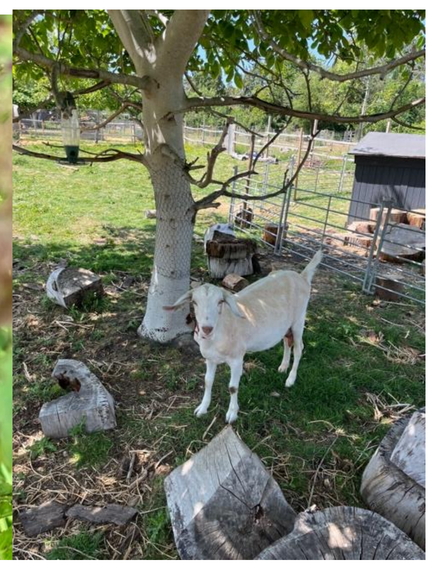
From Farm to Institution

Assessing the Economic, Environmental, and Social Impact of Local Procurement in Oxford



Authors: Clara Cecil, Ali Elhassan

Affiliation: SDG Impact Lab, Oxford University Department of Geography

Partner Organization: Good Food Oxfordshire | OxFarmToFork Initiative

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Executive Summary

Key Findings Snapshot

- **Producer Economic Impact**: OxFarmToFork provides critical market access for local farms, representing 50-60% of sales for emerging operations like Traditional Garden Growers, with farmers receiving premium pricing above standard wholesale rates while facing significant challenges from demand volatility, seasonal mismatches, and institutional procurement barriers.
- **Biodiversity and Environmental Stewardship**: All four farms studied demonstrate sophisticated ecological approaches, investing in natural pest management systems that require 5-year development timelines and focusing on soil health through compost and wool pellet solutions, while facing infrastructure constraints around water security and cold storage that limit production capacity and quality maintenance.
- **Social and Community Impact**: The initiative supports local employment with operations like Oxford City Farm maintaining Oxford Living Wage standards, though many farmers earn sub-minimum wages, highlighting the need for enhanced economic models that balance fair compensation with farm viability. Despite demonstrated student appetite to learn about local food procurement, collaborative educational initiatives with colleges have been limited, representing an opportunity to expand community engagement programming.

Bottom Line Impact

Economic Outcomes: 50% revenue dependency for high-participating farms, with £3,500+ infrastructure investments enabling expansion that would otherwise require debt financing.

Environmental Benefits: 100% of farms implement natural pest management through habitat creation, with systematic biodiversity features including beetle banks, parasitic wasp habitats, and pollinator-focused planting strategies across all operations.

Employment and Skills Development: 9 part-time positions at Oxford City Farm plus significant volunteer engagement, with collaborative decision-making models reducing isolation and administrative burden for farm operators.

Infrastructure Investment Impact: Critical support provided for polytunnels, caterpillar tunnels, irrigation equipment, and insect mesh, enabling production capacity increases and season extension capabilities.

OxFarmToFork Success Factors

1. **Producer-buyer relationships** build on trust and communication.
2. **Flexible logistics** prioritizing quality over pure efficiency.
3. **Premium pricing** that recognizes true cost of sustainable production.
4. **Integrated approach** combining economic, environmental, and social benefits.

Primary Recommendations

Through strategic investments and championing local procurement policies at the county and national levels, OxFarmToFork can realize its potential as a “template to be replicated across the country.” Recommendations include:

1. **Address Logistics and Quality Control**: Implement systematic cold chain management, standardize packaging protocols, and resolve delivery timing issues to eliminate wilted produce problems that affect all farms and compromise institutional buyer satisfaction.
2. **Diversify Institutional Partnerships**: Expand beyond colleges to include restaurants, hospitals, and corporate partnerships that provide year-round demand stability, addressing the critical summer gap when college demand drops during peak production periods.
3. **Develop Farmer-Friendly Measurement Systems**: Create simple data collection frameworks that provide market intelligence farmers need (demand patterns, product performance) while building evidence for initiative impact without overwhelming small-scale operations.
4. **Pilot Contracted Growing and Multi-Year Support**: Trial pre-purchasing arrangements and performance-based contracting that provide farmers and chefs and procurement officers with planning predictability while acknowledging the 5-year timeline required for developing effective ecological farming systems.
5. **Advocate for Sustainable Procurement Policies**: Work with University of Oxford to designate “preferred supplier” status for OxFarmToFork, while pushing for increased Environmental, Social, and Governance transparency for all the University’s wholesale suppliers and institutional commitments to at least 5 percent local food procurement annually.

Research Methodology Overview

This assessment utilized a comprehensive mixed-methods approach examining four local farms participating in the OxFarmToFork initiative. **Primary research sites** included Oxford City Farm (educational/community farm), Sandy Lane Farm (diversified family operation), Traditional Garden Growers (emerging collaborative enterprise), and Worthy Earth (multi-site market garden operation).

Data collection methods encompassed detailed stakeholder interviews with farm operators focusing on economic impact, environmental practices, and operational challenges; biodiversity documentation through habitat feature mapping and conservation practice assessment; and infrastructure and business model analysis examining revenue dependencies, investment needs, and supply chain dynamics. Students and chefs from six University of Oxford were interviewed to incorporate consumer perspectives.

Assessment framework designed to capture multi-dimensional impacts across economic sustainability (revenue percentages, pricing premiums, infrastructure support), environmental stewardship (natural pest management, biodiversity features, water and soil management), and social outcomes (employment standards, community engagement, knowledge sharing networks).

The research methodology prioritized farmer perspectives and practical operational realities, ensuring recommendations reflect actual producer needs and constraints rather than theoretical frameworks. Interviews were conducted over three weeks in June 2025 with follow-up analysis of business models, supply chain relationships, and partnership dynamics affecting local food system sustainability in the Oxford region.

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1. Introduction & Context

1.1 The Evolution of Food Markets in the UK

1.1.1 Food Markets Across the UK: From National Scale to Local Impact

The United Kingdom's food system represents a £212 billion market employing 3.8 million people across Great Britain, demonstrating the scale and importance of food distribution networks nationwide (DEFRA, 2025). The UK grocery retail market is dominated by supermarket chains, with Tesco and Sainsbury's holding 43.4% of market share together as of November 2024, while traditional food markets represent less than 4% of the overall food retail landscape (Kantar Worldpanel, 2024; DEFRA, 2025). This concentration represents a dramatic shift from the historical model where local markets served as primary food distribution centres.

Within this broader context, Oxford exemplifies both the historical significance and modern challenges facing traditional food markets. Home to the Covered Market, one of the oldest continuously operating markets in the UK, Oxford has an embedded tradition of connecting farmers and community (Oxford History, 2024). After opening in 1774, the Covered Market became a place where the local community, including Oxford colleges, could source meat, poultry, fish, and vegetables (Oxford History, 2024).

1.1.2 The Common Agricultural Policy and Agricultural Transformation

In the late 1800s, as agricultural productivity surged in other parts of the world and importing goods became cheaper, there was a decline in the profitability of local farming in Oxford. The UK's entry into the European Economic Community after World War II fundamentally reshaped British agriculture through the Common Agricultural Policy (CAP). Launched in 1962, the CAP was designed to provide income support for farmers, increase agricultural productivity, ensure fair living standards for farmers, stabilize markets, and promote food supply security through guaranteed prices and import protection. For most of its existence, the CAP provided income support by supporting the prices farmers received for produce, though this system was widely criticized for encouraging overproduction, leading to notorious "wine lakes and butter mountains" (Institute for Government, 2017). CAP payments represented 55% of farm incomes in the UK by 2014, demonstrating how deeply integrated European agricultural policy had become with British farming economics (Institute for Government, 2017).

1.1.3 The Globalization of Food Systems: Distance and Scale

The globalised food system has dramatically increased the distance between Oxford residents and the food they consume. In developed industrial countries, processed foods now travel an average of 1,300 miles, while fresh produce travels 1,500 miles before reaching customers (Harris, 2022). This increased distance is caused by the globalization of food trade, which has increased by four times since 1961 (Harris, 2022). Most food transport – nearly 60% – now occurs by sea, with only 0.16% traveling by air, though air transport produces around 50 times the emissions for the same quantity (Ritchie, 2020).

This transformation has fundamentally altered food distribution patterns, with chain grocery stores and wholesale distributors overtaking local markets as the primary source of food purchases for residents and institutional purchasers alike. Modern food supply chains have become very highly vertically coordinated, operating on just-in-time delivery principles to move products from source to consumer as quickly as possible, though this optimization has reduced the diversity of supplier bases and created vulnerabilities to systemic shocks (Garnett & Heron, 2020).

1.1.4 Contemporary Challenges and Opportunities

Today, agriculture in Oxford and the UK continues to evolve to adapt to changing environmental and economic conditions and an evolving policy environment in the aftermath of the UK's departure from the EU. Recent years have seen significant supply chain disruptions, with fertilizer costs for UK farms rising from £1.5 billion in 2021 to £2 billion in 2022 due to geopolitical tensions, before dropping to £1.4 billion in 2023 (DEFRA, 2024). Despite these challenges, sustainably minded farmers and organizations like Good Food Oxfordshire (GFO) are charting a new path for the future of the good system, focused on sustainability, soil resilience, food security, and nutrition, rooted in Oxford's rich farming history while leveraging new technologies and business models.

1.2 Good Food Oxfordshire Farm-to-Fork Initiative Background

Good Food Oxfordshire (GFO), established in 2014 as a grassroots food partnership, represents a network of over 200 organizations across Oxfordshire working toward their central mission: ensuring everyone in Oxfordshire has access to food to thrive every day. The OxFarmToFork initiative, launched as a critical component of GFO's broader strategy, aims to create viable and successful short food supply chains connecting local producers with institutional buyers like university colleges, schools, and hospitals.

1.2.1 Initiative Goals and Current Scope

The current goals of the OxFarmToFork initiative include:

- Creating direct partnerships between local farms and Oxford colleges
- Implementing agroecological assessment frameworks for producer vetting
- Operating as a "wholesaler with a conscience" that prioritizes fair wages and sustainable practices
- Currently working with 20+ farms and 18 Oxford colleges, with the goal to expand the number of farms supported and colleges served
- Ambition to expand into public procurement, including schools and hospitals

1.2.2 Key Challenges Identified

Based on initial stakeholder interviews, the initiative faces several operational challenges, including:

- Volume and consistency requirements from institutional buyers
- Seasonal production variations and demand fluctuations
- Competition from established wholesale providers (namely, FoodQuad/ Compass)
- Limited logistics infrastructure and nascent quality control systems
- Need for robust evidence to support impact claims for fundraising and marketing communications

1.2 SDG Alignment and Research Significance

This research directly addresses multiple United Nations Sustainable Development Goals, including:

- **SDG 2 (Zero Hunger):** Sustainable food production and local food system resilience
- **SDG 3 (Good Health):** Nutritional quality and food system health impacts
- **SDG 8 (Decent Work):** Fair wages and employment in local agriculture
- **SDG 12 (Responsible Consumption and Production):** Reducing waste and promoting local production
- **SDG 15 (Life on Land):** Biodiversity conservation and sustainable land use

This research has indirect impacts on the following Sustainable Development Goals:

- **SDG 5 (Gender Equity):** Empowering female farmers and gender wage equity
- **SDG 10 (Reduced Inequalities):** Supporting equitable access to affordable nutrition
- **SDG 11 (Sustainable Cities):** Cultivating a thriving food system in Oxford
- **SDG 13 (Climate Action):** Reducing carbon emissions through soil health improvements and localized, low-carbon transit
- **SDG 16 (Partnerships for the Goals):** Establishing partnerships among local producers, institutional purchasers, and other food actors across Oxfordshire

2. Literature Review

The relationship between organic and regenerative farming practices, biodiversity enhancement, and nutrition is a critical consideration for sustainable agriculture systems promoting the health of people and planet. As OxFarmToFork works to promote environmentally responsible farming systems, understanding the evidence base for biodiversity and nutrition benefits provides essential context for impact assessment and future expansion. Beyond these environmental impacts, the literature review covers business model innovation for local procurement.

2.1 Biodiversity in Agroecological Systems

2.1.1 Biodiversity in Oxfordshire

Oxfordshire represents a critical case study for understanding the intersection of agricultural practices and biodiversity conservation, with agricultural land comprising 74% of the county’s 260,500 hectares and supporting nationally significant biodiversity within England’s most intensively farmed region (Wild Oxfordshire, 2022). This agricultural dominance persists despite ongoing urbanization pressure around Oxford and major market towns, with approximately 25% of the county designated as Areas of Outstanding Natural Beauty, providing additional land use constraints (Oxfordshire County Council, n.d.). Contemporary land use shows 56% arable land (above the English average of 53%) and 30% permanent pasture (below the English average of 34%), with 31% of farmed area under rental agreements, indicating dynamic land tenure arrangements that may influence long-term environmental management decisions (Department for Levelling Up, 2022).

The county’s biodiversity profile demonstrates exceptional conservation value, supporting 20 priority habitats distributed across 111 Sites of Special Scientific Interest (SSSI) (Wild Oxfordshire, 2022). Priority habitats include 4,502.94 hectares of floodplain grazing marsh (the largest priority habitat by area), 1,220.28 hectares of lowland meadows, and 778 hectares of chalk and limestone grasslands concentrated in the Chilterns, North Wessex Downs, and Cotswold escarpments (Oxfordshire County Council, n.d.). However, recent State of Nature Oxfordshire reports document continued biodiversity decline, with habitat fragmentation and loss of connectivity across the county's landscapes representing ongoing conservation challenges (Wild Oxfordshire, 2022).

Agricultural land management in Oxfordshire faces significant environmental pressures, with agriculture contributing 50-60% of nitrates, 20-30% of phosphates, and 75% of sediment to England's waterways (Wild Oxfordshire, 2022). The county's rivers face "high risk" from nitrate pollution despite "low to moderate risk" from general diffuse pollution, indicating specific challenges from agricultural nutrient management (Wild Oxfordshire, 2022). Post-WWII agricultural intensification has caused dramatic declines in farmland habitats and species, particularly farmland birds, through increased pesticide and fertilizer use, hedgerow removal, and changes from spring to autumn sowing practices (Wild Oxfordshire, 2022).

2.1.2 Evidence for Biodiversity Enhancement

Multiple meta-analyses demonstrate that organic farming systems generally support higher species richness compared to conventional agriculture across three levels: the ecosystem, the species they contain, and genetic diversity within species. Bengtsson et al. (2005) found particularly strong evidence for enhanced diversity of plants, birds, and predatory insects in organic systems. This finding is supported by a 21-year comparative study in central Europe, which documented enhanced soil fertility and higher biodiversity in organic plots, despite 20 percent lower crop yields (Mäder et al, 2002). The study notably found that organic systems achieved these biodiversity gains while reducing fertilizer and energy inputs by 34 – 53 percent and pesticide use by 97 percent (Mäder et al, 2002).

The mechanisms driving these biodiversity benefits appear linked to organic farming's regulatory framework and practices. EU regulation 834/2007 – in force in the UK until further notice – explicitly requires organic systems to "sustain and enhance the health of soil, water, plants, and animals" and "contribute to a high level of biological diversity" (EUR-Lex, 2007; Bavec & Bavec, 2015). The regulation includes specific principles for organic farming, including maintaining soil life and fertility, supporting animal and plant health, and enhancing ecosystem biodiversity (EUR-Lex, 2007). This regulatory foundation, implemented through certifiers like the Soil Association, translates into farming practices that preserve and enrich biodiversity at field, farm, and ecosystem levels through the elimination of synthetic pesticides and fertilizers, enhanced crop rotations, and maintenance of semi-natural habitats (Soil Allocation, 2025).

Furthermore, the UK's Biodiversity Net Gain Policy requires land managers, developers, and local planning authorities to ensure that development results in more or better-quality natural habitat than there was before development (DEFRA, 2025). Measurement includes size, quality, location, and type of biodiversity units, as well as an assigned biodiversity value as determined by ecologists. The Biodiversity Net Gain policy enables the trading of biodiversity credits, which introduces a potential additional revenue stream for farmers supporting biodiversity (Milners, 2024).

2.1.3 Best Practices for Biodiversity Monitoring

Effective biodiversity assessment in agricultural systems requires strategic targeting of key indicators and standardized methodologies. Research identifies field margins as the most critical monitoring locations, as arable farmland diversity typically peaks in the first meter of the crop edge – the initial portion of a cultivated field where the crop meets the edge of the field – making these areas valuable habitats for many species including plants, pollinators, birds, small mammals, reptiles, and invertebrates (Marshall & Moonen, 2002; Hawes, 2022). Field margins encompass the crop edge, any margin strip present, and associated semi-natural boundary habitats (see Figure 1), providing a comprehensive representation of farm-scale biodiversity (Marshall & Moonen, 2002; Hawes, 2022).

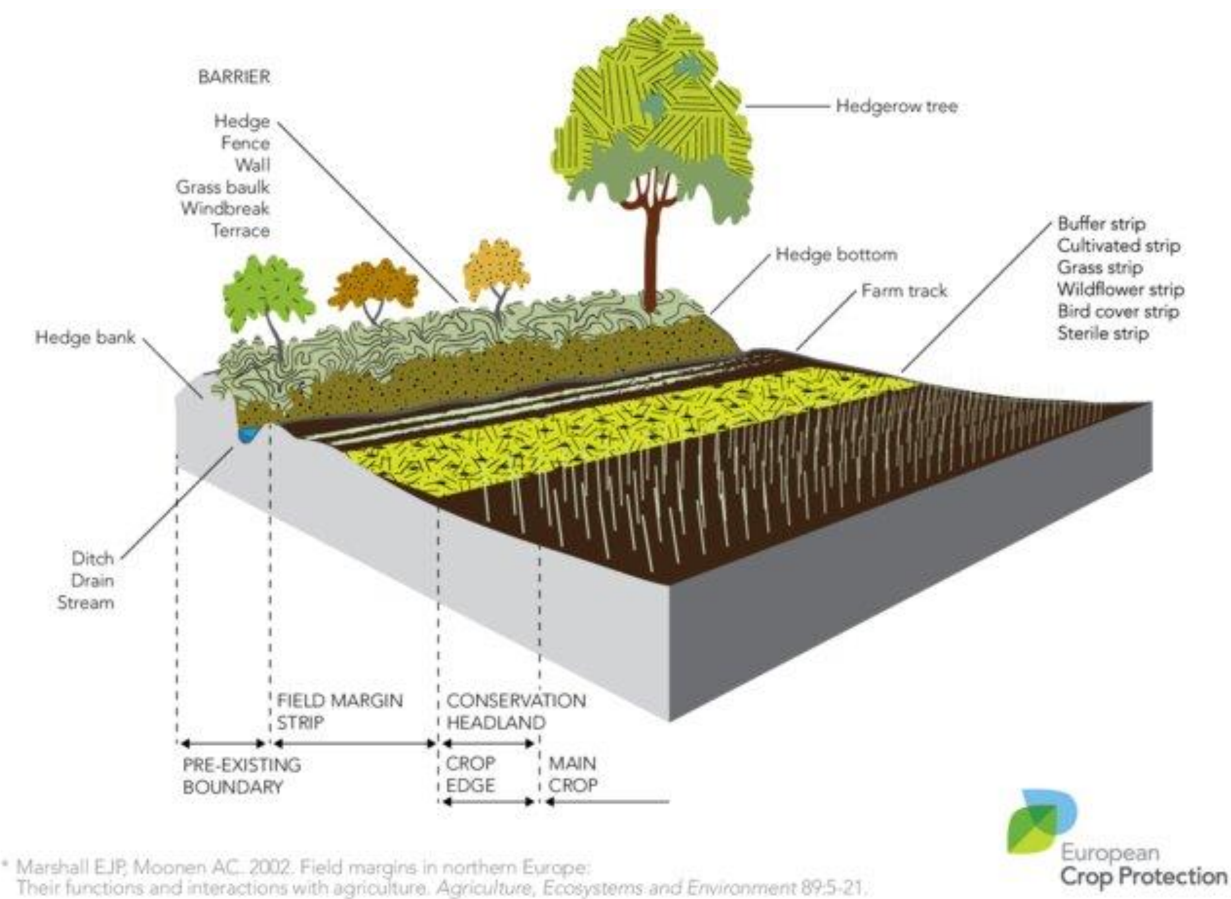


Figure 1: The Principal Components of an Arable Field Margin
Source: Laurence & Hackett, 2014

Temporal sampling design proves equally important, and studies recommend conducting three annual surveys to capture seasonal variation in both plant resource availability and pollinator activity (Hawes, 2022). This frequency accounts for phenological differences among species and ensures representative data collection across growing seasons. For invertebrate studies, standardized weather conditions are essential – surveys should occur when wind speeds are below 5.5 m/s, during non-rainy conditions, and when temperatures exceed 17°C under overcast skies or 13°C when skies are 60% clear (Marshall & Moonen, 2002).

