BeanMeals
Thinking beyond the can

Enhancing the Missing Middle

Pathways to scaling the value chain for British-grown beans

Written by 3Keel for the BeanMeals Project
Authors: Katie Jones, Julian Cottee

September 2024

3keel

A Report for the Transforming UK Food Systems SPF Programme

About this report

The primary purpose of this piece of work is to outline different routes through which innovation in the nascent UK bean value chain, and primarily within the 'missing middle', can support the ultimate goal of thriving UK bean production to meet burgeoning consumer interest and demand. To do so, we describe three prospective 'pathways' to scaling-up the UK bean value chain, and their outcomes, enablers and barriers. We provide accompanying recommendations around how these routes can be actively pursued by a range of actors.

Disclaimer

3Keel Group Ltd (3Keel) has exercised due and customary care in preparing the report but has not, unless explicitly stated, verified the information provided by the companies included in this report. No other warranty, express or implied, is made in relation to the contents of this report. The use of this report, or reliance on its content, by retailers or third parties in decision making processes shall be at their own risk, and 3Keel accepts no responsibility for the outcomes of those decisions. Any recommendations, opinions, or findings stated in this report are based on the facts and information provided to 3Keel or otherwise available in the public domain as they existed at the time the report was prepared. Any changes in such facts and information may adversely affect the recommendations, opinions, or findings.

3Keel does not provide legal or regulatory advice, including with regards to reporting requirements. Any services provided by 3Keel shall not be deemed or treated to constitute any advice of this sort, in any form whatsoever, or as a substitute for such advice. The client is solely liable for the conclusions it draws from the use and receipt of services provided by 3Keel.

Acknowledgements

We extend our gratitude to all those who shared their time, expertise, and insights during the interviews conducted as part of this project. Their valuable contributions have been instrumental in informing this report. Special thanks to: Lucy Bridge; Alex Taylor; Emily Williams; Andrew Collinson; Mitch Coulter; Alexa Tonkovich; Rebecca Bratter; Rebecca White; and Eric Holub. The views and opinions expressed in this report do not necessarily reflect the views of any individual contributors or their organisations.

This report should be referenced as:

> Jones, K. & Cottee, J. 2024. Enhancing the Missing Middle: Pathways to scaling the value chain for British-grown beans. 3Keel report for BeanMeals project, Environmental Change Institute, University of Oxford.

Contents

Executive summary

The BeanMeals project has identified that there is an opportunity for the UK to significantly boost the production and consumption of beans, as part of a transition to a more sustainable and profitable agricultural system, and a healthier, lower environmental impact dietary shift for the population.

This report focuses on the enabling environment that would be required in between farm and fork to facilitate this scale-up: the processing, manufacturing, logistics and trade operations that we call here the 'missing middle'. We find that in the growth and development of these currently under-developed activities in the value chain for UK beans, there could be a range of additional economic benefits – driving innovation and regional growth, onshoring functions that would otherwise be carried out elsewhere in the world, creating new jobs in a range of sectors, and potentially presenting new opportunities for a more equal distribution of profit across the value chain.

In order to achieve the scale-up of the UK bean value chain, we identify three potential pathways to growth:

- **Community Enterprise**: Values- and community-led entrepreneurship to get beans from farm to fork using short food supply chains and minimal processing and packaging.
- **Artisanal Entrepreneurs**: New and innovative brand-led companies focused on value-add bean products, tapping into growing market niches focused on taste, quality and health.
- **Food Giants**: Working with existing large-scale value chains for canned and processed foods to incorporate British grown-beans for mass-market consumers.

Each pathway has its own unique set of barriers, enablers and outcomes, and all three pathways can and should be pursued in tandem to achieve the potential for upscaling UK beans. There is, however, an opportunity here to do 'business as unusual', challenging the industrially dominated UK food system by supporting Community and Entrepreneurial routes to scale-up, and the wider co-benefits they can bring in terms of innovation, transformation, equity, place-based development and quality jobs.

Indeed, these more agile pathways may present the most viable options for scale-up at this early stage of development, given that the UK bean production is currently inadequate to meet the large volume, low-cost requirements of larger manufacturers. Where entrepreneurial and community actors lay the groundwork, larger companies may wish to pay close attention and follow at a later stage to achieve greater scale and affordability.

In order to achieve the growth of the UK bean value chain and realise the potential environmental, health, social and economic benefits, proactive support will be needed from a range of actors. These include local players such as councils, enterprise bodies and Sustainable Food Places, national government and innovation funders, farming bodies and the wider food industry. A full set of recommendations is included within the report. In order to propel these changes with the momentum and velocity that will create real impact, we also identify the need for coordination and ambition-setting on a centralised basis, driven by a coalition of actors with mutual interests in the shared benefits for the UK.

Introduction

UK beans: a growth opportunity for health, environment and the economy

The BeanMeals project has identified that getting more British-grown beans into meals consumed in the UK carries the potential for economic, social and environmental benefits. These include driving innovation and new jobs in the UK food and farming sectors, helping to meet ambitious aims for increased healthy plant-based foods in diets, and reducing greenhouse gas emissions and nutrient pollution from agriculture.

Currently our consumption of beans in the UK is low compared to optimal levels for healthy and sustainable diets,[1] while UK production is also limited.[2] The majority of beans consumed within the UK are imported, with supply predominantly being sourced from the USA and Canada. As explored previously by the BeanMeals project, only fava beans (Vicia faba) are produced at any significant scale in the UK,[3] and of the beans grown, almost all are ultimately destined for animal feed or export.

The 'missing middle' is the critical link between supply and demand

Efforts to increase demand for beans, and to increase the capacity of UK farmers to grow high quality beans, are clearly needed to make good on the promised benefits of a thriving, scaled-up UK bean value chain. However, tackling supply and demand in isolation will not be sufficient. It is also vital to consider how to support and grow the 'missing middle' – the infrastructure of cleaning, preparing, storing, transporting, processing and manufacturing UK beans to get them to the consumer in a desirable form; as well as the businesses that will underpin such undertakings.

Considering the 'missing middle' in this way not only gives a pragmatic sense of what might be needed to connect nascent supply and demand to help them grow in tandem, but also expands the scope and scale of the opportunities around British beans. Instead of being a conversation just about farming and consumption, it presents a wider range of opportunities for new and existing businesses and entrepreneurs – from processing and transport to technology and branding – to create mutually beneficial economic and social value.

1 Lane, L., Wells, R. and Reynolds, C. (2024). Beans, peas and pulses for improved public and planetary health: Changing UK consumption patterns. *Proceedings of the Nutrition Society*, 83(OCE2):E203. doi: 10.1017/S0029665124004270

2 Lovegrove, J., O'Sullivan, D.M., Tosi, P., Millan, E., Todman, L.C., Bishop, J. et al (2023). Raising the pulse: The environmental, nutritional and health benefits of pulse-enhanced food. *Nutrition Bulletin*, 48(1). doi: 10.1111/nbu.12601

3 Nicholson, W. and Jones, K. (2023). Putting beans on the plate: Analysis of UK demand and supply of beans and plant-based proteins. Oxford: Environmental Change Institute, University of Oxford.

Scaling the UK bean value chain can help meet national and local priorities

The change of national government in the UK in July 2024 represents an opportunity to make a strong case for growing the UK bean value chain as part of emerging policy priorities. The new Secretary of State for Environment, Food and Rural Affairs has indicated a continued and renewed focus on food security, for which a diversified range of UK-produced plant protein can be an important aspect. There is also the potential for a more integrated food, agriculture and health perspective to re-emerge if elements of the previous National Food Strategy recommendations are brought back to the fore. Such a systemic perspective would help to recognise the multiple benefits of growing the UK bean value chain. This includes alignment with the priorities of Public Health England Public (PHE) in tackling rising obesity in the UK.[4] Linked to this, public procurement also offers an important policy lever for change through prioritising UK and local sourcing.

