



RESPUBLICA
society · prosperity · virtue

October 2023

HUNGRY TO LEARN:

Lifelong Learning Pathways for the Agri-food Sector

Marius S. Ostrowski

A Report for the Lifelong Education Institute



Lifelong
Education
Institute



ABOUT THE LIFELONG EDUCATION INSTITUTE

In February of 2021, former Universities Minister the Rt. Hon. Chris Skidmore MP, launched the Lifelong Education Commission, to recommend how the multiple and varied barriers to lifelong learning can be removed, what future investment is needed to support this, and what regulatory change is needed to ensure the maximum possible flexibility that will benefit learners and deliver on the promise of a whole system change for education post-18.

The Commission focussed on how post-18 education and skills ought to be designed, so that both Higher and Further Education institutions are valued, but also how the individual learner can be better empowered to make decisions and undertake their learning.

Through its run, the Commission produced several important research outputs, published a skills and levelling-up manifesto, worked with Chris Skidmore to table amendments to the Skills and Post-16 Education Bill, submitted evidence to DfE's Lifelong Loan Entitlement consultation, and more.

On **1st April 2023**, the Commission transformed into the Lifelong Education Institute, becoming a permanent fixture of the Education and Skills space, fostering radical policy thinking and advancing the debate on the most important topics. Chris Skidmore MP stepped down from his role as Chair, to focus on his work on Net Zero, and Dame Ann Limb DBE DL became the new Chair of the Institute.

ABOUT RESPUBLICA

The ResPublica Partnership Ltd (ResPublica) is an independent non-partisan think tank. Through our research, policy innovation and programmes, we seek to establish a new economic, social and cultural settlement. In order to heal the long-term rifts in our country, we aim to combat the concentration of wealth and power by distributing ownership and agency to all, and by re-instilling culture and virtue across our economy and society.

CONTENTS

FOREWORD	2
EXECUTIVE SUMMARY	4
1. INTRODUCTION	8
2. THE NEGLECTED POTENTIAL OF UK AGRI-FOOD	9
3. HARPER ADAMS AT THE FOREFRONT OF AGRI-FOOD LEARNING	23
4. A NEW APPROACH TO LIFELONG AGRI-FOOD SKILLS	38
5. CONCLUSIONS AND RECOMMENDATIONS	49
ENDNOTES	52
ACKNOWLEDGMENTS	56



FOREWORD

by The Rt Hon George Eustice MP

The conventional view among economists in the latter part of the 20th century was that food security was achieved predominantly from open markets and international trade, and that primary industries like agriculture would inevitably become less important in developed economies like the UK. A series of global crises has exposed the folly of these presumptions and brought a renewed focus on the critical importance of domestic food production.

At the peak of the first lockdown during the Covid-19 pandemic as world supply chains faced enormous stress, there was, for a moment, a genuine risk that the world would turn in on itself and that countries would start imposing export bans. While global food security depends both on both diversified production and open markets, national resilience only comes from having a profitable domestic agri-food industry in the UK and a growing agricultural output.

It has also become increasingly clear that water scarcity on agricultural land will become an early consequence of climate change. Parts of the world that currently produce food will find it harder to do so in future, placing more importance on countries within the temperate zone to increase their agricultural output. Meanwhile, the impact of the energy price spike on agricultural commodities since the invasion of Ukraine is a further reminder that we need to change systems of production, so they become less reliant on expensive inputs that depend on oil and gas.

The UK government recognised all of these emerging challenges in its Food Strategy, published in July 2022. It set out the key ingredients for a new industrial strategy for UK agriculture with new investment in business-led research and development; new grants to invest in modern

technology; plans to facilitate the reshoring of fresh produce production through a new generation of glasshouses; a new system of agricultural incentives to support more sustainable production; and the creation of a new body, The Institute for Agriculture and Horticulture, to ensure that we develop the skills our nation will need in the future.

This excellent paper by the Lifelong Education Institute builds on that all-important skills agenda. The idea of a National College in agriculture that would support lifelong learning and ensure that more students progressed to level three qualifications has been mooted for some time, and the report is right to identify this as a vitally important priority. We also need to raise the status of the agri-food industry and change attitudes among

those giving careers advice. During the pandemic, we soon learnt which jobs were truly important, and all those working in the food industry became key workers. Linked to this, more work is needed to bring consistency and credibility to the system of qualifications. Multiple changes over the decades have undermined perceptions about the credibility of some qualifications.

Hungry to Learn makes many policy recommendations which are a powerful contribution to the debate. There has never been a time where our food system and the importance of domestic output to our national security has attracted such attention, and it is important to ensure that this translates into concrete progress.



EXECUTIVE SUMMARY

INTRODUCTION

In this report the Lifelong Education Institute explores the opportunities and challenges facing skills provision in the agri-food sector. It outlines a model of Lifelong Learning Pathways designed to open up training and retraining opportunities for existing agri-food learners and new entrants transferring across from other economic sectors. In addition, it examines how higher education institutions' teaching courses related to agri-food can learn from the close industry partnerships and teaching model pioneered by Harper Adams University to help establish the UK as a global leader in agri-food education, research, and knowledge exchange.

THE NEGLECTED POTENTIAL OF UK AGRI-FOOD

The agri-food industry in the UK has undergone several major shifts in the last three decades. As a sector, it has shifted 'downstream' away from

primary agriculture and towards food wholesaling, retail, and catering. It has also become less regionally concentrated in the East of the UK, with major growth above all in the South and West, with its outputs more orientated towards livestock grazing (meat and dairy). The UK's industrial strategy, meanwhile, has only focused on agri-food in a somewhat marginal way, connected to questions of 'clean growth' and 'net zero', and has insufficiently acknowledged the new growth areas of UK agri-food: the South West, South East, and West Midlands.

There is a gap between the skills requirements of the agri-food sector and the available skills provision by agri-food education institutions. These have the willingness to work together to integrate high-end technologies into the UK's precision agriculture, but they lack the consistent sector-wide support and skills investment from Government and Innovate UK needed to foster innovation growth, and also face unresolved strategic questions about workforce

training priorities. At the same time, the agri-food sector faces pressure to help the UK meet national-level policy targets around sustainability and accessibility, which requires a mindset shift to seeing food independence, resilience, and security as public goods aligned with the UK's ecological and energy independence aspirations.

HARPER ADAMS AT THE FOREFRONT OF AGRIFOOD LEARNING

The approach to agri-food teaching pursued by Harper Adams deserves to be given special attention, both as a source of insights for other education institutions to emulate and as a model for Government to study closely for future policy around research, knowledge exchange, and lifelong learning. Harper Adams has achieved significant alignment between cutting-edge agri-food innovation, high-level skills training, and the latest industry requirements through its system of in-degree placements, the Ni.PARK incubator development, and its School of Sustainable Food and Farming (SSFF). The SSFF is an agri-food supply chain school, which focuses on climate change, 'net zero', human and animal health, and planetary sustainability from farm to consumer, which supports a network of Living Labs. Overall, Harper Adams operates a hybrid model of 'place-based' and 'hub-and-spoke' integration between education and industry that has strong replication potential within and beyond the agri-food sector.

Harper Adams is also leading curriculum development to vertically and horizontally diversify agri-food course provision. Its apprenticeship for Vet Technicians, Agricultural Engineers, and Advanced Food Engineers are clear examples of how to

expand the offering for level 5 and 6 agri-food qualifications, although more granular work still needs to be done to extend this higher technical skills provision into the area of short courses and microcredentials by the start of the 2025–26 academic year, to meet the recent legislative push for modularisation. This will build on Harper Adams' track record of delivering continuous professional development (CPD) to nearly 1,000 learners annually. Further, there is increasing pressure to build out its embryonic credit transfer agreements into a wider model for accreditation, quality assurance, credit interoperability, and credit transfer across the whole agri-food sector.

A NEW APPROACH TO LIFELONG AGRIFOOD SKILLS

The Harper Adams model contains several key elements that should be developed into a radical new structure for lifelong agri-food learning that is closely integrated with the needs and priorities of the agri-food industry. Lifelong Learning Pathways, continuous upskilling trajectories made up of full- and part-time modular courses from level 1 to level 8, delivered by partnerships between agri-food education institutions and industry bodies, allow learners to achieve skills and career progression in parallel. These should be funded by a mixture of tuition and maintenance grants, fiscal incentives for business, and local and national Government funds. Harper Adams should continue the development of the School of Sustainable Food and Farming (SSFF) to act as an interdisciplinary hub for innovation, knowledge exchange and pedagogical training for the agri-food sector.

Lifelong Learning Pathways should be designed in a way that allow students who 'major' in agri-food to also 'minor' in adjacent subjects, enabling them to acquire 'clean growth' knowledge and skills, such as EVs, low-carbon energy, ecological manufacturing and construction, green finance, and ESG. This is true not just for 'green'-badged apprenticeships in the agri-food sector, but also for a wider roster of sustainability behaviours that should be built into all apprenticeships and skills courses. Harper Adams can pioneer overarching models of sustainability teaching in this space. In the same vein, it should also open its teaching provision to a wider learner pool by expanding the usage of hybrid and online distance learning, in collaboration with other agri-food education institutions. It also needs to expand its 'place-based' and 'hub-and-spoke' strategic partnerships within and beyond its immediate locality in Shropshire and the West Midlands to make the most of growth regions and 'best practice' insights across the UK and beyond.

RECOMMENDATIONS FOR POLICYMAKERS:

1. Categorise food security, accessibility, and sustainability as a public good, and give the agri-food sector the status of a strategic industry.
2. Develop a system of Lifelong Learning Pathways as the primary framework for skills and career progression in agri-food, and expand this framework to all UK strategic industry sectors and employment areas.
3. For skills areas covered by Lifelong Learning Pathways, expand the Lifelong Learning Entitlement into a Pathway Premium combined tuition and maintenance grant, set at the equivalent of six years' worth of full-time tertiary education (currently £55,500 p.a.) and living costs.
4. Add a 'strategic innovation rate' to SME R&D tax relief (at an extra 64% of qualifying costs deductible from profits), and a 'strategic innovation credit' band (at an extra 5% of qualifying expenditure) to R&D expenditure credit, to cover business innovation activity within strategic priority industries such as agri-food.
5. Add a 'strategic innovation multiplier' of 1.5 to the Annual Investment Allowance, to cover business investment in capital projects in partnership with tertiary education providers.
6. Introduce a 'strategic skills tax credit' at a rising rate proportional to the number of industry placements and employees undertaking 'on the job' training and upskilling.
7. Unify the system of disparate local skills funding pots into a single resource under the auspices of the Local Skills Improvement Fund tied to the operations of Local Skills Improvement Plans (LSIPs), made available to all education providers across the relevant LSIP area, and with a mandatory agri-food funding and strategy strand.
8. Recognise agri-food as a growth industry for the UK and convert the Rural England Prosperity Fund into a 'Breadbasket of England' strategic fund designed to support innovation, knowledge exchange, and training developments in key agri-food growth regions (South West, South East, and West Midlands), following similar models operating in Scotland, Wales, and Northern Ireland.
9. Develop a single sector-wide accreditation, quality assurance, credit interoperability, and credit transfer system for agri-food qualifications.
10. Create a UK-wide network of agri-food incubators and Living Labs test sites, supervised and operated by a consortium accountable to The Institute of Agriculture and Horticulture (TIAH).

RECOMMENDATIONS FOR HARPER ADAMS UNIVERSITY:

1. Develop the IfATE agriculture, environmental, and animal care occupational map into a full prospectus of agri-food Lifelong Learning Pathways, constructed around 'majors' in agri-food, along with 'minor' or 'elective' concentrations in adjacent subjects, building on work already undertaken to support the development of apprenticeships and the current review of undergraduate curricula.
2. Pilot or roll out flexible and (where appropriate) modularised delivery for teaching, including online/blended and 'day-release' optionality, and converting level 3–6 provision into short credit-bearing courses that are either standalone or stackable into larger qualifications at each Pathway level.
3. Issue clear subject guidance for Harper Adams students about how these modular courses should be grouped together, and the requirements they must meet to count as 'foundational', 'advanced', or 'capstone' modules to allow learners to progress along their chosen Pathways.
4. Develop the four-year Harper Adams learning model into a '2+2' approach, with two years of study for an accelerated degree course and two years of in-depth work-based learning, and identify courses that can be used as pilot case studies.
5. Expand the use of hybrid and virtual teaching methods to offer more online distance learning options, such as 'flipped classroom' teaching with on-site 'residential sessions', remote learning 'deals' with other education institutions, and 'virtual reality' environment rendering to widen access to the Demonstration Farm sites — Living Labs and Ni.PARK.
6. Extend the in-degree placement scheme with industry partners into a post-graduation 'business practitioner' secondment system and strengthen 'visiting study' agreements with other agri-food education providers to let Harper Adams and other students set up learning exchanges and other knowledge transfers.
7. Work with all West Midlands Chambers of Commerce to develop a coordinated regional agri-food skills strategy, and clarify the balance between depth (upskilling existing workers) and breadth (attracting new workers to the sector) in workforce training.
8. Build capacity within the School of Sustainable Food and Farming for an interdisciplinary hub for rural connectivity and agri-food innovation, 'clean growth' knowledge exchange with adjacent sectors, and 'Teach First' training programmes for mixed-methods agri-food pedagogy.
9. Create 'best practice' exchange partnerships focusing on cutting-edge innovation, curriculum design, and teaching infrastructure development with agri-food education institutions and industry bodies in the other growth regions for UK agriculture (South West, South East, East of England) and beyond the UK.
10. Collaborate with Mayoral Combined Authorities (MCAs) across the UK to raise awareness of Harper Adams, and of agri-food as a high-level learning and career option, among school leavers and workers in adjacent sectors who have the higher technical skills needed in agri-food.