The Centre for Sustainable Cropping recommends focusing on key indicator groups including field margin vegetation, insect pollinators, ground-surface predators, and soil invertebrates, as these provide comprehensive insights into ecosystem health while remaining feasible for routine monitoring (Hawes, 2022). Modern mobile applications like E-Surveyor, iRecord, and iNaturalist, which incorporate AI identification capabilities, make biodiversity monitoring accessible to farmers, landowners, and community members while promoting data quality through expert verification systems (Kelling, et al., 2019).

2.1.4 Landscape-Scale Considerations

Recent research reveals that biodiversity benefits extend beyond individual fields to landscape-scale interactions. An experiment-driven agroecological farming study demonstrated how crop diversification and ecological infrastructure create spatial and temporal gradients in floral resources that support complex pollinator-plant interactions (Monticelli et al, 2022). The study found that agroecological management enhanced both pollinator services and biocontrol through parasitoid activity, with effects varying by species flowering phenology and landscape context (Monticelli et al, 2022).

However, the evidence suggests that landscape context significantly influences outcomes. Bengtsson et al (2005) propose that organic farming effects on species richness are likely larger in intensively managed agricultural landscapes compared to small-scale diverse landscapes with existing non-crop biotopes because conventional agriculture has a lower baseline of species richness and biodiversity and thus has greater room for improvement. In landscapes with a high proportion of non-crop areas such as hedgerows and woodlands, the positive effects of organic farming on species richness may be less noticeable because the existing habitats already support a high level of biodiversity (Bengtsson, 2005).

2.1.5 Functional Biodiversity and Ecosystem Services

Beyond species counts, organic systems appear to enhance functional biodiversity that provides crucial ecosystem services. Meta-analyses indicate that organic farming enhances local densities of insect predators and soil fauna, contributing to natural pest control without necessarily increasing pest abundance, through natural pest management

(Bengtsson et al 2005). This suggests that organic systems maintain effective pest management through enhanced biodiversity rather than external inputs.

2.1.6 The Soil Health-Biodiversity-Nutrition Nexus

The enhanced soil fertility documented in organic systems represents more than an agricultural output measure – it reflects a fundamental interconnection between soil biodiversity, ecosystem health, and nutritional outcomes. Soil invertebrates, including earthworms, nematodes, and springtails, serve as key indicators of agroecosystem health while directly contributing to nutrient cycling, pest suppression, and litter decomposition (Hawes, 2022). These soil communities, which are generally more diverse and abundance in organic systems, create the foundation for enhanced crop nutrition and ecosystem resilience.

This soil-nutrition relationship extends beyond the farm gate through what Hunter et al. (2020) describes as the "biodiversity for food and nutrition" framework. Diverse agroecosystems support a broader range of crop varieties and associated wild species that contribute to dietary diversity and nutritional security. The preservation of local food biodiversity through organic and agroecological practices directly addresses malnutrition by maintaining access to nutrient-dense foods that conventional intensive systems often eliminate (Hunter et al, 2020). Research across varied contexts, including Brazil, Kenya, Turkey, and Sri Lanka, demonstrates how strategic promotion of biodiversity through media campaigns, school education programs, and national policy brings together conservation, nutrition, and livelihood concerns (Hunter et al. 2020).

Furthermore, the enhanced soil organic matter content characteristics of organic systems supports both below-ground biodiversity – such as bacteria, fungi, and invertebrates like earthworms – and improved nutrient availability for crops (Tscharntke et al, 2021). Soil organic matter acts as a reservoir for essential nutrients like nitrogen, phosphorus, and potassium, while diverse soil microbial communities facilitate nutrient cycling and enhance the bioavailability of micronutrients such as zinc, iron, and selenium that are critical for human nutrition. This creates a positive feedback loop where diverse soil communities enhance crop nutritional quality through increased concentrations of antioxidants, vitamins, and minerals, reduced pesticide residues, and improved protein quality with better amino acid profiles. These nutritional improvements translate to measurable human health outcomes including reduced exposure to synthetic chemicals, higher intake of beneficial compounds like polyphenols and omega-3 fatty acids, and potentially lower risks of chronic diseases, while simultaneously maintaining the ecological processes of nutrient cycling, soil structure formation, and pest regulation that sustain long-term agricultural productivity (Tscharntke et al, 2021).

2.2 Local Food Systems and Nutritional Outcomes

2.2.1 Organic, Regenerative & Conventional Agriculture and Nutrition

Agricultural practices vary significantly in their impact on soil health, biodiversity, and nutritional outcomes. Conventional agriculture typically prioritizes yield and efficiency using synthetic fertilizers, pesticides, and mechanized tillage. While effective at large-scale production, it often leads to soil degradation and lower biodiversity. In contrast, organic agriculture avoids synthetic inputs and emphasizes ecological balance, using composting, crop rotation, and natural pest control. It adheres to strict certification standards focused on soil and environmental health. Regenerative agriculture builds on and often exceeds organic practices by actively restoring ecosystems. It uses approaches like cover cropping, no-till farming, managed grazing, and agroforestry to rebuild soil organic matter, enhance biodiversity, and improve nutrient cycling. While not always certified, regenerative farms are defined by their outcomes — particularly improvements in soil function, water retention, and long-term productivity. These differences in method influence not only environmental sustainability but also the nutritional quality of the food produced.

The nutritional profile of food is influenced by how and where it is grown. Comparisons of organically or regeneratively grown produce versus conventionally grown counterparts often find minimal differences in macronutrients, but notable variations in certain micronutrients and phytochemicals (Montgomery and Biklé, 2021). For example, organically grown fruits and vegetables tend to contain higher levels of health-promoting phytochemicals (antioxidants, polyphenols) and lower pesticide residues compared to conventional produce. These phytochemicals contribute to food quality and have anti-inflammatory and antioxidant effects relevant to human health. The concept of "nutrient density" encompasses not just vitamins and minerals per calorie, but also these bioactive compounds that support long-term health. Local small-scale farmers often prioritize crop varieties chosen for flavour and nutrition (rather than long-distance ship-ability), and harvest at peak ripeness, which can further enhance nutrient content. Extension nutrition studies note that produce picked fully ripe and consumed soon after harvest can have higher concentrations of key nutrients like vitamin C, vitamin A, potassium, and magnesium. In short, while not all local foods are inherently more nutritious, there is evidence that produce grown with soil-friendly practices and consumed fresh (as is typical in local food systems) can offer greater nutrient density in terms of certain vitamins and phytochemicals than the same items grown conventionally and shipped long distances (Montgomery et al., 2022).

2.2.2 Soil Health and Nutrient Density

Recently, academic research has increasingly linked soil health and farming practices to the nutritional quality of crops. Healthy soils teeming with microbial life facilitate better uptake of minerals and foster the production of phytochemicals in plants. A recent study by Montgomery et al. (2022) provides empirical evidence: crops grown under regenerative farming practices (no-till, cover cropping, diverse rotations) had higher soil organic matter and produced measurably higher levels of certain vitamins, mineral micronutrients, and phytochemicals compared to the same crops grown on nearby conventional farms. For instance, regenerative no-till vegetable farms in California and Connecticut (USA) yielded vegetables with greater phytochemical content than grocery store produce, and regenerative wheat contained higher mineral density than conventional wheat in side-by-side trials (Montgomery et al., 2022). Likewise, livestock raised on regenerative pasture had more favourable fatty acid profiles (higher omega-3s, better omega-6:3 ratio) than animals from conventional feedlot systems (Montgomery et al., 2022). These differences are attributed to richer soil ecology and plant stress responses: farming methods that avoid heavy tillage and synthetic chemicals tend to increase soil organic matter and microbial diversity, which in turn improves plants' access to nutrients and triggers the synthesis of defensive phytochemicals. Conversely, intensive use of synthetic nitrogen fertilizer and continuous tillage can degrade soil biota and has been shown to reduce the uptake of some minerals and the production of phenolic compounds in crops. Overall, improving soil health through agroecological practices appears to create a positive feedback loop: healthier soils produce more nutrient-rich plants, which benefits consumer nutrition while also reinforcing sustainable crop productivity. This evidence underpins the Farm-to-Fork Initiative's emphasis on agroecological farming as a strategy not only for environmental gains but also for enhancing the nutrient quality of the food.

2.2.3 Nutritional Degradation in Fresh versus Transported Produce

Another factor affecting nutritional outcomes is the time and distance food travels from farm to plate. A study by Barks et al (2024) confirms that fresh produce undergoes nutrient loss during prolonged storage and transportation. For example, water-soluble vitamins (like vitamin C and B vitamins) and certain antioxidants begin degrading soon after harvest, especially if produce is stored at ambient temperatures for days. It is estimated that fresh produce in a conventional supply chain travels over 1,500 miles on average before consumption, during which time both freshness and nutrient levels decline.

This issue is particularly relevant in the UK, which remains heavily reliant on imported fresh produce. In fact, recent UK government figures indicate that nearly half of the UK's food is imported from overseas, with greater importation rates of some food groups such as fruit and vegetables. Much of this produce comes from distant countries such as Spain, the Netherlands, and South Africa (UKHSA, 2022). These long supply chains not only contribute to higher carbon emissions but also reduce the nutritional quality of food due to time delays and extended storage. In contrast, local sourcing – as practiced by the OxFarmToFork initiative – can shorten the time between harvest and consumption to just 24–48 hours, preserving a higher proportion of fragile micronutrients and offering a more flavourful, nutrient-dense product.

The greater the distance and the longer it takes to reach the consumer, "the more freshness declines and the more nutrients are lost," according to the National Centre for Appropriate Technology (Barks et al, 2024). This is partly why fruits and vegetables grown for long-haul distribution are often harvested early (before peak ripeness) and bred for shelf life, which can sacrifice some nutritional quality for robustness in transport. Research on post-harvest handling shows that produce stored in suboptimal conditions loses moisture and vitamins: for instance, lettuce held at retail temperature (25°C) with low humidity suffered significant weight loss and degradation of phytonutrients by the time it reached the store shelf. By contrast, locally sourced produce is usually harvested within a day or two of sale and often allowed to ripen naturally, preserving higher nutrient content and better flavour. Shorter supply chains mean fewer handling steps and less need for chemical preservatives or long cold storage. In summary, local food systems can mitigate nutritional degradation by delivering food more quickly after harvest. This helps retain perishable nutrients and explains why "fresh, local" produce can be more nutrient-dense: it spends less time in transit or storage where vitamins and antioxidants might otherwise deteriorate.

2.2.4 Linking Food Quality and Student Performance

The nutritional quality of food is not only a health matter but also has cognitive and educational implications, especially for students. A well-established body of research links improved diet quality with better brain function and academic performance in children and young adults (Nyaradi et al, 2013). The brain is a highly energy- and nutrient-demanding organ, consuming about 20% of our daily calories. It requires adequate protein, essential fatty acids, and a range of micronutrients to develop and function optimally. An article published by the World Food Program USA in 2023 explains how deficiencies in key nutrients (such as iron, iodine, zinc, folate, vitamin B12, and omega-3 fatty acids) can impair neurotransmitter synthesis, slow neurocognitive development, and reduce concentration (WFP USA, 2023). For example, iron deficiency in children is known to cause attention and memory problems, and even mild dehydration can affect cognitive performance. In the context of local food and farm-to-institution programs (like farm-to-school), the premise is that fresher, higher-quality foods will translate into better nutrition for students and thereby support their learning. There is evidence to support this: school meal programs that emphasize fresh fruits, vegetables, and whole foods (often sourced locally) have been associated with improved student focus, fewer disciplinary issues, and higher test scores (Joshi et al., 2008).

Good nutrition positively influences brain development – for instance, omega-3 rich foods (fish, walnuts, flax) are linked to improved cognitive function and memory, while antioxidants in berries and leafy greens protect brain cells and may enhance mental acuity. On the other hand, a diet high in processed, nutrient-poor foods are linked to poorer academic achievement and even behavioural problems in the classroom. While farm-to-fork initiatives are relatively new, they draw on these findings by aiming to improve the overall diet quality of students (e.g. more vitamins, minerals, and phytonutrients from fresh produce), which in turn can contribute to better brain health. In summary, ensuring access to fresh, nutritious foods is a strategy to "fuel" students' brains for learning. As the WFP article notes, "a hungry or undernourished child cannot learn." Conversely, well-nourished children are more likely to reach their full cognitive potential and perform better academically (WFP USA, 2023).

2.2.5 Brix Measurement and the GRFFN Tool

To quantify nutritional outcomes in the field, the Oxfordshire Farm-to-Fork initiative employs the GRFFN (Growing Real Food For Nutrition) tool, which uses a handheld Brix refractometer (see Figure 2) to assess produce quality. This tool measures the soluble solids content of plant sap or juice—essentially the percentage of dissolved compounds, including sugars, vitamins, minerals, and organic acids. One degree °Brix corresponds to 1 gram of sucrose per 100 grams of solution. While often used in the wine and fruit industry as a proxy for sweetness and ripeness, Brix has also been adopted in sustainable agriculture circles as an indicator of nutrient density and produce vitality.

However, academic validation of Brix as a broad measure of nutritional quality yields mixed results. Brix readings are influenced primarily by sugars, meaning they are not particularly sensitive to variations in micronutrient content (Adams, 2023). For example, doubling the vitamin C content in an orange would barely shift the Brix value, whereas a small increase in sugar or a reduction in water content would raise it significantly. This highlights the limitations of the Brix method as a comprehensive nutrition assessment tool.

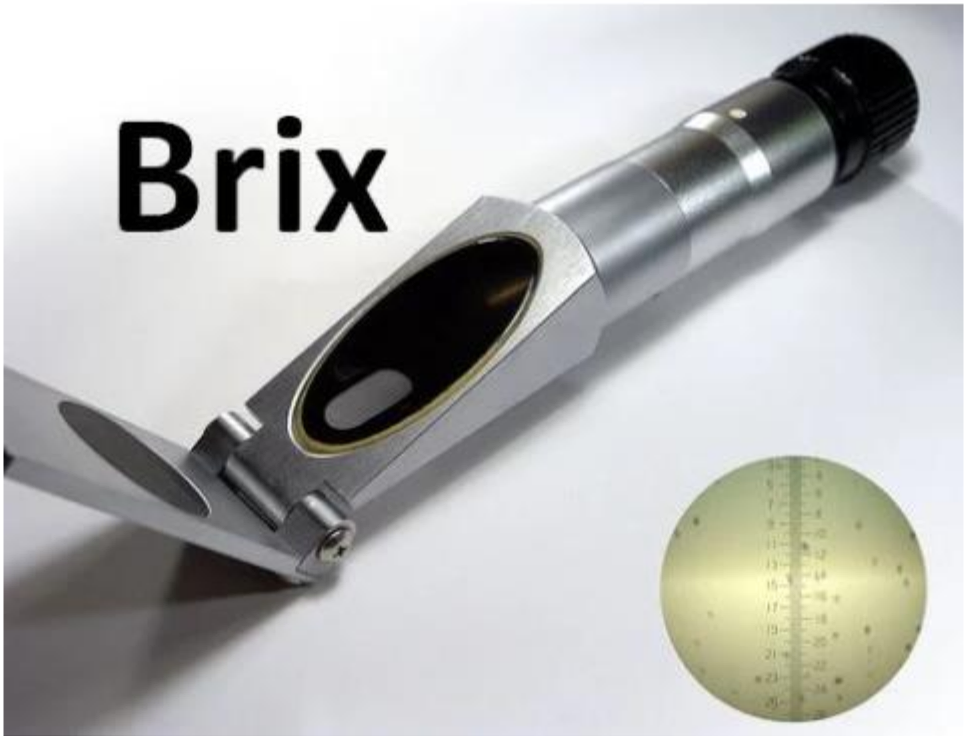


Figure 2: Brix Refractometer

Despite these limitations, Brix is still valuable as a screening tool for food quality because it is simple, low-cost, portable, and provides real-time feedback. It allows farmers and buyers to quickly assess relative differences in crop quality – particularly in sweetness, ripeness, or water content. When paired with standardized sampling protocols and interpreted carefully, Brix can serve as a starting point for identifying higher-quality produce that may warrant further analysis using laboratory-based nutrient testing.

Reliability and Constraints: The reliability of Brix as a nutritional proxy remains under debate. Existing research on its correlation with vitamin or mineral content is limited and inconclusive. For Brix readings to be credible indicators of nutrient density, further validation is necessary. This would require comparing Brix scores with lab-analysed nutrient profiles across a diverse array of crops, farm systems, and conditions—ideally using a standardized sampling framework.

Importantly, Brix measurements are sensitive to several environmental and handling variables. Temperature, post-harvest handling, moisture content, and time since harvest all influence soluble solids. A wilting vegetable that has lost water through transpiration may show a higher Brix value, even though its nutrient density per gram of fresh weight is unchanged – or potentially lower. For this reason, researchers have proposed recording juice yield or plant moisture content alongside Brix readings. Doing so would help adjust for freshness and enable more accurate comparisons between, for example, a freshly harvested farm lettuce and one that has spent several days on a supermarket shelf.

The Role of Citizen Science: The GRFFN framework could benefit significantly from a citizen science approach (Hawes, 2022). Because Brix refractometers are inexpensive, portable, and require no electricity or advanced training, they are ideal tools for widespread use by farmers, food cooperatives, students, and consumers. This presents a valuable opportunity: if users across different farms consistently record Brix values using agreed-upon protocols (e.g., crop type, time of day, juice yield), then a shared data ecosystem could emerge to help map and compare food quality across regions and practices. These efforts would also build public literacy in nutrient transparency, potentially increasing demand for healthier, more nutrient-dense food.

Implementing citizen science initiatives should follow a structured process, including:

1. Participants first receive simple training – either in-person or via instructional videos – on how to use the tool, including calibration, sample preparation, and best practices for measurement.
2. Establishing standardized sampling protocols, outlining key steps such as which part of the plant to test, the time of day to measure, how to extract and press juice, and how many readings to average.
3. Each participant would then record their results, along with relevant contextual details like crop variety, date, farm location, weather conditions, and visual observations, ideally using a shared digital platform or app.
4. Periodic lab validation or peer review of a sample subset could help ensure data quality and build confidence in the results.
5. Once data are submitted, they would be aggregated into a shared database for analysis, allowing researchers and farmers alike to explore trends across different crops, seasons, and farming systems.
6. Crucially, findings would be shared back with participants through reports, dashboards, or community workshops, fostering learning, transparency, and engagement around food quality and soil health.

This participatory approach not only democratizes data collection but also builds public awareness of nutrient density and empowers people to support more sustainable, nutritious food systems.

Initiatives like the Bionutrient Food Association (BFA) in the United States are already pioneering this space. Other organizations such as the Sustainable Food Trust, Soil Association, and Growing Real Food for Nutrition (GRFFN) in the UK are also advancing practices that link soil health to food quality, though with varying approaches. The Sustainable Food Trust emphasizes the need for farming systems that deliver nutrient-dense food within environmental limits, advocating for policies and metrics that value nutritional outcomes as much as yields. Similarly, the Soil Association, a leading certifier of organic farms in the UK, promotes agroecological practices known to enhance soil fertility and crop quality, although it does not currently use tools like Brix refractometers. More directly aligned with nutrient testing, GRFFN piloted a citizen science initiative in Wales and the West of England that involved 20 growers collecting over 350 Brix samples across various crops to explore food quality in relation to soil practices. Their findings support the idea that Brix could serve as a grassroots tool for building food transparency and influencing regenerative land use. While these UK-based initiatives differ in methods, they share a common goal: making nutrient density a measurable and valued outcome of sustainable farming.

In response to the limitations of refractometry, they have developed a spectrometer-based device that scans for a broader range of compounds (including specific antioxidants and minerals) in produce. Spectroscopy, though more accurate, is also significantly more expensive and technically demanding. In this context, the refractometer remains a valuable screening tool- a first step in identifying higher-quality food, particularly when paired with qualitative indicators like taste, texture, and shelf life.

2.3 Economic Impacts of Farm-to-Institution Programs

The academic literature reveals that innovative farm-to-institution sourcing models are evolving beyond traditional direct procurement toward sophisticated multi-stakeholder networks that emphasize values-based supply chains, cooperative governance structures, and food hubs as intermediary organizations. These models prioritize both economic viability and sustainability outcomes while addressing structural barriers that have historically limited small and mid-scale producer access to institutional markets.

