for the workshop:

- Determine which crops could be grown by which farmers;
- Seek ideas for ingredient substitution;
- Determine best practice growing methods;
- Investigate likely cost per kg for production and price for purchasing;
- Understand what regenerative methods farmers are currently employing;
- Obtain initial inputs for carbon calculator tool;
- Identify challenges and barriers to farmers entering into local procurement;
- Discuss financial incentives (subsidies/carbon credits) available;
- Discuss how standards might be applied within a Regenerative Farmer procurement scenario.

3.3.1 Identifying suitable ingredients

The first stage of the workshop involved a run through of a list of ingredients commonly bought in procurement in the example use case that had been shortened to include only items that are able to be produced in the UK. Dan, Amy, and Alex were asked to identify items on the list that they could potentially produce.

Results:

	Amy	Dan	Alex	Long Clawson
Fruit and Vegetables	Apples, cut-and-come-again greens, lettuce, cabbage, garlic, celery, radish, rocket, squash, swede, pumpkin; **items not on ingredient list:**	-	Apples, pears, cabbages, nuts and beans	-

	peas, sweetcorn, broccoli, fresh juice			
Meat	-	Beef and lamb items – however in some cases exact product wouldn’t be comparable to current equivalent	Beef and lamb (small quantities)	-
Dairy	-	-	-	Stilton and other speciality cheeses

3.3.3 Key themes and topics discussed
It was TCL’s aim during the workshop to facilitate open discussion between farmers and those involved with wider policy and partnerships. Farmers raised important issues relating to standard-setting in any future procurement scenario and presented the priorities that the council should consider when developing a standards and ethics framework that is progressive in its accounting of producers’ carbon and biodiversity impacts, yet fair and attractive to producers.

A word-map of key issues and themes raised within the workshop is presented in Figure 3 below. The insights and recommendations provided through the workshop are presented in section 5.0 – ‘Accreditations and Frameworks’.

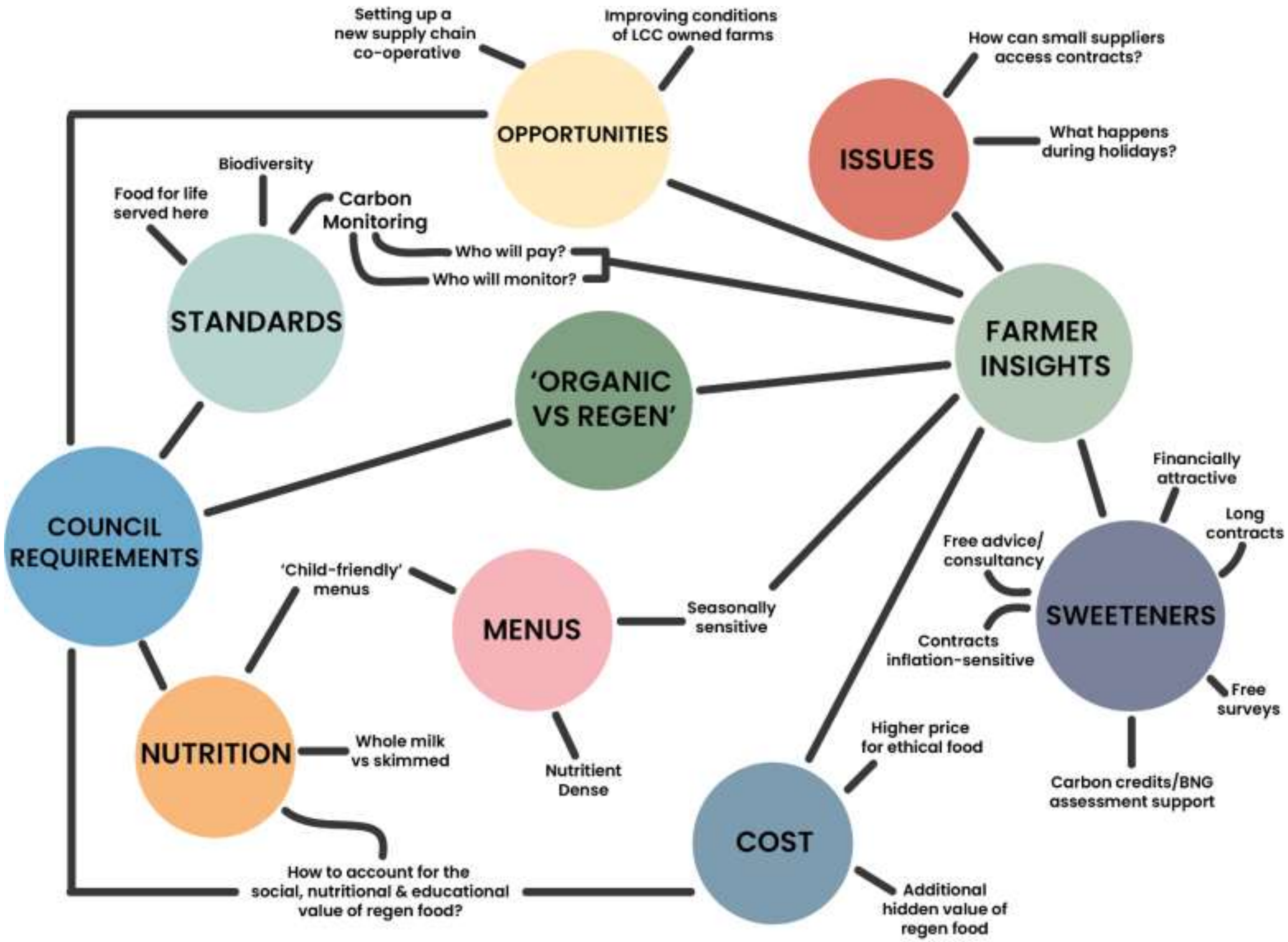

Figure 3. Key themes and topics that arose during the farmer workshop held in November 2022.

3.4 Farm Carbon Calculations

3.4.1 How to calculate carbon on farms?

Over the last decade the number of farm carbon calculator tools has proliferated as the agricultural sector recognises the value of monitoring on-farm emissions. The impact of farming practices on the environment is now well documented and calculator tools help provide an evidence base that enterprises might use to target management changes that simultaneously cut emissions and aid in increasing business efficiency[7]. In addition, the recent growth in the market for natural capital has provided an opportunity for farmers to potentially profit from sequestered carbon through the sale of carbon credits. As a result, carbon calculators are increasingly being seen as a tool to help access these markets.

The methodology that different tools employ varies depending on the context in which they were produced[8]. Greenhouse gas emissions are calculated using internationally recognised methodologies, such as those published by the Intergovernmental Panel on Climate Change (IPCC) in 2006[9]. Emission factors (EFs) sourced from inventories provided by government bodies (like DEFRA) or NGOs (like EcoInvent) are used to calculate emissions embedded within items like feed, bedding, pesticides and fertilisers[7].

3.4.2 Review of Agri-Carbon Calculators

Agrecalc: https://www.agrecalc.com

Agrecalc is a carbon footprint tool developed by the company SAC Consulting, along with SRUC researchers. The tool allows users to run and compare scenarios and identify carbon management practices to implement. The platform has over 6,000 active users, has been offering services for 15 years, and in that time has produced over 14,000 carbon reports.

The carbon reporting calculates whole farm, enterprise & product emissions, as well as on a unit of production basis. The calculations require data inputs from farmers, covering the following areas of emissions:

- **Energy & waste**: waste, water, transport, renewables, electricity & fuel use,
- **Land & crop**: crop area, fertiliser use, yield & output, manure application,
- **Livestock**: numbers, purchased feed, age at slaughter, weight & growth rate, production level & output.

The calculations cover the full range of mainstream agricultural systems and food sectors, including forestry and soil carbon sequestration along with renewable energy production. Reporting conforms to IPCC calculations for all livestock types & PAS 2050:11 supply chain standards.

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[7] https://ahdb.org.uk/farm-excellence/Coton-Wood-Farm/calculating-and-reducing-your-carbon-footprint

[8] Sykes et al, 2017. https://www.sciencedirect.com/science/article/pii/S0959652617313677

[9] Intergovernmental Panel on Climate Change, 2006. Available from https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

The basic package starts at £75 per year, and includes one Agrecalc profile, a Carbon Report Validation Check, and access to detailed benchmarks. The basic package is appropriate for individual farmers. Tailored packages are available for groups, supply chains, advisers and consultants offering multiple Agrecalc + Farm profiles, introduction and support, a tailored portal for groups, and training options.

Trinity AgTech's Sandy: https://www.trinityagtech.com/carbon

Trinity AgTech claims to be "the most comprehensive carbon and net-zero journey planner available for the food and farming industry". The tool follows the IPCC 2019 methodology and includes a Tier 2 soil carbon model. It is compliant with and able to report to PAS2050 and GHG Protocol. Trinity AgTech can be used for conventional, organic and regenerative farming systems. The reporting covers all major enterprises on farm, and provides key carbon sequestration and mitigation options, for example agroforestry, anaerobic digestion, biochar production, and greener energy.