1. INTRODUCTION

In this report the Lifelong Education Institute seeks to explore structures of learning and skills training in the agri-food sector, and how they can help generate and attract the learner talent that the sector needs to help establish the UK as a global leader in precision agriculture and sustainable food systems. The research has been sponsored by Harper Adams University, a higher education institution that provides specialist learning and skills training for the agricultural and rural sector.

The specific aims of this report are to better understand the opportunities and challenges facing skills provision in the agri-food sector, and how far a new approach to lifelong learning that integrates skills and career progression can help overcome the long-term mismatch between workforce skills and industry needs. It examines Harper Adams' experience in setting up sectoral partnerships and undertaking curriculum reform programmes in order to bridge the gap between teaching priorities and industry needs. It assesses what is needed for the future development of an advanced, precision-orientated agri-food sector capable of meeting the UK's strategic needs, including a radical new model of Lifelong Learning Pathways, an equitable portfolio of financial responsibilities, the importance of integrating new pedagogical means and methods, and an interdisciplinary approach to agri-food education, research, and knowledge exchange.

The report makes policy recommendations to Government that can help to integrate lifelong agri-food learning and skills training as a vital component of the UK's mainstream education system.



2. THE NEGLECTED POTENTIAL OF UK AGRI-FOOD

The UK economy of the 21st century is typically associated with a specific roster of key cutting-edge sectors, including aeronautics, automotive, financial services, high-end manufacturing, pharmaceuticals, and research and innovation. These give it a major emphasis on service- and information-intensive industries, not just in terms of economic output but also as a relative share of the UK's total workforce. However, this emphasis sometimes obscures the continued importance of the agri-food industry as a component of the UK's diversified economy. This chapter provides an overview of the recent evolution of the UK agri-food sector and its place within the last decade of UK industrial strategy, and explores the challenges it faces as well as the solutions that have been proposed so far to respond to them.

2.1 AGRI-FOOD IN THE UK ECONOMY

To understand the landscape for agri-food employment and skills, it is first crucial to grasp the longer-term dynamics within the UK agri-food sector as a whole. These amount to a change of emphasis between its constituent branches, a geographical shift in its main operations, and a diversification of its major outputs.

2.1.1 LONG-TERM SHIFTS IN THE UK AGRI-FOOD INDUSTRY

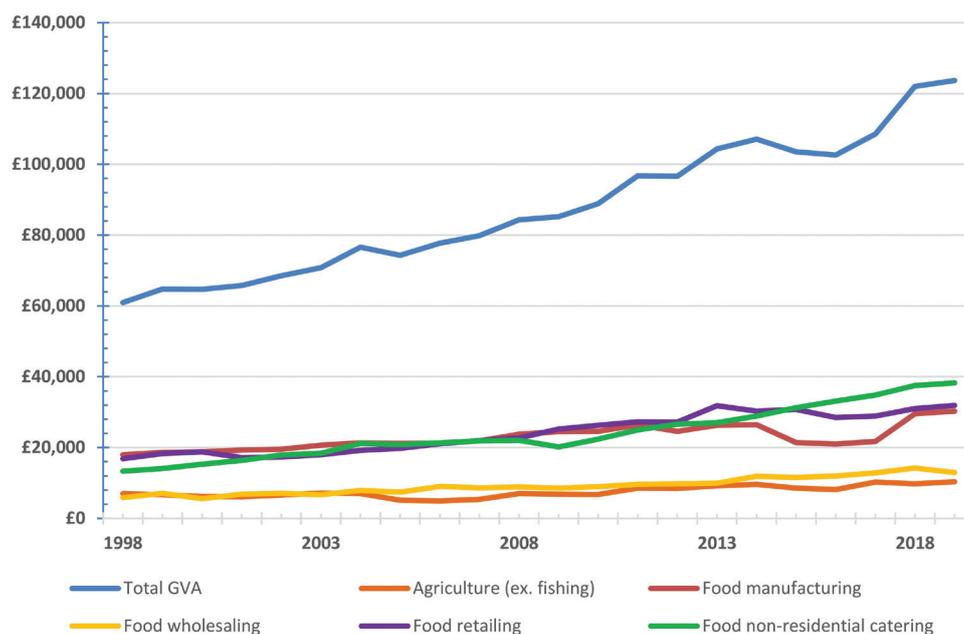
Over the last 30 years, the agri-food sector has played a consistent but gradually shrinking role within the UK economy.¹ In absolute terms, its real-terms contribution to the UK's total Gross Value Added (GVA, at 2022 prices) more than doubled from £60.95bn in 1998 to £123.7bn in 2019, just before the onset of the Covid-19

pandemic, with particularly insurgent growth in 2010–13 and 2017–18. By comparison, over the same period, the UK’s total GVA rose by 122% from £900.6bn to £2.0trn, which means that agri-food slightly decreased from 6.77% of the UK economy to 6.20%, at a time when service industries such as real estate, health and social care, and especially IT and communications, have kept pace with or even dramatically outpaced the UK’s overall economic growth.

This relatively stable picture disguises a noticeable re-composition within the agri-food sector, in terms of the proportional contribution of its constituent parts to sectoral GVA. Primary agriculture, which dipped in absolute terms from £6.98bn in 1998 to as low as £4.94bn in 2006, before recovering to £10.33bn by 2019, has declined from 11.4% of total agri-food GVA to 8.35%. Something similar has happened to food manufacturing, which experienced a less volatile rise from £17.97bn to £30.27bn, but still proportionally shrank from 29.48% to 24.48% of agri-food GVA.

By comparison, food wholesaling has more than doubled in absolute size from £5.83bn to £13.22bn, expanding slightly from 9.57% to 10.69% of the total and thereby overtaking primary agriculture. Whereas food non-residential catering has nearly tripled in size, from the third largest agri-food contributor at £13.32bn or 21.85% of agri-food GVA in 1998 to by far the largest contributor at £38.25bn or 30.93% in 2019. **The overall effect is that UK agri-food has shifted its emphasis ‘downstream’ along the overall food supply chain, away from primary agriculture and towards food wholesaling, food retail, and non-residential catering.**

FIG. 1: AGRIFOOD GVA, 1998–2019 (£000S) (SOURCE: ONS)



At the regional level, the UK agri-food sector has seen a number of major economic shifts. For primary agricultural industry—which groups together crop and animal production, shooting and related services, forestry and logging, and fishing and aquaculture—Scotland has been consistently the single largest contributor to UK GVA.² Within England, the East of England (£1.48bn) and East Midlands (£1.22bn) dominated agricultural industry in 1998, accounting for 42% of English agriculture (£6.37bn) together. By 2019, before the disproportionate negative impact of Covid-19, their GVA in absolute terms only modestly increased: £1.68bn for the East of England and £1.47bn for the East Midlands.

Both have been overtaken by the South West, which underwent a 129% increase in its GVA from £0.89bn in 1998 to £2.04bn in 2019. At the same time, agricultural growth in regions such as the West Midlands (from £0.61bn in 1998 to £1.2bn in 2019) and South East (£0.65bn to £1.22bn) has outpaced overall growth in the UK economy.

Overall, UK agriculture has become less concentrated and more evenly dispersed, with the top two English regions (East of England and South West) now accounting for only 37% of English agriculture (total £10bn).

FIG. 2: REGIONAL GVA AND CHANGE RATES FOR AGRICULTURE, FORESTRY AND FISHING, WHOLESALE AND RETAIL TRADE, AND ACCOMMODATION AND FOOD SERVICE ACTIVITIES, 1998 AND 2019, WITH BIGGEST CHANGERS HIGHLIGHTED (TOP 3 WITHIN ENGLAND, TOP DEVOLVED NATION) (SOURCE: ONS)

REGION	Agriculture, forestry and fishing			Wholesale and retail trade			Accommodation and food service activities		
	1998 (£m)	2019 (£m)	Change (%)	1998 (£m)	2019 (£m)	Change (%)	1998 (£m)	2019 (£m)	Change (%)
North East	173	357	106.4%	5,060	5,343	5.6%	1,490	1,576	5.8%
North West	438	842	92.2%	17,782	23,120	30.0%	4,390	5,550	26.4%
Yorkshire and The Humber	866	1,121	29.4%	12,256	14,761	20.4%	3,078	3,579	16.3%
East Midlands	1,218	1,469	20.6%	11,564	14,483	25.2%	2,374	2,996	26.2%
West Midlands	605	1,203	98.8%	14,348	17,182	19.8%	3,417	4,241	24.1%
East of England	1,478	1,678	13.5%	15,569	20,318	30.5%	3,498	4,585	31.1%
London	40	61	52.5%	31,340	34,909	11.4%	9,691	14,616	50.8%
South East	654	1,224	87.2%	30,161	37,209	23.4%	5,938	8,045	35.5%
South West	892	2,043	129.0%	13,044	16,079	23.3%	3,809	5,378	41.2%
England	6,370	9,999	57.0%	151,209	183,404	21.3%	37,679	50,566	34.2%
Wales	449	599	33.4%	5,304	6,781	27.8%	1,911	2,438	27.6%
Scotland	1,550	2,469	59.3%	12,832	14,156	10.3%	4,136	5,051	22.1%
Northern Ireland	575	736	28.0%	3,760	6,503	73.0%	849	1,236	45.6%
United Kingdom	8,940	13,802	54.4%	173,131	210,845	21.8%	44,583	59,291	33.0%

In terms of sectoral employment, in 2022 c. 330,000 UK workers were employed in agriculture jobs, 0.9% of the UK's total jobs.³ All three devolved nations have above-average proportions of agricultural workers, with Scotland (44,720 jobs) and Wales (26,250) at around twice, and Northern Ireland (26,930) at over three times the UK average. Of the c. 230,000 jobs in English agriculture, nearly a quarter are in the South West (51,730), with a further third in the South East (39,870) and West Midlands (34,690) combined.

By contrast, the historic powerhouses in the East of England (32,580) and East Midlands (19,020) lie far behind, with slightly fewer agricultural workers between them than in the South West just by itself. As a proportion of regional jobs, their agricultural workforce barely tracks and even trails the average share of agricultural jobs, compared to the more 'agrarianised' workforces in the West and the devolved nations.

FIG. 3: NUMBER OF JOBS AND PERCENTAGE OF TOTAL JOBS IN AGRICULTURE, ACCOMMODATION AND FOOD, WHOLESALE AND RETAIL FOR ALL UK REGIONS, 2022, WITH HIGHEST TOTALS AND % HIGHLIGHTED (TOP 3 WITHIN ENGLAND, TOP DEVOLVED NATION) (SOURCE: ONS)

REGION	Agriculture		Retail and wholesale		Accommodation and food	
	Total jobs	% jobs in all industries	Total jobs	% jobs in all industries	Total jobs	% jobs in all industries
North East	16,550	1.4%	146,860	12.5%	100,280	8.5%
North West	17,270	0.4%	594,600	15.4%	254,240	6.6%
Yorkshire and The Humber	17,690	0.7%	369,310	13.6%	162,320	6.0%
East Midlands	19,020	0.8%	368,340	15.5%	135,440	5.7%
West Midlands	34,690	1.2%	428,120	14.4%	187,990	6.3%
East of England	32,580	1.0%	480,080	14.7%	219,070	6.7%
London	1,940	0.0%	679,870	11.2%	409,440	6.8%
South East	39,870	0.8%	658,190	13.4%	375,420	7.6%
South West	51,730	1.7%	391,470	12.9%	251,680	8.3%
England	231,340	0.8%	4,116,840	13.5%	2,095,880	6.9%
Wales	26,250	1.8%	187,500	12.6%	125,750	8.4%
Scotland	44,720	1.6%	360,040	12.8%	198,490	7.1%
Northern Ireland	26,930	3.0%	138,740	15.4%	54,710	6.1%
United Kingdom	329,240	0.9%	4,803,110	13.5%	2,474,820	7.0%

In the last three decades, the economic gravity of UK agriculture has shifted away from the East and towards the South and West. This also implies a re-composition of the main focuses of UK agricultural output, because underlying differences in the agricultural conditions of different UK regions favour different usages for farmed land. Broadly, conditions in Eastern regions favour arable farming, while

Western regions are better suited to pastoral farming. In this context, **the relative decline in importance of the East Midlands and East of England, and the relative rise of the West Midlands, South East, and especially South West suggest that UK agriculture is becoming more diversified**—away from cereal farming, in particular wheat and vegetables, and towards grazing cattle for milk, poultry and to a lesser extent fruit, plants, and flowers, with a consistent focus on poultry farming.