2.3.1 Farm-to-Institution Sustainable Sourcing Models

Values-Based Supply Chains (VBSCs) as Core Framework

Academic research identifies values-based supply chains as a primary strategy for connecting small and mid-scale producers with institutional buyers while maintaining transparency about environmental, social, and economic values throughout the supply chain (UC Davis SAREP, 2017). Recent ecological modelling research demonstrates that without policy supports, institutional food authorities are unlikely to participate in local food procurement programs due to the high transaction costs associated with managing small vendors, potential elevated costs of integrating local items, and limited institutional food budgets (Love et al, 2025). This highlights the need for financial or regulatory incentives to reduce participation barriers in initiatives like OxFarmToFork.

Food Hubs as Innovative Intermediary Organizations

The literature extensively documents food hubs – of which OxFarmToFork is an example – as transformational organizational models. Small and mid-size farmer operations often lack the volume, consistent supply, logistical supports, (i.e. storage, processing, and distribution) and expertise needed to attract larger foodservice customers, and selling to these institutions can come with high transaction costs (USDA, 2012). Research defines food hubs as innovative organizational arrangements that bridge structural holes in agri-food markets between small producers and consumers, achieving scale through "aggregation" and "strategic networking" rather than traditional economies of scale (Berti & Mulligan, 2016). Academic studies distinguish food hubs from traditional cooperatives, noting that they represent a different hybrid organizational arrangement focused on strategic networks and profit-driven models rather than solidarity and mutual principles core to cooperatives (Manikas et al, 2019). The benefits of food hubs include supporting direct and regional job creation, increasing market access and reliability, offering producers the opportunity to capture higher value for their products, and increasing access to healthy food (USDA, 2012).

Food Hubs in the UK

The UK food hub infrastructure remains significantly underdeveloped relative to market potential, with approximately 2,500 active farmers markets operating across the UK and a growing but dispersed network of food hubs that vary greatly in scale and function (ProfileTree, 2025). While farmers markets generate an estimated £500 million annually with over 50,000 stallholders participating, this represents a minimal fraction of the £212 billion UK grocery market dominated by large retailers holding more than two-thirds of market share (DEFRA, 2025). Consumer interest significantly exceeds current infrastructure capacity, with 59% of consumers expressing interest in local foods but only 30% having purchased directly from growers, and merely 2% buying frequently (ProfileTree, 2025). Government involvement has been demonstrated through annual UK Farm to Fork Summits, including commitments of £2.4 billion to support British farming, yet the focus remains predominantly on large-scale agricultural productivity rather than local food hub development. Recent pauses to the Sustainable Farming Incentive, intended to support farmers with transitioning to sustainable practices, have resulted in confusion and frustration (The Wildlife Trusts, 2025).

Governance Innovations

Food hubs face several challenges, including balancing supply and demand, managing price sensitivity, and accessing capital for infrastructural investments (Papargyropoulou, 2024). Systematic reviews of food governance literature emphasize the need for multi-stakeholder approaches that reconcile various pre-existing goals and values, moving beyond traditional producer-consumer distinctions towards unified organization structures serving common good. Research on food hub governance models demonstrates that diverse governance structures can effectively respond to food system challenges and promote resilience while enabling sustainable resource use (Papargyropoulou, 2024). For example, there are substantial opportunities to innovate business models to make use of waste product (Remijnese, 2025). As demonstrated by the case study of a carrot processing company, unharvested crop parts, unsold food products, and vegetable peels can be used for soups, smoothies, sauces, and other goods with longer shelf lives, reducing waste, increasing revenues, and promoting long-term storage to address supply and demand matching challenges (Remijnese, 2025).

Institutional Procurement Strategies

Academic literature documents various farm-to-institution models including on-site farmers markets, farm-to-school programs focused on local agricultural connections, and farm-to-college programs that set purchasing guidelines while promoting dining service innovations (Harris et al, 2012). Case study research chronicles efforts to create values-based value chains for mid-scale farms supplying large school districts through sustainable procurement models, emphasizing partnership development among diverse stakeholders (Conner et al, 2012).

Successful procurement strategies demonstrate the transformative potential of systematic approaches when supported by appropriate policy frameworks and institutional commitment.

Case Study 1: The UK's Food for Life program, operated by the Soil Association, exemplifies effective certification-based procurement strategy, serving over 2 million meals daily to Food for Life standards across roughly 50% of English primary schools, over 50 NHS hospitals, and more than 50 universities (Gray et al, 2017). The program's success stems from combining accreditation schemes with dynamic food purchasing systems that support small enterprises entering public sector contracts, alongside a proposed government target for 50% of public food spend to be on locally produced or certified sustainable food (Gray et al, 2017). Key lessons learned include the necessity of rebalancing tender weightings to priority quality over cost, with recommendations for 60%

quality weighting relative to cost to halt the "race to the bottom" in public food procurement (Gray et al, 2017).

Case Study 2: Copenhagen's Public Kitchens represent perhaps the most ambitious and successful institutional procurement transformation globally, achieving 84% organic food procurement across 900 public kitchens by 2019, targeting 90% by 2025, while simultaneously reducing carbon footprint by 25% (Dragonetti, 2023). The Copenhagen model's success relied on widespread training programs for kitchen staff, cooking from scratch capabilities, and innovative procurement criteria linking food provision to educational activities for school children (Sørensen, 2016). Critical lessons learned include investing in human resources and know-how rather than permanent budget increases, focusing on deep changes in meal preparation and complete reorganization of existing food production and purchasing practices (Sørensen, 2016). Danish research demonstrates that participation in organic conversion projects resulted in a median increase of 24 percentage points in organic food procurement, doubling the number of kitchens eligible for high-level organic certification (Sørensen, 2016).

Both models emphasize the importance of market dialogue between procurement officers and suppliers to overcome sustainability barriers and build strong partnerships, supported by national networks of food procurement officers to facilitate knowledge sharing and implementation of innovative procurement strategies.

2.3.2 Innovative Models for Institutional Partnerships

The academic literature reveals farm-to-institution programs as a field in active transition, moving from traditional cooperative models toward more sophisticated multi-stakeholder networks that leverage technology, shared governance, and values-based approaches to create sustainable pathways connecting producers to institutional markets while addressing broader food system challenges. New models for institutional partnerships offer an opportunity to increase revenue predictability, reduce waste, and access new capital sources.

Community Supported Agriculture (CSA) Models for Institutions

Academic literature documents workplace CSAs as adaptations of traditional models where delivery occurs at institutional locations such as hospitals, schools, and universities, with employees encouraged to purchase shares that farmers deliver to the workplace, providing convenience for members while helping farmers increase sales without additional on-farm distribution space (NCAT, 2019). In contrast with a traditional veg box scheme, organization-initiated CSAs leverage organizational networks for member recruitment, with the potential for subsidization by the organization to offset the cost for community members (NCAT, 2019). Recent studies on CSA business model innovation show trends toward multi-farm, food-hub, and non-farm-based CSA delivery models that complement traditional single-farm approaches (Furness et al, 2023).

Recent academic research demonstrates that individuals participating in CSA programs show significant increases in fruit and vegetable consumption, with evidence supporting CSA participation's contribution to maintaining healthy BMI and potentially reducing obesity prevalence in communities, aligning with public health goals (Furness et al, 2023).

Pay-for-Results and Outcome-Based Contracting Models

Academic literature defines outcomes-based contracting as approaches where substantial portion of payment to service providers are contingent on meeting agreed-upon outcomes, with careful outcome definition required to align with policy objectives and minimize perverse incentives (Nixon et al, 2025). Social impact bonds are a type of outcomes-based contract where contractors receive payment only if specified goals are achieved. Outcomes could be environmental (e.g. reductions in energy or water use) or economic (e.g. output). The outcomes-based contract could be between a producer and an institutional purchaser or a government actor with a mandate to achieve a certain policy objective (e.g. improvement in health outcomes). Research on outcome-based contracting in education demonstrates that this approach compels mutual accountability between districts and providers for achieving outcomes; however, critical analysis identifies concerns around increased monitoring costs and potential entrenchment of systemically produced vulnerabilities (Nixon et al, 2025).

Contract Farming with Advance Payment Features

Academic literature on contract farming documents agreements where buyers and farmers agree in advance on terms for production and marketing, with institutional buyers sometimes providing advance funding in the form of credit and loans to farmers, and contracts serving as collateral for future loans (Miller & Jones, 2010). Preliminary research studies demonstrate significant potential for contract farming as a tool for risk mitigation. For example, Brazilian research on CSA and agroforestry demonstrates how institutional arrangements for marketing fresh food enable producers to use share prices that cover production costs and provide adequate renumeration, while farmers gain secure outlets without facing market demand uncertainties (Tay et al, 2024). Contract farming with advance payment features represents an emerging model combining several areas of prior academic study: advance payment structures from tradition CSA models that provide farmers with upfront capital and risk sharing; contract farming elements that specify quality, quantity, and delivery terms for institutional buyers; aggregation mechanisms from food hub research that allow scaling to meet institutional volume requirements; and values-based supply chain principles that maintain transparency and relationship-building between producers and institutional buyers.

The academic literature reveals significant potential for CSA institutional models, pay-for-results approaches, and institutional advance payment models in food procurement, but identifies substantial research gaps. The intersection of these approaches with institutional procurement models represents a significant opportunity for research and innovation.

2.4 Research Gaps Identified

Current literature on food systems suffers from several critical limitations that hinder comprehensive understanding and policy development:

- Most existing studies examine nutritional, economic, and environmental impacts in isolation, rather than through integrated frameworks that address the complex interactions among these dimensions.
- The field lacks standardized measurement tools for assessing local food system impacts, making it difficult to compare outcomes across different initiatives or geographical contexts.
- There is insufficient evidence-based research to guide institutional procurement policies and innovative business models, leaving decision-makers without robust frameworks for implementing effective local sourcing strategies.
- Perhaps most importantly, existing measurement approaches often fail to consider farmer perspectives and operational realities, creating assessment frameworks that may be academically rigorous but practically unusable for the producers who are central to local food system success.

These gaps collectively limit both scholarly understanding and practical implementation of sustainable local food initiatives.

3. Research Questions & Objectives

Primary Research Question: How does the OxFarmToFork initiative deliver measurable benefits in terms of biodiversity enhancement, nutritional value, and producer economic impact compared to conventional supply chains?

Specific Objectives:

1. Document biodiversity practices and outcomes on participating farms
2. Quantify nutritional quality of OxFarmToFork produce using GRFFN methodology

3. Assess economic benefits and challenges for participating farmers
4. Identify operational challenges and scaling opportunities
5. Develop actionable recommendations for initiative improvement, expansion, and impact measurement

4. Research Methodology

4.1Study Design

The study employed a mixed-methods approach combining quantitative biodiversity and nutrient density metrics, with qualitative stakeholder interviews and analysis. The study included in-person visits to four farms enrolled in the OxFarmToFork initiative for stakeholder interviews and biodiversity and nutrient density data collection. The study also included in-person interviews with the Good Food Oxfordshire and GRFFN teams and virtual interviews with chefs and students from six colleges across the University of Oxford.

4.2 Target Farms

	Oxford City Farm	Sandy Lane Farm	Traditional Garden Growers	Worthy Earth
Archetype	Educational/ Community Farm	Diversified Family Operation	Emerging Collaborative Enterprise	Multi-Site Market Garden Operation
Size and Type	2.5-acre urban community farm Maxed out growing space; open to expand to other parts of Oxford	40-acre farm and market-garden 75% utilization due to crop rotation	2 acres currently in production 27 acres in total, providing opportunity for expansion	3 acres across 3 primary locations (Bletchingdon, Blenheim, Dummer) Additional acreage across 6 other locations; open to expanding to more sites
Focus[1] *See Appendix A for crop list*	Market garden vegetables, eggs, meat	Field-scale vegetables, 80-90% of production	High-value crops, baby vegetables, salads, edible flowers	Market garden vegetables

[1] Note. Farm v. Market Garden: Market gardens are smaller scale operations growing a variety of crops that could be sold at a market, while farms are recognized for specialization at growing crops at a larger scale.

Farming Approach	Follows organic standard (not certified); not overly focused on crop rotation at this scale	Organic certified since 1985; 7-year crop rotation	Minimum tillage, cover crops, transitioning to organic, no chemical additives	Growing organically (not certified)
OxFarmTo Fork Contribution	~50% of sales	<1% of sales; strategically important	50-60% of sales (ideally 80%)	Significant portion of sales from Bletchingdon and Dummer
Unique Features	Community engagement, flood mitigation systems	Sandy soil, integrated pest management, engineering and business mindset	Clay soil, wood pellet production, water table management	Selling the service of growing vegetables for clients, integrated pest management

4.3 Data Collection Methods

4.3.1 Biodiversity Mapping

Biodiversity mapping was conducted using the eSurveyor and iNaturalist apps, following a "Biodiversity Data Collection Guide" prepared for the initiative by a prior OxFarmToFork researcher. Together with the farmers, the researchers identified a "representative" plot at each farm on which to conduct the biodiversity testing. Starting at the edge of the field, the researchers moved through the field margin, stopping at 10-meter intervals to study a one-meter square transect. The e-Surveyor app was used for plant biodiversity mapping, while the iNaturalist app was used for pollinator identification. The study resulted in geotagged photographs of habitat features, submitted for verification through the e-Surveyor and iNaturalist applications (see Appendix G for sample photos from the farm visits). In addition to field studies, the researchers completed a biodiversity checklist to understand practices on each farm contributing to biodiversity (Appendix B).

4.3.2 Nutritional Assessment

The nutritional assessment was conducted using the GRFFN tool, which involved measuring Brix values of various crops using a handheld refractometer. This method allowed for rapid, in-field estimation of total soluble solids—primarily sugars and organic compounds—as a proxy for produce quality and potential nutrient density. As part of the GRFFN toolkit, a manual juicing device was used to extract sap or juice from the crops being tested, ensuring consistency in sample preparation and minimizing contamination across readings. A comparative sampling approach was used to evaluate differences between locally grown agroecological produce and conventional supermarket alternatives.

For each selected crop, three samples were collected per source (local and conventional), documenting the environmental conditions. Different crops were tested across the four participating farms included kale, lettuce, beetroots, broad beans, radish, cucumber, courgettes, green beans, kohlrabi, potatoes, purple top turnips, raspberries, baby tomatoes, golden and candied beetroots, and parsley. This structured and consistent method enabled both within-farm and between-source comparisons of produce quality while laying the groundwork for future expansion of participatory nutritional monitoring.

4.3.3 Stakeholder Interviews

The research included qualitative data collected through stakeholder interviews, including:

- 4 semi-structured interviews with farmers (on-farm)
- 3 semi-structured interviews with chef and procurement officers (virtual)
  - Kellogg College (OxFarmToFork participant)
  - Pembroke College (prospective OxFarmToFork participant)
- 7 semi-structured interviews with students (virtual)
  - Kellogg (2)
  - St Antony's (2)
  - Jesus College (1)
  - Somerville College (1)
  - JCR sustainability representative (college anonymous) (1)
- GFO team consultations
- GRFFN technical consultation and in-person training

4.4 Limitations and Ethical Considerations

Due to the timeframe and scope of the fellowship, there are several limitations to this research study deserving acknowledgement:

- One-month study timeframe limits seasonal variation capture for biodiversity and nutrition testing
- Focus on testing biodiversity monitoring tools rather than implementing comprehensive biodiversity mapping on each farm
- Small sample size of farms (4) compared to broader OxFarmToFork initiative (20+)
- Small sample size of college chefs (2) compared to broader OxFarmToFork initiative (18) and broader University of Oxford (44); due to the busy time of year, there was limited participation of chefs and procurement officers despite persistent outreach

- Due to the variation in availability for farm visits, biodiversity observations and nutrition tests were taken at varying times of day (2 farm visits in morning, 2 farm visits in afternoon)
- Students interviewed were primarily Masters students with existing ties to sustainability, potentially biasing the response; future research should survey a broader subset of students from across the university
- Research ethics training was completed by all researchers, and all participants provided verbal agreement to research protocols

5. Key Findings

5.1 Biodiversity Documentation and Assessment

The assessment of biodiversity practices across the four farms reveals sophisticated ecological approaches that balance food production with environmental stewardship. Farmers demonstrate a systems-thinking approach, viewing biodiversity not as a constraint but as a production tool that reduces costs and improves yields over time. However, significant challenges exist around monitoring, certification costs, and resource allocation.

5.1.1 Current Biodiversity Practices

Appendix B includes a detailed summary of biodiversity practices and habitat features across each farm, while Appendix C and D include a detailed assessment of insect, animal, and plant biodiversity based on field transects.

Natural Pest Management Strategies

All four farms have moved away from chemical pest control toward ecological solutions:

Oxford City Farm creates “messy borders” – undisturbed areas that provide habitat for beneficial insects. They use targeted companion planting to attract parasitic wasps that naturally control crop pests, though space constraints limit expansion of these practices.

Sandy Lane Farm has established “beetle banks” – raised strips of vegetation that house slug-eating beetles. They position parasitic wasp habitats strategically near their covered growing areas and follow a two-year hedge cutting cycle to protect nesting birds.

Traditional Garden Growers maintains tall grass corridors between production areas and reduces mowing frequency to support beneficial insect populations. They integrate fruit trees throughout the farm to create habitat diversity.

Worthy Earth uses innovative mixed planting strategies, growing different plant families together (such as beetroot, kale, and spring onions) to confuse pest insects. This approach also reduces water needs as the soil retains moisture better.

Long-Term Ecological Thinking

Farmers consistently emphasized the time investment required for ecological approaches. As one farmer from **Sandy Lane** noted, it takes "5 years to build up biodiversity capital to manage pests." This long-term perspective reflects a fundamental shift from quick-fix chemical solutions to sustainable ecosystem management. Each of the farms is experimenting with perennial crops, which build soil structure, increase water holding capacity, and enhance biodiversity.

The underlying philosophy was captured by one farmer's observation: "Look after the whole ecosystem and the ecosystem will look after you." This systems approach treats biodiversity as infrastructure that provides ongoing returns through natural pest control, improved pollination, and enhanced soil health.

Soil Health as Foundation

Several farms exemplify advanced soil management by "maintaining living roots in the soil" year-round through cover crops. They have switched from rotovators (which damage soil structure) to power harrows that preserve the biological activity concentrated in topsoil layers. Multiple farms mentioned composting systems and allowing crops to go to seed naturally, though farmers noted the discipline required to resist removing plants once they are no longer harvestable.

5.1.2 Challenges and Limitations

"Bad Biodiversity" Management

Farmers face ongoing challenges with wildlife that damages crops. Traditional Garden Growers deals with rabbit populations that have rebounded strongly after disease, while bird pressure (particularly blackbirds and pigeons) requires netting solutions. **Oxford City Farm** encounters badger and fox populations that are managed with electric fencing, and it uses selective organic-friendly spraying to stop the infestation of insects that are detrimental to crops (e.g. slugs). **Worthy Earth** makes use of sonar sounds for mole prevention. These experiences highlight that biodiversity management requires nuanced approaches rather than blanket wildlife encouragement.

Space and Infrastructure Constraints

Smaller operations like **Oxford City Farm** face spatial limitations that restrict their ability to implement comprehensive natural pest management systems. The availability of covered growing spaces (polytunnels and caterpillar tunnels) can extend growing seasons by five weeks but requires substantial investment and irrigation capabilities.

Market Access and Processing

Infrastructure gaps create additional challenges for livestock management. **Sandy Lane Farm** and **Oxford City Farm** noted the difficulty of finding nearby slaughterhouses that meet animal welfare standards, requiring transport of at least three animals to make distant facilities economically viable.

5.1.3 Organic Certification Considerations

Mixed Perspectives on Value

Farmers expressed varied views on organic certification’s necessity and value:

Traditional Garden Growers expressed an interest in future certification but questioned the immediate need for certification when selling directly to known community members.

Sandy Lane Farm is an enthusiastic promoter of organic certification and an active Soil Association Ambassador. Sandy Lane growers emphasize the certification’s market value, noting that the Soil Association’s rigorous standards provide financial incentives that justify participation costs. The rigorous annual organic certification process provides a platform for assurance and integrity.

Oxford City Farm – although not certified – acknowledges the importance of the Soil Association’s robust certification scheme in the UK. The growers disagree with some animal welfare requirements that don’t suit smaller-scale operations.

5.1.4 Monitoring and Assessment Gaps

Current Limitations

The research identified significant gaps in systematic biodiversity monitoring. While farmers demonstrated sophisticated ecological knowledge, documentation is informal and inconsistent across operations. This report offered a preliminary assessment of on-farm biodiversity (plant and insects), focused on reviewing one 100-meter observation transect per farm to familiarize the farmers with the eSurveyor and iNaturalist measurement tools and pilot the methodology for future biodiversity monitoring.