Figure 4: Data Inputs for Trinity AgTech's carbon management tool

Their tool 'Sandy' is described as an 'end to end natural capital navigator' which allows farmers to understand, measure and optimise their natural capital assets. Additional modules can add scope 2 and 3 emissions to the model. Sandy is used by farms of various sizes. So far, the smallest producer using Sandy is 15ha.

Trinity Agtech say they are more user friendly and flexible than first generation tools such as Agrecalc. The Sandy tool is designed to be affordable, coming in at £52/month over a 12 month subscription for individual farmers. The monthly subscription model encourages ongoing monitoring rather than a one-off 'check-box' approach to carbon management. A lower price of £48/month is offered to small-holders.

Cool Farm Tool: https://coolfarmtool.org/

The Cool Farm Tool was developed by the University of Aberdeen in 2011, funded in large part by Unilever Sustainable Agriculture. The tool uses IPCC Tier 1 and 2 methodology, and, while not being PAS2050 certified, has been reviewed in academic research.

Cool Farm Tool functions at an 'intermediate' level[7], having been designed to support farm-level decision making. As a result, the inputs required for this tool are deliberately limited to those that farmers have a good knowledge of[10]. Indeed, in an initial research paper, those behind the Cool Farm Tool describe its most appropriate application as constituting "an initial assessment to highlight the general mitigation options [available to a farmer], perhaps preceding analysis with more complex bio-physical models or measurements"[9].

In addition to carbon calculations, the Cool Farm Tool provides a module to quantify how well the reported farm management practices support biodiversity at a farm scale. Points are awarded for action in the following areas

- Diversity of products
- Production practices
- Small natural habitats
- Larger natural areas and landscape

Points are also awarded for how well reported practices affect ten different species groups.

The tool is designed to be open access for farmers and is free to use, however, aggregating data across farms requires membership. The level of detail provided in the final report is generally lower than that provided by the other two calculator tools discussed here[11].

3.4.3 Limitations of farm carbon calculators

Notoriously, it should be noted that different calculator tools, when applied to the same farm, provide different results. One study compared the application of five tools to a range of beef producing enterprises and found a large variability in the tools' attribution of livestock emissions as a percentage of the total farm footprint (ranging from 43-92% across the five tools)[10].

The reason for this variation is due to the differing methodologies employed by each tool; for example, different tools include different sources when it comes to calculating categories of emissions such as fuel, inputs, livestock and manure and feed production Another example is shown by the fact that well-used methodologies, for example those outlined by the IPCC (2006), are not considered sufficient enough to account for carbon sequestration in certain habitats and certain regions, leading to its exclusion by some tools. This issue is confounded by the fact that tools are often not transparent in the publication of their methodologies.

3.4.4 Choice and justification

Trinity Agtech's *Sandy* tool (referred to henceforth as Sandy) was chosen for the purposes of this project. Sandy measures both carbon and biodiversity-related impacts of different products and can provide results for small areas, giving results on a field-by-field basis. This

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[10] *Hillier et al, 2019.* https://www.sciencedirect.com/science/article/pii/S1364815211000892?via%3Dihub
[11] *Farmer's Weekly.* https://www.fwi.co.uk/business/business-management/business-clinic/business-clinic-carbon-calculators-where-do-i-start

is particularly important for the outputs of this project, as in some cases very small patches of land (as small as 0.04Ha) are being modelled.

Additionally, TCL has been in good communication with a founding member of Trinity Agtech, Angus Gowthorpe. Through Angus, a Sandy technician, Scott Millar, has offered (free) valuable walk throughs of the Sandy platform and has supported with the running of the emissions model to generate results.

Sandy provides the user with an online hub that can centralise the emissions results for multiple farms. This function may be particularly useful in future stages of this project, as tool for standards assessment, progress monitoring and target setting for partner farmers. See section 6.0 for full discussion on this function of Sandy.

3.5 Carbon and Biodiversity Measurements

3.5.1 Methodology

Once Sandy was chosen to run the carbon calculations, TCL organised online meetings with the three farmers who were identified as fulfilling 'regenerative' criteria.

Sandy calculates land-based farm emissions on a field-by-field basis. For each field in the input spreadsheet, a minimum of one row will have cells for data relating to outputs (crop type, yield), inputs (fertiliser, pesticide, machinery fuel) and other land uses (hedgerows, trees). The questions for a field may be duplicated, for example when multiple outputs are produced, or where cover crops are used.

For arable fields, questions are further divided in categories of 'cropping' (tillage, planting dates, yield) 'operational' (types, quantity, application of inputs), 'land use' (size of productive area, length of hedgerows and other linear features, number of field trees), 'fuel' (if any), soil data (if available, including questions on organic matter concentration, pH, Mineral Nitrogen) and questions on the chemical components of any applied organic or manufactured fertilisers or crop protectors.

For livestock fields, in addition to the soil and input questions described above, questions relate to grazing management (stocking rates, rotation length, sward cutting and biomass) and grassland management (sward species, renewal frequency).

Farm	Field Name	Soil type	Field Size (Ha)	Is this an Organic field?	Primary land use
Stanford CSA	Field 1	Silty clay loam	1.2	No	Arable
Stanford CSA	Field 2a	Silty clay loam	0.0404686	No	Arable
Stanford CSA	Field 2b	Silty clay loam	0.0404686	No	Arable
Stanford CSA	Field 2c	Silty clay loam	0.0404686	No	Arable
Stanford CSA	Field 2d	Silty clay loam	0.0404686	No	Arable
Stanford CSA	Field 2e	Silty clay loam	0.0404686	No	Arable

Figure 4. Example of input table of Trinity Agtech's Sandy tool.

Ingredients chosen for calculation

- **Stanford CSA: spring field bean, garlic, spinach, pumpkin, kale, radish (6 fields)**

Farm	Field Name	Harvest Year	Crop Type	Crop Name	Crop Variety	Working Area (Ha)	Tillage Method	Planting Date (dd/MMM/YYYY)
Stanford CSA	Field 1	2023	Main crop	Spring Field Bean	Pyramid	1.2	Direct drill	01/05/2022
Stanford CSA	Field 2a	2023	Main crop	Garlic	Plavigar	0.0404686	Direct drill	15/12/2022
Stanford CSA	Field 2b	2023	Main crop	Spinach	Sioux	0.0404686	Direct drill	15/03/2022
Stanford CSA	Field 2c	2023	Main crop	Pumpkin	Ute Indian	0.0404686	Direct drill	15/05/2022
Stanford CSA	Field 2d	2023	Main crop	Curly kale	Red Russian	0.0404686	Direct drill	15/03/2023
Stanford CSA	Field 2e	2023	Main crop	Radish	French Breakfast 2	0.0404686	Direct drill	01/03/2023

Six fields were parcelled from Stanford's CSA's existing land operation. This includes one 1.2Ha field, which has been modelled for spring field bean production. Spring field bean was grown on this field in the 2022 season.

A 0.2Ha field was divided into five 0.04 Ha parcels which is in line with Stanford's existing land management. The crops of garlic, spinach, pumpkin, curly kale and radish were chosen to be grown on each patch. These products were chosen on the basis of Stanford already holding cropping data for them based on previous years' production.

- **March House Farm: beef cattle, sheep (2 fields)**

Farm	Field Name	Harvest Year	Record Type	Livestock (ENCOURAGED)	Stocking Rate (ENCOURAGED) LSU / HA	Animal grazing Day from (ENCOURAGED)	Animal grazing Day to (ENCOURAGED)
March House Farm	Freehold	2023	Grazing livestock	Beef cattle	5	15/03/2023	15/11/2023
March House Farm	Big ded	2023	Grazing livestock	Sheep	10	01/03/2023	30/11/2023

Two existing fields were chosen to run a sheep and cattle grazing model. An eight hectare field (Freehold) was chosen for beef production (Freehold) and an eleven hectare field for lamb production (Big Ded).

- **Brooksby College: apples, (1 field in an agroforestry system)**

Farm	Field Name	Harvest Year	Crop Type	Crop Name	Crop Variety	Working Area (Ha)	Tillage Method	Planting Date (dd/MMM/YYYY)
Brooksby	Agroforestry	2024	Perennial crop	Apple Orchard	Amanda	8.1	Direct drill	01/01/2024

Brooksby college are in the process of converting one 8.1 hectare field to an agroforestry system containing fruit trees (this simulation limits the fruit to apple, but pear and plum will also be planted), elderberry, hazel and sweet chestnut. The perennial grassland between tree rows will be grazed by cattle.