Meanwhile local actors are also important to realising change, with beans and pulses being an avenue for local government to help meet public health priorities, and new businesses powering entrepreneurship for regional development through food and drink enterprise clusters. Non-governmental bodies such as the Sustainable Food Places network can play a key role in helping to draw together local players to realise such systemic and place-based opportunities.

4 Public Health England, 2017. Health matters: obesity and the food environment. London: Crown Copyright.

Method

Following work led by Oxford University's Environmental Change Institute (ECI) to map the UK 'fork to farm' bean value chain, we set out to determine the opportunities and barriers to upscaling UK-grown bean consumption, specifically in relation to the innovations required across the 'missing middle' portion of the value chain.

We began by determining three potential pathways through which UK bean products could be upscaled through either enhancing existing enterprises or through new enterprise opportunities. This identified three potential pathways: the Community Enterprise Pathway; Artisanal Entrepreneurs Pathway; and Food Giants Pathway. Desk-based research supported articulation of the value chain steps required to get beans from farm to fork (e.g. cleaning, processing, logistics, retail) under each of these pathways.

Following this, interviews with seven industry stakeholders were conducted to identify the barriers and enablers for upscaling UK-grown beans through one or multiple of the proposed pathways. Stakeholders were selected based on their organisations being positioned within one of the pathways, or due to their role within the industry providing insight across the 'missing middle'. Interviews followed a semi-structured format with interviewees being asked to look across the value chain stages to identify barriers, enablers and opportunities for upscaling products using UK-grown beans. Insights provided by interviewees directly informed the findings of this report.

Each interview concluded by asking interviewees to indicate which potential outcomes of scaling up UK-grown bean consumption they believed upscaling would achieve and which were most important to them. These 'outcomes' were structured around the four quadrants of the ECI's Food Systems Sustainability Compass (Hebinck 2021)[5] – see Figure 1. Interviewees were encouraged to elaborate on reasonings behind each identified outcome, with responses contributing to the outcomes outlined for each pathway within this report.

5 Hebinck, A., Zurek, M., Achterbosch, T., Forkman, B., Kuijsten, A., Kuiper, M., Nørrung, B., van't Veer, P. and Leip, A. (2021). A Sustainability Compass for policy navigation to sustainable food systems. *Global Food Security*, 29: 100546. doi: 10.1016/j.gfs.2021.100546

Figure 1: The Food Systems Sustainability Compass

How beans get from farm to fork

In this report, we consider the stages that would be needed to take an increased supply of UK beans from on-farm production through to the final value chain agent preceding consumers – with this usually being retailers or foodservice providers. The stages of the chain feature some variation depending on the final bean-based product on the shelf, for example dried whole beans bypass the processing steps essential for producing ready-to-eat bean-based products like baked beans. However, despite some differences, overall, the UK bean value chain can be considered to be made up of the following five stages:

1. **Primary Production**
2. **Cleaning & Storage**
3. **Processing & Manufacturing**
4. **Transportation & Logistics**
5. **Routes to consumer: Wholesale / Retail / Catering**

Under the currently dominant import model, although the value chain stages are equivalent to those for UK grown beans, primary production, processing, and potentially even manufacturing, take place outside of the UK. Import logistics additionally lengthen the supply chain stretching back from fork to farm.

Figure 2: The 5 stages of the bean value chain

What is required at each stage of the value chain?

Primary production – 'Farm'

This initial stage of the value chain encompasses all steps involved in the growing and harvesting of beans. The majority of beans consumed in the UK are sourced from the US and Canada. In the UK, the dominant bean, the fava bean (*Vicia faba*), is grown as spring or winter varieties.[6]

Whether grown domestically or abroad, beans are sown and grown annually in open fields. Exact practices and growing periods vary depending on the region of production. At the end of the growing season, beans are left to dry on the plant and, once dried, are harvested within their pods. In-field harvesting separates dried beans from their pods, producing a crop of whole beans to undergo initial cleaning.

Conditioning & Storage

Following harvesting, beans undergo conditioning and food grade inspection, if destined for human consumption. Conditioning involves a number of stages to ensure uniformity of final batches and proper preparation for storage and consumption. Initially this involves destoning, sieving, shifting and gravity separation.[7] These processes ensure all foreign debris such as soil, pod fragments, rocks, and dust are removed. Depending on the final use, sorting and grading can be additionally employed to ensure consistent bean size and colouration; making use of optical technology and near infrared systems to separate beans based on colouration and shape.[8] Further drying and moisture equilibration may be required to ensure moisture levels are safe (typically below 10%) to prevent mould growth and insect infestation.

Depending on facilities available, conditioning may possibly take place on-farm using owned or shared equipment, or more typically, beans may be transported to designated facilities. Resulting conditioned batches are inspected, and once approved, are ready to be sold as whole dried beans for direct consumption or for further downstream processing.

Once conditioned, dried beans can be stored for prolonged periods in cool, dry and dark environments, without the need for the creation of energy-intensive storage conditions (e.g. freezing) or further processing. Large quantities may be stored in ventilated silos. Following food grade conditioning, beans may be packaged at packing facilities to be sold as whole dried beans direct to consumers, or, if destined for further processing, transported to processing sites, either in the UK or abroad.

6 PGRO, n.d. Growing field beans. Peterborough, UK: Processors and Growers Research Organisation.

7 Hall, C. Farm to Fork. Fargo, USA: Bean Institute, Northarvest Bean Growers Association.

8 Hall, C. Farm to Fork. Fargo, USA: Bean Institute, Northarvest Bean Growers Association.

Processing & Manufacturing

A diverse range of processing techniques are used to transform beans into the plethora of processed bean-based products available on the market today. At scale, processing and manufacturing typically takes place at specifically designed manufacturing facilities, either in the UK or abroad.

For canned and jarred products, including whole beans cooked in water for use in scratch cooking, as well as composite products (e.g. baked beans, tinned chillies and stews), beans may be kept whole and minimally processed to produce final products. For canning and jarring, beans are washed, blanched, and subsequently heated to sterilisation within cans/jars in order to produce shelf stable products. Roasting offers an alternative approach to processing, with this approach typically being used to provide crispy snack products.

Creating more intensively processed bean-based products, such as bean flours, involves a greater number of processing stages and potentially multiple processing sites. For example, the production of bean flours requires grinding pre- or post-cooking, and extrusion processes may follow to transform flours into specific consumer-friendly convenience end products (e.g. puffed snacks). Within this single value chain stage, bean-based substrates may pass between various processors until the final product familiar to consumers is produced.

Transportation & Logistics

Despite occurring throughout the value chain – farmer to processor, processor to retailer, and retailer to consumer – there is reason to consider transportation as a value chain stage in its own right, given the essential role it plays in facilitating surrounding value chain stages.

For dried beans, transportation is aided by beans being easy to handle, store and transport, provided they are kept in sufficiently low moisture environments. This accommodates transportation of dried beans from primary production sites downstream onto processing or retailing. Processed bean-based products tend to be produced as shelf stable, simple to transport products, which facilitates transportation through modern logistics networks.

Routes to Consumer – ‘Fork’

Beans, bean-based products and bean dishes typically reach the plates of UK consumers through individuals making purchases from retailers and foodservice providers. Dried, tinned, jarred and otherwise transformed bean-based products are widely available in high-street supermarkets, independent food shops, online shops, and marketplaces. Equally, restaurants, convenience food providers, and caterers integrate beans into ready to eat dishes.

Wholesalers often play a mediating role between producers or supply aggregators, and retailers and foodservice organisations. Wholesalers facilitate the final value chain link, allowing retailers and foodservice providers to acquire a stable supply of beans.

Three pathways to scale up British-grown beans

A growing market for plant-based foods

3Keel's previous report for BeanMeals highlighted the trend of rising demand for plant-based foods in the UK.[9] While the initial explosive growth and investment in the processed plant-based proteins sector has tapered off somewhat, the UK vegan food market as a whole was still growing at 9.58% in 2023.[10] There are some indications that consumers are now more selective, with greater interest in minimally processed whole foods with perceived health benefits.[11]

Current demand growth is likely to be met from overseas

Both the continued interest in plant-based foods and a potential move towards whole foods could be good news for getting more beans onto UK plates. However, by default any increased demand for beans by UK consumers is likely to be fulfilled primarily by overseas production rather than UK farmers. Beans are not currently a major crop in the UK. A significant portion of our main bean crop, Fava beans, are used as a high protein supplement in animal feed. Quality seed for human consumption is difficult to produce and this pulse is less palatable to UK consumers than imported alternatives such as chickpeas and Phaseolus dry beans.