FIG. 4: MAIN AGRI-FOOD OUTPUTS AND FARM AREA USAGE FOR ALL UK REGIONS, 2019 (SOURCE: DEFRA)

REGION	Main outputs (% of total output value)	Farmed area usage 2019
North East	Cattle for meat, wheat, sheep for meat, barley (together 45%)	Grazing livestock 55%
North West	Milk, cattle for meat, sheep for meat, poultry (61%)	Grazing livestock 59%
Yorkshire and the Humber	Pigs, wheat, poultry, milk (48%)	Grazing livestock 32%, cereal farms 30%
East Midlands	Poultry, wheat, vegetables, plants and flowers (51%)	Cereal farms 49%
West Midlands	Milk, poultry, wheat, fruit (47%)	Grazing livestock 28%, cereal farms 26%
South West	Milk, plants and flowers, cattle for meat, poultry (57%)	Grazing livestock 36%
South East	Fruit, wheat, milk, plants and flowers (41%)	Cereal farms 46%
East of England	Wheat, poultry, vegetables, pigs (51%)	Cereal farms 51%, general cropping 33%

This pattern is largely borne out by trends in the accommodation and food industry—which covers food and beverage services like restaurants, delivery and takeaway, catering, pubs and bars alongside hotels and holiday accommodation.⁴ Between 1998 and 2019, the sector saw 33% growth from £44.58bn to £59.29bn GVA across the whole of the UK.

Within England, only three regions outperformed this growth rate: London (51% growth from £9.69bn to £14.62bn), the South West (41% from £3.81bn to £5.38bn), and the South East (35% from £5.94bn to £8.05bn). Together with the North West (£5.55bn GVA in 2019), these four regions also dominate accommodation and food employment. As of 2022, the UK has a total of 2.47m jobs in this sector, with 2.1m in England alone. Out of these, well over a third are just in London (409,440) and the South East (375,420), and a further quarter are in the North West (254,240) and South West (251,680) taken together.

The picture is similar for the wholesale and retail industry—which includes specialised sales of foodstuffs from shops and stalls—which grew a more modest 22% from 1998 to 2019.⁵ In that time, the South East

(£37.21bn GVA in 2019) has steadily eclipsed London (£34.91bn), although both together still account for over a third of the UK total. The regions with the highest sectoral growth over this period are the East of England (31% growth from £15.57bn to £20.32bn) and the North West (30% from £17.78bn to £23.12bn), which in combination account for a further fifth of UK wholesale and retail GVA.

This is closely mirrored by wholesale and retail employment, which at 4.8m jobs in 2022 is the largest work sector in the UK (13.5% of the total workforce). Of the 4.12m jobs in England, by far the most are in London (679,870), the South East (658,190), the North West (594,600), and the East of England (480,080), with these four a distance ahead of the other regions. Together, these four regions make up nearly 60% of retail and wholesale employment in England.

In broad strokes, it is possible to sketch the economic circulation of agri-food in the UK along the supply-chain from producers to consumers. From its roots in a central band of agricultural land stretching from South/West to East, the pull for consumption through food and beverage hospitality is towards the urban centres and other high-footfall destinations in the South and North of the UK. For wholesale and retail, the pull is again partly North but above all East. **These geographical dynamics are important to consider when determining how and where best to forge institutional partnerships to support Lifelong Learning Pathways for every stage of the agri-food industry.**

FIG. 5: COMPARATIVE GVA IN AGRICULTURE (GREEN), ACCOMMODATION AND FOOD (BLUE), AND WHOLESALE AND RETAIL (RED) ACROSS UK REGIONS (SOURCE: ONS, FDSC)

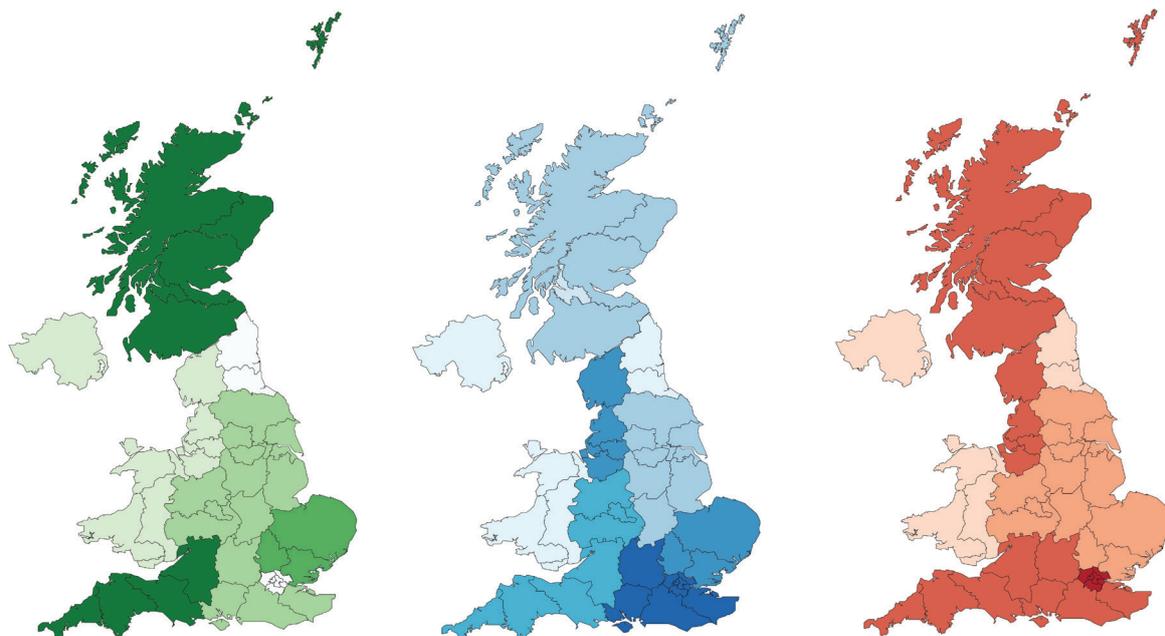
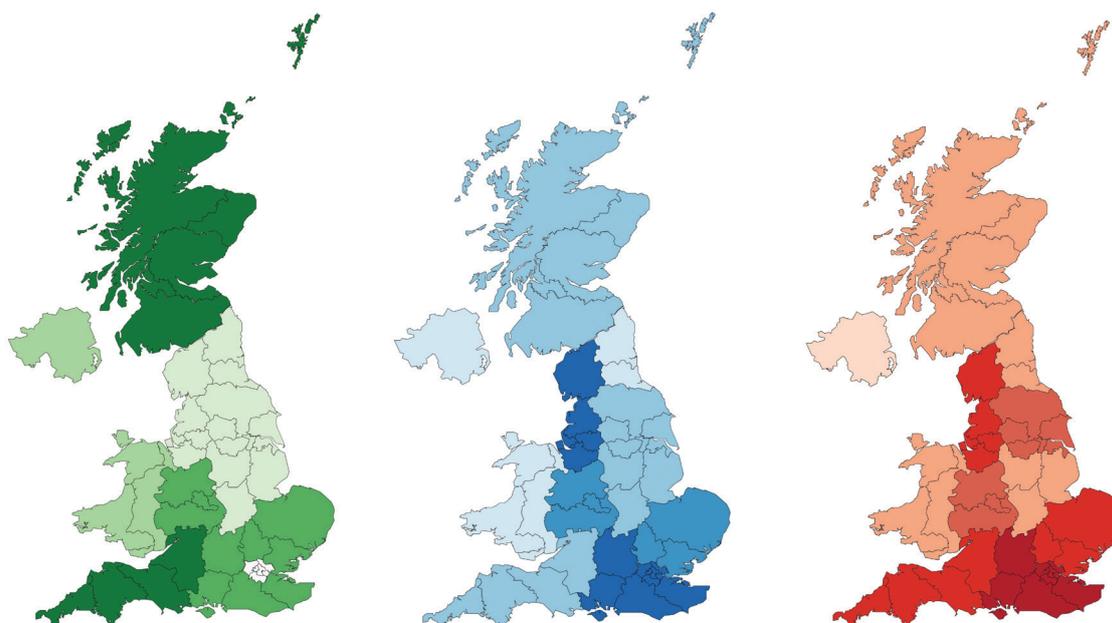


FIG. 6: EMPLOYMENT CONCENTRATIONS IN AGRICULTURE (GREEN), ACCOMMODATION AND FOOD (BLUE), AND WHOLESALE AND RETAIL (RED) ACROSS UK REGIONS (SOURCE: ONS, FDSC)



2.1.2 AGRI-FOOD AND INDUSTRIAL STRATEGY

Agri-food has featured only selectively in recent iterations of UK industrial strategy. It received the strongest focus in the *Industrial Strategy: Building a Britain fit for the future* white paper in November 2017, where agri-food was included within two of the Government's four Grand Challenges: 'Artificial Intelligence and data', and 'clean growth'. For 'Artificial Intelligence and data', agricultural technology was identified as one of six priority business sectors, connected primarily with how intelligent algorithms and data-processing could be used to achieve more efficient use of energy and resources—including reducing the quantity of water needed for agriculture.⁶

For 'clean growth', precision agriculture was named as one of the UK's areas of world-leading industrial capability, alongside EV manufacture, offshore wind, smart energy systems, sustainable construction, and green finance. Agri-food was also the subject of one of three 'clean growth' industrial strategy programmes, called 'Transforming food production: from farm to fork', which aimed to bring about a major transformation in the sector towards high resource efficiency and low-carbon sustainable technology use.⁷

The white paper argued for stronger food and drink industry partnerships with manufacturing and agriculture, with the aim of raising agri-food productivity and resilience, reducing environmental impact, prolonging shelf life, reducing food waste, and making food and drink sustainable as well as affordable, safe, and high-quality. It set out the framework for the Food and Drink Sector Council as a partnership of Government with the whole food chain industry, including primary agriculture, food and drink manufacturing, retail, hospitality, and logistics.⁸

Industrial Strategy also identified a number of key regional agri-food research and innovation assets and clusters, tied to specific Science and Innovation Audit themes:

- East of England: life sciences and agri-tech (e.g., the Norwich Research Park, University of East Anglia);
- North East: agri-tech and industrial biotechnology for bioeconomy (e.g., North East of England Process Industry Cluster);
- Wales: steel innovation, smart manufacturing, health informatics, and agri-tech (e.g., the ‘Crucible’).⁹

This industrial strategy approach was superseded in March 2021 by *Build Back Better: Our plan for growth*, which introduced a shift from ‘vertical’ industrial strategy to ‘horizontal’ industrial planning, along with a much-reduced focus on agri-food explicitly. The aim was to put in place a supportive environment for dynamic entrepreneurship, including regulatory innovation as well as new processes, products, and business models, for a range of key industries such as financial services, health, data, and agriculture. In this vein, the white paper also announced a Better Regulation Committee designed to boost the development of modern, sophisticated industrial technologies by easing financial and regulatory burdens and fostering sectoral competition.¹⁰

Build Back Better also introduced the first explicit link between agri-food and the UK’s ‘net zero’ aspirations. It built on the November 2020 Agricultural Transition Plan, which outlined the specific contribution that farming, and the countryside, could make to achieving key UK climate and environmental goals. In addition, this white paper pledged to maintain the annual budget to farmers, phase out the Basic Payment Scheme between 2021 and 2027, and replace it with a system of delinked payments from 2024, in order to support the gradual phasing-in of several schemes intended to support increased sustainability and productivity within the agri-food sector – supporting the notion of *public money for public goods*.¹¹

The approach outlined in *Build Back Better* was supplemented in February 2022 by *Levelling Up the United Kingdom*, which set out the Government’s regional empowerment agenda. This sharpened the connection between agri-food and sustainability, focusing on the agricultural employment opportunities and skills needs created all over the country by the commitment to a ‘net zero’ transition.¹² The white paper set out a 25-year ‘Environment Plan’, with the aim of achieving greater coordination between stakeholders in the agriculture and energy sectors, and embedding spatial considerations and collaborative policy solutions

in the Government's centralised processes.¹³ It also strengthened the urgency of bringing technological innovation to bear on industrial processes at every scale, including investing in 5G Testbeds and Trials for startups and SMEs in industries such as agri-tech.¹⁴

Levelling Up the United Kingdom also pointed to a number of key regional agri-food research and innovation assets and clusters, this time tied to specific private-sector initiatives:

- East Midlands: UK Food Valley, a business–higher education joint venture by Greater Lincolnshire Local Enterprise Partnership and the University of Lincoln.
- Scotland: Opportunity North East, a food and drink, agriculture, life sciences, tourism, digital, energy partnership series between business, academia, and the public sector.
- Yorkshire and the Humber: several high-value agri-tech cluster developments.¹⁵

The aim in all cases was to showcase the role that higher education institutions can play in supporting regional economies, either as local employers or as anchor institutions for regional collaboration. The 'star example' this white paper gave is the University of Lincoln's Institute of Agri-Food Technology, which has undertaken technological collaboration projects with the local agricultural sector to solve local food chain challenges.¹⁶

Overall, agri-food and rural economic sectors enjoy only a somewhat patchy presence in the UK's industrial strategy. Where they do feature, there is typically only selective mention of the most cutting-edge innovations in precision agriculture, focusing in particular on agri-tech in the East of England, East Midlands, the North, and Scotland. These are regions that were either historically dominant in UK agri-food but have since been rivalled or overtaken by other UK regions, or regions that only make a small contribution to the sector.