3.5.2 Emissions results

Stanford CSA

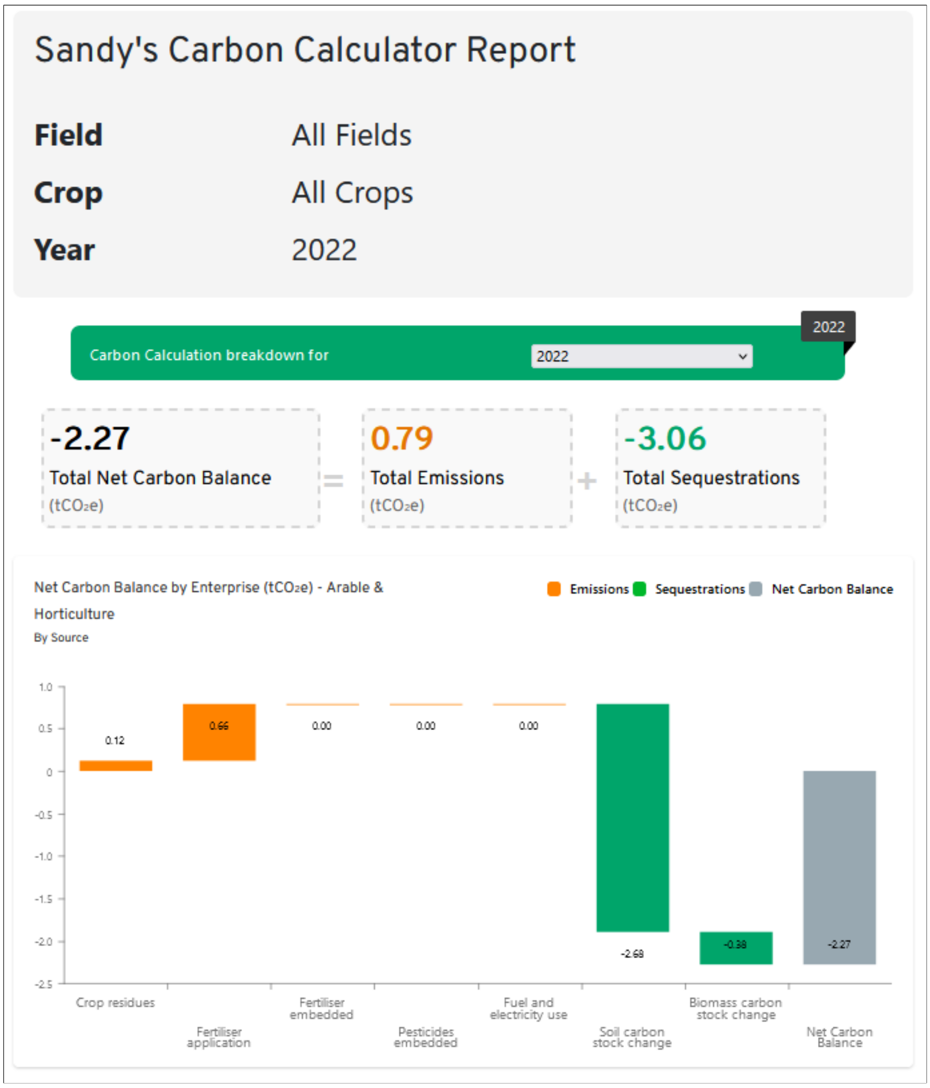

Figure 5. Example of results page provided by Sandy, showing total net CO2e balance for all modelled fields. Emissions associated with crop residues, fertiliser application, pesticides and fuel are shown in orange. Sequestered carbon in soil and other biomass is shown in green. Net balance is presented by the grey bar.

<u>Spring field beans – Field 1</u>

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-1.63	0.37	-2.00	-0.75	0.33

<u>Garlic – Field 2a</u>

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-0.40	0.35	-0.75	-0.10	0.54

Spinach – Field 2b

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-0.03	0.00	0.03	-0.06	0.15

Pumpkin – Field 2c

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-0.07	0.01	0.08	-0.03	0.24

Curly kale – Field 2d

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-0.13	0.04	-0.17	-0.07	1.72*

*UK benchmark taken from alternative database: Plate Up for the Planet

Radish – Field 2e

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-0.02	0.00	0.02	-0.02	0.07**

**UK benchmark taken from alternative database: Agribalyse 3.1

Discussion: Emissions intensity for all products modelled at Stanford CSA was lower than the UK benchmarks reported by the carbon calculator databases. In part this is due to the fact that there is very low utilisation of artificial inputs across the CSA. In addition, fuel use, normally the main contributor to Scope 1 emissions on arable farms, is zero at Stanford CSA; all crops are sown and maintained by hand. For example, the largest field used in the model (Field 1) was entirely harvested by volunteering schoolchildren in 2022.

March House Farm

The emissions associated with beef and lamb production are given below. Due to the nature of the calculation, Sandy was not able to calculate an individual figure for beef or lamb product associated solely with the two fields modelled. Therefore, the numbers provided in Figures 6 and 7 relate to the emissions of the entire beef and lamb enterprise at March House Farm. Conducting a full scale farm footprint was not within the scope of this project however we have been able to calculate an emissions intensity for animals being grazed regeneratively on the two fields that are of interest. This has been done by calculating the emissions intensity for the precise number of animals grazing both fields and factoring in the sequestration rates of the fields for the duration of time being grazed.

Beef

Emissions intensity (before adjustment to account for grassland sequestration) (kgCO2e/kg liveweight)	Emissions intensity (adjusted) (kgCO2e/kg liveweight)	UK equivalent (kgCO2/kg liveweight)
17.96	17.16	32

The figure of 17.16kgCO2e/kg for beef at March House Farm is well below the UK benchmark of 32kgCO2e/kg. However, it should be noted that the UK figure is ‘in store’, including emissions associated with processing, packaging and transport. The farming emissions remain the largest proportion of beef’s overall emissions, with CarbonCloud showing that nearly 100% of the emissions associated with beef’s in store footprint come from on-farm activity[12].

Lamb

Emissions intensity (before adjustment to account for grassland sequestration) (kgCO2e/kg liveweight)	Emissions intensity (adjusted) (kgCO2e/kg liveweight)	UK equivalent (kgCO2/kg liveweight)
32.57	26.83	32

The emissions intensity for lamb reared at March House Farm is equivalent to the figure reported by CarbonCloud. However, modelling the emissions intensity of lamb reared on the field used in this study and accounting for carbon sequestration produces a lower figure of 26.83kgCO2e/kg lamb. Practices like rotational grazing increase grassland vegetation growth rates, helping to store more carbon in the soil.

[12] https://apps.carboncloud.com/climatehub/product-reports/id/121602434791

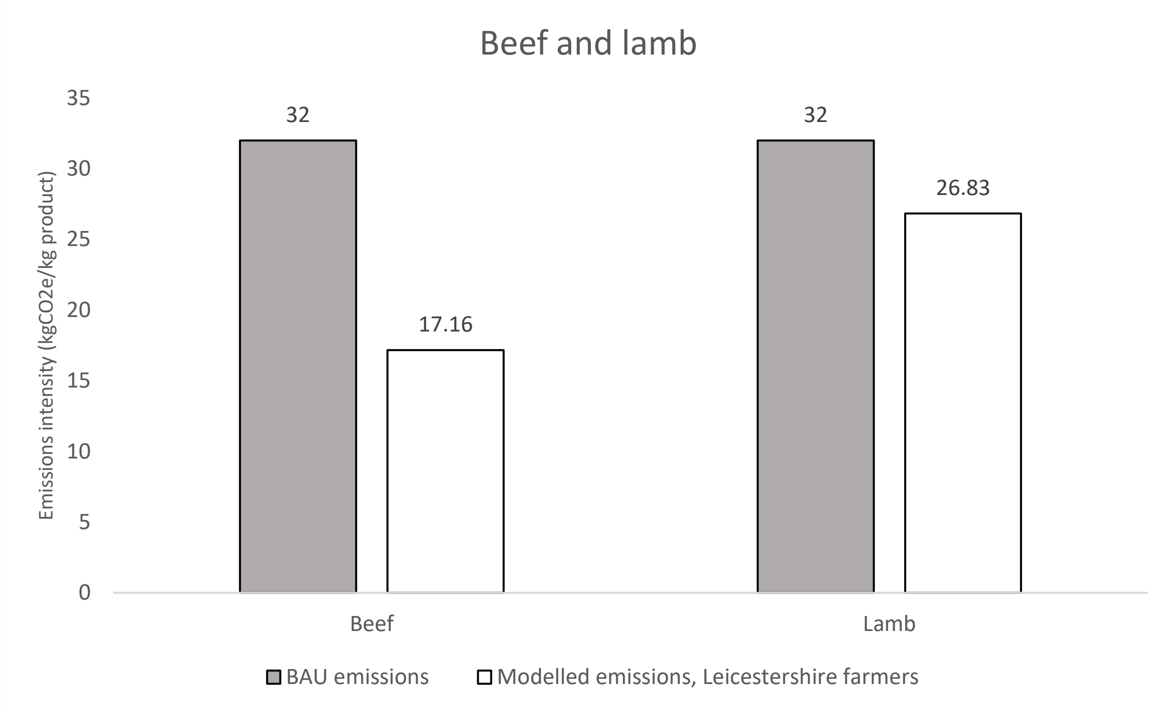

Figure 6. Comparison of emissions for BAU/UK vs Leicestershire-produced meat

Brooskby College

An agroforestry field was modelled at Brooksby College based on discussions held with Alex Gray. Presently, the field is being prepared for agroforestry production with apple, pear and plum trees due to be planted in 2023. For the purposes of this project, the field was modelled at year five of production. Yield assumptions are made based on published, peer reviewed data. During an interview with Alex we gathered data on current and predicted management practices associated with the field.