A whole value chain perspective on scale-up

Capitalising on the potential benefits of supplying demand growth for plant-based foods with UK beans will therefore require strategic and systemic interventions to build value chain capacity. In this report we look at three different potential routes, or pathways, to scaling UK beans, and what would be required to help realise their development. Our focus is less specifically on what would be required for UK farmers to grow more beans, but looking at the broader value chain, what would need to happen for those beans to reach willing consumers and create additional value on the way. This is the 'missing middle' – the collective capacity for cleaning, processing, manufacturing, logistics and supporting infrastructure that would be needed to realise the growth of a thriving bean-based economy.

9 Nicholson, W. and Jones, K. (2023). Putting beans on the plate: Analysis of UK demand and supply of beans and plant-based proteins. Oxford: Environmental Change Institute, University of Oxford.

10 Straits Research (2023). Vegan food market size, share & trends analysis report by product type. Maharashtra, India: Straits Research.

11 Starostinetskaya, A. (2023). 2024 Will be the most vegan year yet, according to these 2 trend predictors. VegNews, October 25, 2023. Los Angeles, USA: Fresh Healthy Media.

Three pathways to scale

Our three pathways have been selected to demonstrate different ways of reaching the same ultimate goal of scaling British beans but involving different actors and a range of different outcomes. They are not the only possible pathways, nor are they mutually exclusive – each of these pathways can play their own unique role alongside each other in scaling.

Here are the three pathways explored in this report:

Community Enterprise

This bean value chain is based in community-driven entrepreneurship with emphasis on short supply chains.

Locally-focused social entrepreneurs are central to organising the value chain steps needed to get beans from farm to consumer, driven by growing interest in cooking-from-scratch and realising the environmental, health and local economic benefits of minimally processed and packaged beans.

The end consumer is socially and environmentally conscious, and invested in the local community.

Artisanal Entrepreneurs

This value chain is characterised by new innovative companies setting up to serve a growing demand for bean-based products.

Companies are focused on the value-add from processing, packaging and establishing new branding of bean-based products by tapping into growing market niches that established branded companies are unable to access.

The consumer in this value chain is likely to be a 'foodie' – a relatively affluent consumer able to prioritise taste and quality, and potentially driven by having a healthy, balanced diet and lifestyle.

Food Giants

This pathway taps into existing large-scale value chains for canned and processed foods, creating the infrastructure necessary to incorporate British-grown beans within it.

This pathway allows for the greatest scalability both in terms of efficiency of throughput and access to a wide range of end consumer markets through existing commercial relationships.

The consumer in this pathway is mass-market, driven by accessing affordable, good food that is familiar but brings additional health and societal benefits.

The next section dives into more depth on each of these pathways to understand what they look like at each value chain stage, the barriers and enablers of scale-up and the potential outcomes and scaling actions. In common with the wider BeanMeals project, the value chain is discussed here in 'reverse' fork-to-farm format, underscoring the importance of demand-side drivers and how they shape value chains.

Pathway 1: Community Enterprise

In the Community Enterprise pathway, the supply chain is kept as short as possible. Farmers are envisaged to connect with local outlets such as zero waste shops to provide them with bulk dried beans that have not undergone processing. Supply chain linkages are based on relationships and are mutually supportive, providing fair prices for produce. This will appeal to consumers who are connected into the community, are socially and environmentally aware, and want to support local and impact-driven businesses. In terms of absolute volumes of beans, this pathway will initially be relatively niche, as the vast majority of UK consumers do not access food through these kinds of community-led outlets and value chains.

There is a disproportionate potential for value-creation in these supply chains in terms of both social outcomes (community-building, food knowledge and culture, local food ecosystems) and food system innovation (doing new things that would not otherwise happen, providing proof-of-concept for further developments). For example, with a short supply chain approach, a coordinated social enterprise could provide a trade model for increasing production from UK farms to meet a growing demand, with marketing driven by social media. Linking the sale of dry goods with zero plastic waste refill shops and community kitchens provides interesting scope for market innovation.

What this pathway looks like in detail – from fork to farm

Routes to Consumer

Beans will reach domestic consumers largely as a dried product requiring soaking before cooking. This has the advantage of reducing value chain and product costs as there are fewer processing stages required.

Beans can be supplied to consumers through a variety of mechanisms. For example, beans could be sold at local wholefood or refill shops with an existing customer base likely to support the ethos of the product. Refill shops provide an efficiency in that no separate packaging stage is required. Alternatively, Community Supported Agriculture (CSA) could be used to create a ‘bean subscription’ delivering monthly supplies of dried beans to consumers for an up-front annual fee supporting the farmer’s risk in growing novel crops for the local market.

An alternative to retail is that beans reach end consumers via local catering outlets such as small cafés and restaurants, community kitchens, schools and universities, or voluntary sector organisations. Here, chefs could be trained and upskilled to use British beans creatively and soak and cook them at greater scale, allowing for efficiencies. For end consumers, this means that there is an easier entry point to eating British beans, as initial barriers to purchasing and food preparation are removed.

Transportation & Logistics

Due to the short supply chain nature of this pathway, overall demand on transportation and logistics is reduced compared to some other models. However, the need for cleaning and conditioning at specialist facilities, and the small volumes involved in supplying local outlets means that there are challenges in making transportation efficient and cost effective.

One solution is distribution through local delivery hubs where bulk deliveries of dried beans can be further distributed by smaller players. For example, community kitchens or voluntary organisations could add collection of dried beans into existing delivery and collection schedules.

Processing & Manufacturing

In this pathway there is no additional processing or manufacturing other than cleaning of beans, as the beans are supplied to the consumer in dried form.

Conditioning & Storage

Basic sorting, sieving, cleaning and de-stoning of beans can be carried out on the farm with simple equipment. However this is not likely to meet food-grade standards. There is the potential that mobile units could provide a solution, otherwise beans would need to be transported to one of a small number of food-grade cleaning and conditioning facilities nationally. This presents some limitations to the short supply chain model.

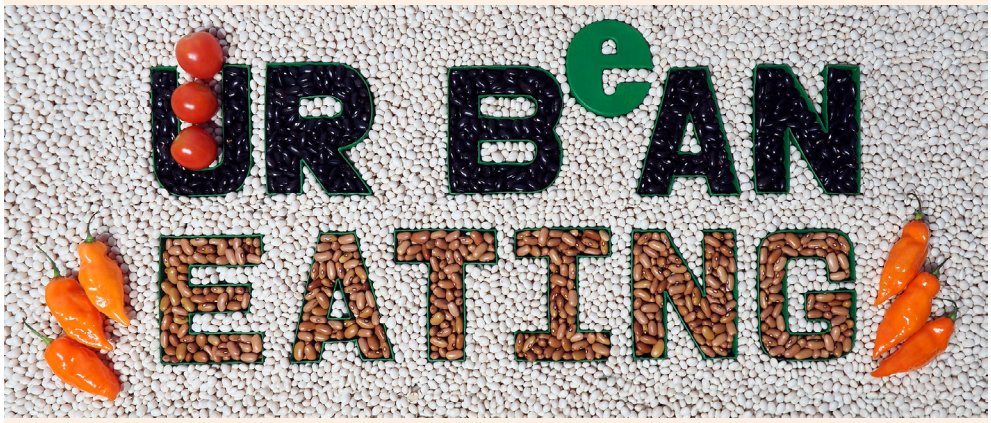
Primary Production

Farmers will be motivated by innovation, the environmental benefits of incorporating beans into rotations, and creating social value in the local community. Profitability at this stage will not be a major driver as tonnages will be small and significant engagement will be required to get the product to market.