Industrial strategy has insufficiently recognised the regions that have become the new major contributors to UK agri-food in terms of GVA and employment: the South West, South East, and West Midlands. Government urgently needs to address this mismatch, by steering greater funding support and policy attention towards agri-food research and innovation clusters in these regions, and by significantly increasing strategic focus on the teaching and courses required to translate and disseminate this research into sectoral skills.

2.2 EMERGING PRESSURES ON UK AGRIFOOD

This hesitant approach to agri-food within the last several iterations of Government industrial strategy has led to only piecemeal improvements in employment matching within the sector. The reasons for this are partly to do with insufficient progress on supply-side reforms to agri-food labour, especially around advanced skills

capacity, and partly with demand-side problems in relation to recruitment and training priorities. These place additional hurdles in the way of the agri-food sector contributing to key UK strategic aims around economic security and sustainability.

2.2.1 SUPPLY- AND DEMAND-SIDE PROBLEMS IN THE AGRICULTURE SECTOR

There is still a sizeable gulf between place-based provision of the technical skills on which agri-food relies and the sector's national and local recruitment needs. In 2022–23, out of 105,600 total intermediate (Level 2), advanced (Level 3), and higher (Level 4+) apprenticeships achieved in England, only 2,330 (2.2%) were in agriculture, horticulture, or animal care.¹⁷ These are skewed heavily towards the lower levels of apprenticeship standard, primarily intermediate (1,540) with some advanced (800) but essentially negligible uptake at the higher level. Since 2019–20, the subset of these apprenticeships that were specifically in agriculture and horticulture has shrunk as a proportion of this total, from 790 out of 1,780 (44.4%) to 730 out of 2,330 (31.3%)—with agri-food apprenticeships increasingly dominated by animal care and veterinary science, alongside a steady growth in environmental conservation.

Skills achievement and skills provision are also highly asymmetrically distributed across the UK, in a way that does not reflect regional trends in terms of contributions to overall UK agri-food GVA and employment. Of the 2,330 apprenticeships achieved in 2022–23, 810 (34.7%) were concentrated in the South of England, spread across the South East (420) and South West (390)—but only 180 in the other major agri-food region of the West Midlands. At the same time, the South East entirely lacks apprenticeship providers in several agri-food standards, such as food manufacturing; while for a large number of higher and degree apprenticeship standards (Level 4–6), the only available providers operate exclusively at a national level.

At the same time, the agri-food sector is facing increasing difficulties in recruiting new talent. Different parts of the sector face different gaps in sector-specific, technical skills, for roles that require intermediate, advanced, and higher skill levels—such as process and plant operations, and mechanical, electrical, and packaging engineering, as well as quality control and regulation. But a common theme across the board is a dearth of management and leadership skills in both training and recruitment.¹⁸ According to the Agriculture and Horticulture Development Board (AHDB), the UK is falling behind other countries on offering training programmes for agri-food workers, leading to chronic underinvestment in new training and skills within the sector.¹⁹

This underinvestment becomes more and more acute with the growing scope for interaction between 21st century agriculture and new technologies (including AI and machine learning, digitalisation, and automation). Government industrial strategy currently lags far behind the clear appetite for technical skills and higher qualifications within agri-food that make the most of these new technological opportunities. In particular, there is appetite within the agri-food sector for institutions to work together on tech and

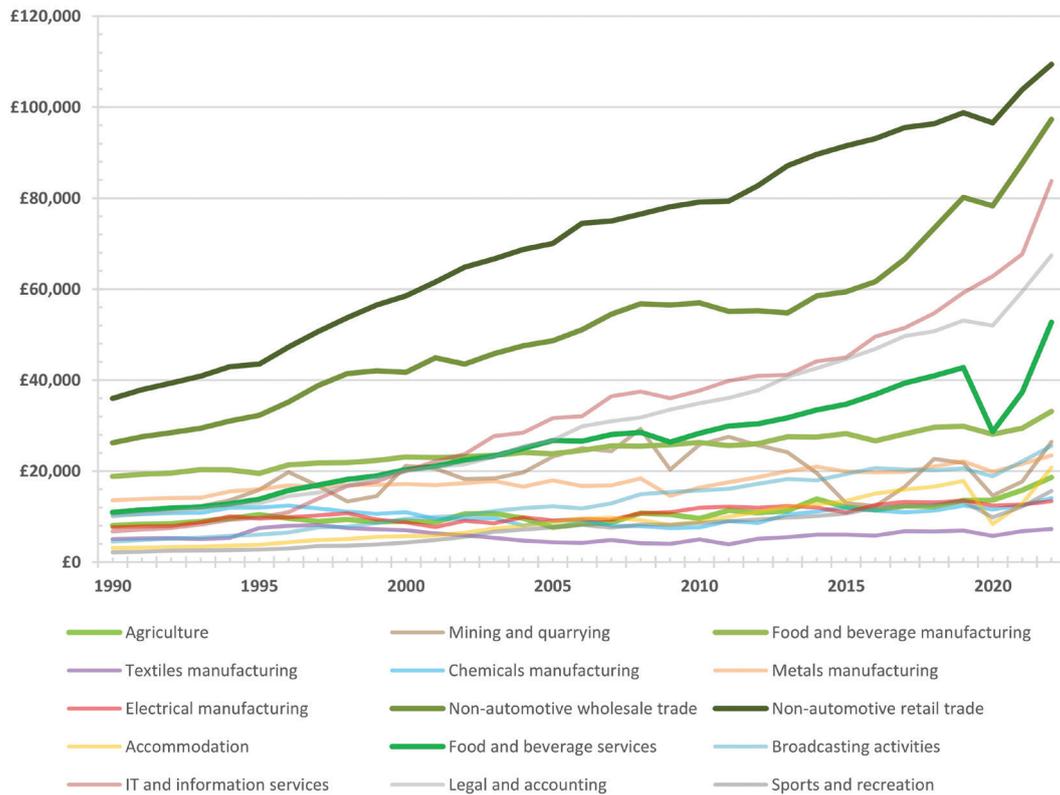
readiness levels. One example of this is the creation of Agritech UK: a platform that provides a directory for agri-tech businesses, and research and innovation founded by Innovate UK in partnership with UK Technology for Agriculture and Genetics, the Agricultural Engineers Association, and the Commercial Horticultural Association. This platform has its origins in the 2013 interdepartmental paper *A UK Strategy for Agricultural Technologies*, which highlighted the need to develop consolidated funding, stronger leadership, and a network of new centres of agri-food innovation and informatics.²⁰

Agritech UK's flagship bodies are four Centres of Excellence: Agri-EPI Centre (precision agri-engineering), Centre for Innovation Excellence in Livestock (CIEL), Crop Health and Protection (CHAP), and Agrimetrics (agri-data and analytics). These support a network of specialist institutions that aim to co-position on agri-food strategy nationally and internationally. But there is scope for significantly greater alignment of these Centres' management structures, either by introducing closer coordination or subordinating them to a single management structure, as Harper Adams' School of Sustainable Food and Farming (SSFF) and *Food and Farming Futures* have recommended in their report on *Application of Science to Realise the Potential of the Agricultural Transition*.²¹

But beyond this fairly slow trickle of supply-side interventions, the agri-food sector also suffers from demand-side issues that have a strong dampening effect on recruitment of high-skill and rising talent. One aspect of this is a long-standing image problem for agri-food, which is often seen as a low-prestige, low-opportunity employment destination, and as a 'dead-end', low-growth area of economic activity.²² This is out of kilter with the focus on cutting-edge precision technology in UK agri-food, which creates opportunities for highly skilled and well-remunerated employment.

It also belies the growth trends for agriculture as an industrial sector within the UK economy.²³ Between 1990 and 2022, agriculture (including crop and animal production, forestry, and fishing) grew from £8.05bn to £18.62bn (a 131% increase), food and beverage manufacturing from £18.84bn to £33.13bn (76%), non-automotive wholesale and retail from £62.2bn to £206.71bn (232%), and food and beverage services from £10.95bn to £52.73bn (382%). This is certainly behind flagship UK sectors such as accommodation (577.81%), broadcasting (469.54%), creative arts (430.66%), sports and recreation (631.67%), and services such as advertising (458.34%), finance (397.1%), IT (1,140.21%), legal and accounting (573.03%), and research (390.43%), but ahead of several others, including large parts of mining and extraction (147.29%), as well as textile (42.99%), chemicals (36.19%), metals (72.62%), and electrical manufacturing (75.28%).²⁴

FIG. 7: PRODUCTION LEVELS IN AGRI-FOOD AND OTHER KEY UK INDUSTRY SECTORS, 1990 - 2022 (£000S) (SOURCE: ONS)



This situation is exacerbated by an unresolved strategic question about the training priorities for the UK agri-food workforce. Agri-food businesses and education providers are all forced to navigate a path between achieving greater depth or breadth: crafting opportunities to upskill existing workers to make the agri-food profession as a whole more technically specialised, or opening up the workforce to bring in new workers, either by transferring in workers who have the required skills already from other economic sectors or by training a wholly new generation of agri-food apprentices. Without clear strategic guidance from Government, institutions face the prospect of having to go for ‘a bit of everything’ to cover all eventualities.

2.2.2 AGRI-FOOD AND THE UK'S STRATEGIC AGENDA

Alongside these supply- and demand-side considerations, the agri-food industry also faces growing pressure to help the UK meet a number of its national-level policy targets. Among the most important are targets around environmental sustainability and the public accessibility of the UK's food supply. These lie at the heart of the UK's National Food Strategy, which sets as its key priorities the health of the food system and consumers, its ability to withstand global shocks, the restoration of nature, and the establishment of

minimum standards on nutrition, ecological impact, and animal welfare.²⁵ These priorities imply significant changes to the UK's relationship with agriculture, food, and drink on a decadal timescale, including changes to the national diet, the UK's food culture, educational and healthcare initiatives around food and drink, and agricultural land use.

A major plank of food accessibility is the security of the agri-food sector. The aim here is to ensure that food production as a sector of the UK economy operates in a way that maximises its resilience to any potential future ecological and other external shocks and emphasises medium-to-long-term stability and viability over short-term 'quick fixes'. To a large extent, this is a question of generating capacity within the agri-food labour force to cover both long-term expected and short-term unexpected deficits within the sector.²⁶

In this vein, the UK's Green Deal policy has seen a strong pivot back to food production as the cornerstone of the ecosystem of interrelated industries that make up the wider agri-food sector. A central plank of this is the trio of Environmental Land Management Schemes (ELMS), which aim to incentivise a systematic reorientation of farming practices towards delivering clean air and water, thriving plants and wildlife, limiting the impact of climate change and environmental hazards, and treating nature as a key part of national heritage.²⁷

The first of these schemes, the Sustainable Farming Incentive (SFI), which began piloting in 2021 before launching in 2022, sets out a framework to pay farmers to meet a particular set of sustainability standards and apply certain environmentally friendly features on their land. The remaining two, initially a Local Nature Recovery, later (DEFRA 2023) changed to an evolution of the existing Countryside Stewardship (CS) Scheme and a CS plus, and Landscape Recovery, have been in the pilot stage since 2022 and are due to launch in 2024, and will foster collaboration between farmers to rewild and restore local landscapes (including large-scale tree planting).²⁸

The key factor here is a move towards seeing food security and sustainability as a public good alongside the preservation of the UK's natural capital.²⁹ In that light, food production, food manufacturing, food logistics, food wholesale and retail, and all other aspects of the agri-food industry become a form of public good provision. This is the principle that needs to underpin the replacement for the Basic Payment Scheme, the financial support system operated by the Rural Payments Agency for farmers who produce, rear, or grow agricultural products, or who maintain land for grazing or cultivation, which is due to end after the 2023 scheme year.