Apples

Net carbon balance (tCO2e)	Total emissions (tCO2e)	Total sequestration (tCO2e)	Emissions intensity (kg CO2e / kg)	UK equivalent (kg CO2 / kg)
-8.66	0.05	-8.72	-0.68	0.17

The low emissions intensity for apples produced on the Brooksby College agroforestry field comes as a result of the high sequestration rates of the system (with over a thousand trees present in this field); the low inputs associated with crop protection and nutrition (woodchip is the only compost added to the trees at when initially planted) and low fuel use associated with planting and maintenance.

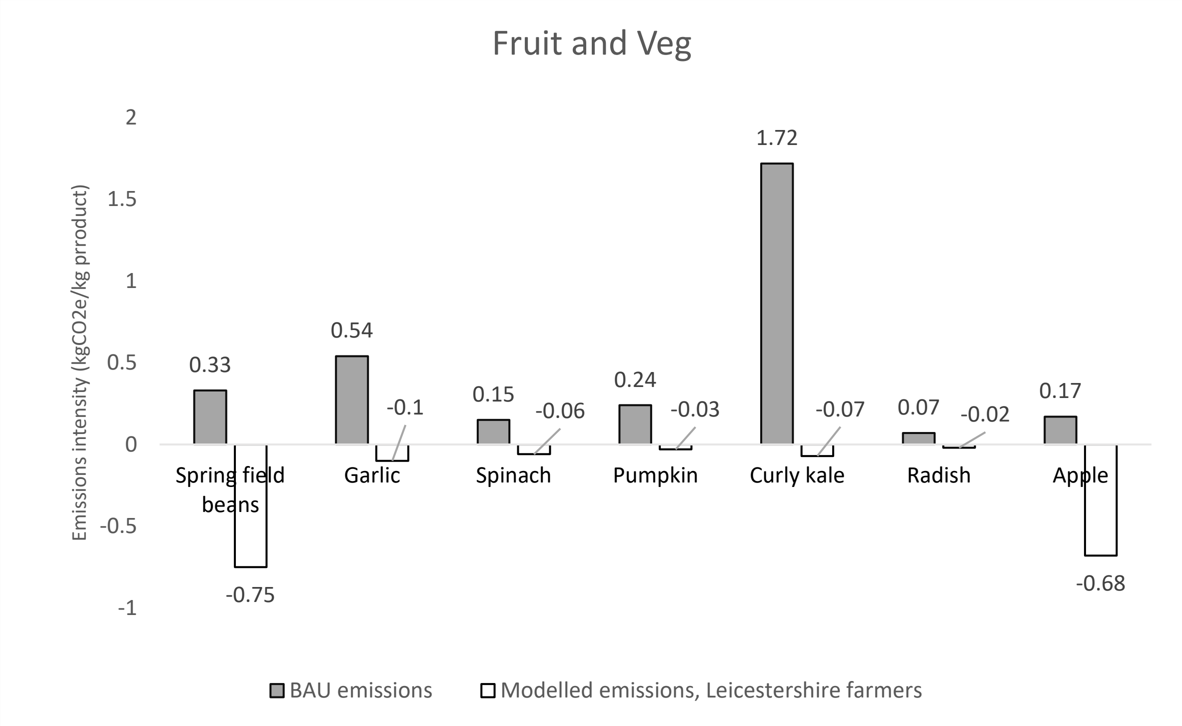

Figure 7. Comparison of emissions for BAU/UK vs Leicestershire-produced fruit and veg products

Ruth Grice and Long Clawson Dairy

Milk

Emissions intensity – Ruth Grice (kg CO2e/kg)	Emissions intensity – Long Clawson average (kg CO2e/kg)	UK average (kg CO2e/kg)
1.05	1.17	1.25

Ruth Grice, along with all other Long Clawson members, has conducted a farm carbon audit using the platform Map of Ag. The emissions intensity for their milk product is reported above; in both cases the emissions intensity is lower than the UK average.

In addition, Ruth has measured the Soil Organic Carbon (SOC) content of the soils at her farm. SOC refers to the carbon components of organic compounds within soil[13]. The SOC across her farm is between 7-8% compared to a UK average SOC on farms of 2%.

[13] https://www.agric.wa.gov.au/measuring-and-assessing-soils/what-soil-organic-carbon

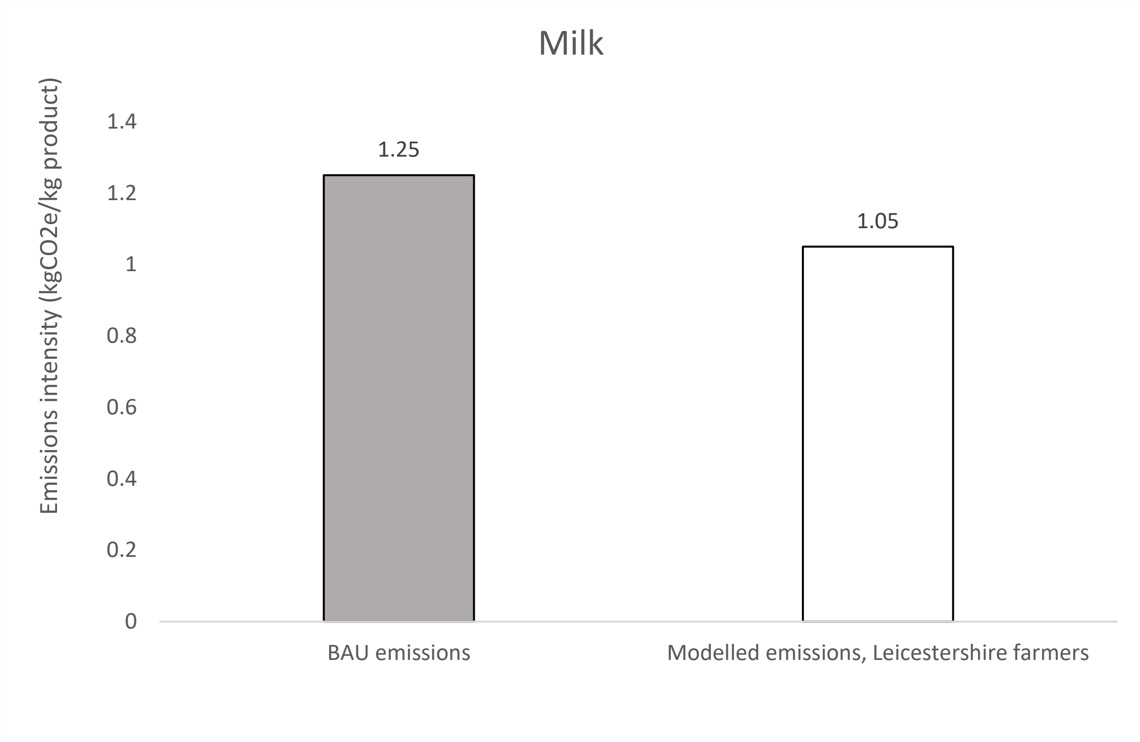

Figure 8. Comparison of emissions for BAU/UK vs Leicestershire-produced milk

3.4.3 Biodiversity results

Sandy 'scores' individual fields under five different categories relating to different aspects of farmland biodiversity. Scores are assigned using inferences from a range of variables, such as:

- hedgerow length and management style;
- presence of individual trees;
- use of pesticides, herbicides and fertilisers;
- size of any wildlife features like beetle banks, wildflower margins and buffer strips;
- level of soil disturbance (inferred through drilling method, grazing methods);
- presence of any species-specific management activity (for example, plots for skylarks).