Producers will include larger-scale growers who want to pilot new kinds of crops and smaller-scale growers with existing connections into the local community, as well as community farms and gardens operating on a voluntary or social enterprise basis. To enable producers to grow beans cost-effectively there may be a need for clustering of a number of local farms collaboratively sharing specialised equipment, as well as sharing knowledge and other resources.

Community Enterprise Case Study: Nurtural Food

Nurtural Food



Nurtural Food is a non-profit (cost recovery) business unit for social enterprise envisioned using a viable systems model (VSM) framework, that will act as the marketplace for URBeans (UK-Registered Beans). It is being developed by the University of Warwick. Nurtural Food will coordinate short food supply chains, linking demand from food preparers (e.g. progressive catering services and community innovation projects) with supply from an association of URBean growers. These supply chains will grow initially via local sales distribution from zero plastic waste stores, and expand more widely across the country with increasing demand and managed farm production.

Nurtural Limited is envisioned as a potential parent company for the social enterprise, which will generate income from master-planning and managing construction of food system infrastructure, and invest 50% of profits to support Nurtural Food's work ensuring affordable access to URBeans and other UK-grown whole ingredients.

Outcomes

Scaling the community enterprise pathway strengthens community links to the food value chain and facilitates innovation in ways that might otherwise not occur in more conventional commercial settings.

The central outcomes associated with this Missing Middle value chain (not taking into account the outcomes associated with primary production) aligned with the Food Systems Sustainability Compass (Hebinck 2021)[12] are:

Healthy, adequate and safe diets for all

- **Adherence to food-based dietary guidelines**: Community-based enterprise can be a powerful route for raising awareness of the value of pulses in the diet from a nutritional standpoint, spurring people to change their diets.

Clean and healthy planet

- **Preservation of natural resources**: Lower packaging requirement creates potential circular economy benefits.

Economically thriving, robust food value chains

- **Innovative and transformative businesses**: Community-based social innovation is a key space for trying new ideas that might not flourish in more traditional commercial settings.

Just, ethical and equitable food systems

- **Fair and just food value chains**: Short supply chain food systems tend to prioritise fair prices for producers, putting producers within a relatively more empowered position in the value chain. This could include de-risking of production through guaranteed price per tonne of beans.

Trade-Offs

Despite the variety of beneficial outcomes that the community enterprise pathway offers, there are also trade-offs to upscaling via this pathway over other models. The dried bean product offering and the route to market via small-scale social enterprise restricts the breadth of consumers who will buy these beans, as most consumers choose ready to eat foods purchased through supermarkets. This limits the overall volume of beans that can be upscaled through this pathway, inherently limiting the scale of positive outcomes. Moreover, there are potentially social outcome trade-offs compared to other routes to upscaling. People need to live near distribution points and have the time and ability to shop for and cook dried beans.

12 Hebinck, A., Zurek, M., Achterbosch, T., Forkman, B., Kuijsten, A., Kuiper, M., Nørrung, B., van't Veer, P. and Leip, A. (2021). A Sustainability Compass for policy navigation to sustainable food systems. *Global Food Security*, 29: 100546. doi: 10.1016/j.gfs.2021.100546

This niche may potentially struggle to expand bean consumption to individuals in lower income communities, especially those in food deserts, where healthier food options have the greatest potential for beneficial impact.[13] Accessible and affordable food bean-based products available in supermarkets are likely better placed to reach many demographics.

The short supply chain model, which circumvents product manufacturing, may also generate fewer job opportunities and could potentially have increased carbon impacts due to longer at home cooking times (an impact requiring further research)[14] or less efficient transportation. The balance of these trade-offs against the multiple benefits of this pathway are important to weigh up.

Key barriers to scaling

1. **Establishment and coordination of multiple small supply chains** is complex and time consuming. Separate supply chains are additionally less able to benefit from economies of scale and efficiencies associated with larger operations.
2. Many consumers are unfamiliar and therefore **wary of how to cook dry beans**, placing a cap on scalability of dried bean products.
3. **Most farmers will not engage in a novel supply chain** until a market is established and those who do are likely already driven to farm in more environmentally sustainable ways.
4. Until volume reaches a critical mass, **logistics and cleaning remain inefficient and costly**.

Ways forward

The Community Enterprise pathway represents a vibrant and impactful route to scaling UK beans, but it is not without its hurdles. Significant effort is needed to establish relationships and logistical arrangements, and to coordinate the incremental increases in supply and demand that would lead to this becoming established enough to operate efficiently and achieve commercial viability.

One key to unlocking this pathway could be the creation of a social enterprise with a mission to coordinate such work. Social enterprise legal structures can be useful in achieving this market creation work due to their ability to attract philanthropic and grant funding as well as using more conventional routes to finance. Such an enterprise could be seeded and incubated by place-based organisations with an interest in improving food systems, such as members of the Sustainable Food Cities network.

13 Janatabadi, F., Newing, A. and Ermagun, A. (2024). Social and spatial inequalities of contemporary food deserts: A compound of store and online access to food in the United Kingdom. *Applied Geography*, 163: 103184. doi: 10.1016/j.apgeog.2023.103184

14 Frankowska, A., Rivera, X.S., Bridle, S., Kluczkovski, A.M.R.G., Tereza da Silva, J. and Martins, C.A. et al. (2020). Impacts of home cooking methods and appliances on the GHG emissions of food. *Nature Food*, 1(12), 787–791. doi: 10.1038/s43016-020-00200-w

The social enterprise would have the mission of coordinating with farmers and farm clusters (utilising shared equipment and knowledge) to establish supply of beans, ideally at a guaranteed price per tonne to de-risk production. The enterprise can then aggregate bean volumes from multiple farms to facilitate efficient access to cleaning facilities. This would happen at a geographically focused scale – e.g. M5 corridor – to begin with, to facilitate easier aggregation.

At the current time, appropriate cleaning and conditioning facilities are located in Lincolnshire and Cambridgeshire, but in due course, investment in cleaning facilities closer to production areas could facilitate growth. Investment for such facilities could be provided from sources including the UKRI / Defra Farming Innovation Programme.

The enterprise would also be responsible for marketing and supply chain logistics for the dried beans to a network of outlets including zero plastic stores, as well as catering. Universities could be a key avenue for early uptake, as demonstrated through the use of the first batch of Godiva beans in the University of Warwick's Eatwise Test Kitchen.

Key recommendations for scale-up:

- **Supply chain coordination** (potentially through a new enterprise) is required to allow small volumes to be aggregated for efficient cleaning and marketing.
- **Farmer clusters** and cooperatives will allow for critical mass in supply, including the sharing of knowledge, machinery and supply chain logistics.
- **Future investment in new cleaning facilities** is required to ensure geographical proximity to emerging supply clusters.
- **Market research** would allow for tailoring of the product value proposition for customers so that take-up is strengthened.

Pathway 2: Artisanal Entrepreneurs

Within the Artisanal Entrepreneurs pathway, small businesses are the key agents in driving the scale-up of UK-grown beans by showcasing how they can be high quality, novel or artisanal foods. Beans may be supplied to consumers as whole, ready to use ingredients (e.g. jarred or canned beans) or as processed easy-to-eat products (e.g. tinned meals or snack products). Whichever the format, the products will appeal to consumers who are able to pay higher prices for foods that they perceive as high quality, health supporting, and better for the planet.

The significance of this pathway is its ability to introduce consumers to novel ways of eating beans, and for the necessary value chain investments to be supported by a higher consumer price-point. Entrepreneurial companies are a vital driving force behind food product innovation. If this is successfully supported, rapid shifts in consumer attitudes towards beans can be generated as appealing new products are placed onto the market. There is the potential for novel products, combined with effective marketing campaigns, to reposition beans to being thought of as flavourful and aspirational ingredients.