Recommendations for Improved Monitoring

Several improvements can be made to enhance the rigor of future biodiversity testing.

- **Sampling bias** has a direct influence on perceived patterns of biodiversity, yet most methods disregard or underestimate the role of sampling bias (Dubos et al, 2022).

Future site selection should be done through randomized sampling, rather than selecting “representative” areas.

- **Increased coverage** is recommended, with at least two, but optimally three, 100-meter transects, to reduce uncertainty across a one-hectare plot (Hortal & Lobo, 2005).
- Field margin sampling may not represent whole-farm biodiversity. **Comprehensive sampling** should include crop fields, not just field margins.
- Three samples over the summer season may miss early spring and late autumn species. **Seasonal tracking** with 4-5 sampling periods throughout the growing year would allow for greater insights across a variety of seasons.
- **Weather conditions** can affect sampling conditions for several hours or even days (Hoffman et al, 2019). Future biodiversity studies should include backup date protocols and standardized time of day restrictions.
- **AI identification** may introduce systematic errors, with apps providing confidence percentages but no clear validation protocols. Where uncertainty is low, employ farmer knowledge and cross-reference across platforms.
- While above-ground biodiversity is important, it is also important to understand below-ground biodiversity. Consider expanding beyond plant and insect monitoring, to **soil health.**

5.1.5 Resource and Technology Considerations

Soil Analysis Partnerships

Traditional Garden Growers has established soil sampling partnerships with Reading University, though resource limitations prevent expansion of testing across all areas. The Soil Mentor app was mentioned as a potential tool for broader soil health monitoring.

Carbon Measurement Opportunities

Farmers expressed interest in carbon measurement, particularly for high-carbon inputs like wool pellets used as soil amendments. However, carbon credit systems were viewed as challenging to navigate and implement.

Biodiversity as Production Tool

Biodiversity brings financial benefits in addition to ecosystem balance. Natural pest control reduces input costs for farmers. Pollinators support increased crop yields, while diversity enhances long-term soil biology.

5.2 Nutritional Value Assessment

5.2.1 Nutritional Value Drivers

The nutritional assessment conducted across the four participating farms revealed a strong alignment between agroecological practices and food quality. The data collected using the GRFFN tool (see Appendix E), supported by farmer interviews and field observations, indicates that nutritional value is shaped by multiple interacting factors including soil health, harvest timing, plant maturity, and varietal diversity. Farmers consistently emphasized taste, freshness, and consumer feedback as indicators of nutritional strength, supported by emerging metrics such as Brix values.

Soil Health Management

Evidence from farmer interviews suggests several factors contribute to nutritional quality:

Oxford City Farm: No-dig composting system showing year-over-year soil improvement; compost is mostly internally generated (see Figure 3). The tested crops included kale, lettuce, beetroots, leaf mixes, broad beans, and radish. Results were consistent with expected nutrient profiles for these crops. Notably, broad beans recorded a high Brix value of 16.5, suggesting significant sugar content and nutrient density.

Sandy Lane Farm: A 20-year green manure program supports soil fertility. The tested crops included cucumber, courgettes, green beans, broad beans, kale, and kohlrabi. Results were consistent with nutrient expectations across all samples.

Traditional Garden Growers: Minimum tillage and use of biological soil amendments (wood pellets). Tested crops included potatoes, broad beans, Milan purple top turnip, and raspberries. All samples reflected nutrient profiles in line with healthy, well-managed soils.

Worthy Earth: Soil health is prioritized for improved taste and nutrition. Tested crops included baby tomatoes, golden beetroots, candied beetroots, lettuce, and parsley. The candied beetroots scored particularly high on Brix (up to 15), indicating elevated sugar content and likely nutrient density.

Figure 3: The compost pile at Oxford City Farm is heated to a high temperature, accelerating the decomposition of organic matter, increasing moisture and aeration, and enabling nutrient release. Some compost is sourced locally (e.g. care home and coffee shops) while other compost is purchased externally and heated on-farm to encourage greater microbial activity.

Freshness and Harvest Timing:

All participating farms emphasized the importance of harvesting produce within 24 to 48 hours of delivery to maximize freshness and preserve nutrient quality. At **Sandy Lane Farm**, this principle is formalized through a “harvest and sell within the same week” protocol. Farmers reported that customers consistently noted the difference in taste and appearance compared to conventional alternatives. This freshness-focused approach contrasts sharply with conventional supply chains, where produce often endures multi-day transport and storage, leading to significant loss of delicate nutrients such as vitamin C and certain antioxidants.

Seasonal and Growth Factors

Seasonality and crop growth patterns were identified as important factors influencing both nutritional quality and flavour. **Traditional Garden Growers** observed that "slower growing plants develop deeper flavours," suggesting a link between plant maturity rates and phytochemical richness. **Sandy Lane** supported this by theorizing that "plants that have to fend for themselves while having resources create better protection compounds," referring to natural defences like antioxidants. Additionally, farms involved in the initiative reported cultivating a wider variety of vegetables – many of which are not commonly found in supermarkets – thereby increasing the dietary diversity available to local consumers.

5.2.3 GRFFN Tool Effectiveness and Limitations

The GRFFN tool demonstrated several notable strengths during implementation. Its simplicity and accessibility – requiring no batteries or complex equipment – made it especially user-friendly for on-farm testing. Farmers and chefs appreciated the ability to obtain real-time results for quality assessment, and early use suggested a strong correlation between higher Brix values and positive taste ratings. Furthermore, the tool provided a clear and communicable metric that could be shared directly with chefs and customers to promote transparency in food quality.

- However, several limitations were also noted. Brix readings varied significantly throughout the day, with peak values typically observed around 3:30 pm, introducing inconsistencies if timing was not standardized. Storage conditions and time between harvest and measurement also affected results, emphasizing the need for controlled protocols. While Brix effectively captures sugar levels and total soluble solids, its correlation with specific micronutrients remains limited and unvalidated. This raises concerns about relying on it as a comprehensive nutritional indicator. Additionally, the tool is not widely recognized as a standard method within scientific nutrition circles. Farmers also highlighted that too much emphasis on soil health might overlook the importance of above-ground biodiversity, and that certain soils – like sandy soils – struggle to retain nutrients. As one participant aptly put it, "It's cool. But as with all measurements of the natural environment, it needs to be in the context of something larger."

5.2.4 Recommendations for Nutritional Monitoring

Practical Implementation Recommendations

To improve practical application, several recommendations emerged. First, Brix testing should be repeated monthly to capture seasonal changes and crop variation. Given the diversity of crops across farms, tailored approaches are needed to accommodate different growing conditions. Importantly, monitoring tools and protocols must remain manageable for farmers who already face time and labour constraints.

To ensure more robust use of the GRFFN tool, enhancements are advised. Sampling protocols should be standardized by crop, including specific guidelines for sap extraction, optimal time of day for measurement, and environmental conditions. Where possible, juice yield or plant moisture content should be recorded alongside Brix values to control for freshness bias. Reference benchmarks should be developed through lab analysis to define high-, medium-, and low-Brix thresholds for key crops. Finally, the GRFFN initiative would benefit from participatory research – enabling farmers, citizens, and students to contribute data and insights to a growing, open-access database that links food quality to soil practices and harvest methods.

While Brix refractometers are not a substitute for laboratory nutrient analysis, they hold considerable promise as accessible, low-cost indicators of food quality. When used thoughtfully – especially within a standardized, citizen-engaged framework – the GRFFN tool can support more transparent, data-informed food systems and help advance the mission of local, nutrient-rich, and environmentally regenerative agriculture.

5.3 Other Environmental Impacts

5.3.1 Water Management Challenges and Solutions

Current Water Access and Infrastructure Limitations

Although not a primary focus of the study, water availability represents a significant constraint for all four farms, with each operation facing distinct challenges that limit production capacity and planning flexibility.

Traditional Garden Growers relies heavily on irrigation using municipal water supply. The farm has attempted to develop alternative water sources by digging a well to two meters depth but failed to reach groundwater. Future expansion plans are constrained by licensing requirements for substantial groundwater extraction, while the operation would prefer to implement rainwater harvesting systems to reduce dependence on municipal supplies.

Sandy Lane Farm faces significant water constraints that directly impact production planning. The operation had to delay field-scale planting by six weeks due to insufficient rainfall, highlighting how water limitations affect crop timing and yields. Despite investing in a 100-meter borehole based on geological surveys indicating groundwater presence, no water source was found. The farm now plans to construct a reservoir with collection ponds, which would require outsourced expertise in water management system design.

Interestingly, **Sandy Lane** does not qualify for existing multi-farm reservoir partnership schemes due to geographic isolation created by road infrastructure, demonstrating how transportation networks can inadvertently limit agricultural collaboration opportunities.

Flood Management and Dual Water Challenges

Oxford City Farm experiences the opposite extreme, dealing with significant flooding issues during wet periods while facing water scarcity during dry seasons. The farm has implemented flood mitigation measures including swales and ditches, with swales specifically designed using biodiversity seed mixes to provide dual benefits of flood control and wildlife habitat.

During dry periods, the farm operates rainwater capture systems and uses drip irrigation in covered growing areas, though staff noted they would prefer sprinkler systems if redesigning the infrastructure. The farm faces additional financial pressure from municipal water pricing that charges £1 per cubic meter for supply and £1.50 per cubic meter for wastewater treatment, assuming all purchased water becomes sewage; the team was able to negotiate a lower rate with the municipality after some effort.

Adaptive Water Management Strategies

Farmers have developed various strategies to maximize water efficiency within existing constraints. **Sandy Lane** employs early cultivation timing to minimize water loss through evaporation and uses insect nets over crops to lock in soil moisture. This dual-purpose approach demonstrates how farmers integrate pest management with water conservation.

Worthy Earth's philosophy views water limitations as directing a different growing strategy rather than presenting an existential threat. The operation relies on municipal water with daytime usage restrictions and occasionally exhausts available supplies, requiring alternative source arrangements.

5.3.2 Food Waste Management and Circular Economy Practices

Current Waste Reduction Strategies

All four farms have implemented comprehensive food waste reduction strategies, though approaches vary based on scale, market channels, and available infrastructure.

Traditional Garden Growers employs multiple waste reduction techniques including freezing surplus produce and creating value-added products like chutneys sold alongside vegetable boxes. The farm utilizes WhatsApp group outreach to quickly distribute excess produce to community members, demonstrating how digital communication can support local food networks.

The operation also exemplifies circular economy principles by collecting waste wool from other farms to create soil amendment pellets, turning agricultural waste streams into valuable inputs. Any remaining organic waste becomes compost, which the farm views as an investment in soil health rather than simply a loss of income.

Institutional and Community Partnerships

Sandy Lane Farm has established partnerships with Oxford Mutual Aid and local food banks, as well as participating in food hub distribution networks. Remaining waste feeds pigs or goes to compost, creating closed-loop systems that minimize true waste.

Oxford City Farm relies heavily on volunteer networks for surplus distribution and works with food banks, though staff noted challenges in community acceptance due to preferences for processed or cooked foods over fresh produce. The observation highlights broader food system education needs beyond production issues.

Packaging and Materials Management

Packaging represents a significant environmental challenge across all operations, with each farm balancing preservation needs, cost considerations, and environmental impact.

Traditional Garden Growers uses plastic bags for optimal food preservation but faces challenges with durable bag return rates from institutional customers. The farm also uses plastic crates that frequently are not returned, creating ongoing replacement costs and waste.

Sandy Lane Farm currently uses biodegradable rather than home compostable packaging, acknowledging that this is not a perfect solution but noting that clear packaging increases sales by improving product visibility.

Oxford City Farm relies on second-hand polystyrene boxes that are not returned and plastic bin bags for distribution. Staff recognize that plastic packaging is light, inexpensive, and effective for food preservation, but this creates ongoing environmental trade-offs.

5.3.3 Systemic Infrastructure Needs

Water Management System Development

The water challenges identified across all four farms indicate significant opportunities for regional infrastructure development. The lack of accessible expertise in water management system design represents a knowledge gap that affects multiple operations.

Multi-farm water sharing arrangements could provide economies of scale, but current schemes have geographic limitations that exclude potential participants.

Circular Economy Integration Opportunities

The food waste management practices demonstrate existing circular economy thinking that could be expanded through systematic support. The success of **Traditional Garden Growers'** wool pellet production from other farms' waste streams suggests potential for broader agricultural waste exchange networks.

Packaging Innovation Requirements

The packaging challenges highlight the need for solutions that balance food preservation, cost effectiveness, and environmental impact. The preference for clear packaging that increases sales suggests that sustainable packaging solutions must account for market psychology alongside environmental goals.

The diversity of approaches across farms suggests that environmental solutions must be tailored to specific operational contexts rather than implementing one-size-fits-all strategies.

5.4 Social Impact and Employment

5.4.1 Current Employment Landscape

Workforce Structure and Composition

The four farms demonstrate diverse employment models that reflect both operational needs and resource constraints. **Oxford City Farm** operates with nine part-time staff members, officially limited to four days per week though staff frequently work additional hours. The operation maintains a significant volunteer base that supplements paid workforce capacity.

Sandy Lane Farm and **Traditional Garden Growers** both operate as family-based enterprises, with family members serving as primary labour sources. Sandy Lane supplements family labour with seasonal workers during peak periods, while Traditional Garden Growers has structured their operation with family members as formal employees.

Worthy Earth operates through a founding team of three members who manage various growing sites, with additional workers employed on part-time contracts.

Wage Standards and Economic Challenges

The economic sustainability of local food production faces significant challenges, with wage standards varying considerably across operations. As a registered non-profit, **Oxford City Farm** maintains compliance with Oxford Living Wage standards, demonstrating a commitment to fair compensation despite operational constraints.

However, broader wage challenges impact the entire OxFarmToFork initiative. As one farmer candidly observed, "Most farmers in OxFarmToFork make sub-minimum wage." This economic reality creates tension between the initiative's agroecological charter commitment to fair wages and the practical challenges of farm profitability.

The challenge extends beyond farmer compensation to employee wages. Operations struggle with the fundamental tension between paying farmers sustainable wages and fairly compensating employees, particularly when farm profitability remains marginal.

5.4.2 Workforce Development and Skills Challenges

Specialized Skills Shortage

Traditional Garden Growers identified specific workforce challenges that affect operational capacity and growth potential. The limiting factors for expansion include both machinery access and experience, but more critically, the difficulty of finding mechanically minded workers who want to work in organic farming settings.

The skills shortage reflects broader labour market dynamics. Experienced tractor operators typically work on large-scale conventional farms where wages are higher, and work is more consistent. The combination of lower wages and organic farming requirements creates a challenging recruitment environment.

Geographic dispersion compounds these challenges. Part-time work becomes impractical when farms are located far apart, limiting the labour pool to workers willing to commit to full-time positions despite lower compensation levels.

Machinery and Resource Sharing Limitations

Sandy Lane Farm highlighted the complexity of machinery sharing agreements, which appear economically attractive but face practical barriers. Effective machinery sharing requires additional equipment for transportation, and peak usage periods typically coincide across farms, reducing availability when needed most.

These operational challenges demonstrate how seemingly straightforward efficiency improvements face implementation barriers that require systematic solutions rather than individual farm-level innovations.

5.4.3 Business Management and Decision-Making Structures

Professional Services and Administrative Burden

Small-Scale Farming Operations face significant challenges in accessing professional services that larger businesses take for granted. As **Sandy Lane Farm** noted: “HR, Accounting – if you don’t have a hat you have to pay for it, which is challenging if you’re a small business.”

This observation highlights how administrative complexity can disproportionately burden smaller operations that lack economies of scale to justify dedicated professional support or the resources to outsource these functions.

Collaborative Decision-Making Benefits

Sandy Lane’s experience with collaborative management provides insights into alternative business structures that could support farm viability. Their four-person joint decision-making model reduces individual burden and provides emotional support during challenging periods.

As they explained: “Having four joint decision-makers reduces the burden. You don’t feel alone on the big decisions.” This collaborative approach suggests that business structure innovations could address both practical and psychological challenges facing individual farm operators.

5.4.3 Economic Impact and Local Development Potential

Regional Economic Development Opportunity

The economic impact of the OxFarmToFork initiative extends beyond individual farm viability to broader regional development considerations. One farmer articulated this perspective clearly: “Labor is the thing that [institutions that buy through] OxFarmToFork can have a huge impact on. Developing local economies and keeping money in the pockets of people who live locally.”

While the initiative is largely positioned from the perspective of environmental sustainability, the contribution to economic development cannot be understated. Supporting local food production can create multiplier effects throughout the regional economy, aligning with the University of Oxford’s sustainable procurement strategy (University of Oxford, 2025).

Institutional Purchasing Power and Local Impact

The contrast between farmers’ incomes and institutional purchasing patterns reveals significant opportunities for economic impact. One farmer noted: "A lot of farmers through this initiative are making £12,000-£18,000 a year, while colleges spend money on international produce… This is a way to give people a wage to do something honourable." This annual income estimate provides stark context for the economic challenges facing local food producers and highlights how redirecting institutional purchasing could significantly impact local livelihoods.

5.4.4 Volunteer Engagement and Community Building

Community Participation Models

Oxford City Farm's significant volunteer base represents an important community engagement model that extends social impact beyond paid employment. Volunteer participation creates opportunities for community members to engage with local food production, building understanding and support for sustainable agriculture practices.

The volunteer model also provides operational flexibility that helps farms manage variable workloads without the financial burden of maintaining large permanent workforces during slower periods. Global schemes like Worldwide Opportunities on Organic Farms (WWOOF) provide educational and cultural exchange opportunities for volunteers, while augmenting farmer labour resources; the farmers have not yet participated in these schemes, but smaller operations expressed interest in future participation.

5.4.5 Knowledge Sharing and Collaborative Learning

Peer Learning Networks and Inspiration

The farmers consistently emphasized the importance of learning from other practitioners, rather than viewing them as competitors. **Traditional Garden Growers** identified FarmEd as particularly inspirational, demonstrating how established educational programs can influence emerging farm operations.

The collaborative approach extends to direct peer support, with farmers able to contact OxFarmToFork team members throughout the week for guidance and problem-solving. This accessibility creates a support network that reduces the isolation often experienced by individual farming operations.

Formal and Informal Learning Opportunities

Sandy Lane Farm actively welcomes other farmers for farm tours, with the growers noting they "learn something new every time." This commitment to continuous learning demonstrates how experienced farmers remain open to new approaches and techniques.

The farm also participates in the Thames Organic Growers Group, indicating the value of regional networks that connect farmers with similar production approaches and challenges.

Innovation and Technique Development

Farmers actively seek out innovative approaches from diverse sources. **Worthy Earth Farm** referenced Joshua Sparks' work on syntropic farming applied to vegetable growing, which uses dense planting techniques. Farmers utilize digital platforms, including Facebook farming groups, for knowledge sharing, showing how traditional agricultural learning networks have expanded through digital communications tools.

Community Engagement and Social Inclusion

Several farmers have developed programs that extend knowledge sharing beyond the farming community. Both Sandy Lane Farm, Worthy Earth, and Oxford City Farm participate in the FarmAbility program, which invite children with special needs to experience farm environments.

The employment and social impact findings suggest several strategic directions for enhancing the social sustainability of the OxFarmToFork initiative. Workforce development programs addressing specific skill gaps, business structure innovations that reduce administrative burden, and economic models that improve farm profitability while maintaining fair wage commitments could significantly strengthen the social impact of local food production efforts.

5.5 Producer Impact Evaluation

5.5.1 Economic Benefits and Revenue Impact

Current Revenue Dependencies and Market Position

The OxFarmToFork initiative demonstrates varied economic impact across participating farms, with dependency levels ranging from minimal to critical for business viability.

Oxford City Farm shows significant reliance on the initiative, with OxFarmToFork representing 50 percent of total sales. However, the farm faces demand volatility challenges, with staff noting that "sales have been low this year," highlighting the unpredictable nature of institutional purchasing patterns.

Traditional Garden Growers exhibits the highest dependency, with 50-60 percent of sales flowing through OxFarmToFork. The operation's founder emphasized the critical nature of this relationship: "We definitely wouldn't be as far without them." This indicates the initiative's crucial role in enabling new farmer establishment through what they describe as a "leapfrog effect" that accelerates business development.

In contrast, **Sandy Lane Farm** maintains minimal direct revenue impact at less than 1 percent of total sales. However, the farm values the strategic importance of the relationship, viewing it as a "template to be replicated across the country." This diversified approach provides risk mitigation against initiative fluctuations while contributing to broader movement development.