Taking data input for each field, biodiversity is scored within the following categories:

Farmland wildlife	The general ability of a land-use/intervention to support all farmland wildlife that does not directly contribute to ecosystem services underpinning food production (including abundant and rare species of wild-plants, pollinators, natural enemies and soil fauna)
Pollinators	The general ability of a land-use/intervention to support species of pollinators underpinning food production
Natural enemies	The general ability of a land-use/intervention to support species of natural enemies of pests relevant to food production

Conservation species	The general ability of a land-use/intervention to support species of conservation concern (such as, but not limited to, those which are red listed)
Soil biodiversity	The general ability of a land-use/intervention to support species of soil fauna underpinning soil processes relevant to food production

Stanford CSA

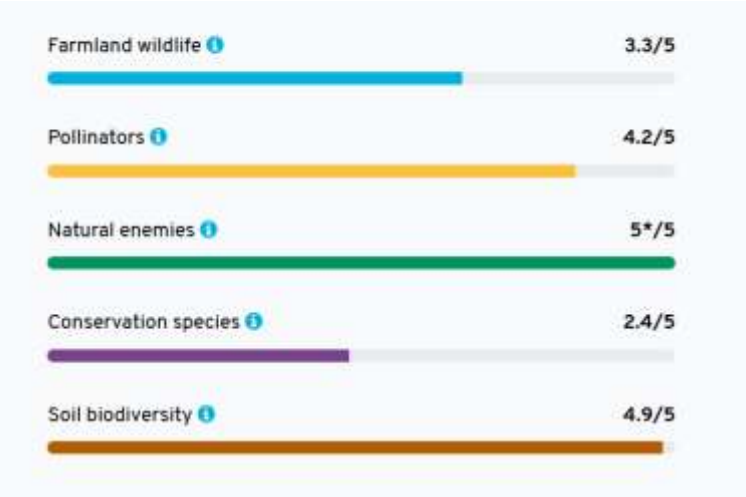

Figure 9. Biodiversity scores for all fields modelled at Stanford CSA.

High scores for Stanford CSA for soil biodiversity, natural enemies and pollinators are likely due to the zero use of artificial fertilisers and insecticides, fungicides and other chemical crop protection, all of which can have a damaging effect on soils and invertebrates.

There are no specific measures in place on the CSA to promote species of conservation concern which is a likely factor for the lower score for 'Conservation species'.

There is also only one reported hedgerow used as a boundary feature in the fields reported at Stanford and no 'marginal' land that might support non-cropped plants, possible explaining a lower Farmland Wildlife score.

March House Farm

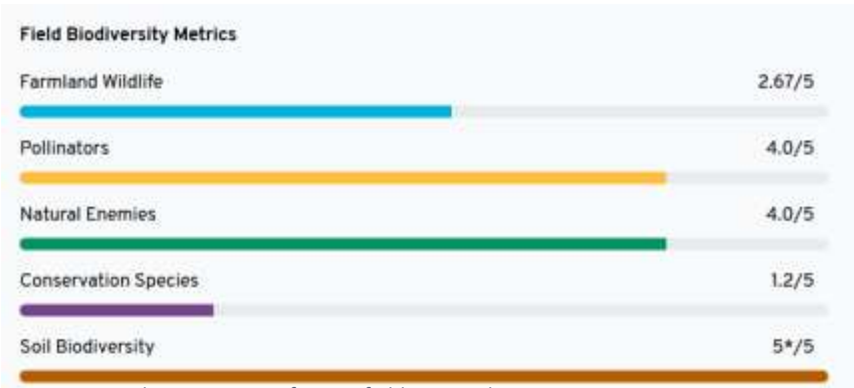

Figure 10. Biodiversity scores for one field at March House Farm

Fields at March House Farm score high for soil biodiversity, pollinators and natural enemies. It is likely that these scores are influenced by the mob grazing regime practiced on the fields, with sheep and cattle rotated over a period of 28 and 20 days respectively. This type of grazing has beneficial effects on grassland structure and plant diversity.

Brooksby College

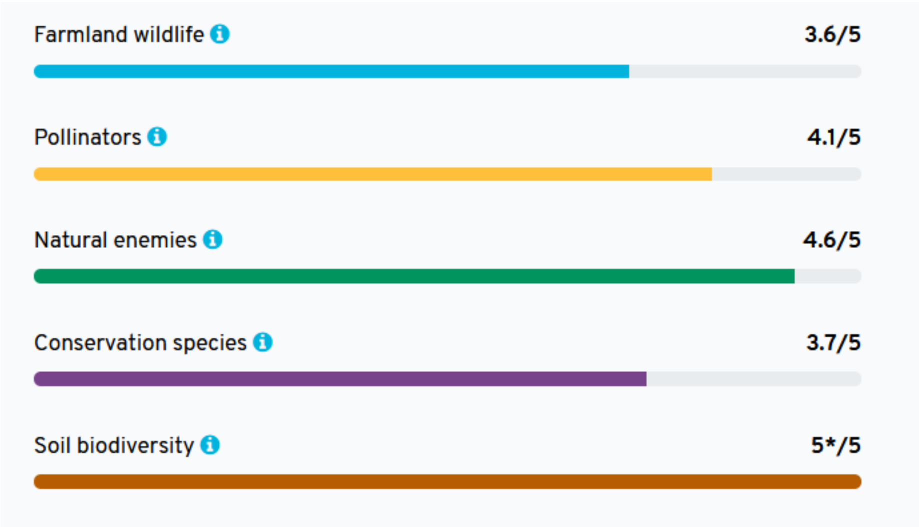

Figure 11. Biodiversity scores for Brooksby College's agroforestry field.

Overall, the agroforestry field at Brooksby farm scores highly for biodiversity. This score is influenced by the range of low input, high nature value practices that are implemented on the field. A very high number of trees are likely to contribute to this, providing a habitat for pollinators and birds. The legume and herb rich sward of the grassland between tree rows is likely to offer good habitat for pollinators and natural enemies, while the minimal chemical fertiliser input in addition to the practice of mob grazing is likely to affect the high soil biodiversity score.

Ruth Grice – Long Clawson Dairy

No biodiversity model was performed for Ruth Grice's farm, however some reported practices that are beneficial for farmland biodiversity are:

- Cover cropping;
- Minimum tillage;
- High levels of hedgerow maintenance and planting (2km increase last year years);
- Many small field parcels retains habitat heterogeneity.

4.0 Accreditations and Frameworks

TCL investigated how the Soil Association's Food for Life Served Here (FFLSH) assurance framework, used by larger procurers such as the example use case, enables and promotes the production of food that is low carbon and biodiversity-friendly. Subsequently, existing farm accreditation stamps were compared to examine how they might support the aims of this report in a regenerative procurement scenario. The issues surrounding standard application on farms were discussed during the farmer workshop and recommendations for a new framework are presented in section 4.3.

4.1 Existing Standards in place in school meals served in Leicestershire

4.1.1 Food for Life Served Here

Food For Life Served Here is a Soil Association scheme that works with schools, nurseries, hospitals and care homes to boost the consumption of healthy, tasty and sustainable food in these spaces. The School Award encourages caterers to:

- *serve fresh food*
- *source environmentally sustainable and ethical food*
- *make healthy eating easy*
- *champion local food producers*[14]

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Complementarity between FFLSH and project aims

The suitability of FFLSH's standards to meet the priorities for a local regenerative procurement scenario were elaborated. The overarching priorities assessed are (1) that food is produced as locally as possible (2) that standards promote a reduction in emissions associated with farming and (3) that standards encourage biodiversity enhancement on farms.

Either directly or indirectly, the following FFLSH standards were identified as being able to potentially contribute to the regenerative procurement aims.

Bronze:
1.8: *Menus are seasonal and in-season produce is highlighted*
1.9: *Information is on display about food provenance*

Silver and Gold:
2.1: *Sourcing environmentally friendly and ethical food*
2.1.1: *Points awarded for serving Organic-certified food*
2.1.2: *Points awarded for serving free range eggs and poultry*
2.1.6: *Points awarded for serving food from LEAF-Marque farms*
4.1: *Points awarded for spend on ingredients within local area or adjacent counties*
4.2: *Points awarded for spend on procurement of raw food produced in local area*

Achieving Silver and Gold status requires the accumulation of 150 and 300 points respectively. Points can be picked up by illustrating good practice across a range of themes. However, engaging with all the standards is not mandatory to achieve Silver or Gold. This raises the question of whether regenerative procurement priorities (outlined above) are properly supported within FFLSH. There are clear links between regenerative agriculture and Soil Association's Organic certification (full description given in section 4.2.1) and there is a requirement within the Silver and Gold frameworks that a minimum percentage of ingredient budget be spent on organic produce (including one organic animal produce for the Gold award). However, adhering to other standards that either promote local

[14] The Soil Association, 2019. *Food For Life Served Here Handbook: Schools*

procurement or indirectly have carbon and biodiversity benefits (2.1.6, 4.1 or 4.2, described above) is not mandatory for attaining Silver or Gold standards.

4.2 Other Standards

4.2.1 Popular Farm Certification Schemes

Popular existing farm standards were researched. Their requirements are described below. Particular attention has been given to existing standards' requirements relating to energy/carbon management and biodiversity protection and/or enhancement.