However, this pathway is not without its challenges. The UK needs to foster an environment that is encouraging and supportive of start-up food entrepreneurs, and that provides channels for building successful product offerings and brands. Following initial product development, manufacturing facilities need to be both accessible and affordable for small scale enterprises. There must be sufficient reasons for entrepreneurs to use UK beans and base their supply chains in the UK, to avoid demand being filled by overseas operations and imports. If this was fully realised, the gradual growth of entrepreneurial companies could provide the much needed stable demand for beans grown in the UK and in time provide a foundation for larger companies to start scaling up their use of UK beans.

What this pathway looks like in detail – from fork to farm

Routes to Consumer

The bean-based products produced by independent, small scale entrepreneurial companies will reach consumers via a range of retail environments, including independent food shops, online stores, food markets, and supermarket retailers. Entrepreneurial companies can take advantage of existing artisanal marketing networks used by their manufacturers to establish themselves with many of these consumer-facing establishments. Some highstreet retailers may showcase independent producers, boosting awareness of consumers to their presence in the market.

Novel products will offer quality, diversity and taste above what is currently available from widely accessible bean-based products. These characteristics will encourage consumers to eat beans in previously unavailable formats, especially when creative brand marketing is used. Consumers may initially be attracted to products due to positive health connotations, however, high quality, flavourful offerings will drive repeat purchases.

The novel products made available may be more expensive than more commercially available bean-based products, however their taste, quality and UK provenance will drive demand; primarily from the 'foodie', relatively affluent consumer envisioned as central to this pathway. An element of convenience will be key – with easy to prepare products appealing to consumers who value quality, but who do not have the time to soak dried beans. The price premium of these products will restrict their use in most catering and foodservice environments, so significant scaling under this pathway is focused on household decision-makers.

Transportation & Logistics

The limited facilities available across the UK for manufacturing entrepreneurial products results in higher demand for transport logistics within this pathway. Manufacturing facilities can be far from the locations of both primary production and retail. During early establishment, companies may opt to prioritise regional sales (e.g. health food shops local to manufacturing sites), however as product popularity and batch sizes increase, and per unit logistical costs fall, expansion becomes possible. As this market grows, logistics distances should reduce as improved manufacturing infrastructure, supported by public and private financing, is developed.

Processing & Manufacturing

Improved manufacturing infrastructure is key to this pathway. New contract manufacturing businesses will be established to support the growing number of emerging bean-based brands, operating from regional hubs. They will offer a range of processing techniques that are not currently widely accessible to smaller companies, including high quality canning and jarring as well as production of bean flours and proteins and manufacturing of snack foods through processes like extrusion. The ability to work with small batch sizes will facilitate company growth. As companies scale up, they will be able to channel financing towards larger specialised facilities.

Conditioning & Storage

Entrepreneurial companies buy whole dried, cleaned beans as a raw material from supply aggregators or direct from growers. This will require UK-grown beans to be cleaned to food-grade standard before purchasing. This will likely be through initial on-farm cleaning followed by food-grade cleaning at specialist facilities within the UK. This will build from the currently limited number of facilities to a greater number of facilities serving a growing number of farmers in key regions.

Primary Production

This pathway relies upon start-up companies being able to source reliable and sufficient volumes of UK-grown beans for use in their products – however, volumes needed for artisanal production are substantially lower than those needed for large manufacturers to begin production using UK beans.

Beans will be sourced from medium- to large-scale growers who hold existing supply chain relationships which ultimately mean that their volumes are sold on the market by wholesalers. Entrepreneurial companies can subsequently purchase volumes directly from wholesalers, but direct farmer links may be necessary during the early establishment of this market.

Artisanal Entrepreneurs Case Study: Bold Bean Co

Since 2021, UK-based Bold Bean Co has hosted a product range exclusively comprised of jarred pulse products, including chickpeas and various bean varieties. Their product range and popularity has expanded rapidly, with products now available online and in independent retailers and supermarkets across the UK.

Bold Bean Co is founded on the opportunity to shift perceptions of beans from being a "war-time staple, a side dish, [or] a commodity".[15] Describing their mission as wanting to get everyone eating more beans by providing the best quality, Bold Bean Co offer premium products that reposition pulses as 'hero' ingredients central to dishes. Through the creation of a strong brand identity, aspirational branding and showcasing of how beans can be used in novel and interesting ways (through 'Beanspo' recipes[16] and their own cookbook), Bold Bean Co are successfully targeting the 'foodie' market niche.

While demonstrating the power of shifting consumer preferences through brand innovation, Bold Bean Co's operations also highlight some of the key barriers to upscaling the use of UK grown pulses. The company's success depends on being able to source the best quality specific pulse varieties that appeal to customers, and access to the necessary manufacturing expertise and facilities, both of which are restricted in the UK. One way around this so far has been a limited run of jarred UK-grown Queen Carlin Peas sourced through a collaboration with Hodmedod's.

Outcomes

Scaling the 'Artisanal Entrepreneurs' pathway boosts opportunities for the growth of small food businesses and opens the door to consumers being able to discover new ways of eating beans that may otherwise have not been available.

The central outcomes associated with this value chain (not taking into account the outcomes associated with primary production) aligned with the Sustainability Compass are:

15 Bold Bean Co, n.d. Our story. London: Humble Foods Ltd.

16 Bold Bean Co, n.d. Beanspo recipes. London: Humble Foods Ltd.

Healthy, adequate and safe diets for all

- **Adherence to food-based dietary guidelines, population with normal weight, and increased nutrient adequacy**: Novel products are a powerful way of introducing people to previously unexplored ways of eating foods. Enjoyment of these foods can shift people's purchasing decisions towards more nutritional, healthier options and away from less healthy (e.g. HSSF) alternatives.
- **Safe food**: Facilities dedicated to helping entrepreneurs get their food businesses off the ground, outlined as central to this pathway, can impart knowledge around food safety regulation compliance to start-ups which they subsequently carry forward into future endeavours.

Clean and healthy planet

- **Climate stabilisation**: Improved UK manufacturing facilities that are accessible to small companies can make reasons for basing production abroad redundant. Shortening supply chains with food grown, processed and eaten in the UK can help minimise associated greenhouse gas emissions.

Economically thriving, robust food value chains

- **Innovative and transformative businesses**: Start-up led food innovation offers unique opportunities to develop niche products and manufacturing techniques that larger food manufacturers may not explore.
- **Adequate distribution of profits in food value chains**: Small and artisanal businesses are more likely to prioritise transparent, ethical value chains and pay appropriate prices for high quality beans.

Just, ethical and equitable food systems

- **Fair and just food value chains**: If increases in UK bean consumption is fuelled by newly founded, entrepreneurial companies, UK producers will have greater options concerning who they supply, avoiding pressure put on prices by monopolising or dominant industry players.

Trade-Offs

The Entrepreneurial Pathway is not without its trade-offs when compared to alternative routes to upscaling. This pathway is inherently based around shifting the perceptions of relatively affluent consumers. As the quality-first products offered come with a price premium, the diversity and number of people who are likely to discover the potential of beans as an appealing ingredient is restricted, particularly as concerns access for low-income groups. Similar to the limitations outlined regarding the Community Enterprise Pathway, this fundamentally limits the scale of beneficial outcomes that can be achieved.

The elevated price-point of manufactured products produced under this pathway means they are additionally unlikely to be utilised in foodservice environments (whereas dried beans or cheaper more mainstream products may be), restricting ability to drive menu change and dietary preferences via this sector.

Key barriers to scaling

1. There is a **lack of UK facilities that support innovative product development**, directly restricting entrepreneurs' ability to bring novel products to market.
2. **Limited contract manufacturing facilities that specialise in the major production techniques used for beans** (e.g. canning, jarring) and smaller batch sizes mean that start-ups struggle with accessing production sites in the UK.
3. **Equipment for more specialised manufacturing processes is lacking in the UK** and previous capital funding schemes such as those accessible pre-Brexit through the EU Regional Development are no longer widely available for capital expenditures.
4. **International expertise on pulse product manufacturing significantly exceeds that available in the UK**, offering cost and quality advantages to basing production abroad.
5. **Entrepreneurial companies are interested in sourcing specific bean varieties** valued for their size, texture and familiarity to UK customers, which may not currently be available in the UK.