Pricing Strategies and Premium Positioning

Participating farms report receiving premiums above standard wholesale rates, though pricing strategies vary based on organizational philosophy and market positioning. **Oxford City Farm** follows Soil Association guidelines and "tends towards the higher end" while remaining below retail pricing levels. While some farmers complained about the lack of visibility into prices charged by other farms, **Sandy Lane** emphasized that price fixing would be contrary to the "marketplace" goals of the initiative.

Oxford City Farm's focus on fair wages rather than profit maximization, reflecting its non-profit status, creates pricing dynamics that benefit farmers. However, maintaining premium positioning becomes challenging as more producers join the network, particularly given limited visibility into competitor pricing within the initiative.

Certain products present ongoing challenges despite premium pricing. **Oxford City Farm** noted difficulties selling specialized items like sorrel, where chefs lack familiarity with preparation methods, and salads that wilt quickly and lose visual appeal.

Infrastructure Investment and Capital Support

The initiative has provided critical infrastructure support that enables farm expansion and operational improvements. **Traditional Garden Growers** received support for a £3,500 polytunnel purchase that would otherwise have required debt financing, demonstrating how targeted investment can remove capital barriers for emerging operations.

Sandy Lane Farm received support for caterpillar tunnel installation, described as "very quick, easy, straightforward," while **Oxford City Farm** benefited from investments in insect mesh, winter fleece, GRFFN kit, and water equipment. **Worthy Earth** installed a large polytunnel in Dummer after determining that water pressure in Bletchingdon was insufficient to support the installation.

Outstanding Infrastructure Needs

Despite existing support, signature infrastructure gaps remain across all operations. **Oxford City Farm** requires refrigeration, washing stations, and polytunnel repairs. **Sandy Lane Farm** identifies water infrastructure and irrigation systems as major capital needs, along with larger propagation facilities.

Traditional Garden Growers continues to need polytunnel expansion and basic equipment, while **Worthy Earth** seeks refrigeration space that could serve as a communal resource. These needs suggest substantial ongoing investment requirements to achieve operational sustainability.

5.5.2 Supply Chain Stability and Operational Challenges

Demand Predictability and Planning Constraints

Multiple farmers identified OxFarmToFork demand fluctuations as a critical constraint, with several noting that they "can't plan growing around it." The seasonal mismatch between college demand and production cycles creates particular challenges, with college demand lowest during summer peak production periods.

This seasonal challenge has led farms to develop alternative strategies. One farmer noted: "Oxford is really quiet in the summer – it doesn't make sense to have the garden bursting with veg in that time period. We've started planning around it." Restaurant partnerships help address this gap, with mid-tier establishments willing to pay premiums for quality while less demanding about visual perfection than institutional buyers.

Quality and Logistics Management

Meeting institutional quality standards requires specialized skills and significant time investment. **Oxford City Farm** outlined the process: ensuring selection of the most presentable vegetables, rapid refrigeration, and careful packaging. This process consumes considerable management time and is typically not suitable for volunteers, as noted by farm leadership.

Order Fulfilment and Resource Allocation

Order preparation creates additional workload pressures beyond growing activities. **Sandy Lane Farm** described fulfilment as "another set of orders that needs to be prepared" with unpredictable demand patterns. The farm cited an example of preparing 100 kilos of broad beans while only selling 5 kilos, illustrating the planning challenges created by demand volatility.

Traditional Garden Growers has developed direct relationships with college chefs to understand specific requirements, particularly focusing on baby vegetables and edible flowers that suit smaller-scale production. This approach allows farms to "fill a niche as a smaller farm" rather than competing directly with larger operations.

5.5.3 Diversified Revenue Streams

Complementary Income Streams

All farms have developed multiple revenue channels that provide stability beyond OxFarmToFork sales. **Sandy Lane Farm** operates over 400 weekly vegetable boxes and serves 200+ customers weekly through their farm shop. **Worthy Earth** has developed relationships with Blenheim Palace, local pubs, bakeries, private chefs, and event catering services. They also operate a farm shop and are investing in value-added processing including large-scale kimchi, sauerkraut, and pesto production to utilize surplus vegetables.

Oxford City Farm integrates food production with health programming, including externally taught yoga sessions and educational classes, while providing significant produce benefits to volunteers. **Traditional Garden Growers** sees substantial opportunity for growth in wool pellet production, in addition to selling to veg box schemes and local pubs.

Innovation in Value-Added Products

Traditional Garden Growers demonstrates circular economy principles through wool pellet production using waste from other farms, creating both revenue and agricultural input streams. The operation also freezes surplus vegetables and produces chutneys sold alongside veg boxes.

The investment in preservation and processing capabilities suggests recognition that raw sales alone may not provide sufficient economic sustainability, particularly given seasonal demand mismatches and product perishability challenges.

5.5.4 Pre-Purchasing and Contract Considerations

Farmer Perspectives on Advance Purchasing

Farmers expressed mixed views on pre-purchasing arrangements that would provide demand predictability. **Traditional Garden Growers** viewed advance purchasing positively, noting it "would provide a great amount of predictability" for planning and investment decisions. Likewise, **Worthy Earth** viewed it as a natural extension of their existing "market garden as a service" model used for Blenheim and other clients.

However, **Sandy Lane Farm** expressed concerns about the pressure created by advance commitments, noting potential problems "if a plot is purchased and it comes to nothing." The farm values "the challenge of fighting for customers' money" and worries that advance payment could reduce competitive drive and service quality, while also noting that added certainty would be beneficial for farmers who are early in their journey. These challenges could be mitigated through quality control and closer relationships between farms and certain colleges.

Expansion Opportunities and Community Integration

Traditional Garden Growers articulated a vision for expanding the business model to Oxford colleges, suggesting that "colleges could have their own market run by professional growers that produces not just vegetables but also an outdoor growing space for members of the college." This model would create community connection opportunities while providing economic sustainability for growers.

The proposal reflects recognition that economic sustainability may require innovative models that combine food production with education, community engagement, and place-based experiences rather than relying solely on wholesale produce sales.

5.5.5 Success Factors and Support Requirements

Critical Partnership Elements

Farmers identified several factors essential for successful producer partnerships. Direct relationships through WhatsApp groups and chef connections receive high value, providing immediate communication channels that enable responsive service and problem-solving.

Technical support through equipment grants and infrastructure assistance proves critical for capacity building, while fair pricing that recognizes quality and sustainability commitments enables economic viability. The collaborative environment where farmers support each other rather than competing creates a supportive ecosystem for business development.

Data and Analytics Needs

Traditional Garden Growers specifically requested "more data on what is and is not selling," a need echoed by other farmers looking for better market intelligence to guide production decisions. Enhanced reporting and demand forecasting capabilities could significantly improve planning accuracy and reduce waste from overproduction.

The current information gap forces farmers to make production decisions without clear market signals, contributing to the demand volatility and planning challenges that affect economic sustainability across the initiative.

5.6 Partnership Dynamics and Systemic Barriers

5.6.1 Institutional Purchasing Context and Systemic Barriers

Current Market Structure and Constraints

The OxFarmToFork initiative operates within a complex institutional purchasing environment dominated by established supply chain relationships. The FoodQuad consortium, which collaborates with Compass Group's Foodbuy division, has maintained Oxford college procurement relationships for over 20 years, with a five-year contract extension secured in 2019 (FoodBuy, n.d.). University of Oxford Sustainable Procurement maintains a database of "Preferred Suppliers," in which Compass Group appears but OxFarmToFork is not listed (University of Oxford, 2025).

This established relationship creates significant structural barriers to local procurement expansion. Long-term contract structures favour large suppliers who can provide economies of scale and consistent supply chains that small local producers struggle to match. College food budgets averaging £500,000 annually suggest potential for 15% local procurement, but current contracts limit this opportunity.

One farmer candidly assessed the initiative's position: "We're under no illusion that this is a normal set of conditions. We're subsidized by the goodwill of places that want to do a good thing, and the hard work of the GFO team to push it. We're propped up by a lot of energy that might not be real in other parts of the world or this country."

Seasonal Demand Misalignment

The institutional purchasing calendar creates fundamental challenges for local food production. College demand reaches its lowest point during summer months when local production naturally peaks, requiring farmers to develop alternative markets or accept reduced utilization of growing capacity.

Restaurant partnerships have the potential to provide some mitigation for this seasonal gap, particularly weekend demand that colleges do not generate. However, the scale difference between institutional and restaurant purchasing potentially means that these alternative channels cannot fully compensate for reduced college demand during peak production periods.

Product Category Limitations

Economic realities limit which crops make sense for local institutional supply. **Worthy Earth** noted that basic commodities like carrots, onions, cabbage, and potatoes do not generate sufficient premiums to justify small-scale production, lending to focus on artisanal, high-value crops that can command premium pricing.

This specialization creates both opportunities and constraints. While farms can achieve better margins on specialty products, they cannot serve as comprehensive local food suppliers, limiting their potential institutional impact and requiring colleges to maintain dual sourcing strategies.

5.6.2 College Buyer Perspectives and Requirements

Primary Purchasing Decision Factors and Criteria

Interviews with two head chefs from different Oxford colleges revealed a strong appreciation for the quality, taste, and freshness of OxFarm2Fork produce. One chef remarked that the initiative's ingredients are "noticeably superior" in flavour and freshness compared to standard suppliers, largely due to the short harvest-to-delivery window and the small-scale, natural growing practices. While the produce often lacks the uniform appearance of supermarket-grade items, chefs emphasized its excellent shelf life and vibrant flavour. The seasonal variety – especially from late spring to early winter – was praised for adding diversity and creativity to institutional menus, though both chefs noted that availability during the winter and early spring remains a challenge.

Currently, OxFarmToFork supplies only a small portion of their kitchens' total demand, primarily due to volume and consistency constraints, but both chefs expressed a willingness to scale up their use of local produce if menu planning systems could be adapted accordingly. Pembroke College, not yet enrolled in OxFarmToFork, has recently renewed for a 5-year contract with FoodQuad/Compass and is required to allocate at least 95 percent of food spend through that contract. While the college expressed an interest in sourcing more food locally to support local businesses, enhance nutrition, and increase sustainability, the contract limits the total produce volume that could be procured through OxFarmToFork. The college engages students in weekly meal planning, who are increasingly advocating for locally grown produce. The FoodQuad platform notably provides limited transparency regarding where food is procured.

Opportunities to Align with College Requirements

Key operational needs include earlier-in-the-week deliveries, improved consistency, and greater availability to align with high-volume service schedules. One chef explained that previous issues with inconsistent supply made it difficult to feature local produce explicitly on menus, but improved communication—particularly through the shared WhatsApp group—has enhanced trust and coordination. Another chef indicated openness to contract farming to purchase growing capacity in advance (e.g. a plot of tomatoes), which would help address the predictability of food supplied through the initiative.

While several farmers and OxFarmToFork team members referred to a "summer lull" in ordering, Pembroke's chef emphasized that college food production in the summer is not lower due to a high volume of conferences and events, which is likely to vary by college. Summer schools result in a high volume of food required, typically in an informal dining setting, which would be less suitable for higher-end OxFarmToFork produce. On the other hand, the chef noted that international clients traveling for conferences would likely appreciate the high-quality local produce offered by OxFarmToFork. Menus for conferences, events, and formal dinners are often prepared several weeks in advance, so shifting to local procurement would require advanced notice regarding food availability or would require the college to incorporate flexibility in the menu description.

Across both interviews, chefs agreed that the most valuable aspects of OxFarmToFork are its transparency, flavour quality, and alignment with college values around sustainability and community. Local sourcing is increasingly seen as a way to offer fresher, higher-quality meals while strengthening ties to regional producers and supporting the University of Oxford's environmental goals.

5.6.3 Logistics and Quality Management Challenges

Cold Chain and Transport Infrastructure

Refrigeration gaps represent a critical barrier to quality maintenance throughout the supply chain. Not all farms have adequate refrigeration facilities, with **Worthy Earth** using a refrigeration trailer to allow vegetables to cool properly after harvest. The Velocity partnership, while generally praised for service quality, faces challenges with cold storage and transport reliability. Multiple farms mentioned problems with wilted salad leaves, indicating systematic cold chain management issues.

Packaging and transport professionalization remains critical, with one farmer noting: "packaging and transport needs to be as professional as wholesale veg if we're going to compete against it." Modern commercial kitchens have evolved to expect pre-washed, ready-to-use products, requiring farms to adapt their processing approaches. Friday delivery timing creates additional challenges, with college operations requiring different scheduling than the current delivery framework provides.

Communication and Feedback Systems

Farmers report receiving feedback primarily when problems occur, particularly regarding wilted products. This negative feedback bias limits learning opportunities and makes it difficult to understand what aspects of service and product quality work well. Enhanced communication systems that provide both positive and constructive feedback could improve farmer understanding of institutional requirements while building stronger relationships between producers and buyers.

All farmers expressed a willingness to understand college's preferred crops and varieties, with **Sandy Lane** emphasizing, "We need to have an open mind about what the customer wants, rather than what we want." Some farmers even expressed an interest in "shadowing" chefs to better understand how food is used in colleges.

5.6.4 Student and Community Engagement Opportunities

Student Awareness of Local Food Sourcing in College Dining

Student awareness of local food sourcing remains remarkably low across colleges. A student from St. Antony's noted having "very little" knowledge about procurement, stating "I'm not sure where meat/vegetables are from" and estimated that "they would have advertised it if they were using local food." Similarly, a student from Jesus College admitted having "no clue at all" about where their college procures food, noting "I don't see it declared anywhere." A student from Kellogg expressed surprise at local farm capacity, saying, "I didn't know that local farms had that much capacity to provide for the colleges."

However, some students indicated intuitive awareness without explicit information from their colleges. The Kellogg student noted having "a feeling that it's locally produced and organic" despite lacking clear indicators, while recognizing that their college "carefully select[s] ingredients that they put on table." Indeed, this perception aligns with the fact that Kellogg is one of the highest purchasers through OxFarmToFork.

Students broadly agreed that information regarding food sourcing should be made available through existing college communications channels including menus, social media accounts, and dining hall posters. One student observed, "Being transparent should never be harmful. If it is, that probably means there's something wrong."

Interest in Farm Visits and Educational Programming

Students showed genuine enthusiasm for educational opportunities around food sourcing. A student from St. Antony's expressed interest in "food-related education opportunities" during less intensive academic periods. A student from Jesus College highlighted the value of "education on the benefits that come with eating locally grown food," emphasizing how this could make "dishes exciting" and address student concerns about "lack of seasonality."

The desire for connection with food sources was particularly strong among some students. A student from Jesus College, who already participates in local veg box schemes, emphasized the importance of "connecting to the space that we live in" and the "human link" that comes from knowing "who has grown food and how it has been grown."

Perceptions of Food Quality and Sustainability

Student perceptions of current food quality varied significantly by college. A student from St. Antony's reported being "impressed with quality," while a student from Jesus College described it as "not very good quality," noting that vegetables are "often just boiled" and vegetarian options lack creativity. Another student praised their college's "really good chefs" and noted "variety in vegetarian meals is very good."

Regarding sustainability, students demonstrated sophisticated understanding of trade-offs. A student from Jesus College articulated multiple benefits of local food: "CO2 emissions," "shorter transport distances," and "human health" benefits, while also noting the "intangible" value of "connecting to the space that we live in." A student from another college showed concern about global food transportation and animal ethics, advocating for "pasture raised animals" as "more moral."

Willingness to Participate in Seasonal Menu Variations

Students expressed clear interest in seasonal menu variations, particularly when linked to local sourcing. A student from Jesus College specifically mentioned wanting "seasonality of the food" and gave the example of "Oxfordshire tomato stew" as appealing. This same student noted that "food tastes better if grown seasonally" and that people are "put off by lack of seasonality." A student from Somerville – where menus are published in advance – indicated that a creative menu with local produce would entice them to sign up for meal at the college rather than opting for their typical default of cooking at home. The same student complained about the "lack of spice" that is common in the UK kitchen, indicating an appetite for some of the more flavourful herbs that farmers have struggled to sell through OxFarmToFork.

A student from Kellogg suggested creative solutions, noting that colleges "have all this spare land sitting around Oxford" and questioned whether they "would be interested in piloting farming on unused land," suggesting "growing on spare allotments would make a lot of sense."

Understanding of Local Food System Benefits and Challenges

Students demonstrated nuanced understanding of both benefits and challenges. A student from Kellogg showed business acumen, noting that "chefs might not be keen on buying local food at higher prices especially if there are undergrads" who are "trying to bring down prices as much as possible."

Price sensitivity varied by student background. A student from St. Antony's, who noted being "on scholarship," said they "wouldn't mind if they added half a pound if you know that it's sourced responsibly." Meanwhile, a student from Kellogg mentioned that "28 pounds is too much for the food even though the food is great."

Students also recognized systemic challenges. A student from St. Antony's noted that "EU has a lot of subsidies for farmers – it’s hard for British farmers to compete," while a student from Jesus College emphasized that benefits extend beyond carbon footprint to include "biodiversity and nutrients."

Challenge: Students’ Brief Time in Oxford

The interviews confirmed the challenge that comes with students’ – especially graduates – brief period in Oxford. Term time is typically busy, and there is limited time to engage with topics that fall out of course content, indicating the potential for initiatives that are integrated into course programming. Even the JCR and MCR student sustainability representatives interviewed had limited visibility into or influence over college procurement processes. The lack of a centralized student representative across the university adds to the challenge of information dissemination and continuity of initiatives from term-to-term or year-to-year due to frequent changes in college representatives.

However, students also provided practical solutions for accessibility. A student from Jesus College suggested that "potentially the college could have a deposit scheme within the college to pick up a veg box," referencing successful undergraduate programs where the "university organized veg boxes that would come onto campus."

As one student from Kellogg pragmatically noted: "Students will do it if it's convenient and cheaper. The change needs to come from the institution."

The interviews reveal that while student awareness of current local sourcing remains low, there exists significant interest in transparency, education, and sustainable food systems when presented with accessible information and convenient participation options.

Educational and Volunteer Integration

Student involvement was noted by farmers as the “missing link” for the initiative’s success. **Traditional Garden Growers** expressed strong interest in increased student involvement, particularly through farm visits and taste testing programs. This suggests significant untapped potential for educational programming that could build understanding and support for local food systems while creating authentic community connections.

The current system operates primarily as transactional relationships "over a spreadsheet," missing opportunities for meaningful engagement that could strengthen institutional commitment to local sourcing. Enhanced volunteer programming could create more authentic community relationships while providing farms with additional labour support.

Cross-training opportunities where individuals work both as market gardeners and chefs could improve understanding and coordination between production and preparation activities, potentially reducing quality issues and improving menu planning.

5.6.5 Technology Platform Assessment and Improvement Needs

Current Tream Marketplace Functionality

The custom-built ordering and payment system provides basic marketplace functionality with invoice and delivery note generation capabilities. However, integration challenges with college procurement systems create additional administrative burden and limit seamless ordering processes.

Farmers appreciate that the substantial support from the system and the OxFarmtoFork team on managing invoices. However, payment processing delays of up to three months after sales create cash flow challenges for farms that operate with limited working capital. Enhanced payment processing and integration with institutional accounting systems could significantly improve financial management for participating producers.

Analytics and Planning Support

Current system limitations prevent effective demand forecasting and inventory management. Farmers lack visibility into "what produce was available versus what was purchased" and cannot identify unmet demand patterns that could guide production planning.

Standing order implementation for stable products like bread, eggs, and coffee could provide predictable revenue streams while reducing administrative overhead for both farmers and buyers. Enhanced reporting capabilities could support better inventory management and reduce waste from overproduction.

Chef Communication and Menu Planning Tools

The platform currently lacks tools for effective communication between chefs and farmers regarding availability, seasonal variations, and preparation requirements. Enhanced communication features could improve menu planning coordination and reduce quality issues through better expectation management.

Seasonal availability calendars and advance notification systems could help chefs plan menus around local product availability while giving farmers better demand visibility for production planning.

5.6.7 Competitive Landscape and Market Positioning

Established Competition Analysis

The dominant FoodQuad/Compass relationship represents the primary competitive challenge, offering economies of scale, consistent supply chains, and integrated ordering systems that small local suppliers struggle to match. FoodQuad offers limited transparency regarding sourcing locations and social and environmental data, contributing to an uneven playing field for local producers. Other local vegetable suppliers serve Oxford colleges through various channels (for example, FoodQuad's local procurement scheme), creating competition for the limited local procurement opportunities available. Consumer-facing competition includes established vegetable box schemes and farmers markets that compete for customer attention and premium pricing. These channels often provide better margins but lower volume than institutional sales.