The standards presented below cover a large proportion of accredited food produced in the United Kingdom. For example, 48% of vegetables are produced by LEAF Marque-accredited businesses. Some standards are very comprehensive in their coverage of farm activity (Soil Association Organic, LEAF Marque) while others (RSPB Fair to Nature, Pasture for Life) are much more specialised, focussing on a particular area of assurance, or a style of farming.

Red Tractor

Red Tractor is a standard assurance scheme that covers all areas of agricultural production, with standards categorised under beef, lamb, pig, chicken, 'crops and sugar beet' and 'fresh produce'. According to their website, 75% of UK agriculture is assured through Red Tractor or their partner schemes. It's potentially the UK's most reputable farm assurance scheme; in a consumer survey 75% of respondents said they were 'aware' of Red Tractor, with 72% people trusting Red Tractor to deliver 'safe, traceable food that has been farmed with care'[15].

Only the categories of 'Crops and Sugar Beet' and 'Fresh Produce' have standards that cover biodiversity and/or energy management.

Carbon/Energy Audit	Yes
Emissions Reductions	Recommended* indirect through consideration of 'Renewable energy options'
Biodiversity Audit/Monitoring	Recommended
Conservation Management	Yes

*Where an action is noted as being 'Recommended', it is mentioned within the issuer's standards but not an obligation for achieving the standard.

Soil Association Organic

The Soil Association's 'Organic' accreditation covers 90% of all organic growers in the UK[16]. The standards comprehensively cover organic food production, setting requirements for record keeping, labelling, cleaning, pest control, transport, storage and packaging.

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[15] https://redtractor.org.uk/our-standards/
[16] https://www.soilassociation.org/certification/food-drink/why-certify-with-us/

There are considerations made for on-farm biodiversity, including requirements to identify habitats and sites of conservation interest and for the creation of a conservation plan. Energy consumption is mentioned, although the language around the use of energy is not strong – Standard 2.3.3 states that energy, water and natural resources must be used 'responsibly' and that energy from non-renewable resources must be reduced. Recommendations are made for the reporting of energy use.

Carbon/Energy Audit	Recommended
Emissions Reductions	Recommended
Biodiversity Audit/Monitoring	No
Conservation Management	Yes

Planet Mark

Planet Mark is a sustainability-focussed standard developed to reduce carbon emissions associated energy and water for a range of businesses. To achieve accreditation, the applicant must commit to measure their carbon emissions and subsequently reduce emissions by a minimum of 2.5% annually. They report one case study with an agricultural enterprise, claiming to work with agricultural businesses "to measure and reduce their carbon emissions, ensuring responsible farming and sustainable agriculture that has a positive impact on planet and society".

Carbon/Energy Audit	Yes
Emissions Reductions	Yes
Biodiversity Audit/Monitoring	No
Conservation Management	No

Fair to Nature

The RSPB's *Fair to Nature* assurance scheme certifies businesses that are committed to restoring nature on farmland. They are the only certification in this list with a focus on biodiversity. As such the requirements for biodiversity protection and enhancement are stringent, with applicants required to manage a minimum of 10% of their farmed area as wildlife habitat (specifications are made for habitat type). There are requirements to monitor wildlife on farm and control invasive species.

Carbon/Energy Audit	No
Emissions Reductions	No
Biodiversity Audit/Monitoring	Yes
Conservation Management	Yes

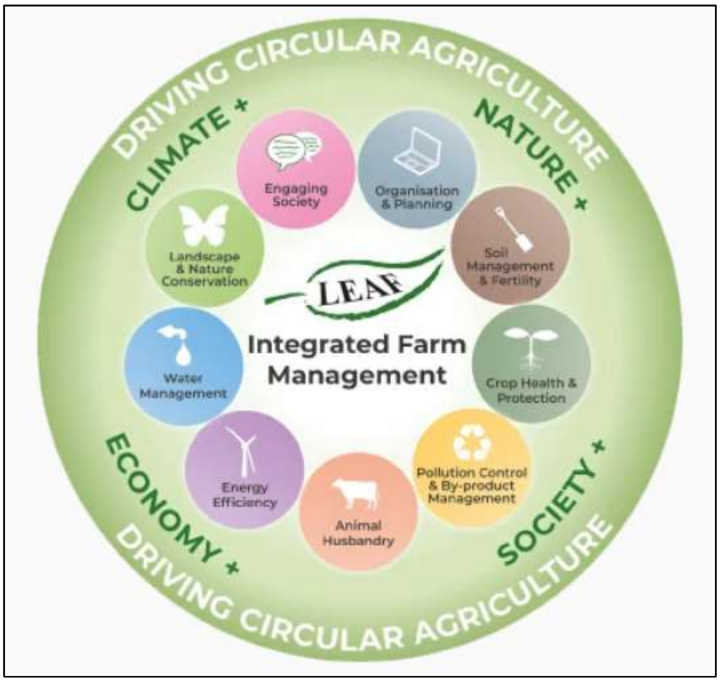
Pasture for Life

Pasture for Life, delivered by the Pasture for Life Association, sets standards for high quality pasture-fed livestock. Standards cover, feeding, grazing, stocking, and other on-farm activities, in addition to activities occurring 'beyond farm gate' (such as traceability and storage).

Biodiversity is accounted for through standards for soil health, biodiversity within pastures and biodiversity in the wider farm environment. The design of a habitat map that covers specified habitats in addition to statutory and non-statutory areas of conservation interest and areas under Countryside Stewardship. Some obligation is made for applicants to manage specific habitats and some habitat management is recommended for other habitats (field margins, bird nesting habitat).

Carbon/Energy Audit	No
Emissions Reductions	No
Biodiversity Audit/Monitoring	No
Conservation Management	Recommended

LEAF Marque



The Linking Environment And Farming's (LEAF) LEAF Marque accreditation is a comprehensive assurance system that recognises sustainability across a range of categories. Underpinned by LEAF's 'Integrated Farm Management' system, sustainable farming is certified through LEAF Marque through engagement with different farming systems.

Biodiversity and carbon management are well accounted for through LEAF Marque accreditation, within sections 'Soil Management and Fertility', 'Energy Efficiency' and 'Landscape and Nature Conservation'. There is a requirement for a soil management plan to be designed to include 'strategies to improve carbon capture and carbon sequestration'. An annual energy audit is required as is the use of a carbon footprinting tool. Through the obliged implementation of an Energy Action Plan there is a requirement for farmers to make targets for GHG emissions reductions.

Biodiversity conservation and enhancement requirements are extensive – with the implementation of a Landscape and Nature Conservation Enhancement Plan required to attain certification. The plan must be integrated within the farming system. A percentage of the farm is required to be managed as habitat area and there is an obligation to monitor at least one 'representative species' on the farm.

Carbon/Energy Audit	Yes
Emissions Reductions	Yes
Biodiversity Audit/Monitoring	Yes
Conservation Management	Yes

4.3 Establishing a standard for carbon and biodiversity

The priorities for any assurance and accreditation framework that would support procurement of (Leicestershire) regenerative produce are as follows:

1. **Carbon and biodiversity management/monitoring is properly accounted for;**
2. **Local procurement is supported;**
3. **Standards are complementary to Food For Life Served here accreditation;**
4. **Standards are rigorous; trade-offs between tick-box exercises and in-person auditing are understood;**
5. **Standards are fair to farmers and are attractive enough to be preferred over Business As Usual supply chains.**

Carbon management

Currently, it is difficult to determine farm emissions associated with products procured through large bodies such as those supplying school meals, and therefore any reductions made are currently hard to report.

Existing farm standards that make requirements of farmers to monitor and/or reduce carbon emissions are Soil Association's Organic scheme and LEAF-Marque (Planet Mark has been developed primarily for non-farming corporations and thus is not considered appropriate for this project). Of the two, LEAF-Marque is the most comprehensive, with farmers required by the scheme to use a carbon footprinting tool and to develop GHG-emissions reductions targets. Some measurable carbon reductions are likely ongoing as a result of any procurement policy associated with FFLSH as points are awarded for caterers supplying food from farms with Organic and LEAF-Marque certification.

Workshop notes and recommendations: In the farmer/policy/partnership workshop, it was made clear that any accreditation framework must strike a balance between a reporting methodology that is easy for farmers to engage with, yet truthful and robust in data generation. Any accreditation framework developing as a result of this project may wish to consider carbon calculator tools of the type employed in this report to determine regeneratively produced products' CO_2 emissions. These tools are designed to be farmer-friendly (in theory), not requiring more information than the farmer holds already for agronomic or business purposes. Upon calculating emissions some tools will make recommendations for emissions reductions. Trinity Agtech's *Sandy* calculator interface allows for multiple farms' results to be viewed on one platform, enabling easy visibility of carbon emissions across the procurement network. There is also scope for this platform to be used to administer targets in carbon setting. Carbon calculator tools do have limitations, which are fully presented in section 3.4.