Ways forward

The significance of the 'Artisanal Entrepreneurs' pathway is its potential to introduce consumers to exciting new ways of eating beans. Novel products that, by design, use UK-adapted bean varieties offer a unique opportunity to drive demand for domestically produced beans. However, encouraging new entrepreneurial ventures that can achieve this is not without its challenges. Entrepreneurs must come up with both novel and appealing product ideas, provide convincing proof of concept (PoC), and find UK manufacturing facilities that cater to small-scale production – all while justifying the use of UK beans over imported varieties. The current UK food business environment is not necessarily conducive to achieving these milestones, however there are ways to minimise the barriers faced.

Assuming that desirable UK bean varieties are available to start-ups, there are two principal ways of driving this pathway forward: i) improving access to facilities that aid UK food product innovation, ii) creating manufacturing spaces that cater to small-scale, high quality production. Beyond this, there is a broader need to embed pulses in UK culture, beginning with programmes to grow expertise surrounding processing and preparation techniques.

Firstly, access to facilities that offer entrepreneurs support with concept development, initial production, and product refinement is essential. For new bean-based products to be successful, entrepreneurs with innovative product ideas need access to facilities where they can experiment with product creation, access professional processing techniques, and seek advice on best practice. Support like this is already available in some areas of the UK through initiatives such as Community Kitchens and Food Parks,[17] however these types of initiatives will need to be expanded to boost the number of opportunities for successful innovation.

17 Leicester Food Park, Food & Drink Forum. n.d. Leicester: Food & Drink Forum.

Secondly, for shortened UK-based supply chains to exist, start-up companies need access to appropriate UK manufacturing facilities. Currently, the manufacturing sites that pulse-themed start-ups can use are restricted due to minimum batch sizes, high costs, and limited product formats. Moreover, the UK lacks the technical expertise needed for making high quality pulse-based products. For some start-ups, these factors make basing manufacturing abroad in countries where pulses are more embedded in food culture the more viable option. This pathway aims to tackle these issues to make UK-based production, using domestically produced beans, more feasible.

To set this pathway in motion, government backing alongside engagement from large food sector players is essential. Previous public sector funding under the EU Regional Development Fund (EURDF) or through Local Enterprise Partnerships (LEPs) is no longer available, and the UK Shared Prosperity Funds (UKSPF) that replace EU structural funds do not offer sufficient replacement.

To rectify this, governments could have a role to play in providing funding and/or tax breaks for the set up of innovation supporting sites and manufacturing facilities. Use of targeted regional development funds could play a role in this. Furthermore, the government is uniquely placed to fund research and development projects aimed at experimentation with using UK beans for product creation. Start-ups receiving funding in return for willingness to experiment with UK beans can be directly encouraged to use UK beans over imported varieties. Drawing on international expertise within these projects, for example by involving pulse manufacturing experts, could further bolster the success of these initiatives.

Large food manufacturers could further play a partnering role in this. Blended public-private financing of new sites and research initiatives would lessen the public funding burden and bring in industry perspectives. As is explored under the 'Food Giants' pathway, established manufacturers have a vested interest in maintaining awareness of start-up companies. By funding innovation projects, firms can have stakes in new start-ups and opportunities to acquire them entirely if new product concepts are a success.

Finally, UK-based small-scale manufacturing can be made possible through the use of co-packing facilities. By working with companies in other areas of the food sector, such as companies specialising in canned fruit and vegetables, there is an opportunity for co-packing facilities to establish themselves, offering start-ups a way to produce their products at affordable rates, without any need to own their own facilities.

Key recommendations for scale up:

- **Support for product innovation** through regional food manufacturing innovation centres bringing together knowledge, facilities and supply chain linkages.
- **Availability of public and private funding for capital expenditure** on processing equipment – for both established and more novel processing types.
- **Support the development of technical food science expertise** to embed bean-related knowledge and position the UK as an attractive place to manufacture.

Pathway 3: Food Giants

In the Food Giants pathway, the ambition is to incorporate UK-grown beans into the supply chains of established large food companies primarily via manufacturers in a range of goods. These include canned beans, incorporation of beans as ingredients into pre-prepared meals, and using bean-derived flours and proteins in processed food products and snacks. These beans and bean products can then be supplied to final customers via large-scale retail outlets, and in meals via out-of-home foodservice companies and public procurement settings. This pathway is aimed at a more mainstream consumer than the entrepreneurial or community pathways, with greater weighting on price competitiveness and convenience, though they may still be motivated by health considerations (e.g. increased plant-source protein) and supporting British agriculture.

This pathway has the greatest potential for scale, as large food businesses are firmly established in the UK and widely accessed by consumers. If UK-grown beans can become a fixture in even a small range of products already known by consumers, sold at accessible prices in familiar outlets, this could support rapid growth in UK primary production. However, this is also the most challenging pathway as it suffers from the 'chicken or egg' paradox – the significant minimum volume demands of this route cannot be met unless sufficient production is in place, but production cannot scale unless demand is already in place. This pathway therefore focuses on potential routes to overcoming these issues.

What this pathway looks like in detail – from fork to farm

Routes to Consumer

UK beans reaching consumers via this pathway will come either through large supermarket chains where most UK shoppers purchase groceries, through foodservice companies supplying mainstream markets or through public procurement for settings like schools, hospitals and prisons. A focus on schools will help get children accustomed to eating beans and set healthy dietary preferences early on in life, with a lasting legacy into adulthood.

A 'British Beans' supply chain will be used as a point of differentiation for consumers, helping to generate pride and interest in the products in which they are included. In some scale-up models the provenance is less central to the market proposition. For example, where British beans are used at first in small volumes to bulk out beans from other origins as part of a reformulation strategy.

Transportation & Logistics

Transportation and distribution logistics to retail or foodservice customers will be via existing supply chains and distribution hubs. Increased logistics provision will be required earlier in the supply chain to link increased volumes from farms efficiently to cleaning and manufacturing facilities.

Processing & Manufacturing

The manufacturing stage is key to understanding the scale up of this pathway. All beans provided through this route will be processed and manufactured to some degree. This will range from:

- Cooking and canning to provide beans in a format that is easily recognisable to consumers and easily used without additional soaking / cooking.
- Incorporating whole beans into more complex manufactured products such as ready meals, in either the fresh or shelf stable categories.
- Using UK bean-derived protein flours or isolates to produce snack foods or processed alternative protein products such as burgers or other meat replacements.

UK beans may be included in any of these product types as the sole source, or alternatively UK beans could be phased in as part of a longer-term product reformulation strategy alongside imported beans. This would allow companies to hedge their risk, and consumers to adjust to potential changes in taste or texture from UK varieties that they would be less familiar with.

In all of these scenarios, scale and quality has to be sufficient to allow a dependable and consistent supply of UK beans to meet demanding manufacturer specifications. This will also require a high degree of price competitiveness, although there may be some flexibility on this where UK provenance allows products access to a more premium market.

Conditioning & Storage

In order to meet the needs of manufacturers, basic processing and cleaning of beans will need to be efficient and scalable as well as meeting high quality and consistency standards. In order to achieve this, existing UK facilities may not be sufficient. The establishment of cooperative farmer-owned infrastructure alongside cooperative marketing schemes would be a clear route to scale in this space allowing for coordination and control as well as capturing value for primary producers that might otherwise be lost by engaging with third parties in the supply chain.

Primary Production

Assuming that UK producers want to produce beans, can get a viable financial return from them, and have access to suitable varieties (questions that are outside of the scope of this paper), the biggest challenge for UK bean production is achieving the coordinated scale and quality required to meet manufacturer specifications. This could be achieved through both farmer clusters, but also be strongly facilitated through cooperative farmer-owned logistics, cleaning and marketing functions. In return, farmers can help manufacturers to meet their climate and other sustainability-related ambitions, for example regenerative agriculture or plant-based protein targets.