Minimising the exposure of UK agri-food to external shocks is also a question of attaining a higher degree of food independence, which essentially requires shoring up key weaknesses in the UK's cross-border food supply chains. Certainly, a sizeable level of food interdependence is always likely to be a reality for the UK as a longstanding net agri-food importer: vegetables and fruit (£12.49bn), beverages (£8.44bn), and meat and meat preparations (£7.86bn) were all among the top 30 UK goods imports in 2022.³⁰ At the same time, the UK has achieved a degree of self-sufficiency in wheat, meat, egg, and some fruit and vegetable production, with the agri-food sector stabilising around producing approximately 75% of what the UK consumes overall.³¹

Yet the UK has the capacity to do more to stave off the adverse effects of current and future disruptors. The ongoing retreat of globalisation, accelerating automation and digitalisation, and an ageing labour force are all contributing to a growing gap in labour and skills availability. In part, this is due to a lack of systematic financial support through the apprenticeship levy. As of 2022, only 2% of food and drink businesses have so far taken advantage of the increased apprenticeship levy transfer rate to spend their unused funds within their supply chains.³² But the lack of collaborative action to improve skills across the supply chain is also a result of insufficiently coherent planning, which fails to treat the agri-food sector as a single complex area of national focus, and as a strategic priority.

Treating a secure, sustainable agri-food industry as a public good overlaps significantly with several of the UK's other national strategies. On the environmental side, transforming the agri-food sector into a world leader in sustainability is a core aim of the UK's Net Zero Strategy. Climate change poses a range of threats to the agri-food industry, including falling yield growth, and rising pressures on water management and flood protection.

At the same time, agri-food contributes to CO₂ emissions in several unique ways, from carbon leakage in its production and supply chains to residual emissions that cannot be captured at their source of release. This creates particular pressures around effective land use, including setting aside land for decarbonisation, biodiversity, and local energy generation. It also shapes innovation needs around resource use (including 'circular' reuse and recycling) and energy generation (biomass from agri-food waste), which present the sector with future-facing opportunities.³³

On the question of global interdependence and independence, the position of agri-food aligns closely with that of the UK's energy sector. In March 2023, the Government released *Powering Up Britain: Energy Security Plan*, which set out the necessary steps towards boosting domestic energy production and storage capacity, curbing domestic energy demand, and putting in place measures to ensure security, flexibility, and resilience in the domestic energy market.³⁴ The plan's underlying principles, of managing global interdependence, and navigating a path for independence between dependence and isolationism, apply directly to the UK's agri-food sector as well. In a similar vein, agri-food security can be seen not as a necessary response to crisis but as a strategic opportunity, with the potential to boost UK reindustrialisation, sectoral innovation, and global competitiveness.

2.3 SUMMARY

Overall, the UK agri-food sector holds far greater economic potential than its usual depiction as a 'minority pursuit' within the wider landscape of UK economic activity would imply. It faces several existential concerns that urgently need to be addressed in a more concerted, joined-up way than national strategic guidance has made room for up to now. Yet it also shows a few promising 'green shoots' of policymaking, often from the grassroots level within the sector, that should be leveraged to give agri-food the strategic attention it deserves.



3. HARPER ADAMS AT THE FOREFRONT OF AGRI-FOOD LEARNING

To supplement the somewhat uneven focus of UK industrial strategy on the learning and skills required to underpin a comprehensive technological transformation of the agri-food industry, a number of local models of knowledge exchange and skills improvement have emerged that push the boundaries of ‘best practice’ in the sector. This chapter outlines the central insights and challenges that emerge from Harper Adams’ experience of learning development, with a particular focus on unique aspects of its pedagogical model. It showcases its approach towards building partnerships with sectoral stakeholders, integrating industry experience, and uniting theoretical knowledge with practical skills, and examines how it has sought to meet the new demand for higher-level and modular qualifications.

3.1 INDUSTRY INTEGRATION IN AGRI-FOOD EDUCATION

One of the distinctive characteristics of agri-food education at Harper Adams is a multilayered integration between the contexts and structures that shape how students learn, and the needs and priorities of industry stakeholders. Key to this are:

- The compulsory year-long in-work placement undertaken by every full-time undergraduate degree student, and the work-based learning for all other undergraduate degree students through the apprenticeship offering, supported by a network of 1,100 employers (representing the full range of organisations in the sectors from SMEs to large national multinational companies).

- The well-established CPD course offered in partnership with key professional and industry training providers relating to: agronomy (with BASIS Registration), animal health and wellbeing (with AMTRA – Animal Medicines Training Regulatory Authority) and animal medicines (with Improve International).
- The creation of a dedicated agri-food incubator site at Ni.PARK, and supporting primary agriculture, especially farmers, to find solutions through the SSFF.

3.1.1 SECTORAL PARTNERSHIPS AND LEARNING DEVELOPMENT

The core purpose of Harper Adams' approach to local partnerships is to generate a series of strategic alliances with other bodies operating within the agri-food sector. These include the founding partners of the School for Sustainable Food and Farming (SSFF)—McDonald's UK and Ireland, Morrisons, and the National Farmers' Union (NFU)—as well as Harper Adams' apprenticeship partners, including Avara Foods (poultry suppliers), Dalcour Maclaren (property and planning consultants), Fisher German (chartered surveyors), and Pilgrim's UK (pig farming and pork), as well as other strategic alliances such as with Anglo-Beef Processors (ABP), Alltech, TAFE and Saputo.

These alliances are designed to craft long-term links that allow Harper Adams and its partners to reciprocally influence and align their internal strategic direction. The aim is to closely match the supply of newly (re) trained and (up)skilled learners to industry demand for workers, and to minimise disruptions and delays in the transition from education to employment. The sheer range of Harper Adams' partners reflects the need for strategic alignment between agri-food education at every stage of agri-food industry, from production and manufacturing to logistics and wholesale/retail.

Such strategic alliances provide opportunities for close cooperation between Harper Adams' research and teaching, and the specific skillset needs articulated by stakeholders representing different parts of the agri-food sector. This is the remit of the Harper Forward programme for agri-food curriculum development, which puts together academic leaders and industry experts in order to co-create a range of course options. These are designed to teach learners transferable, versatile skills that allow them to get to grips with new techniques and technologies covering a broad range of agri-food themes, including consumer needs, nutrition, supply-chain management, marketing, and product development.

Focused initially on undergraduate teaching, Harper Forward takes a holistic approach to the roster of different frameworks that need to coexist to provide the knowledge and skills required by the various parts of the agri-food industry. The first of the refreshed undergraduate courses will be offered in the following subject areas from 2023–24, with the remainder from 2024–25: Agribusiness Management; Business Management; Food Business Management; Food Science and Innovation; Agricultural Engineering; Automotive Engineering; and Mechanical Engineering.³⁵

Another major aspect of this is the creation of incubation spaces. Harper Adams' flagship incubation project is the facility at Newport Innovation Park (Ni.PARK), jointly delivered with Telford & Wrekin Council, Phase One of which was completed in October 2021. Ni.PARK is a custom-built site designed to help businesses with existing strengths in high-end precision technology expand and diversify into agri-food space, giving them a dedicated platform to test out new agri-tech products and solutions. So far, Ni.PARK has attracted businesses including HCI Systems (EVs and hydrogen motoring) and Provisur (food processing), and Phase Two of its construction began in December 2022.

This approach allows Harper Adams to create a 'live' microcosm model of the latest dynamics at all stages of the agri-food industry. It gives it a uniquely immediate oversight of the diverse pressures and skills requirements confronting the agri-food workforce, which acts as an 'early warning' that can shape changing priorities for its research and teaching agenda. In 2024, Harper Adams is due to unveil its Institute of Animal Diagnostics and Health on the Ni.PARK site, as a flagship centre to support industry and the risk of animal disease and zoonotic threat.

Alongside this, Harper Adams has pursued a grassroots approach to integrating local agri-food learning provision. It supports the promotion of the agri-food industry to future generations through the work of both its Student Recruitment and Widening Participation (WP) team members within schools and colleges, and through its role as a hub for the HigherHorizons+ National Collaborative Outreach Programme (NCOP). These are designed to raise awareness of agri-food industry career paths via Higher Education to both traditional and non-traditional audiences, with particular emphasis on new entrants.³⁶

In the first instance, this has focused on tertiary integration through forging close relationships with local Further Education colleges. But this has also included integration across the secondary–tertiary education boundary, through partnerships with local schools. HigherHorizons' work targets 99 of the most deprived and lowest-engagement schools across the region (as a part of a wider network for the region along with other hub partners, pulling in schools from across Shropshire, Cheshire, and beyond).

Meanwhile, the WP team works with organisations such as Speakers for Schools to run a range of activities targeting core WP groups to raise understanding, attainment, and aspiration within the agri-food industry across a range of schools. This includes intensive work with 12 of the most deprived schools within the surrounding area through the Reachout project, as well as targeting 56 schools identified as being based within areas of significant rural deprivation to benefit from the targeted Harper Adams Rural Deprivation Index (HARDI) work and aligned scholarships. This sits alongside additional projects to identify and record work with schools across a range of key Office for Students (OfS) indicators, such as low engagement backgrounds, mature learners, and Black and Minority Ethnic (BAME) learners.

The broader Student Recruitment team targets approximately 400 schools and colleges across the UK, ranging from the land-based colleges, FE and sixth form colleges, and secondary schools, from both traditional rural/agricultural environments and non-traditional urban areas, within a strategy to create links and relationships with key institutions, such as Reaseheath College, CAFRE, and Cronton Sixth Form College. Projects such as Wrekin to Ag, or the recent Westminster Academy visit (televised on Countryfile), are designed to bring urban-based students into rural environments and industries, and highlight the successes of Harper Adams' work in this area.

In addition, the unique proposition of the SSFF has the development of 'new talent' for the agri-food industry of the future at the heart of its first 'pillar', aiming to attract new and diverse talent into the industry. To achieve this, the SSFF works with core industry partners, such as Morrisons, McDonalds, and the NFU, as well as leaders in agri-research and education, such as LEAF. As an example of this commitment, the recent LEAF/SSFF collaboration involved 2,500 young people participating in research into consumer understanding within the agri-food industry and its place within the curriculum, culminating with a residential event to engage students with the industry at Harper Adams.

This approach of local and regional integration has extended Harper Adams' reach and understanding of the barriers for young people considering higher education relating to the agri-food sector. It lays the foundation for a hybrid model of education integration that combines both 'place-based' and 'hub-and-spoke' elements, driven by the overarching logic of sectoral need.

Like other sector-orientated education providers, Harper Adams has also maintained close links with the designated bodies responsible for local economic strategy. Prior to the phasing-out of Local Enterprise Partnerships announced in the 2023 Spring Budget, its main contact has been to the Marches LEP, which covers Shropshire, and which has a representative of Harper Adams' senior leadership team among its board members. Despite this close integration, agri-food enjoys a limited presence in local strategic priorities. The four 'sectors in the spotlight' identified by Shropshire Chamber of Commerce as part of the LSIP formation cover health and social care, construction, professional services, and engineering and manufacturing—with only an incidental recognition of agri-food in the form of food and drink manufacturing.

At the time of writing, Harper Adams has begun to pursue closer involvement with other rural LEPs, chambers of commerce, and LSIP partnerships, in conjunction with the NFU's regional connections at Local Authority level, to improve exchange and alignment around strategic planning and visioning across the wider West Midlands region.

3.1.2 LEARNER PLACEMENT AND INDUSTRY EMBEDDING

A second key source of Harper Adams’ strategic influence and alignment with the wider agri-food sector is through its well-established framework of embedding its learners directly into key industry stakeholders at both the local and national level.³⁷ As part of their four-year degree programmes, since 1966 Harper Adams students on BSc courses in subjects ranging from Agriculture and Land Management to Veterinary and Agri-business take part in a compulsory in-degree industry placement, during their third year of study.³⁸ During these placements, students gain experience of the granular challenges facing the agri-food sector, from networking, strategic planning, and decision-making to staff and financial management. The aim is not just to provide tangible examples of how the beneficial skills that students have learned lend themselves to practical applications, but also for students to develop their career management skills and set up options for future employment once students have graduated.