A more in-person approach to carbon monitoring may be for partner farms to be supported by expert sustainability consultants, who will produce detailed carbon audits and make emissions recommendations that are more tailored to the farmer and which are often contained within a bespoke carbon management plan.

Is the monitoring of emissions inevitable for UK farmers? As the food sector moves towards net-zero carbon emissions[13] retailers are facing increasing demand from consumers to report on food carbon footprints. This consumer demand translates into pressure up the production chain as retailers make carbon reporting a requirement of supply contracts, or conduct audits on behalf of their producers[14].

Biodiversity Monitoring

As has already been discussed, the direct biodiversity impact of farming is, for the majority of suppliers, impossible to determine. At the same time, while some wildlife conservation planning is required as part of the *Organic* certification, and some items on the example procurement list may be from LEAF-Marque farms, FFLSH standards do not explicitly or comprehensively make assurances for biodiversity monitoring or enhancement on farms.

"There's no point re-inventing the wheel. Any monitoring mechanism needs to work with whatever's already out there" Alex Gray, Brooksby College

Workshop notes and recommendations: Farmers stressed the need for any new biodiversity standards to complement existing processes. For example, could biodiversity targets on farms be cohesive with those set out in Leicestershire's Biodiversity Action Plan (BAP)? Alternatively, as ELMS schemes become more developed, how could local biodiversity enhancement priorities tie in with schemes that award farmers for biodiversity-friendly farming, like Countryside Stewardship (CS) and the Sustainable Farming Incentive (SFI)?

Questions were raised by farmers around who should carry out any surveys associated with the administration of biodiversity 'baselines' and assessing progress towards any targets (table 7). It was recommended that existing platforms, like NatureSpot[19], a species recording site for Leicestershire and Rutland, could be beneficial in collating species data gathered on farms.

Who should monitor biodiversity on farms?	Farmers	Council officers	Citizen Scientists	Students
Level of expertise	Low	High	Medium	Low

[17] DEFRA. The Environmental Improvement Plan, 2023.
[18] Ian Quinn. Food data body to mandate transparency on HFSS, Scope 3 and animal welfare, 2023
[19] https://www.naturespot.org.uk/

Learning lessons from retailers: Angus, Alex and Dan all agreed that any biodiversity standard needs to be sensitive to farmer needs and limitations. Surveys are likely to be costly in training and time. Contracts offered should reflect the additional cost that regenerative agriculture and progress monitoring incurs. Lessons can be learnt from supermarkets like M&S, who are mandating on-farm biodiversity conservation through their contracts, facilitated by wildlife experts who develop species recovery plans alongside farm managers.

Supporting Local Farmers

Any new standard should have a local focus – the workshop focused on Leicestershire farms and so the discussion around support for local farmers has a Leicestershire lean.

Workshop notes and recommendations: raising this issue in the workshop provoked the following questions:

- What is the value of Leicestershire-based food procurement?

The value of keeping supply chains local was highlighted in the workshop. As well as having lower carbon emissions associated with ingredients' transport, sourcing food locally benefits local economies, by providing jobs and favouring local businesses. In addition, sourcing food through local CSAs has a health value, as community members and volunteers involved in food production spend time outside. An educational value may also be realised; Amy discussed how Stanford CSA held activity days for school children, getting them involved in the harvest of beans.

- How should the values of *local* be balanced/complemented with *regenerative* production?

If local farming operations are to be favoured by procurement standards, should there be a differentiation between small farms who sell their produce locally, and large farms who might export their produce off-county? Would standards favour large scale farmers who, while farming regeneratively, have a smaller local impact through the activities described above, over smaller scale producers who might find their carbon and biodiversity impacts harder to prove, yet provide social value to their community? Any standard seeking to measure the environmental value of farming should be balanced with the social and economic value of smaller-scale farms.

Complementing Food for Life Served Here

To understand how a new procurement model that prioritises local, low-carbon and biodiversity friendly farming could be designed cohesively alongside the FFLSH standards, TCL held discussions with representatives of the Soil Association.

The existing standards are presented below (Table 8). In the majority of cases, a regenerative, locally-based procurement scenario will strengthen the ability of schools to adhere to the standards (in particular, by enhancing seasonality in menus or by increasing the opportunity for schools to score points for sourcing local food).

Standard	Comments on standards	Standard is strengthened (S), weakened (W) or unaffected (-) by a local regenerative procurement scenario, or effect is unknown (?)
1.0 Caterers in schools and academies can demonstrate their compliance with national standards or guidelines on food and nutrition.	Ensuring minimum national nutritional standards are met	-
1.1 At least 75% of dishes on the menu are freshly prepared (on site or at a local hub kitchen) from unprocessed ingredients.	Internal (within catering facility) standard, to give better control over the content of school meals	-
1.2 All meat is from farms which satisfy UK animal welfare standards.	Meat must be accredited to at least one of a list of standards that ensure animal welfare and traceability is accounted for	? Requires investigation of the accreditations held by regen farmers in Leicestershire
1.3 No fish are served from the Marine Conservation Society 'fish to avoid' list.	Ensuring fish is not from overfished stocks	-
1.4 Eggs are from free range hens.	Supporting hen welfare; 'free range' hens are not confined to cages and have outdoor access	S
1.5 No undesirable additives or artificial trans fats are used.	Limiting the serving of additives that have been linked to negative affects on child health	-
1.6 No genetically modified ingredients are used.	Soil Association does not support genetic modification due to potential environmental and human health risks	-
1.7 Free drinking water is prominently available.		-
1.8 Menus are seasonal and in-season produce is highlighted.	Seasonal fruit and veg are used in menus. Reduce reliance on imported foods	S
1.9 Information is on display about food provenance.	Enhancing connection between customers and food they consume	-
1.10 Menus provide for all dietary and cultural needs.	Menus are inclusive and reflective of all needs	-
1.11 All suppliers have been verified to ensure they apply appropriate food safety standards.	Supplier is supplying food that is verified as safe and compliant with UK legislation	? Will depend on the supply chain infrastructure and

		contract requirements in a regenerative procurement scenario
1.12 Catering staff are supported with skills training in fresh food preparation and Food for Life Served Here.	Internal standard to ensure training of catering staff is adequate; awareness is raised in kitchens of FFLSH standards	-
2.1 Sourcing environmentally friendly and ethical food: Food is Organic, Free Range, MSC 'fish to eat', RSPCA Assured, Fairtrade, LEAF-marque	Points awarded for food that is accredited with standards that promote animal welfare and environmentally friendly farming	**?** What efforts can be made to recognise food that is regeneratively produced but not recognised through accreditations? Can a 'regen' standard be developed (for Leicestershire farmers)?
2.1.9 Rewarding the use of more sustainable palm oil or avoiding palm oil	Concerning cooking oils, spreads, confectionary, baked goods; points awarded if palm oil free or from sustainable sources	-
3.1 Making healthy eating easy	Internal; concerning availability of healthy products on menus, rasing awareness of healthy eating for students and parents, reducing food waste	-
3.2 Support to eat well	Supporting pupils through engagement events, tasting, enhancing dining experience	-
3.3 Cooking and serving practices	Altering seasoning methods and baking ingredients; reducing plate waste	-
3.4 Healthier menus: Fruit and vegetables, starchy foods, milk and dairy, meat fish eggs and beans	Encouraging intake of five a day, serving higher quality bread, more nutritional dairy, meat and egg options available	-
3.5 Display and marketing	Increasing knowledge of serving staff around healthy eating; better signage; menu design	-
4.1 Championing local food producers	Points are given for spend on ingredients from your local area or adjacent county and raw ingredients from the UK.	**S**
4.2 Ingredients from your local area or adjacent county	Score points for every % spend on locally grown ingredients; points scored for multi ingredient products with 50% or more local ingredients	**S**
4.3 Raw ingredients from the UK	points for each % of spend, over the national average of 59% on raw	**S**

For the majority of FFLSH Standards, the implementation of a regenerative procurement regime is unlikely to affect a caterer's ability to meet the standard. Where a '?' is noted, there remains uncertainty over what capacity a regenerative supply chain has to meet the standard. For example, while it is likely that livestock farmers who qualify as 'regenerative' adhere to one or more animal welfare accreditations, at the time of writing the level of quality assurance of meat produced by March House Farm is unknown, beyond Red Tractor Assured.

Standards are attractive to farmers

All farmers remarked that procurement standards need to be accompanied with contracts that are attractive enough to incentivise a switch of buyers. When asked what the components of an attractive contract were, farmers responded that price and duration (longer contracts offering greater stability) were important considerations. Support in baseline monitoring, either reflected through a higher price, or through complementary consultancy and survey support, should also be demonstrated. One farmer noted that regenerative agriculture is by nature more costly than intensive farming and that the any council-offered contract would need to reflect this.