Food Giants Case Study: The Kraft Heinz Company

The Kraft Heinz Company produces a variety of affordable manufactured food products. One of the most renowned, especially in the UK, are Heinz Baked Beans. Heinz Baked Beans represent a significant product in the canned food market and are considered an iconic traditional staple of British cooking.

The canned product format of Heinz Baked Beans lends itself to the large-scale, cost efficient production and distribution key to the Food Giants Pathway. Each can is produced through an automated process in which haricot beans in tomato sauce are canned and heated to sterilisation. The resulting product is shelf stable and standardised and offers a quick and convenient meal component. Efficiency of large scale production allows for the per can price point to be low, making baked beans accessible to consumers with a wide range of budgets. Heinz Baked Beanz currently rely on US grown imported haricot beans due to existing supply chain structures and the need for high sourcing volumes at an affordable price.

With beans remaining as their key iconic ingredient, Kraft Heinz continues to innovate to produce bean-based vegan and vegetarian products such as hummus and bean-burgers to adapt to consumer preferences.

Outcomes

Prioritising this pathway is a route to achieving mass-market scale for UK beans. While there is a considerable journey ahead to achieving such a position, if it could be achieved the outcomes could be substantial given the potential to reach millions of people.

The central outcomes associated with this value chain (not taking into account the outcomes associated with primary production) aligned with the Sustainability Compass are:

Healthy, adequate and safe diets for all

- Adherence to food-based dietary guidelines**: UK beans at scale through this** pathway could play an important role in helping the mainstream UK population to meet dietary guidelines for plant-based protein alongside increasing dietary fibre.

Clean and healthy planet

- **Climate stabilisation**: There is the potential for beans and bean-derived products to displace animal-based proteins, playing a role in meeting demand-side climate targets.

Economically thriving, robust food value chains

- **Robust open food systems**: If achieved at scale, this value chain could represent an additional UK-provenance protein source that is affordable vs animal-based proteins and not highly dependent on global inputs, increasing national self-reliance.
- **Adequate distribution of profits in food value chains**: If following a cooperative farmer-owner scale-up model, this could ensure that value is captured by primary producers and can be reinvested in farm businesses and sustainable production.

Just, ethical and equitable food systems

- **Fair and just food value chains**: If UK bean production became mainstream, it could represent a valuable new income stream for farmers, capturing a market segment that has traditionally been supplied from overseas.

Trade-Offs

Upscaling beans through the Food Giants pathway offers the potential for large scale positive impact if achieved. However, there are also potential trade-offs associated with this route to scaling. Firstly, the product offerings of large food manufacturers can be limited in their health credentials. Many highly accessible convenience options contain high levels of salt, sugar and fat (HFSS) and bean-based products coming to market via this pathway may offer reduced health benefits compared to the alternative pathways to upscaling discussed. This is perhaps especially a risk for novel products using bean flours and proteins, which may fall under the definition of Ultra-Processed Foods (UPFs), linked to a range of suboptimal health outcomes. As well as containing beans, product offerings need to align with the requirements of healthy diets for wide scale health benefits to actually be achieved.

Secondly, upscaling via this pathway may avoid the benefits associated with upscaling methods that deviate more substantially from the food industry's status quo. For example, even if sourcing UK grown beans, food giants may not prioritise fair prices for producers and are unlikely to support empowerment throughout the supply chain.

Finally, integrating beans into mainstream manufactured products does not tackle issues of sub-optimal resource use (e.g. resource intensive packaging formats) which are addressed by alternative routes to upscaling.

Key barriers to scaling

1. Manufacturers will not consider UK-based bean supply chains unless there is an existing **consistent, dependable and high quality supply**.
2. **The price of imported beans and bean-derived ingredients** (e.g. flours, proteins, isolates) is likely to remain considerably lower than UK-based alternatives until supply can be scaled.
3. There would be a necessary **adjustment of manufacturing methods and techniques**, as well as potentially also in consumer tastes, to transition from imported to UK bean varieties.
4. **Investment would be required for scaling** and government and private sector financial support is currently lacking.

Ways forward

The 'Food Giants' pathway holds the greatest potential in terms of achieving impactful scale for making UK-grown beans widely cultivated and readily available for consumers. However, it also presents some significant challenges, particularly with regards to reaching sufficient scale to be able to integrate with existing large-scale value chains and reaching a competitive price per tonne vs imported beans.

Nonetheless, there are ways of overcoming these barriers, if there is sufficient buy-in from growers, food sector and manufacturers, and government. Firstly, there are routes through which large manufacturers with an interest in product and supply chain innovation can 'dip their toes' into UK bean procurement without making substantial commitments, and in so doing support the scale-up of supply. One of these routes would be through procuring relatively small volumes of UK-grown beans for 'limited edition' product ranges or for inclusion in small amounts as part of a phased product reformulation for existing product lines. The latter approach would also help to overcome potential changes in product taste or texture, as small adjustments over time allow consumer tastes to evolve.

In addition to such an approach, manufacturers can also adopt an 'open innovation' or corporate venturing approach to UK bean supply. Under this model, manufacturers do not directly change their own procurement or ingredients in the first instance, but remain open around their interest in UK beans and convene industry players and especially start-up companies to move the sector forward. This can include corporate venture capital investments in emerging companies that allow manufacturers to keep a stake in innovations and learn more about how the value chain and market is developing. This may then lead to the option to acquire successful companies and therefore fold UK-bean sourcing into existing operations, but with lower up-front risk and the ability to deal in smaller volumes to begin with.

There will be a need for considerable innovation amongst producers and suppliers in order to meet manufacturer demands. It may be instructive to look to successful models of bean supply chains in other geographies, notably North America, which supplies a significant percentage of beans consumed in the UK. There it is common for bean growers to be collectively organised through trade associations to coordinate supply and demand.

For example, a collectively owned marketing board such as a 'UK Dry Bean Council' could act to coordinate sales to canners, dehydrators, ingredients companies and other manufacturers, while providing shared infrastructure for cleaning and logistics. In this way, manufacturers can deal with one central point of contact that can then work with multiple suppliers to provide the product. Such associations can also have a significant role in fuelling innovation through research and policy work, for example establishing breeding programmes for new varieties, facilitating investment in new facilities or lobbying government for funding.

Finally, government can play a role through prioritising UK bean production as a policy aim and promoting it through schemes such as the Sustainable Farming Incentive (SFI) and innovation funding. This would help to support the ongoing Defra priority area around UK food security by boosting domestic supplies of plant protein, as well as championing the role of beans in soil health through incorporation into arable and mixed farming rotations. At the other end of the value chain, government can provide a stable demand signal through encouraging uptake of UK-grown products including beans through its public procurement standards. There is a key opportunity to embed sustainability and UK sourcing into the UK Government Buying Standards for Food and Catering Services (GBSF).

Key recommendations for scale-up

- Consider options for product reformulation or 'limited editions' to experiment with UK-based bean sourcing and consumer interest.
- Manufacturers to engage in open innovation to encourage scale-up of UK bean production and value chains.
- Organise collective farmer-owned infrastructure to promote the interests of UK bean growers and over time engage in collective marketing, capacity building, policy and research work.
- Government to support UK beans through incorporating into school meals via public procurement guidelines, which can be fulfilled cost-effectively and at scale by large manufacturers.

Conclusions and recommendations

This report has outlined three pathways to growing the value chain for British-grown beans through building out the 'missing middle', enabling synergistic growth in demand and supply with beneficial outcomes for the environment, economy and health. In practice, these pathways are not independent of each other, and driving growth through each of the pathways (as well as others not discussed directly here) can help accelerate scale-up through mutually beneficial interactions. Additionally, each of the pathways allows for a range of different beneficial outcomes to be obtained.

Just as importantly, pursuing multiple routes to upscaling allows trade-offs or downsides of the individual models to be counterbalanced. For example, growing high value premium UK beans through the Artisanal Entrepreneurs pathway will promote innovation and job creation but these products might be inaccessible to consumers on a reduced income. This issue might be overcome by looking to the Food Giants pathway, which offers to make UK bean-based products widely available to a broader range of consumers and to allow bean products to be used cost effectively within foodservice environments.