Harper Adams’ internal survey data suggests that these industry placements play a major role in boosting students’ learning motivation. Students found them especially useful in developing new skills and knowledge, for giving them greater confidence and self-awareness, and for developing industry contacts and clarifying their options for future work and study. In 2021–22, 183 out of 315 respondents (58.3%) to Harper Adams’ placement survey found their placements ‘very useful/valuable’, and a further 103 (32.8%) ‘quite useful/valuable’.³⁹ In particular, respondents rated placements as especially helpful in developing new skills and knowledge, and developing their own confidence and self-awareness, but not quite as helpful in clarifying their career aspirations, forging industry connections, or underpinning further study.

FIG. 8: HARPER ADAMS PLACEMENT SURVEY — BENEFITS OF PLACEMENT (SOURCE: HARPER ADAMS)

How well did your placement achieve the following?

	Very	Quite	Not	N/A
Provided experience to apply to university-based studies	146 (49.3%)	114 (38.5%)	25 (8.4%)	11 (3.7%)
Developed a larger network of contacts	174 (58.8%)	83 (28.0%)	38 (12.8%)	1 (0.3%)
Developed new skills and knowledge	222 (75.5%)	63 (21.4%)	8 (2.7%)	1 (0.3%)
Clarified career aspirations	162 (54.7%)	98 (33.1%)	32 (10.8%)	4 (1.4%)
Greater self-awareness	192 (65.3%)	88 (29.9%)	12 (4.1%)	2 (0.7%)
Greater confidence	196 (66.4%)	80 (27.1%)	17 (5.8%)	2 (0.7%)

Whilst many graduates return to their home areas using their graduate skills to transform family businesses, set up their own businesses or undertake other graduate roles, some are offered and accept employment with their placement provider. Despite a dip in business confidence and hence recruitment figures due to the Covid-19 pandemic, 32.8% of the 2021–22 respondents surveyed entering their final year had a job offer from their placement employer going into their final year, with 12% holding a different job offer. It is worth noting that the Harper Adams policy for agriculture farm study prevents students from having a placement within a 50-mile radius of home to manage potential conflicts of interest—for example, to ensure students are not working for family/friends or indeed competitors. Many of these agriculture students then ultimately return to their home farms after graduation.

The Harper Adams placement scheme certainly offers students a vital window in the agri-food industry sector, but it does not act as a direct or automatic doorway through which Harper Adams students can enter specific jobs. Of the 2021–22 respondents, 33.3% were not sure of their plans following graduation, while the numbers of students planning to further train or upskill via further learning remained extremely low: 3.7% for top-up courses, and 9.7% for postgraduate study. At the same time, in the latest survey of graduate destinations (published in 2023), 99.2% of respondents were in employment and/or further study, which illustrates the value and relevance of the work-based applied education that Harper Adams provides.

Students are responsible for making most of the arrangements for their respective placements, though in many cases they consciously opt to benefit from the existing partnerships that Harper Adams has already created at an institutional level. This process is helped by sustained employer interest in the placement scheme: the Harper Adams leadership reports extensive employer contact around recruiting students for its food and agri-business courses. Harper Adams also offers students a strong level of institutional support: placement positions are advertised on the internal placement database, and students can call on advice and guidance procedures at each stage of the application and selection process.

Typically, there is a healthy spread of student applications to Harper Adams partners versus other agri-food employers—although, even in the vast majority of cases where students find placements with established partners, they still have to secure them by going through the partners' own selection processes. The general trend, especially since the Covid-19 pandemic, and exacerbated by recent spikes in living costs, has been for more students to look for placements that allow them to remain relatively close to home (excluding agricultural farm-based placements, which are subject to the 50-mile radius rule). These include but are not limited to: agri-food processors, retailers, merchants, wildlife centres, land agents and surveyors, and animal-related small businesses.

A small but consistent minority choose to submit applications for international placements, usually associated with larger multi-national companies that work with Harper Adams, including highly specialised forms and methods of agri-tech that are more common in economies such as Germany or the Netherlands than in the UK. In 2022–23, for instance, nine students elected to undertake an overseas placement, with the number rising to 16 for 2023–24.

The pattern of in-degree and graduate placements underlines the hybrid ‘place-based’ and ‘hub-and-spoke’ structure of Harper Adams’ sectoral partnerships. Given the benefits of local proximity, a large majority of Harper Adams partnerships are with local SMEs or locally based larger companies active in food processing, catering and food supply, food and agricultural equipment manufacturing, food sustainability, and agricultural utilities, such as: ABP, Avara Foods, Bakkavor, Co-op Food, JCB, Minor Weir, Muller, Premier Foods, Saputo, Severn Trent, Willis, and Wynnstay.

At the same time, Harper Adams also has partnership networks with large national enterprises that can help advance specific course areas in the agri-food sector, boosted by the high demand for high-calibre graduates in the current sectoral labour market. National employers include: Aldi, Arla Foods, the British Army, Cargill, Dumbia, Elanco Animal Health, the Forestry Commission, Fox’s Biscuits, G’s Fresh, Hovis, the London Borough of Hounslow, Mars Petcare, Morrisons, Moy Park, the National Farmers Union, the National Trust, Natural England, Samworth Brothers, Savills, and the Welsh Government (EIDCymru).

Of the 1,100 employers with which the University works overall, many have a sustained and multifaceted relationship with the university and its students, as shown in the table below showing examples of larger employers (those highlighted in yellow are multinational companies):

FIG. 9: HARPER ADAMS PLACEMENT — OVERVIEW OF EMPLOYERS (SOURCE: HARPER ADAMS)

Employer	Placement Students (last 5 years)	Apprenticeships (current students)	Graduate Destinations (last 5 years of data)
2 Sisters Food Group	8	0	4
Associated British Foods (inc. ABD)	5	1	4
Agrovista	2	0	22
Avara Foods	6	17	5
Aviagen	9	0	2
Bakkavor	2	3	15
Barfoots of Botley	3	0	1
BASF plc	16	0	0
Bayer CropScience	6	0	5
Berrys	13	2	11
Bidwells	2	0	14
BQP/Pilgrim’s Pride/Tulip/Dalehead	13	4	23
Brown & Co	0	0	19

Employer	Placement Students (last 5 years)	Apprenticeships (current students)	Graduate Destinations (last 5 years of data)
Buccleuch Estates Ltd	12	0	13
Cargill Nutrition	13	0	7
Carter Jonas	15	0	21
Claas	27	0	15
Clent Hills Rehabilitaion	15	0	0
CNH Industrial Ltd	19	0	4
Cranswick Foods	5	0	16
Dalcour Maclaren	20	11	25
Dawn Meats (UK)	13	0	4
Dunbia	2	0	15
Faccenda Foods Ltd	13	0	11
Fawley Farms Ltd	12	0	0
Fisher German	28	4	49
ForFarmers	9	0	2
HUSCO	1	0	4
Hutchinsons	0	0	28
JCB	12	0	17
John Deere Ltd	14	0	2
KWS	8	0	2
McDonald's Restaurant Ltd	15	0	3
Moy Park	6	0	6
Muller	8	2	11
National Trust	12	0	31
NFU	5	0	22
PDSA	0	0	11
Saputo	17	1	0
Savills	5	2	43
Strutt and Parker	2	0	22
Syngenta	4	0	9
Velcourt	16	0	10
Vets 4 Pets	2	0	20
The Village Bakery	12	0	4

This means that, in terms of the transition from education to employment, Harper Adams acts as a 'gateway' or 'waymarker' institution. It gives learners the skills they need to leave the local economy and pursue employment elsewhere, and it attracts learners to the locality temporarily for the duration of their studies. **One intervention could be considered here: developing 'visiting study' agreements with other agri-food education providers, which would allow other Harper Adams students (especially those studying courses other than undergraduate degrees or apprenticeships) to benefit from sectoral learning exchanges and other knowledge transfers, and familiarise themselves with other agricultural geographies within the British Isles.**

Meanwhile, **local economic strategy must focus on creating high-prestige, well-remunerated jobs that match Harper Adams' strengths in (re)training and (up)skilling**, to let it also act as a 'hub' or 'magnet' that retains local talent and retains non-local learners within the local economy after their studies end. This must include developing more work-based learning opportunities that still allow students to remain 'in-house' for their teaching and skill accreditation. **One option here would be to build out the in-degree placement scheme with Harper Adams' industry partners into a system of post-graduation 'business practitioner' secondments, which would provide a two-way injection of sectoral skills (cutting-edge learning in return for 'frontline' experience).**

3.1.3 MAKING AGRI-FOOD LEARNING PRACTICAL AND ACCESSIBLE

The third vital element of Harper Adams' strategy to match its learning provision with industry requirements is its focus on 'in-house' practical learning and experimentation. The primary components of this are its onsite Future Farm (including the Hands Free Farm, SMART Dairy, Field Trials, Pig, Beef, Sheep, Poultry and Aquaculture facilities),⁴⁰ Elizabeth Creek Laboratories, Veterinary Education centre (and from 2024 the Institute of Animal Diagnostics and Health), Food Academy, and the specialist engineering facilities (including the Soil Hall).

Harper Adams launched the Sustainable Farm Network (hosted by SSFF as part of its Pillar 3 activity—applied research and demonstration), as a direct response to a recommendation in the *Application of Science* report to connect together demonstration farms. Working with Harper Adams, these 'Living Labs' (a network of small functioning farms) will test innovations in agri-food methods and technologies, with the aim of using the insights generated by this testing to shape future agricultural practice and new curriculum directions.⁴¹

Harper Adams students are prepared for the transition from education to employment through a dynamic, challenging 'trial' space, which lets them apply and develop their learning in an authentic real-world setting. They can work interactively on projects connected to various aspects of food production as soon as they start their studies, with many students winning industry awards based on their honour research projects.

This practical dimension of Harper Adams' approach to learning complements the in-degree placement system and mirrors the incubator microcosm of the various parts of the agri-food industry at Ni.PARK and across its strategic alliance partners. It also has significant potential to 'cascade' nationally, which requires a clear sense of where the urgent pressure-points for expansion and capacity-building lie. **One of the crucial focuses for how Harper Adams constructs future partnerships around the UK must be how these allow other Living Labs to be replicated and scaled out to reach larger cohorts of learners.**

It is worth noting that the term 'living lab' is used widely and inconsistently across different institutions and policy jurisdictions, often including requirements of not-for-profit status, independent ownership, and responsibility for setting implementation benchmarks, fostering rural connectivity and communication, and outreach into local communities and beyond. **A key precondition of scaling up Living Labs as Harper Adams defines them into an advanced UK-wide network or ecosystem is putting in place clearer definitions and parameters for what these entities are and what they do, and above all how they interact with their 'parent' education providers and their local economies.**

The aim of Living Labs will be to familiarise students more fully with the most recent 'from gate to plate' or 'from farm to fork' solutions for every stage of food production. This includes a holistic introduction to methods and technologies from primary agriculture and agri-tech engineering through to food innovation and business management; 'embodied' technologies relating to machinery or production inputs, carbon reduction and sequestration, and 'farmer-led' versus 'linear' models of knowledge transfer.⁴² This gives them a broad long-term foundation in the wide variety of skills needed to succeed within the agri-food sector, alongside the more targeted specialisms they develop through their courses.

An important element of teaching at Harper Adams is inclusion, with the aim of ensuring that the curriculum is accessible to all learners regardless of their prior knowledge or their learning needs, and relevant to the skills they require for the particular employment they later hope to move into. Agriculture, food, and related studies, along with veterinary science, attract a consistent (and in recent years steadily increasing) strong minority of mature learners relative to school leavers across the UK, ranging from 24.4% to 43% of the annual learner population in each subject category between 2012 and 2022.⁴³ This is on a par with subject areas such as architecture, building, and planning (32.9–48.1% mature learners in each cohort), computing (32.4–40.1%), and engineering and technology (30.8–40.5%), and puts agri-food as a learning area in the top half of the OfS student population subject-by-subject breakdown for mature students.

Harper Adams' curriculum has to serve the interests of students from different backgrounds, including industry delegates on short courses, courses which provide legally necessary training, first degrees, and postgraduate courses. The pattern of study for these different types is extremely varied, which can create challenges for how all of these approaches can be sustained 'under one roof'. A particular concern is that some of these courses are extremely specialist, which can make it difficult to find pedagogical expertise at

the level and at the scale required. Yet Harper Adams can point to considerable success on this count, as it ranks third in the UK in terms of the proportion of its student body aged 50 or older: 7.2% in 2022–23.⁴⁴

One approach taken by Harper Adams to address this challenge is to have cultivated a model of dual professionals: Teaching staff are appointed based on academic and/or significant professional experience. Some staff launched their careers via a traditional academic route and others through having significant relevant commercial and professional experience. A consistent finding in Harper Adams surveys is that its students value the richness of experience and real-world knowledge shared by their teaching staff.⁴⁵

In a similar vein, a case study detailing the value of dual professionals from Harper Adams' experience was included in a 2018 GuildHE publication on *Practice-Informed Learning*.⁴⁶ This approach ensures that Harper Adams courses reflect cutting-edge practices and challenges in the environments in which students will study (during their placement year) and work. Staff new to teaching are supported through an in-house Postgraduate Certificate course in Teaching and Supporting Learning in Higher Education, accredited by Advance Higher Education to gain a professional fellowship.