Competitive Advantages and Differentiation

Local suppliers maintain several competitive advantages including superior freshness, sustainability credentials, and compelling local impact stories. Direct farmer relationships provide traceability and personal connections that large supply chains cannot replicate. The flexible ordering system through the digital marketplace offers responsiveness that larger suppliers may struggle to match, though this advantage requires reliable technology platforms and efficient logistics coordination.

Market Development Opportunities

The success of farm shops and vegetable box programs at participating farms suggests strong consumer demand for local products that could be leveraged to support institutional sales. Integration between consumer and institutional channels could provide farms with diversified revenue streams while building community support for local food systems. Furthermore, educational programming and community engagement could strengthen institutional commitment while building support for policy changes that favour local procurement in public institutions.

5.6.8 Policy and Regulatory Environment

Public Procurement Policy Gaps

Current public procurement policies lack specific preferences for local food sourcing, limiting institutional buyers' ability to prioritize local suppliers even when willing to pay premium prices. Enhanced policy frameworks that recognize local food system benefits could create more supportive purchasing environments.

Food safety licensing complexity creates barriers for small producers seeking to serve institutional markets. Streamlined certification processes that maintain safety standards while reducing administrative burden could enable broader participation in institutional supply chains.

Certification Cost-Benefit Analysis

Organic certification costs must be weighed against market premiums and competitive positioning. The mixed farmer perspectives on certification value suggest that institutional buyers could play a role in clarifying quality requirements and supporting certification costs where they provide meaningful market advantages. During the interviews with chefs and students, organic certification was not a primary topic of concern, indicating that the “local” aspect of production and transparency about production practices is more important than certification given the current state of consumer awareness and education.

6. Recommendations

Based on the assessment of the OxFarmToFork initiative’s producer impact, environmental outcomes, and partnership dynamics, the following strategic recommendations are proposed to strengthen the initiative’s effectiveness and sustainability. These recommendations address four critical areas that emerged as priorities through farmer interviews and operational analysis: partner engagement and market development, data collection and measurement, logistics and infrastructure development, and business model innovation.

6.1 Partner Engagement and Market Development

Enhance Educational Programming and Stakeholder Engagement

Student and Chef Education Initiatives

Implement comprehensive educational programming that connects students and college staff with local food production realities. **Traditional Garden Growers** expressed strong interest in hosting student farm visits and taste testing programs, indicating significant untapped potential for building understanding and support. Develop structured programs including:

- Seasonal farm visits integrated with academic curricula
- Chef training workshops on specialty product preparation and seasonal menu planning
- Student and chef taste testing events that introduce unfamiliar products like sorrel and edible flowers, integrated with GRFFN testing
- Cross-training opportunities where individuals experience both farming and food service perspectives (e.g. farmer visits to learn about chef preparation methods in college kitchens)

These programs should move beyond transactional relationships "over a spreadsheet" to create authentic community connections that strengthen institutional commitment to local sourcing.

Diversify Institutional Partnerships

Address the critical seasonal demand mismatch by expanding partnerships beyond colleges to create year-round market stability. The summer gap when "Oxford is really quiet" while farms reach peak production requires systematic solutions:

- **Restaurant Partnerships:** Develop formal relationships with mid-tier restaurants that appreciate quality while being less demanding about visual perfection than institutional partners
- **Hospital and Healthcare Partnerships:** Explore opportunities with local healthcare institutions that maintain consistent food service throughout the year
- **Summer Conference Demand:** Engage with Oxford colleges to understand menu requirements during summer conference season to align with advanced menu planning timelines

This diversification strategy would provide farmers with predictable revenue streams while reducing dependence on volatile college purchasing patterns.

6.2 Data Collection and Measurement Framework

Implement Streamlined Monitoring Systems

Standardized Measurement Framework

Develop simple, farmer-friendly frameworks that capture meaningful impact data without creating excessive administrative burden. The current lack of systematic monitoring limits the initiative's ability to demonstrate value and guide improvements. Priority measurements should include:

Impact	Metric	Definition	Tools	Responsibility	Frequency
Economic Indicators	Revenue	Total value of revenue through OxFarmTo Fork initiative	Tream (platform)	OxFarmToFork	Monthly
	Percent Listed Produce Sold	Percentage of produce sold, out of total listed on platform	Tream (platform)	OxFarmToFork	Monthly
	Infrastructure Investment	Summary of infrastructure investments made possible through OxFarmToFork		OxFarmToFork	Annual
Environmental Metrics	Biodiversity Checklist	Simple list of on-farm biodiversity practices	Excel template	Farmers	Annual
	Biodiversity Counts (Plants, Insects)	Total number of unique plant and insect species per 100M transect	eSurveyor (plants) iNaturalist (insects)	Farmers / Community volunteers	5-6 times / year
	Brix Testing	Applying GRFFN methodology to measure concentration of dissolved solids, as proxy for nutrient density	GRFFN	Farmers / Community Volunteers	Monthly
	Soil Health	Assessment of on-farm soil health	Soil Mentor (app)	Farmers	Quarterly
	Water Usage Patterns	Farmer observation of drought/ flood	Soil Mentor (app)	Farmers	Quarterly

		conditions and associated on-farm water usage; if possible, total volume of water used			
Social Outcomes	Number of Employees (Full-Time, Part-Time)	Total number of employee individuals (full-time and part-time)		Farmers	Annual
	Wage Standards	Adherence to Living Wage standards		Farmers	Annual
	Community Engagement	Number of community engagement events hosted, including description of event and photos to share on college social media		Farmers	Quarterly

This proposed measurement framework is designed to optimize for simplicity, while aligning metrics with farmer decision-making timelines. Future focus areas for consideration include greenhouse gas emissions measurement, student engagement surveys, and chef satisfaction surveys.

Citizen Science Integration

Measurement should leverage farmer knowledge and volunteer networks to create sustainable data collection systems**. Traditional Garden Growers'** soil sampling partnership with Reading University demonstrates effective academic collaboration models. Implement:

- **Community-Led Monitoring:** Train farmers and community members (e.g. veg box members) in simple data collection techniques that integrate with existing operations
- **Volunteer Engagement:** Utilize volunteers (e.g. Oxford City Farm) for systematic observation and recording

- **Digital Platforms:** Leverage mobile-friendly tools that enable real-time data entry without disrupting farm operations

Traditional Gardens Growers and **Sandy Lane** indicated veg box scheme participants would likely be willing to participate in biodiversity monitoring. **Worthy Earth** and **Oxford City Farm** also indicated that members of their volunteer networks would be interested in contributing to measurement studies, assuming that clear training and instructions are provided. “If there is a standardized way to collect and deposit and make use of this information – we are very happy and excited to do that,” **Oxford City Farm** noted.

Keep Measurement Simple

Avoid over-complication that could overwhelm small-scale operations already facing resource constraints. Focus on core indicators that provide actionable insights rather than comprehensive academic assessments. Prioritize measurements that farmers find valuable for their own planning and decision-making.

Biodiversity and Carbon Credits

Consider policy-driven schemes like Biodiversity Net Gain and carbon credits to create alternative income streams for farmers. Partner with university researchers and partners to educate farmers on opportunities to leverage these opportunities, as well as required measurement approaches to qualify for these schemes.

Future studies should consider the integration among biodiversity, soil health, and nutrition outcomes, in order to contribute to the nascent literature on the Biodiversity – Soil Health – Nutrition nexus.

Enhanced Market Intelligence

Demand Forecasting and Analytics

Address farmers’ request for “more data on what is selling and what isn’t” by implementing enhanced reporting capabilities. Insights from the OxFarmToFork team could include:

- **Seasonal Demand Patterns:** Historical analysis to guide production planning
- **Product Performance Metrics:** Clear visibility into successful and challenging products
- **Unmet Demand Identification:** Analysis of what chefs want but aren’t getting from current suppliers

Ideally, these insights would be automated through the Tream platform to minimize manual work for the OxFarmToFork team. This market intelligence would significantly improve production planning accuracy and reduce waste from overproduction while identifying expansion opportunities. To avoid all farmers migrating to the same in-demand crops, it would be helpful to develop an initiative-wide strategy for which farmers will focus on growing specific in-demand items.

6.3 Logistics and Infrastructure Development

Quality Control and Cold Chain Management

Standardize Post-Harvest Handling

Address the systematic cold chain issues that multiple farmers identified, particularly problems with wilted salad leaves. Implement:

- **Rapid Cooling Protocols:** Ensure all farms have adequate refrigeration capabilities for immediate post-harvest cooling
- **Standardized Packaging:** Develop consistent packaging standards that maintain quality while presenting professional appearance
- **Transport Coordination:** Work with Velocity and other partners to ensure refrigerated transport through the delivery chain

Professional Standards Implementation

Modern institutional kitchens expect products to arrive “washed and ready to go,” requiring farms to match commercial wholesale standards. Support farms in developing centralized processing capabilities that meet these requirements while maintaining cost effectiveness.

Delivery Timing and Coordination

Optimize Delivery Schedules

Address Friday delivery timing problems that create challenges for college operations. Coordinate with institutional buyers to identify optimal delivery windows that support weekend food service while accommodating farmer logistics. Collaborate with institutional buyers to align meal planning schedule with OxFarmToFork product uploads on Tream and delivery timelines.

Enhanced Communication Systems

Develop better feedback mechanisms beyond the current pattern where “farmers only hear feedback when it is negative.” Implement structured communication tools that provide both positive reinforcement and constructive guidance for continuous improvement. For example, consider implementing a “review” system in Tream where chefs can rate produce on a scale of 1-5 and log any comments or complaints. Encourage colleges to share images of produce in use during college meals to enhance the sense of community and knowledge sharing.

Infrastructure Investment Priorities

Cold Storage Development

Support Worthy Earth's vision of refrigeration space as "communal good" by exploring shared infrastructure investments. Develop regional cold storage facilities that serve multiple farms while providing economies of scale.

Water Security and Management

Address the critical water constraints that affected Sandy Lane and other farms. Priority investments should include:

- **Water Infrastructure Development:** Support reservoir construction and collection pond systems
- **Irrigation System Upgrades:** Enable more precise water management and reduced waste
- **Technical Expertise Access:** Provide farmers with professional water management system design guidance

The missing expertise on "this is the system you need" represents a knowledge gap that systematic support could address effectively.

6.4 Business Model Innovation and Sustainability

Contracted Growing Pilot Programs

Implement Pre-Purchasing Agreements

Pilot contracted growing arrangements with colleges that **Traditional Garden Growers** noted "would provide a great amount of predictability." Design contracts that:

- **Balance Risk and incentive:** Address Sandy Lane's concern about pressure while providing planning security
- **Include Crop Insurance:** Protect both farmers and buyers against weather and pest-related losses
- **Enable Seasonal Planning:** Allow colleges to plan menus around guaranteed local product availability

Worthy Earth Expansion Model

Support Worthy Earth's community-integrated growing model that combines contracted food production with educational and community engagement opportunities. This approach addresses economic sustainability while building community connection and support.

Strategic Partnership Development

Work within Existing Systems

Rather than competing directly with the established Food Quad/ Compass relationship, explore collaborative opportunities that leverage existing institutional commitments and promote wholesaler transparency. The 20-year partnership and recent five-year extension indicate long-term stability that local food initiatives should work with rather than against.

Advocate for Sustainable Procurement Policies:

Work with University of Oxford leadership and student advocates to designate "preferred supplier" status for OxFarmToFork, while pushing for increased Environmental, Social, and Governance transparency for all the University's wholesale suppliers to level the competitive playing field. Work towards enforceable institutional commitments to at least 5 percent local food procurement, with a growing percentage year-over-year.

Develop Complementary Services

Focus on providing specialized products and services that large suppliers cannot match effectively:

- **Specialty and Artisanal Products:** Emphasize baby vegetables, edible flowers, and unique varieties
- **Educational and Community Service:** Integrate food supply with educational programming and community engagement
- **Seasonal and Event-Specific Supply:** Provide flexible, responsive service for special occasions and seasonal menu variations

Pay-for-Success Model Exploration

Trial Performance-Based Contracting

Explore pay-for-success models with colleges that align financial incentives with desired outcomes across economic, environmental, and social dimensions. This approach could:

- **Reward Environmental Stewardship:** Provide premiums for documented biodiversity and soil health improvements
- **Incentivize Community Engagement:** Compensate for educational programming and volunteer coordination
- **Support Quality and Service:** Reward consistent delivery of high-quality products and reliable service

Multi-year Commitment Framework

Given the five-year timeline for developing effective natural pest management systems, design support frameworks that provide multi-year commitments rather than annual project cycles. This longer-term perspective would enable farmers to make infrastructure investments and develop ecological systems that require time to mature.

6.5 Implementation Priorities

The assessment findings suggest that addressing logistics and infrastructure challenges should receive immediate priority, as these directly affect product quality and customer satisfaction. Simultaneously, partner engagement initiatives can build the community support and market diversification necessary for long-term sustainability.

Data collection improvements should be implemented gradually to avoid overwhelming farmer capacity, while business model innovations require careful piloting to ensure they strengthen rather than disrupt existing successful relationships.

The overarching goal should be creating a local food system that is economically viable for farmers, environmentally beneficial, and socially meaningful for the broader Oxford community while working constructively within existing institutional frameworks rather than attempting to replace them entirely.

7. Conclusion

The OxFarmToFork initiative demonstrates measurable benefits across nutritional, economic, and environmental dimensions. Through a combination of agroecological practices, short supply chains, and community-based engagement, the initiative delivers fresher, more nutritious food while supporting local livelihoods and ecological resilience. By connecting small-scale producers directly with institutional buyers such as Oxford colleges, the program not only strengthens regional food systems but also improves the transparency and traceability of food sourcing.

7.1 Critical Success Factors

Several factors underpin the success of OxFarmToFork. First, strong relationships between producers and buyers—built on trust, responsiveness, and direct communication—have been central to the initiative's effectiveness. Second, flexible logistics systems that prioritize quality over sheer efficiency allow producers to meet institutional needs without compromising the integrity of their products. Third, premium pricing structures recognize the true cost of sustainable production, enabling farmers to invest in practices that benefit both people and the planet. Finally, the integrated approach—one that combines economic viability with environmental stewardship and social value—has made the initiative both resilient and impactful.

7.2 National Model for Sustainable Procurement

Good Food Oxfordshire is now well-positioned to become a national model for sustainable institutional procurement. Achieving this vision will require continued investment in producer support, delivery and cold-chain infrastructure, and the development of predictable, values-driven markets. These efforts must be backed by robust and transparent evidence of impact—nutritional, economic, and ecological—to secure stakeholder buy-in and attract long-term funding.

7.3 Regional Replication and Policy Advocacy

The next step is to codify lessons learned into a transferable model or toolkit that other cities and regions can adapt to their local contexts. At the same time, policy advocacy should focus on enabling local procurement through supportive frameworks at institutional, county, and national levels. This includes aligning public procurement rules with sustainability goals and incentivizing institutions to partner with local food networks.

7.4 Aligning Local Action with Global Goals

While the Sustainable Development Goals (SDGs) are global in scope, their impact is ultimately realized at the local level. The OxFarmToFork initiative is a powerful example of this principle in action—addressing SDG targets related to health (SDG 3), responsible consumption and production (SDG 12), decent work and economic growth (SDG 8), and life on land (SDG 15), among others. Through an integrated approach centred on local procurement, biodiversity, soil health, and community well-being, the initiative is generating meaningful and measurable progress toward sustainable food systems. Future improvements will further embed OxFarmToFork within the local economy, ensuring its continued growth, profitability, and replicability.

8. References

Banham, D., & Faith, R. (2014). Anglo-Saxon Farms and Farming (First published in paperback). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199207947.001.0001

Barks, P., 2024. Study reveals troubling truth about the majority of the produce we eat: “Nutrients are lost.” Cool Down. URL https://www.thecooldown.com/shop/fresh-produce-shipping-lost-nutrients/ (accessed 7.3.25).

Bavec, M., & Bavec, F. (2015). Impact of Organic Farming on Biodiversity. InTech. doi: 10.5772/58974.

Berti, G., & Mulligan, C. (2016). Competitiveness of Small Farms and Innovative Food Supply Chains: The Role of Food Hubs in Creating Sustainable Regional and Local Food Systems. Sustainability, 8(7), 616. https://doi.org/10.3390/su8070616

BENGTSSON, J., AHNSTRÖM, J. and WEIBULL, A.-C. (2005), The effects of organic agriculture on biodiversity and abundance: a meta-analysis. Journal of Applied Ecology, 42: 261-269. https://doi.org/10.1111/j.1365-2664.2005.01005.x

Conner, D. S., Nowak, A., Berkenkamp, J., Feenstra, G. W., Van Soelen Kim, J., Liquori, T., & Hamm, M. W. (2011). Value Chains for Sustainable Procurement in Large School Districts: Fostering Partnerships. Journal of Agriculture, Food Systems, and Community Development, 1(4), 55–68. https://doi.org/10.5304/jafscd.2011.014.005.

Department for Environment, Food and Rural Affairs (DEFRA). (2025). Understanding biodiversity net gain. *GOV.UK*. https://www.gov.uk/guidance/understanding-biodiversity-net-gain#who-bng-rules-affect

Department for Environment, Food and Rural Affairs. (2024, December 11). United Kingdom Food Security Report 2024: Theme 3: Food Supply Chain Resilience. *GOV.UK*. https://www.gov.uk/government/statistics/united-kingdom-food-security-report-2024/united-kingdom-food-security-report-2024-theme-3-food-supply-chain-resilience

Department for Environment, Food and Rural Affairs. (2025, April 9). Food statistics in your pocket. *GOV.UK*. https://www.gov.uk/government/statistics/food-statistics-pocketbook/food-statistics-in-your-pocket

Department for Levelling Up, Housing & Communities. (2022). Land use statistics: England 2022, Gov.UK, https://www.gov.uk/government/statistics/land-use-in-england-2022/land-use-statistics-england-2022.

Dragonetti, Wilma. (2023). The Secrets to Food Procurement, EuroCities, https://eurocities.eu/stories/the-secrets-to-food-procurement/.

Dubos, N., Préau, C., Lenormand, M., Papuga, G., Monsarrat, S., Denelle, P., Le Louarn, M., Heremans, S., May, R., Roche, P., & Luque, S. (2022). Assessing the effect of sample bias correction in species distribution models, Ecological Indicators, Volume 145, 109487, ISSN 1470-160X, https://doi.org/10.1016/j.ecolind.2022.109487.

EUR-Lex. (2007). Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, European Union, https://eur-lex.europa.eu/eli/reg/2007/834/oj/eng.

Foodbuy. (n.d.). *The colleges of University of Oxford*. https://www.foodbuy.co.uk/case-studies/the-colleges-of-university-of-oxford/

Furness, E., Sanderson Bellamy, A., Clear, A., Mitchell Finnigan, S., Meador, J. E., Mills, S., Milne, A. E., & Sharp, R. T. (2022). Communication and building social capital in community supported agriculture. Journal of agriculture, food systems, and community development, 12(1), 63–78. https://doi.org/10.5304/jafscd.2022.121.009

Garnett, P., Doherty, B. & Heron, T. Vulnerability of the United Kingdom's food supply chains exposed by COVID-19. Nat Food 1, 315–318 (2020). https://doi.org/10.1038/s43016-020-0097-7

Gray, S., Orme, J., Pitt, H., & Jones, M. (2017). Food for Life: evaluation of the impact of the Hospital Food Programme in England using a case study approach. JRSM Open, 8(10), 2054270417712703–2054270417712703. https://doi.org/10.1177/2054270417712703

Harris, D., Lott, M., Lakins, V., Bowden, B., & Kimmons, J. (2012). Farm to Institution: Creating Access to Healthy Local and Regional Foods, Advances in Nutrition, Volume 3, Issue 3, Pages 343-349, ISSN 2161-8313, https://doi.org/10.3945/an.111.001677.

Hawes, C., 2022. Farmland Biodiversity, Soil Health & Sustainability Assessment. [Online] Available at: https://csc.hutton.ac.uk/

Harris, L. (2022). What Are Food Miles? Connect4Climate, https://www.connect4climate.org/initiative/what-are-food-miles.

Hoffmann, S., Steiner, L., Schweiger, A. H., Chiarucci, A., & Beierkuhnlein, C. (2019). Optimizing sampling effort and information content of biodiversity surveys: a case study of alpine grassland, Ecological Informatics, Volume 51, 2019, Pages 112-120, ISSN 1574-9541, https://doi.org/10.1016/j.ecoinf.2019.03.003.