The economic benefits of scaling the UK bean value chain

Throughout this report, we identify a diverse range of benefits which could arise from successfully upscaling UK bean production and consumption via the three pathways explored. These beneficial outcomes span the breadth of the Sustainability Compass, outlining the economic, social, environmental and ethical potential that each pathway presents. In this closing section of the report, we zoom in on the economic outcomes achieved by implementing each of the described pathways. Colleagues within the wider BeanMeals project will be producing a complementary paper looking at a full range of outcomes.

How do the economic outcomes of the Three Pathways interact?

- **Innovative and transformative businesses**: Community Enterprise and Entrepreneurial approaches bring new ideas and innovations to the sector, generating products and business models that would otherwise have gone unexplored. Through having larger disposable funds to allocate to manufacturing methods and scale, Food Giants can drive increased R&D investment and ultimately stand to benefit from innovative practices and products.
- **Robust open food systems**: Growing the value chain for UK-grown beans at scale should fundamentally reduce reliance on global imports. Improved national food security can be an outcome, by providing an additional domestic source of protein that is affordable vs animal protein and not highly dependent on global inputs. The high volume sourcing of food giants has the greatest potential to significantly drive this over the long-term, however smaller scale demand and initial trialling (as supported by dedicated community enterprises) is needed to kick start this. Diversity in the food system (e.g. smaller players as well as large corporations) increases resilience.

- **Good jobs**: The Community Enterprise and Entrepreneurial Artisan pathways offer a range of SME-based job opportunities that can build local multiplier effect. While jobs in the community sector are not likely to be highly remunerated, they do have the potential for high levels of job satisfaction and community embeddedness. The potential for adding the greatest range of high value jobs across the value chain in logistics, manufacturing, technology, branding, and other professions comes from the Entrepreneurial and Food Giants pathways.
- **Adequate distribution of profits in food value chains**: Fundamental to the Community Enterprise pathway is the payment of fair prices to growers. Small, entrepreneurial businesses are also often characterised by having transparent, ethical supply chains. There are more likely to be trade-offs in the Food Giants pathway as large businesses are prone to squeezing supply chain profit margins over time. This risk could be mitigated through the establishment of a strong farmer-owned cooperative marketing organisation.

Figure 3 presents a summary of these economic outcomes achieved through implementation of each of the three pathways.

Figure 3: Economically thriving, robust food value chains – summary of outcomes by pathway

Calls to action

Throughout the report we highlight the actions that can be taken to facilitate scale-up of the UK bean value chain across the three pathways. Here we summarise these actions by stakeholder group:

National & Local Government

- **Establish innovation funding programmes** to replace funding previously provided by EU Regional Development Fund (EURDF) and Local Enterprise Partnerships (LEPs). This should support ingredient and food science innovation and the establishment of regional food manufacturing innovation centres to bring together knowledge and expertise.
- **Consider introducing tax breaks or similar policy measures to support the establishment of food manufacturing infrastructure** designed to utilise plant proteins.
- **Incorporate bean or legume cultivation within rotations as a funded measure within agri-environment schemes**, to support farmers in upskilling and shifting product to these crops.
- **Establish public procurement guidelines** that commit institutions to sourcing UK-grown plant proteins including beans wherever possible.
- **Fund research and development** focused on the development of novel production techniques and processes that could aid utilisation of beans and other plant proteins. This should include supporting increased training in food science expertise.

Farming Bodies & Farmer Clusters

- **Organise collective farmer-owned infrastructure** to promote the interests of UK bean growers and over time engage in collective marketing, capacity building, policy and research work.
- **Investigate the potential of establishing a 'UK Bean Council'**. Such a body could act to coordinate sales to canners, dehydrators, ingredients companies and other manufacturers, while providing infrastructure for cleaning and fostering knowledge sharing.

Manufacturers

- **Consider options for product reformulation** or 'limited editions' to experiment with UK-based bean sourcing and consumer interest.
- **Explore business opportunities to invest in infrastructure for bean processing**. This could potentially be supported by government tax breaks or other supportive measures (as recommended above).
- **Engage in 'open innovation'** or corporate venturing, offering transparency around interest in UK beans. Work towards convening industry players and start-up companies to move this sector forward.
- **Engage in opportunities for public-private financing** of new UK-based innovation, manufacturing, and research facilities and initiatives.

Retailers

- **Showcase a variety of bean products to customers**. Through highlighting the product offerings of entrepreneurial brands as well as established food giants, retailers can drive purchasing of beans across income bands.
- **Support customers in making healthier food choices**, such as purchasing beans as a form of plant-based protein, through general marketing and promotional offers.

Achieving collective impact

Growing the value chain for UK beans is a good example of a systemic challenge. While the opportunity is clear, no individual action or actor can achieve transformational change alone. To do so will require both clear system-wide shared ambition, and practical coordination. Following the model of 'Collective Impact' this could include actions to 1) provide a common agenda, 2) shared measurement of progress towards goals, 3) to ensure that actors undertake mutually reinforcing activities, 4) to facilitate continuous communication amongst participants, and 5) provide a coordinating function.[18] There is space for an organisation or group to step up to help fill these facilitating and enabling roles to achieve rapid collective impact at scale.

18 Turner, S., Merchant, K., Martin, E. and Kania, J. (2012). Understanding the value of backbone organizations in collective impact: Part 1. Stanford, USA: Stanford Social Innovation Review. doi: 10.48558/X3KJ-BS10

BeanMeals
Thinking beyond the can

About the BeanMeals project

The BeanMeals project explores the systemic innovation needed to transform the food system in institutional catering and home-cooking by using healthier ingredients (in particular beans), new public procurement practices and more-local products. Running from June 2022 to November 2024, the project has brought together researchers from several UK research institutions with partners from the public and private sectors.

The research features two quick-cooking navy bean varieties developed by the University of Warwick for UK growing conditions. These bean varieties, Capulet and Godiva, are suitable for a wide range of easily-prepared institutional- and home- cooked meals with lower fat, salt and sugar content.

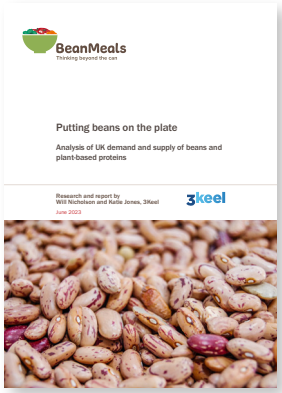
This report is part of a series of outputs from the BeanMeals project. To find out more, visit www.eci.ox.ac.uk/beanmeals

The research was funded through the Transforming the UK Food System for Healthy People and a Healthy Environment SPF Programme, delivered by UKRI, in partnership with the Global Food Security Programme, BBSRC, ESRC, MRC, NERC, Defra, DHSC, PHE, Innovate UK and FSA.

3keel

About 3Keel

3Keel is a UK-based firm of sustainability advisors specialised in working with food systems, supply chains and landscapes. We use our knowledge and skills to accelerate systems change and business transformation towards a world in which nature, people and enterprises thrive. For more information visit 3keel.com



Putting beans on the plate: Analysis of UK demand and supply of beans and plant-based proteins

Will Nicholson and Katie Jones

Published June 2023

This report from the BeanMeals project describes UK demand and supply of plant-based alternatives to meat, for human consumption, and the role of beans. It aims to provide a better understanding of the current and potential future demand for, and supply of, beans and how this fits into a broader shift to plant-based foods.

Download the report at www.eci.ox.ac.uk/beanmeals

Partners

3keel

Campden BRI
food and drink innovation

FOOD FOR LIFE
Soil Association

Joanne Craven
Serious gaming and research communication

Leicestershire County Council

Leicester City Council

TRANSFORMING UK FOOD SYSTEMS
Strategic Priorities Fund

Environmental *Change* Institute
eci
UNIVERSITY OF OXFORD

University of Hertfordshire UH

UNIVERSITY OF HULL

UNIVERSITY OF LIVERPOOL

WARWICK
THE UNIVERSITY OF WARWICK