> *"If farmers feel like there's too much paperwork, they will find a way to sell that doesn't involve the paperwork"* Leicestershire farmer during workshop

> **Carbon credits and BNG 'sweeteners':** There was discussion over the potential for some reward to be earned for farmers through the acquisition of carbon credits and/or developing habitats for Biodiversity Net Gain (BNG). Carbon credits can carry a higher value on land farmed regeneratively and where there is a good social 'story' involved. For example, one might sell a credit as a package with associated biodiversity and social value. Further investigation is required to understand (a) what role the council would play in developing natural capital assets for farmers and (b) whether any natural capital gains accrued through carbon credits and BNG could be purchased by the council for its own offsets.

5 Recommendations and Next Steps

5.1 Recommendations

Costing assessment

This study has been limited in its scope to analysing carbon and biodiversity effects of regenerative procurement. While some discussion of cost took place during the farmer workshop, a full analysis of the costs of regenerative agriculture vs Business As Usual supply chains must be conducted to understand:

- Differences in price between regenerative and BAU procurement scenarios;
- Trade-offs between price and quality;
- Exact costs charged by 'middleman' suppliers.

Trialling a DPS

A Dynamic Purchasing System has been touted as a potential mechanism for facilitating the supply of local products by individual producers. However, it is doubtful whether a DPS will fulfil the priorities outlined by farmers during the workshop – that contracts offered are stable, long term and adjusted for inflation.

A DPS was not discussed in the workshop and some further stakeholder engagement is recommended to determine what farmers' attitudes are towards a more competitive system encompassed within a DPS.

To better compare different procurement frameworks, a full cost/benefit analysis of differing systems should be conducted.

Engagement with suppliers

In order to progress any follow-on work procurement organisations should engage with their current suppliers to evidence their own carbon and biodiversity baseline of products. Consideration should also be given to including provision of this data when new procurement exercises are undertaken. The information provided in this report demonstrates that there are positive impacts from procuring from producers using more sustainable methods, whether from new suppliers or existing.

Biodiversity scoring

Conducting in-person ecology surveys of each farm modelled under the regenerative procurement scenario was not within the scope of this study; due to resource constraints Sandy's biodiversity scoring system was chosen as a cost-effective and indicative way of understanding farms' current biodiversity impact. It must be highlighted that biodiversity is complex and any metric that doesn't use data relating to species' populations, distributions and habitats will be imperfect. Thus any results provided through this study relating to biodiversity on the three modelled regenerative farms should be treated as indicative.

Farmers want to know that any actions to enhance (and potentially measure) biodiversity are suitably rewarded through attractive contract offers. Stakeholders want to ensure that biodiversity measuring on farms is robust, with indicative numbers (like those provided by Sandy's biodiversity onboarding system) backed up by ground truthing.

For this reason, methods for scoring the biodiversity impact of farming must be well elaborated in the development of any new procurement framework. Any requirements that come as part of contract between regenerative farmers and a procurer should be clear in what they are asking farmers to do, how it will be measured, who will do the measuring, and who will pay for the measuring.

The following statement from the World Bank provides a useful insight into biodiversity monitoring:

It is impossible to monitor all aspects of biodiversity at a site. In the interests of efficient use of human and financial resources, a monitoring plan should focus on key biodiversity *elements that the project aims to conserve and the sources of threats to these elements. Key elements and indicator species [should] be defined by the objectives and focus of the project.*[20]

Carbon calculators

TCL have used one farm carbon calculator, Trinity Agtech's Sandy, for the purpose of this report. If carbon calculator tools are to play a role in the monitoring and benchmarking of contracted farmers, and be used to elaborate reductions targets, we recommend that a full review be conducted of available calculator tools to understand which tool fits the criteria appropriate for the task. A good calculator tool should

- Be easy for farmers to use;
- Provide clear results, backed up by a transparent methodology;
- Be accessible to LCC, for example, in helping to unify carbon and biodiversity data of contracted farmers.

TCL were provided with assistance in data input from one of Trinity Agtech's data technicians, who was able to assist with some of the more niche aspects of this project (scaling down livestock enterprise emissions to a field-by-field level, for example). However, the lack of methodological transparency of the tool is a real limitation; in addition, it is unclear how Sandy's userbase compares to other tools like the *Cool Farm Tool*.

Collaboration with FFLSH over the design and implementation of a new procurement standard or 'stamp' for ingredients

Some farmers are 'on the right track' and transitioning to a regenerative system without adhering to the strict regulations set by well recognised accreditations. Farming that is certified as 'Organic' will by default adhere to regenerative principles, but some farmers might be engaging in only a few regenerative practices. To what extent should food produced by these farmers be supported through a new procurement framework? If farmers outside of the big accreditations are to participate, how can quality, progression and good farming behaviour be robustly accounted for and assured?

We recommend that any new approach includes voices from the procurement body, accreditation body (FFLSH in the example use case) and the farming community, including farmers who fall into the categories of 'certified organic/leaf-marque/similar' and 'not certified but regenerative'.

In the example use case, any new regenerative standard should complement FFLSH requirements. Discussions so far with the FFLSH team have been positive and staff have iterated Soil Association's support for the project. Short of endorsing a future local 'stamp' that is recognised by FFLSH when awarding points, there is enthusiasm that the next steps of the process occur collaboratively to ensure any new procurement framework is well recognised for its ethical and sustainable progression.

[20] World Bank, 1998. https://web.worldbank.org/archive/website00528/WEB/PDF/M_EGUIDE.PDF

5.2 Visualising next steps

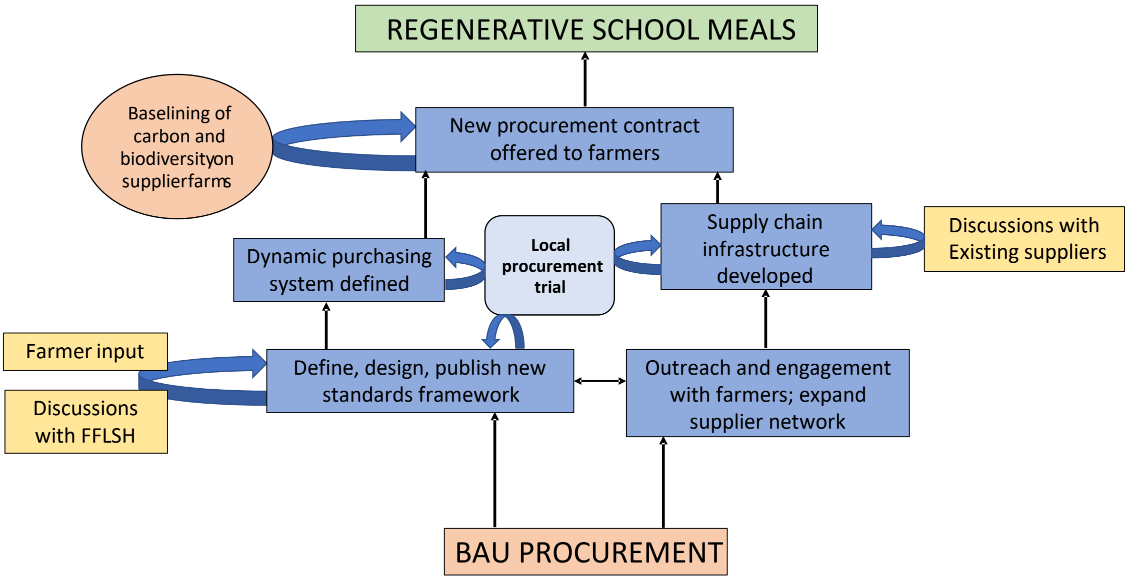


Figure 12. Visualisation of milestones suggested as part of a journey to regenerative procurement. Black arrows represent chronology of steps. External input may be required from farmers and FFLSH staff as well as logistical expertise. A Local procurement trial will help in the conception of a new DPS, replacement supply chain infrastructure and the design of standards. In this model farmers have carbon and biodiversity baselines conducted as a requirement of contract.

A visualisation of the potential steps involved in realising a regenerative procurement scenario is presented above. Input is expected to come from external sources like the FFLSH team, local farmers and existing/new logistical partners. It should be noted that the milestones listed below are not comprehensive and it may be that progress is made on some of the 'later' steps (e.g. design of a DPS) before earlier steps are complete.

An important next step will be to undertake a full cost/benefit analysis of BAU and regenerative procurement scenarios. This analysis should investigate:

- A cost breakdown of the required supply chain infrastructure necessary to accommodate a new procurement system and understanding what the 'middleman' alternatives are;
- A full breakdown of the prices that a regenerative procurement system's products would have and a comparison to their Business As Usual equivalents;
- The costs that any new standards framework would incur for contracted farmers, for example through changes in inputs/yields/equipment.