3.2 CURRICULUM DEVELOPMENT IN AGRIFOOD

Within the teaching framework itself, Harper Adams has responded to the lifelong learning agenda put in place by the 2022 Skills and Post-16 Education Act by starting to vertically and horizontally diversify its course provision. This has predominantly taken the form of offering a new range of higher skills courses at levels 5 and 6, preparing to roll out modular teaching for some courses where this format is deemed appropriate, and exploring mutual credit transfer partnerships across the agri-food sector.

3.2.1 FILLING THE GAPS IN THE AGRIFOOD CURRICULUM

A vital tool to help learners grasp the follow-on education and employment options that each course opens up for them is the occupational map, as created for the agri-food sector by the Institute for Apprenticeships and Technical Education.⁴⁷ This gives an overview of the current and planned courses in various areas of agri-food, which gives learners a sense of how their choice of course fits into a bigger choice about the future training and career trajectory they envisage for themselves. At the time of writing, the agri-food occupation map is skewed towards level 2–4 courses, thanks in part to the strong Government focus on launching T-levels.

What is needed is an equivalent range of higher-level skills courses, especially around climate, carbon literacy, biodiversity net gain, and sustainable diets. Some courses focusing on tech and sustainability skills are available, but they are typically highly enterprise-focused, which leaves significant gaps. Given the Government's priority focus on overcoming the UK's long-running deficit in higher technical qualifications, especially at levels 4–6, significantly greater course development work is needed to generate skills that can support jobs and industries that will 'join up' the UK's strategic needs around food, energy, and net zero.⁴⁸

An example model for how Harper Adams fills this gap is its pioneering level 5 veterinary technician apprenticeship, which intersperses practical training with theoretical knowledge acquisition.⁴⁹ As a specific IfATE learning standard that demonstrates a unique way of mixing theory and practice, this vet tech apprenticeship has recently exited the pilot stage to be rolled out more widely at Harper Adams, with 39 students starting in the 2022–23 academic year. It is also intended to act as a template for other courses that Harper Adams plans to introduce—centring on a two-year programme format that operates through blended delivery and work-based activities. **This apprenticeship is a rare example of the type of higher-level courses that are urgently needed across the agri-food sector more broadly, and a key plank of Harper Adams’ future partnerships should be knowledge exchange around the pedagogical infrastructure needed to introduce similar higher technical courses elsewhere. This should focus especially on the land-based colleges and universities which belong to the Landex network or Agricultural Universities Council UK (AUC-UK).**

But additional curriculum development is required to meet the UK’s technical skills needs due to its specialisation in precision agriculture. The focus here needs to be on increasing the range of level 6 qualifications available, especially those emphasising the use of precision tech—such as robotics, machinery and systems design, and high-end product support—as part of a higher agri-engineering skills programme. In this vein, Harper Adams is currently finalising a full BEng (Hons) degree in Agricultural Engineering within its internal curriculum review processes, ready to start accepting students in September 2024.⁵⁰

But this curriculum development also needs to include short courses that extend the level 5 and 6 precision tech skills that learners can access as part of their agri-food occupation maps. This would allow learners with other agri-food specialisms to diversify their skillsets to incorporate engineering, and create gateways for learners with precision tech skills and experience from outside agri-food to more easily retrain for a shift into the sector.

3.2.2 MODULARISATION AND ITS LIMITS

Alongside the need for more advanced agri-food courses at levels 5 and 6, the Skills Act has sharpened the focus on modularisation. Tertiary education institutions are under legislative pressure to move away from more-or-less fixed year-long or multi-year degrees that comprise specific combinations of core and optional modules, and towards a more flexible approach that disaggregates these courses into their constituent modules. The aim is to make space for more free-standing credit-bearing small awards, which learners can easily ‘mix and match’ to build up their own personal skills portfolio, based on the specific needs of their own career and learning trajectory.

Harper Adams has responded to this evolving teaching and qualifications landscape by piloting modular delivery of teaching in 2023–24 for its undergraduate Food courses, bringing together apprentices and full-time on-campus students to learn together. Intended benefits of this approach, which will be evaluated,

include the sharing of mutually complementary skills and experience of these two types of students. This example of leveraging the benefits of modularisation (building on experiences from other international HE systems) extends the long-standing track record of providing professionally relevant CPD and short courses. Around 1,000 learners annually undertake such courses with Harper Adams in subjects including agronomy (with BASIS), animal health and wellbeing (with Improve International), and animal medicines (with AMTRA).

The new move towards modularisation has different effects when applied to Harper Adams' undergraduate and postgraduate teaching delivery. At undergraduate level, much of its teaching still takes the form of the traditional degree model, although the Food modular delivery pilot (above) seeks to critique new approaches. The main obstacle to shifting this to a fully flexible system is the resource competition created within the institution by layering the different systems on top of each other, even if only on a temporary, transitional basis. In addition, the external regulatory framework for Higher Education operated by the OfS potentially disincentivises providers from operating 'step-on/step-off' courses for credit accumulation.

Modularisation is a more straightforward prospect for Harper Adams' postgraduate teaching, which is typically structured in a more flexible way that already maps onto the logic of modular delivery, although the risks associated with HE regulation mean that this is being reviewed. However, the limiting factor at the postgraduate level is that skills development is so specialised that it may need to rely on the incubation work taking place at Ni.PARK. This is so resource-intensive, and so dependent on long-term stakeholder collaboration, that there is a fairly high 'barrier to entry' before a course associated with it becomes viable for both learners and learning providers, which sets an in-built limit to how far its learning packages can be modularised and micro-credentialised.

Harper Adams' experience in responding to these new teaching demands provides a valuable illustration of the challenges that modularisation poses to many education institutions across the tertiary sector. This is certainly true of any other institutions active in agri-food skills space, but also applies more widely to any learning and skills sector that relies on capital-intensive infrastructure, technology, and natural and other resources. As modularisation and short courses continue to be introduced over the coming years, it is vital that Government consult in detail with these education institutions on a sector-by-sector basis, to ensure that its policy of blanket 'flexibilisation' is refined in a granular way to meet the specific features of each one.

In particular, this consultation process has to address the structural challenges that make it difficult, and not necessarily desirable, to shift agri-food learning from a degree-based to a fully disaggregated modular system. **This includes requirements around how small credit-bearing courses should be 'paired' or 'grouped' together into 'concentrations' or 'mini-series', including minimum participant levels, to reflect staffing and other resource constraints within education institutions. It also means refining the current occupation map model to provide a more granular framework for how specific modules underpin or build on each other, including foundational, advanced, and 'capstone' modules.** This may lead to a partial trade-off between achieving full flexibility and retaining a necessary sense of forward direction in agri-food learners' training and upskilling journey.

3.2.3 ACCREDITATION, INTEROPERABILITY, AND TRANSFER

A vital prerequisite for learners to make the most of these new higher technical qualifications and modularised credit-bearing courses at Harper Adams and other agri-food education institutions is a **comprehensive accreditation, quality assurance, credit interoperability, and credit transfer system**. This gives learners, education institutions, and employers a common framework of reference to precisely evaluate the 'quantity' and sophistication of the knowledge and skills that each module delivers. It clarifies how far learners have progressed along their training and upskilling trajectory within specific parts of the wider agri-food sector.

This lets education institutions assess whether learners meet the minimum entry requirements for their next qualifications and helps employers gauge how well-prepared learners are to take on the responsibilities associated with their next job role. Together, these allow learners to transition more smoothly between courses, and between education and employment, by removing the uncertainty of having to 'prove' the usefulness and relevance of qualifications that may not be universally recognised across the sector.

The agri-food sector has seen some initial moves towards establishing at least a partial credit transfer system as part of the Rural Employer Engagement Development Network (REEDNET), set up with the support of a £4m grant from the Higher Education Funding Council England in 2008. REEDNET was a collaborative scheme to provide Continuous Professional Development (CPD) courses involving Harper Adams, the Royal Agricultural University, and the Landex group of specialist land-based colleges and universities. This included several accreditation agreements for innovative courses developed in conjunction with agricultural practitioners, such as a University College Foundation Certificate in Dairy Herd Health Management delivered by the XLVets group.⁵¹

Ultimately, REEDNET was folded into more traditional patterns of education provider-business relations and CPD delivery, in line with the previous practices of each agri-food education institution. In the case of Harper Adams, it evolved into a consolidated strategic CPD course portfolio delivered in conjunction with two to three key partners. Beyond these fairly fragmentary attempts, the agri-food education sector still lacks the interoperability framework that the move to modularisation requires.

There have been several major barriers to setting up a more comprehensive and durable credit framework for agri-food education institutions. The main reason has been the reticence of institutions which are all competing for market share among a fairly small and highly specialised potential learner pool to move towards a more collaborative 'articulation' approach, which would see them essentially entrench a division of labour between different institutions.

This would further 'segment' the supply of learners attending each institution, which can lead to drastic downward pressure on their expected fee incomes. This situation has been further exacerbated by cuts to the funding available to support forming these collaborative 'deals', which is preventing the design of anything more long-term and sustainable than informal reciprocal credit recognition arrangements for a select number of level 3 and 4 courses.

3.3 SUMMARY

Harper Adams showcases many of the essential ingredients that need to be in place in order for agri-food education institutions to effectively deliver the highly skilled workers who will be needed if the UK is to realise its aspirations to be a global precision agriculture powerhouse. As of yet, many of its partnership and curriculum developments are still in protean, embryonic form, and in need of sustained support from Government and the wider sector to fully unfold their potential. Nonetheless, they provide a promising blueprint for other institutions to follow and signal a clear direction for future policy guidance in agri-food education space.



4. A NEW APPROACH TO LIFELONG AGRI-FOOD SKILLS

A successful education system that allows the agri-food sector to meet the challenges of the 21st century must give learners a framework to upskill whenever and wherever they want, and in the specialism and to the level their future career trajectory requires. This chapter outlines a new model of lifelong learning for the agri-food sector, rooted in a wide range of flexible teaching and training formats that make the most of the latest pedagogical technology as well as ‘best practice’ in partnership-building. It also explores how the institutional changes needed to make this new model effective should be funded, as well as what can be done to enhance the desirability of highly specialised agri-food employment to school leavers and workers transferring in from other sectors.

4.1 LIFELONG LEARNING IN THE AGRI-FOOD SECTOR

To establish the agri-food sector as a leading space for high-prestige employment that appeals to and applies to greatest effect the diverse talents of a modern workforce, the UK needs a clear progression framework that covers both skills and career development. The model that achieves this best is a system of Lifelong Learning Pathways, moulded to the needs of workers looking to enter or advance within the agri-food sector. This system must be supported by a portfolio of targeted funding provisions that share the burden equitably between businesses, Government, and learners, and it must be structured to build up interdisciplinary research and teaching capacity in the areas where agri-food overlaps with other growth sectors.

4.1.1. LIFELONG LEARNING PATHWAYS

There are a number of elements within the current state of teaching and training provision in the agri-food education sector that lay the foundation for a radical shift towards a joined-up model that integrates best practice across the sector throughout the whole of the UK. The key ingredients in this are:

- Sectoral partnerships that combine ‘place-based’ with ‘hub-and-spoke’ collaboration, including education partnerships that bridge the secondary-tertiary and Further Education–Higher Education divide.
- Close relationships between learning and skills provision, and industry needs through incubation spaces and compulsory placements.
- The close integration of theoretical knowledge and practical training through Living Labs (connected demonstration sites) and similar programmes.
- The development of occupation maps that give a sense of trajectory for how courses and careers build on each other.
- The targeted development of courses and qualifications at level 5 and above, and the gradual move towards modularisation.
- The creation of a skeleton framework for sector-wide credit interoperability.

Together, these provide the building blocks of an agri-food education system that lets learners move seamlessly around a ‘climbing frame’ of available qualifications, training and retraining, upskilling and reskilling when and where suits their professional and self-development needs.

This is a system of *Lifelong Learning Pathways*: trajectories of modular courses running from level 1 to level 8, which can act as standalone ‘units’ of knowledge and skills acquisition but can also be ‘stacked’ into cumulative qualifications. They are offered through a blend of local and sectoral partnerships between tertiary (and where relevant secondary) education institutions, including land-based universities, colleges, and private training providers, and industry bodies engaged in food production, food manufacturing, food logistics, or food wholesale and retail, to create a UK-wide network of agri-food education hubs.