Hortal, J., Lobo, J.M. An ED-based Protocol for Optimal Sampling of Biodiversity. Biodivers Conserv 14, 2913–2947 (2005). https://doi.org/10.1007/s10531-004-0224-z

Hunter, D., Borelli, T., & Gee, E. (Eds.). (2020). Biodiversity, food and nutrition a new agenda for sustainable food systems (1st ed.). Routledge.

Lawrence, A. & Hackett, M. (2014). Multifunctional Role of Field Margins in Arable Farming.

Institute for Government. (2020, March 17). Common Agricultural Policy. https://www.instituteforgovernment.org.uk/article/explainer/common-agricultural-policy

Joshi, A., Azuma, A.M., Feenstra, G., 2008. Do Farm-to-School Programs Make a Difference? Findings and Future Research Needs. J. Hunger Environ. Nutr. 3, 229–246. https://doi.org/10.1080/19320240802244025

Kantar Worldpanel. (2024, December 4). Market share of grocery stores in Great Britain from January 2017 to November 2024. *Statista*. https://www.statista.com/statistics/280208/grocery-market-share-in-the-united-kingdom-uk/

Miller, C., & Jones, L. (2010). *Agricultural value chain finance: Tools and lessons*. Food and Agriculture Organization of the United Nations. https://www.fao.org/4/i0846e/i0846e.pdf

Love, E., Jablonski, B. B. R., Thilmany McFadden, D., & Bellows, L. (2025). A roadmap for modeling institutional and values-based procurement decisions in food supply chains. *Agricultural and Resource Economics Review*, 54(1), 109–137. doi:10.1017/age.2025.11

Mäder, P., Fliessbach, A. & Dubois, D., Gunst, L., Fried, P. & Niggli, U. (2002). Soil Fertility and Biodiversity in Organic Farming Science. Science (New York, N.Y.). 296. 1694-7. 10.1126/science.1071148.

Manikas, I., Malindretos, G., & Moschuris, S. (2019). A Community-Based Agro-Food Hub Model for Sustainable Farming. Sustainability, 11(4), 1017. https://doi.org/10.3390/su11041017.

Marshall, E.J.P. & Moonen, A.C. (2002). Field margins in northern Europe: their functions and interactions with agriculture, Agriculture, Ecosystems & Environment, Volume 89, Issues 1–2, Pages 5-21, ISSN 0167-8809, https://doi.org/10.1016/S0167-8809(01)00315-2.

Milners. (2024). Biodiversity net gain (BNG) and its implications for farmers. *Milners*. https://www.milnerslaw.co.uk/biodiversity-net-gain-bng-and-its-implications-for-farmers/

Montgomery, D.R., Biklé, A., 2021. Soil Health and Nutrient Density: Beyond Organic vs. Conventional Farming. Front. Sustain. Food Syst. 5. https://doi.org/10.3389/fsufs.2021.699147

Montgomery, D.R., Biklé, A., Archuleta, R., Brown, P., Jordan, J., 2022. Soil health and nutrient density: preliminary comparison of regenerative and conventional farming. PeerJ 10, e12848. https://doi.org/10.7717/peerj.12848

Monticelli, L. S., Labonté, A., Turpin, M., Biju Duval, L., Felten, E., Laurent, E., Matejicek, A., Vieren, E., Deytieux, V., Cordeau, S., & Vanbergen, A. J. (2022). Agroecological farming, flowering phenology and the pollinator–herbivore–parasitoid nexus regulate non-crop plant reproduction. Journal of Applied Ecology, 59, 2046–2058. https://doi.org/10.1111/1365-2664.14205

National Center for Appropriate Technology. (2019). *Community supported agriculture*. ATTRA Sustainable Agriculture. https://attra.ncat.org/publication/community-supported-agriculture/

Nixon, N., Bryant, M., Sheard, L., Padgett, L. & Doherty, B. (2025). A scoping review of the existing evidence linking school food procurement contract type with school food provision. PLOS ONE. 20. 10.1371/journal.pone.0305685.

Oxford History. (2024). The Covered Market, Oxford History. https://www.oxfordhistory.org.uk/high/tour/north/market.html

Oxfordshire County Council. (n.d.). Landscape and planning, Oxfordshire County Council, https://www.wildoxfordshire.org.uk/oxfordshires-nature/farming-and-wildlife.

Remijnse, M., Rohmer, S., Marandi, A., Woensel, T. (2025). Optimising agri-food supply chains: Managing food waste through harvest and side-stream valorisation, Journal of Cleaner Production, Volume 503, 2025, 145349, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2025.145349.

Ritchie, H. (2020). “Very little of global food is transported by air; this greatly reduces the climate benefits of eating local,” Published online at OurWorldinData.org. Retrieved from: https://ourworldindata.org/food-transport-by-mode

Papargyropoulou, E., Bridge, G., Woodcock, S., Strachan, E., Rowlands, J. & Boniface, E. (2024). Impact of food hubs on food security and sustainability: Food hubs perspectives from Leeds, UK, Food Policy, Volume 128, 102705, ISSN 0306-9192, https://doi.org/10.1016/j.foodpol.2024.102705.

Pavlis, R., 2019. Does Brix measure Nutrient Density of Food? gardenmyths.com. URL https://www.gardenmyths.com/nutrient-density-food-brix-refractometer/ (accessed 7.3.25).

Profile Tree (2025). The Rise of UK Farmers Markets: Stats, Trends, and the Future of Local Food, Profile Tree, https://profiletree.com/the-rise-of-uk-farmers-market-statistics/.

Soil Association. (2025, May 29). Update on the future of organic within the UK-EU SPS agreement. *Soil Association Certification Updates*. https://www.soilassociation.org/certification/certification-updates/2025/may/29/update-on-the-future-of-organic-within-the-uk-eu-sps-agreement/.

Sørensen, N. N., Tetens, I., Løje, H., & Lassen, A. D. (2016). The effectiveness of the Danish Organic Action Plan 2020 to increase the level of organic public procurement in Danish public kitchens. Public Health Nutrition, 19(18), 3428–3435. doi:10.1017/S1368980016001737.

Tay, M.J., Ng, T.H., Lim, Y.S. (2024), Fostering sustainable agriculture: An exploration of localised food systems through community supported agriculture, Environmental and Sustainability Indicators, Volume 22, 100385, ISSN 2665-9727, https://doi.org/10.1016/j.indic.2024.100385.

The Effects of Child Nutrition on Academic Performance: How School Meals Can Break the Cycle of Poverty, n.d. . World Food Program USA. URL https://www.wfpusa.org/articles/effects-child-nutrition-academic-performance-how-school-meals-can-break-cycle-poverty/ (accessed 7.3.25).

Tscharntke, T., Clough, Y., Wanger, T.C., Jackson, L., Motzke, I., Perfecto, I., Vandermeer, J. & Whitbread, A. (2012). Global food security, biodiversity conservation and the future of agricultural intensification, Biological Conservation, Volume 151, Issue 1, Pages 53-59, ISSN 0006-3207, https://doi.org/10.1016/j.biocon.2012.01.068.

UC Sustainable Agriculture Research and Education Program. 2017. "Values-based Supply Chains." What is Sustainable Agriculture? UC Division of Agriculture and Natural Resources. https://sarep.ucdavis.edu/sustainable-ag/values-based-supply-chains.

University of Oxford. "Sustainable Procurement." Finance Division. Accessed July 4, 2025. https://finance.admin.ox.ac.uk/sustainable-procurement.

U.S. Department of Agriculture, Agricultural Marketing Service. (2012). *Regional food hub resource guide*. https://www.ams.usda.gov/sites/default/files/media/Regional%20Food%20Hub%20Resource%20Guide.pdf

The Wildlife Trusts (2025). Frustration as Government Pauses the Sustainable Farming Incentive Scheme, The Wildlife Trusts, https://www.wildlifetrusts.org/news/frustration-government-pauses-sustainable-farming-incentive-scheme.

Wild Oxfordshire. (2022). Farming and Wildlife, Wild Oxfordshire, https://www.wildoxfordshire.org.uk/oxfordshires-nature/farming-and-wildlife.

WWOOF. (n.d.). *WWOOF - World Wide Opportunities on Organic Farms*. https://wwoof.net/

9. Appendices

Appendix A: Produce Grown by Farm

	Oxford City Farm	Sandy Lane Farm	Traditional Garden Growers	Worthy Earth
Leafy Greens & Salads	**Yes** 5-6 varieties lettuce; 10 varieties salad greens	**Yes** Chard, spinach, lettuce, celery	**Yes** Various salad greens	**Yes** Lettuce, various salad greens
Brassicas (Cabbage Family)	**Yes** 20-30 varieties; cabbage, fennel	**Yes** 40-50 varieties; kales, cabbages, brussels sprouts, fennel, kohlrabi, radish	**Yes**	**Yes** Cabbage
Root Vegetables	**Yes** 3-4 varieties; beetroot, carrots	**Yes** Carrots (3), beets (3), parsnips (1)	**Yes**	**Yes** Beetroot
Alliums (Onion Family)	**Yes**	**Yes** Leeks, onion, garlic	**Yes**	**Yes** Leeks
Solanaceae (Nightshade Family)	**Yes** Tomatoes, potatoes/sweet potatoes, aubergine (10 varieties)	**Yes** Potatoes (6)	**Yes** Potatoes	**Yes** Tomatoes, potatoes
Cucurbits (Squash Family)	**Yes** Corn, squash, pumpkins	**Yes** Squash/ pumpkin (25), sweet corn (4), courgette (10)	**Yes** Cucumber	**Yes** Squash, sweet corn
Legumes		**Yes** Climbing, dwarf, French, flag, borlotti beans		
Herbs	**Yes** 10-15 varieties	**Yes** Cilantro, coriander, parsley, fennel herb	**Yes**	**Yes**
Edible Flowers	**Yes**	**Yes**	**Yes**	**Yes**
Perennials	**Yes** Rhubarb, fruit trees, artichokes, raspberries, josta berries, sorrel, black currant, red currant, gooseberries, asparagus, grapes	**Yes** Raspberries, gooseberries, herbs (sage, rosemary, thyme)	**Yes** Artichokes, rhubarb, strawberries	**Yes** Oregano, sage, thyme, sea kale, green celery, artichoke, sorrel, rhubarb, perennial kale, and broccoli

Appendix B: Biodiversity – Habitat Feature Documentation (Checklist)

A habitat feature documentation checklist is a low-lift opportunity to document practices that are typically associated with supporting biodiversity.

	Oxford City Farm	Sandy Lane Farm	Traditional Garden Growers	Worthy Earth
Trees	**Yes** Allow trees to rot in place	**Yes** Fruit trees; trees in chicken runs for natural cover	**Yes** Fruit trees between plots	**Yes** Fruit tree integration
Hedgerows	**Yes** "Farm is a giant hedgerow"	**Yes**	**Yes**	**Yes**
Field Margins	**Yes**	**Yes**	**Yes**	**Yes** Small scale – "flowers are around the edge of everything"
Flower Strips	**Yes**	**Yes**	**Some**	**Yes**
Water Features	**Yes** One wildlife pond; don't draw from it	**Yes** Pond with ducks and toads	**Yes** Pond with wild ducks	**Yes** Pond with ducks
Nest Boxes	**Yes**	**Yes** Owl in barn	**Yes** Tawney owls reported and tagged	**Some**
Tillage	**No Till**	**Low/Medium Till** No-till is very difficult for organic farm; plow to get rid of weeds	**Low Till**	**Low/Medium Till**
Cover Crops	**Sometimes** Intercropping with brassicas to act as a weed suppressant	**Yes**	**Yes**	**Yes** Don't take crops out; plant into remains of previous rotation
Other practices	Swales and ditches for flooding management	Beetle banks; companion planting; nettles as natural fertilizer	Leaving areas between plots un-mowed; tall long grasses	Tall grass corridors between production plots; reduced mowing for beneficial insects; nettles as natural fertilizer
Genetically Modified Organisms	**No**	**No**	**No**	**No**
Synthetic Fertilizers	**No**	**No**	**No**	**No**

Appendix C: Biodiversity – Animals / Insects

Birds and Other Animal observations are based on farmer insights stated during the interviews and field visits.

Insect observations are based on researcher field study of a representative plot (100M transect) on each farm, using the iNaturalist app.

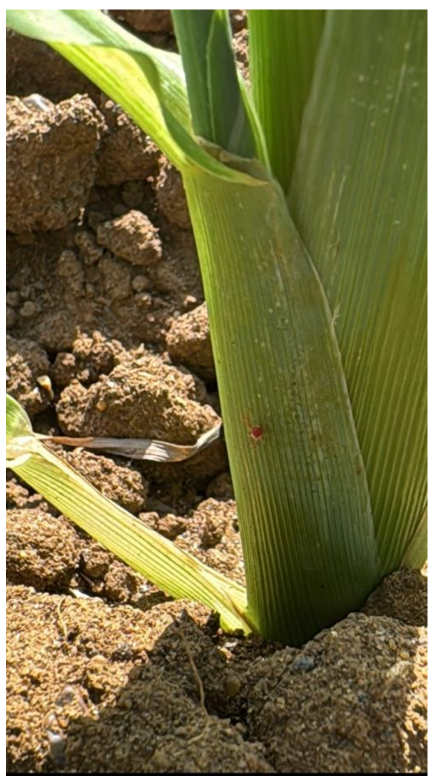
Species counts are illustrative based on a single 100M transect and thus are not a comprehensive representation of the entire farm.

	Oxford City Farm	Sandy Lane Farm	Traditional Garden Growers	Worthy Earth
Birds	**2+** Various tit species, ducks	**2+** Pigeons, ducks	**3+** Gold finches, sparrow hawk, ducks	**2+** Pigeons, ducks
Insects	**6+** Bees, slugs, anthropods, moths (Scarlet tiger), winged and once winged	**5+** Flies (Schizophoran flies, Brachyceran flies), mites (Whirligig) prostigs, anthropods	**2+** Black-spotted Lady beetles, anthropods	**4+** Lady beetles (Greater Lady Beetles, Black spotted), winged and once winged
Other Animals	**2+** Badgers, foxes		**1+** Rabbits (booming after disease wiped out rabbit population)	**1+** Moles

1) Black-spotted Lady Beetle

2) Anthropod

3) Schizophoran Fly



4) Whirligig Mite

Appendix D: Biodiversity – Plants (Field Margins)

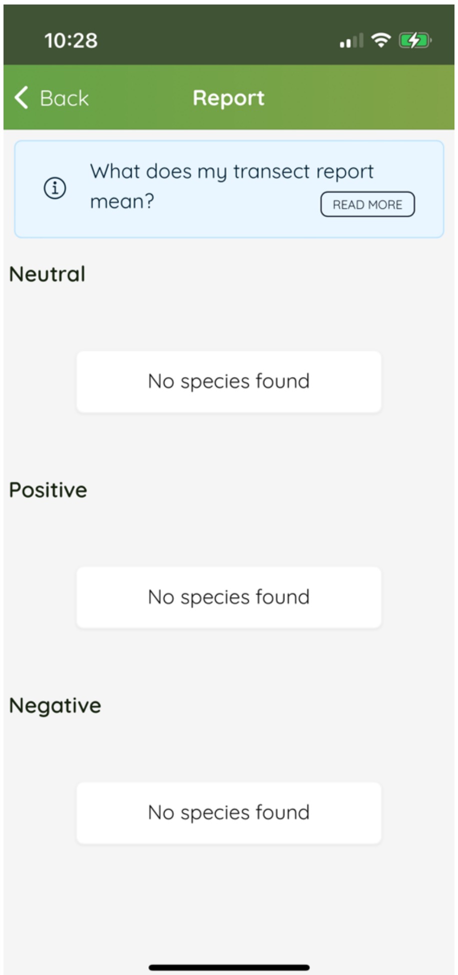
Observations made using e-Surveyor app, based on researcher field study of a representative plot (100M transect) on each farm.

	Oxford City Farm	**Sandy Lane Farm**	**Traditional Garden Growers**	**Worthy Earth**
Total Count	14	9 [2]	14	15
Field Margin Studied	Edge of veg patch along rear corner of farm	Edge of potato field and hedgerow	Edge of potato and bean fields, along hedgerow	Edge of veg patch, along fruit trees
Species Common Name	Black-bindweed Cock's-foot Creeping Buttercup Creeping Cinquefoil Cut-leaved Crane's-bill Goat's-rue Hedge Bindweed Herb Bennet Purple Lettuce Petty Spurge Prickly Sow-thistle Redshank Ternate-leaved Cinquefoil; Wood Burdock	American Fox-sedge Broad-leaved Dock Common Knapweed Creeping Thistle Field Horsetail Noble Yarrow Oxeye Daisy Sun Spurge	Annual Meadow-grass Bulbous Buttercup Cock's-foot Creeping Buttercup Field Bindweed Golden Ragwort Musk Thistle Prickly Sow-thistle Small-flowered Crane's-bill Smooth Hawk's-beard Smooth Sow-thistle Tormentil Yorkshire-fog	Annual Mugwort Beet Bulbous Buttercup Field Bindweed Garden Radish Greater Lettuce Love-in-a-mist Opium Poppy Pot Marigold Smooth Sow-thistle Sunflower Wild Pansy

[2] These study results do not fully capture the biodiversity observed across Sandy Lane Farm. The area surrounding polytunnels had substantial biodiversity

Other flowering plants		1	1	3

E-Surveyor Observations and Implementation Challenges:



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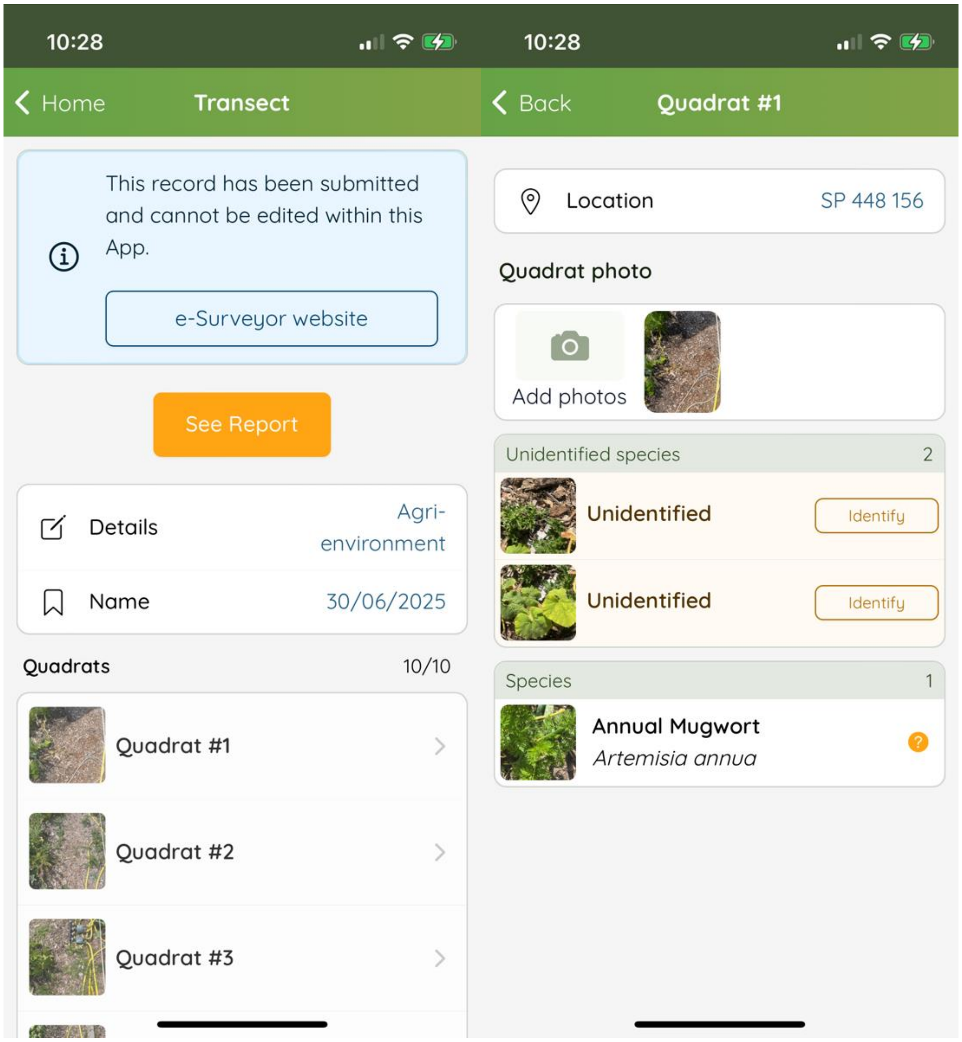
The e-Surveyor app is supposed to generate a report that flags biodiversity as Positive, Negative, or Neutral, but this feature did not work.



The app offers a user-friendly interface to record detailed transect observations, divided into 10 quadrats (1 meter observation area, each 10 meters apart). About half of the observations were "unidentified" by the app, especially grasses and weeds.

- E-Surveyor and other apps have different data structures, resulting in challenges for data aggregation if different platforms are used.
- Observations in this study were limited to one 100M transect per farm, so they are not a comprehensive reflection of the farm. 45-60 minutes should be allocated for plant and insect observation per 100M transect.
- Percent certainty is included in the app, but not in the data download, so it is challenging to return to reference the certainty.
- Verification of outputs is limited if researchers do not have specialized biodiversity experience.
- If you aren't careful to save a study as a draft, it is easy to delete all observations.
- Internet access is needed for the app to run successfully.

- The approach of counting the unique number of species is intended to be a lower-effort and more accessible approach; however, this metric misses several things, including: the number of each species present, genetic diversity within a species, and the unique biodiversity value of each species.
- Due to the different size of plots across farms, the same 100M transect covers different numbers of plots. For example, a 100M transect covered 4 different plots of crops at Traditional Garden Growers, while it only covered 1 plot at Sandy Lane Farm.
- Field biodiversity is very different from biodiversity in and around polytunnels, which should be investigated further in the future.

Appendix E: Detailed GRFFN Tool Metrics and Results – Brix Average

	Brix Table Range (Poor – Excellent)[3]	Oxford City Farm	Sandy Lane Farm	Traditional Garden Growers	Worthy Earth
Beetroot	6 – 12	**12.25**			**11 – Golden 15 – Candied**
Broad Bean	3 – 15	**16.5**	**11.5**	**11**	
Courgette	6 – 14		**4**		
Cucumber	4 –12		**3**		
Green Bean	4 – 10		**6**		
Kale	8 – 16	**5**	**9**		
Kohlrabi	6 – 12		**6**		
Lettuce – Lolla Rosa	4 – 10				**2.5**
Lettuce – Red Salad Bowl	4 – 10	**5**			
Lettuce – Volmain	4 – 10	**3.5**			
New Potato	3 – 8			**5**	
Radish	4 – 10	**5**			
Raspberry	6 – 14			**12.5**	
Tomato	4 – 12				**8**
Turnip	4 – 10			**7**	

Key – Brix Table	Below "Poor"	Poor - Average	Good - Excellent	Above "Excellent"

GRRN Testing Methodology Notes and Implementation Challenges:

- Conducting a comprehensive Brix test should include a reference point to at least 3 other comparable food products (e.g. 3 products purchased from various grocery stores ranging from organic to conventional) and should include a qualitative

[3] Brix tables were created in the early 1970s by soil scientist Dr. Carey Reams. Reams suggested that when Excellent Brix values were achieved, the plant will: 1) be completely resistant to all pests and diseases, give higher yields of more uniform growth, 3) taste better, and 4) have a longer shelf life.

analysis of taste, resistance to pests and diseases, seed viability, and yield. Each crop was tested 3 times (ideally on 3 separate pieces of produce) to create a Brix average for the crop for each farm.

- This preliminary study is focused on familiarizing farmers with the use of the tool and included only the measurement of the Brix value of the crop (and not supermarket alternatives), and in some cases a taste test where possible.
- An attempt was made to test the same types of produce across farms, but not all farmers were growing the same produce or had ripe produce available.
- One farmer suggested adding "smell" as an additional criterion to taste to capture another dimension of sensory perception.
- Brix values are provided by crop type, but not by specific crop variety. For example, there was substantial variation between the different varieties of beetroot at Worthy Earth.
- Some crops (like parsley and certain leafy greens) could not be testing because no liquid could be extracted from the crop.

Appendix F: Interview Guides (Farmer, Student, Chef)

Appendix F-1. Farmer Interview Guide

Warm-Up Questions

1. How long have you been farming here? What drew you to this location/farming?

2. What would you say makes your farm unique or special?

3. Can you give me a quick overview of what you grow/produce? What are your crops?

Current Practices

4. What farming methods do you use? (Organic, biodynamic, regenerative, no dig, etc.)

Follow-up: How did you choose these methods?

Follow-up: What is stopping you from certifying organic?

5. How do you make decisions about what to grow each year? (Market demand, soil rotation, personal preference, water, etc.)

Follow-up: Annuals? Perennials?

6. How has your farming evolved over the years (may only be a short time)? What changes have you made and why? Will you plant differently next year?

7. What is the size of the farm? How much of it is being cultivated?

Follow-up: Could more be put to field scale?

8. What are the biggest challenges you face in your farming operation? *Probes:* Weather, pests, labour, equipment, regulations, markets

Good Food Oxfordshire Partnership

Partnership Experience

9. How did you first get involved with Good Food Oxfordshire? What attracted you to participate?

10. Can you describe what produce you supply?

11. How does selling through the digital marketplace compare to your other sales channels? *Probes:* Pricing, volume requirements, timing, communication

12. What other sales channels do you have other than GFO?

13. What happens if you don't sell your produce?

Economic & Employment Impact

14. What economic benefits have you seen from this partnership? *Probes:* Price premiums, revenue stability, cash flow timing

15. Have you had to make any investments or changes to meet OxFarmToFork requirements? *Probes:* Equipment, certifications, labour, storage, transport

16. How many people do you employ? Full-time v. Part-time v. Volunteer?

17. Have you increased the number you employ since being part of OxFarmToFork?

18. Wages: The agroecological charter includes a focus on worker wellbeing and living wage – how much are you paying your employees?

Operational Challenges & Benefits

19. What challenges have you encountered in supplying to institutional buyers through OxFarmToFork? *Probes:* Volume consistency, delivery schedules, quality standards, paperwork

20. What support have you received from Good Food Oxfordshire? How helpful has this been?

21. How predictable is the demand from colleges? Can you plan your growing around it?

Relationship & Communication

22. How would you describe your relationship with OxFarmToFork?

23. Do you have any direct contact with chefs, students, or college staff? What's that like?

24. Have you received any feedback about your produce from the end users? How does the feedback mechanism work?

25. How important is the 'local' aspect to you and your customers?

Biodiversity & Environmental Practices

Current Biodiversity Features

26. Can you show me around and point out the different habitats or wildlife areas on your farm? *Fill out biodiversity checklist spreadsheet*

27. What wildlife do you regularly see on your farm? Any that you're particularly proud of or surprised by?

Conservation Practices

28. What specific practices do you use that benefit wildlife or biodiversity? *Probes:* Hedgerows, field margins, flower strips, ponds, nest boxes, reduced tillage, cover crops

29. Are any of these practices required by certifications or schemes you're part of?

30. How do you balance production needs with environmental considerations?

Environmental Monitoring

31. Do you currently track or monitor biodiversity on your farm? How?

32. Would you be interested in using digital tools like iNaturalist to document wildlife?

If yes: What would make that easy/appealing for you?

If hesitant: What concerns do you have?

33. What other metrics do you track? Soil health? Nutrient density? GHG emissions?

34. Do you have community members who will be able to support this initiative moving forward?

Product Quality & Nutrition

Quality Perspectives

35. How do you think your produce compares to what's available in supermarkets? *Probes:* Taste, appearance, nutritional value, freshness

36. What farming practices do you think most contribute to the quality of your produce?

37. What are your perceptions of the GRFFN tool? Are there concerns that you have with implementing the tool and related processes?

Harvest & Handling

38. Do you do anything special in terms of harvesting or post-harvest handling?

39. How do you package and present your produce?

40. Are there any quality assurance processes in place? Any related challenges or support that would help from GFO?

Future Perspectives & Recommendations

Partnership Development

41. How would you like to see your relationship with Good Food Oxfordshire develop?

42. What would make it easier for you to supply more to local institutions?

Broader Impact

43. What do you see as the main benefits of local food systems like this initiative?

44. If you were advising other farmers about working with institutional buyers, what would you tell them?

Support Needs

45. What kind of support would be most valuable to you going forward? *Probes:* Training, equipment, marketing, certification assistance, networking

Closing

46. Is there anything important about your farm or this partnership that I haven't asked about?

47. Do you have any questions for me about this research or how the information will be used?

Appendix F-2. Chef Interview Guide

Daily Practices and Sourcing

1. Can you give me a quick overview of your daily responsibilities?

2. How do you currently source ingredients? What proportion is local?

Produce Quality & Experience

3. How would you compare the local produce to standard suppliers? (Taste, freshness, appearance, variety, consistency)

4. Are there particular ingredients where you notice a major difference?

5. For our research comparing local farm produce to supermarket alternatives - what would be the most meaningful contribution or expected outcome? (Healthy food, timely delivery, etc.)

6. How well do local suppliers meet your needs in terms of volume, timing, and consistency?

7. Are there specific logistical or administrative challenges? (Delivery schedules, order forms, payment systems, traceability, certifications)

8. Have you had to adapt your procurement process to include local producers?

9. How is communication with the local farms and Good Food Oxfordshire team?

Institutional Priorities & Local Food Value

10. To what extent does your college prioritise sustainability or ethical sourcing?

11. Who decides what gets sourced locally?

12. Are there any internal pressures or incentives to source more local food?

13. How does local food sourcing align with your college’s values or student expectations?

Appendix F-3. Student Interview Guide

Opening & Context

1. Which college are you in?

2. What is your role in the college, if any (e.g. MCR Sustainability Representative)?

3. How long have you held that role?

4. Are you involved in college procurement decisions?

Daily Practices and Sourcing

4. What is your familiarity with farming, nutrition, etc?

5. Can you tell me a bit about your typical eating habits at college? (e.g., Do you eat in the dining hall regularly? Do you cook for yourself?)

6. How would you describe the quality of food you're served here? (Taste, freshness, variety, portion size, nutrition)

7. What are your perceptions of OxFarmToFork?

Produce Quality & Experience

8. What do you know about where your college procures food?

9. What would you change or improve about the food experience at your college?

10. Would you like more information about where your food comes from? If so, how should it be shared? (e.g., labels, posters, social media, menus)

11. For our research comparing local farm produce to supermarket alternatives - what would be the most meaningful metrics to focus on?

12. What would you like to know more about in the topic of college food procurement and nutrition?

Appendix G: Farm Photographs

Farm Visit 1: Traditional Garden Growers – June 15, 2025

Cucumbers grow in a polytunnel, using drip irrigation; want to invest in sprinkler irrigation.

Beds covered in netting protect against birds, with the added benefit of retaining water in the soil.

Sheep’s wool is used for pellet development, because it helps retain water and releases nutrients slowly.

Voracious rabbits dug up a significant patch in one portion of the field; horses eat grass in the field beyond the vegetable patch.

Raspberries grow in well-organized patches. Irrigation system visible in background.

Grasses, weeds, and flowers growing in the dappled shade of the field margin.

Water capture and storage helps prepare for drought conditions.

A standalone flower bed adds to on-farm biodiversity.

Farm Visit 2: Sandy Lane Farm – June 16, 2025

On the weekends, the farm shop is buzzing with up to 200 visitors per week.

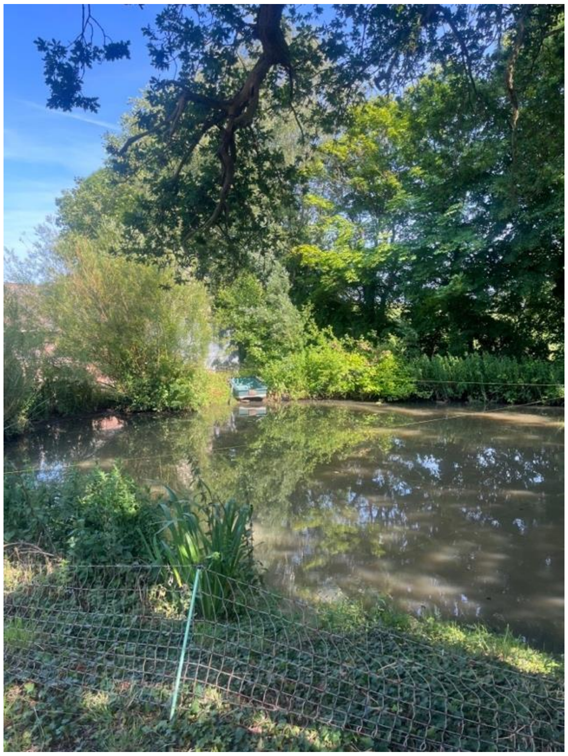
Produce growing at small-scale field scale. Field margins are messy to support biodiversity.

Flower beds are a “coral reef for insects.” In and around polytunnels, the farmers allow predators to have their space, following the principle of integrated pest management. Spiders – a major predator in polytunnels – are attracted to flower beds instead of the crops growing in the polytunnels.

Polytunnels are a well-oiled machine, with a sophisticated irrigation system using municipal water.

The team is constantly experimenting with new practices and has a willingness to fail. The yield for spinach and chard increased by 6 times using no dig (less water and less weeds, but a lot of compost). While some fields are covered in nets to protect against pigeons and butterflies, the goal is to build up enough biodiversity capital to enable natural pest management.

The caterpillar tunnel – made possible through the support of OxFarmToFork – is used to grow aubergines and tomatoes. Unlike polytunnels, caterpillar tunnels allow for crosswinds and better temperature regulation.



The duck pond is a core biodiversity feature.

GRFFN testing was conducted near one of the barns.

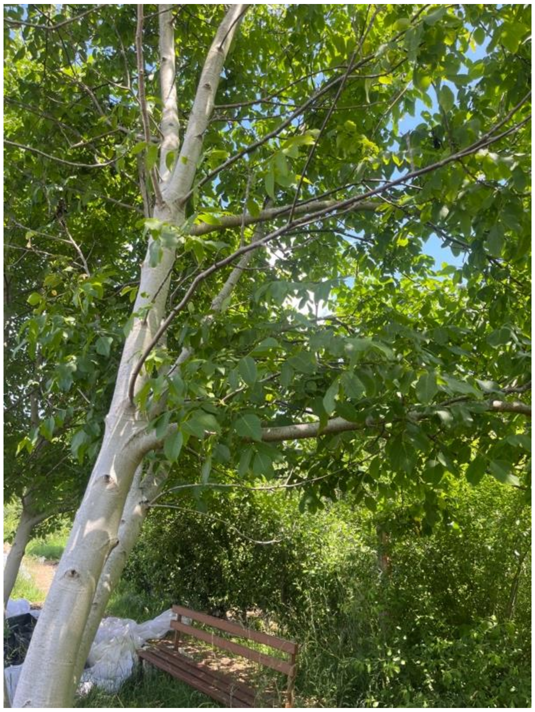
Farm Visit 3: Oxford City Farm – June 17, 2025

Vegetables propagating in a polytunnel and on an outdoor table. Limited propagation space was a common complaint across farms.

The rainwater irrigation system – made possible through donor support – is designed to moderate water supply during drought.

The compost heap is a hallmark of Oxford City Farm’s approach. Compost is turned and bakes until it reaches a high heat – upwards of 140 degrees Fahrenheit. Compost is sourced from the neighbouring care home and Missing Bean coffee.

Polytunnels enable a longer growing season.

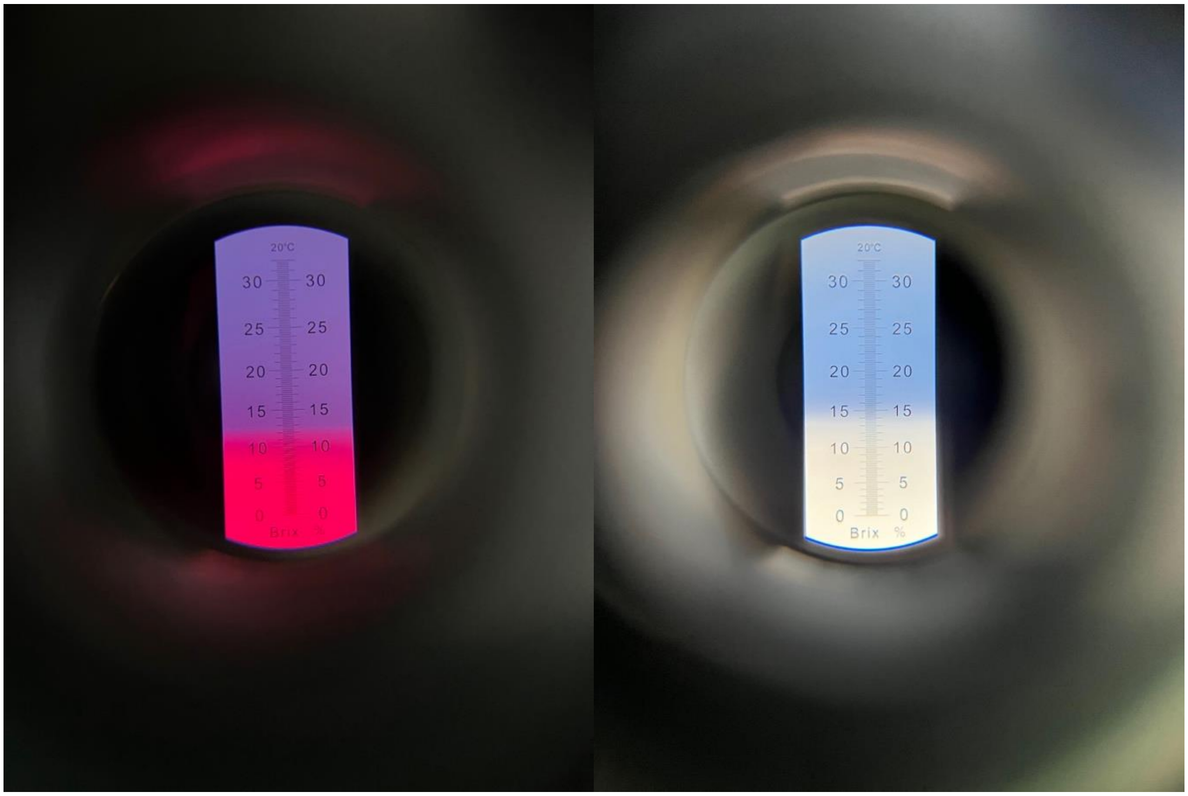


The farm is surrounded by trees, providing shade cover to the perimeter of the farm.

Certain plots are covered by nets to protect against birds and pests. Bed size is standardized to make it easier for volunteers to access.

Trees provide shade to farm animals.

The yurt is used as a community gathering space, hosting educational programming and community-led activities like Yoga in the Yurt.



Brix test results for beets (12) and broad beans (14), among the highest recorded across the farms.

Testing was conducted in the outdoor kitchen space.

Farm Visit 4: Worthy Earth Farm (Blenheim) – June 30, 2025

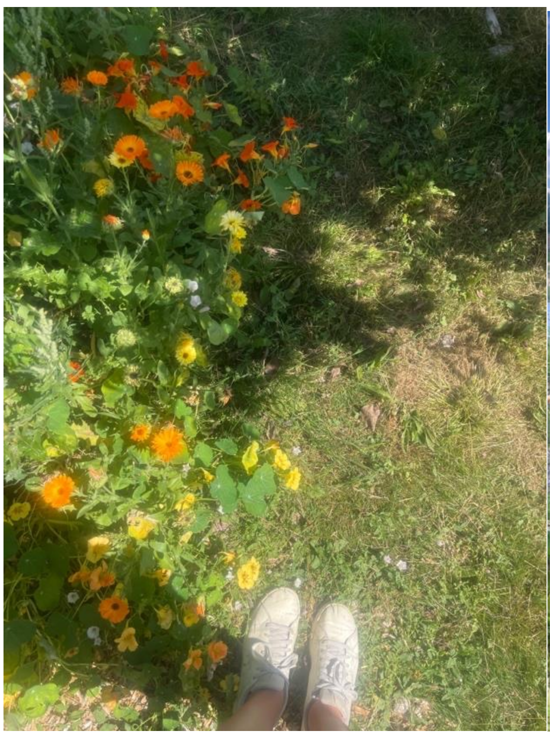
As part of their scientific research, the fellows tasted beetroot samples – which received the highest GRFFN test rating of all observations across farms.

Multiple crop types are planted together, leading to greater soil richness and increased water retention as observed by the Worthy Earth team. Flowers are incorporated as part of the integrated pest management strategy.


The polytunnel is filled with propagating crops. Polytunnels extend the growing season and speed up growth.


Netting is used for protection against birds, as well as soil water retention.

The duck pond – an important biodiversity feature – is managed by Blenheim Palace.

Wildflowers at the field margins are particularly plentiful in dappled shade from fruit trees.

GRFFN samples were taken in a covered area adjacent to the field.