These courses should be accredited, and quality controlled by a body or a consortium specific to the agri-food sector, instead of by the OfS. One candidate might be the newly launched ‘The Institute for Agriculture and Horticulture’ (TIAH), whose stakeholders are businesses and education providers, and which operates at arm’s-length accountability to the DfE, DEFRA, and other relevant Government departments.⁵² More work remains to be done on defining the exact remit and intention of TIAH’s role within the agri-food sector, which is currently limited to offering advice and practical tools to develop agricultural skills and lifelong learning. Course accreditation and quality control is an obvious possible extension of this role, but also represents a significant reorientation and expansion of TIAH’s remit.

Harper Adams' *Application of Science* report provides suggestions for how TIAH could develop and interact with education providers and partnerships such as the SSFF, or similar institutions such as the Royal Agricultural University's Institute of Agricultural Management. These include:

- Refining and personalising TIAH's Online Service to streamline in-work access to CPD opportunities offered by different providers, categorised by TIAH's Professional Framework of job role competencies.
- Government-led establishment of a 'What Works Centre', designed to foster a more coordinated approach to agri-food research and extension among Agri-Tech Centres, National Libraries for Agri-Food, TIAH, and education providers.⁵³

Within the Lifelong Learning Pathway framework, courses at every level should be designed in a way that (at least potentially) builds on lower-level courses *and* leads onto higher-level courses, either at the same institution or another partner within the UK-wide sectoral education network. This means that every course is part of a full, guided qualifications and careers pathway that lets learners gain increasingly specialist skills and knowledge all the way up the UK qualifications 'ladder'. **In the case of agri-food, this Lifelong Learning Pathway framework should integrate all the courses offered across the land-based tertiary education sector—for which a useful 'core' would be the members of AUC-UK and the Landex group.**

While learners are free to retrain and reskill by moving 'sideways' or even 'down' the qualification levels, the main reason for doing so is to open up a new onwards career trajectory within the agri-food sector. This is an opportunity that remains open to them at any age or stage of their lives and careers, and learners can 'step on' and 'step off', or 'pause' and 'continue' their pathways at any point.

Especially for courses at levels 4–6, equivalent to apprenticeships, higher apprenticeships, and degree-level qualifications, modular teaching must be designed to be compatible with both full- and part-time delivery. This gives education institutions the flexibility to train or retrain (e.g.) early-career workers or those transferring in from another industry quickly to meet the immediate needs of the agri-food sector, and to maximise access for on-the-job upskilling for existing workers and for those with non-work responsibilities in a way that does not require them to leave the workforce.

One crucial advantage of having a system of place-based industry incubators and placements is that education institutions can work with their industry partners to combine formal learning and in-work experience in creative and innovative ways. **Harper Adams has the opportunity to pioneer a '2+2' approach to restructuring its four-year learning model. Instead of taking a full degree (three years of study) plus a one-year employer placement, students could take accelerated degrees (two years of study), freeing them up to spend an additional year undertaking work-based learning.**

Such a '2+2' model has several advantages. It allows students to acquire not only the same level of advanced theoretical knowledge and practical skills in their course specialism in a shorter time, but also to gain deeper work experience at the cutting edge of agri-food innovation and knowledge exchange. It also aligns with the SSFF's support for new models of education provision in conjunction with its partner LEAF, across its pillar 1 (focusing on new talent, schools, and re-training) and pillar 2 (upskilling the current workforce).

At the same time, it offers a potentially appealing financial prospect to Government, subject to amending Student Loan Company policy to make clearer allowance for two years' worth of reduced fees. Shifting one year of learning from the education provider to industry also moves the cost of this year off the student loan book and onto the industry that will ultimately benefit from having access to a pool of higher-skilled workers.

4.1.2 FUNDING LIFELONG AGRI-FOOD LEARNING

Lifelong Learning Pathways are a vital way to empower agri-food workers to develop technical skills and should be integrated into national industrial strategy within and beyond the agri-food sector. As the lifelong learning focus within national education and skills strategy moves to the implementation stage, **Lifelong Learning Pathways should be introduced as the primary means of targeted training and upskilling for the UK's strategic industries and employment areas**—especially those the Government considers vital to national security. Above all, these pathways need significant funding and logistical support, and responsibility for this support should be equitably distributed among the key financial beneficiaries of the skills and knowledge learners' gain: learners themselves, businesses, and Government.

At the time of writing, the Government intends to fold all the existing forms of student finance into the new Lifelong Learning Entitlement (LLE), set at the equivalent of four years' worth of full-time tertiary education (currently £37,000 p.a.), with targeted tuition grants and maintenance loans available to learners with a background of financial hardship or disadvantage. Given the strategic importance of agri-food and precision agriculture to the UK economy as well as its national security implications, it is essential to incentivise talented learners to upskill within or reskill into the agri-food sector. **For agri-food Lifelong Learning Pathways, the LLE should be expanded into a Pathway Premium combined tuition and maintenance grant, set at the equivalent of six years' worth of full-time tertiary education (currently £55,500 p.a.) and living costs**, to encourage learners to pursue a full post-16 skills uplift and make the careers switch into agri-food.

On the business side, strategic investment in agri-food can be incentivised by several reforms to the business tax regime. **A special 'strategic innovation rate' should be added to SME R&D tax relief, set at an extra 64% of their qualifying costs deductible from their yearly profit, on top of the existing 186% deduction, making a total of 250% deduction.**⁵⁴ At the same time, a 'strategic innovation credit' band of **an additional 5% should be added to the existing level of R&D expenditure credit for large companies**

(currently at 20% of qualifying R&D expenditure incurred after April 2023).⁵⁵ These special rates should be circumscribed to cover activity for which businesses can show that it contributes to innovation within strategic priority industries such as agri-food.

Similarly, a special 'strategic innovation multiplier' of 1.5 should be added to the Annual Investment Allowance where businesses invest in capital projects in partnership with tertiary education providers, such as incubators, Living Labs, or other knowledge exchange centres.⁵⁶ Further, the Government should introduce a 'strategic skills tax credit' at a rising rate proportional to the number of industry placements and proportion of employees undertaking 'on the job' training and upskilling that businesses provide.

For Government funding, with the imminent integration of LEP functions under the auspices of local authorities, the Government must overhaul and expand the Local Skills Improvement Fund (LSIF) tied to the operations of Local Skills Improvement Plans (LSIPs). As it stands, the LSIF builds on the 2021–23 strategic development fund and has the specific aim of supporting Further Education providers to respond to the priorities identified by the LSIPs for their respective local geography, with total funds of £40m revenue (2023–24) and £125m capital (2023–25).

To allow for larger-scale strategic investments, the LSIF should incorporate the array of smaller pots of targeted funding, including the Adult Education Budget, Multiply numeracy programme, National Skills Fund, Skills Development Fund, UK Shared Prosperity fund, and 16–19 Tuition Fund for Covid-19 recovery into a single allocation per LSIP area. The Government should allow leeway for localities to define their own investment priorities but exert a clear steer towards the regional strategic specialisms identified in the *Levelling Up the United Kingdom* white paper.⁵⁷

One of the core aims of these local investments would be to build capacity for local incubators and other knowledge and innovation clusters after the model of Ni.PARK, drawing on the related experience of the SSFF, as well as the Cultivate forum network. This is a function currently absent from the Rural England Prosperity Fund (Rural Fund) launched in September 2022, which focuses exclusively on supporting product and facility development in new and existing rural businesses, and community infrastructure and services.⁵⁸ **The Government should expand the Rural Fund into a 'Breadbasket of England' strategic fund jointly operated by DEFRA and DSIT to support R&D in precision agriculture in the key growth regions of UK agri-food, in particular the South West, Midlands, and East of England for primary agriculture.**

The models for the 'Breadbasket of England' fund should be the equivalent strategic funds already operating or proposed for introduction in the UK's devolved nations:

- Scotland: the Responsive Research Fund, as part of the Scottish Government's 2022–27 Strategic Research Programme on the environment, natural resources, and agriculture.⁵⁹
- Wales: Food Business Accelerator Scheme, Horticulture Development Scheme, and Agricultural Diversification Scheme, which are the (fragmentary) successors of the 2007–13 and 2014–20 Rural Development Plan schemes.⁶⁰
- Northern Ireland: the expansion of Invest NI's Agri-Food Investment Scheme recommended by the Independent Strategic Review of NI Agri-Food.⁶¹

4.1.3 GROWING THE AGRI-FOOD LEARNER POOL

In order to attract new talent into the agri-food sector, it is vital to leverage the synergies between agri-food and other growth sectors of the UK economy, especially those in which the UK has a global comparative advantage. The 'Future Farm' concept has the opportunity to showcase the forward-looking, highly specialised sides of the agri-food industry brought out and intensified by the sectoral effects of the 'fourth industrial revolution'. The SSFF, through its Sustainable Farm Network, is bringing together the UK's demonstration farm networks, further improving collaborative learning across the sector and showcasing innovation through on-farm demonstration.

Demonstration sites and Living Labs are needed to exemplify the uses of EVs within arable farming, low-carbon power generation and smart energy sources for heating and cooling in food production, high-end agricultural manufacturing, sustainable construction for agricultural infrastructure, and cutting-edge developments in green finance and business ESG. **At Harper Adams, the SSFF has the opportunity to act as an interdisciplinary knowledge exchange hub that integrates the latest insights from all these research and innovation areas relevant to agri-food.**

This interdisciplinary strategy must underpin how the agri-food sector and institutions such as Harper Adams advertise in schools, in order to generate demand for level 3+ agri-food qualifications among school leavers (a key commitment of SSFF's pillar 1 activity). Lifelong Learning Pathways can become a key flagship selling point for reframing agri-food education as not a low-prestige or 'dead-end' option for post-16 learning and work, but as instead a launchpad for highly-skilled vocational careers that can lead to a variety of promising trajectories—with good prospects of job security and opportunities for promotion and salary progression.⁶²

To ensure a healthy cross-fertilisation of technical skills between agri-food and other sectors, this advertising also has to target school leavers outside rural areas and in non-farming communities, especially those that have subject specialisms in (e.g.) STEM or computer science.⁶³ This is vital to meeting the SSFF's first key pillar of attracting diverse people and thinking into food and farming careers.

The SSFF has the opportunity to play an ambassadorial role for Harper Adams specifically, and for agri-food education in general. **This means forging collaborative relationships with Mayoral Combined Authorities (MCAs) in the major UK urban centres to raise awareness of the precision tech side of Harper Adams' course offerings.** The target audience for this is not limited to school leavers but should be broadened to include anyone motivated by the transformative demands created by pressing environmental concerns, and by the new opportunities afforded by advances in AI, digital, automation, and other technologies.

The aim is to attract more mature learners (30+) to move out of cities to live and work in small towns, villages, and rural areas at the appropriate level of seniority and remuneration. This is above all true of learners with young families, who can expand and rejuvenate the population and potential labour force in rural communities. **In order to achieve this, further investment is needed to provide the necessary public infrastructure that can raise the 'draw' of agricultural areas for urban residents, including affordable housing, schooling, transport links, and digital/online connectivity.**

Since the Covid-19 pandemic, non-urban areas that were traditionally part of the expanding 'commuter belt' for cities such as London or Manchester have increasing numbers of residents who predominantly work from home, especially in desk-based white-collar jobs that rely more and more on digital and virtual technology. **This 'down to the countryside' trend creates an opportunity for Harper Adams to expand the remit of SSFF into a hub for rural connectivity and digital agri-food innovation, which could act as a strong 'pull factor' for quaternary and quinary sector workers who want to cut down their urban commuting.**

At the same time, generating an increased supply of agri-food learners, especially for Lifelong Learning Pathways, also means generating the infrastructural and pedagogical capacity to take them on. **In response to the clear shortage of readily available specialist agri-food instructors or lecturers, the SSFF should develop a dedicated 'teacher training' dimension to its agenda. It has the opportunity to become the UK's leading hub for mixed-methods agri-food pedagogy, relying on the Living Labs to produce specialists capable of delivering both academic and vocational teaching, combining theoretical knowledge with practical skills training.**

In order to attract talent with cross-sector relevant expertise in areas such as engineering, the SSFF should work with its partners to develop an agri-food equivalent of the 'Teach First' programme. This should be supported by targeted bursaries, financed either with private sector backing or by bidding for 'Local Skills Development Fund' and 'Breadbasket of England' allocations.

4.2 FUTURE INNOVATION IN AGRIFOOD EDUCATION

Education institutions such as Harper Adams have the opportunity and responsibility to make agri-food skills training as immediately accessible as possible to learners across the entire UK. This means leveraging the latest developments in online distance learning and pursuing a new roster of national and international partnerships, to expand the 'reach' of its curriculum and its pedagogical model within and potentially beyond the UK agri-food sector.

4.2.1 APPLYING THE LATEST ADVANCES IN LEARNING METHODS

The forward-looking, interdisciplinary focus that marks research, knowledge exchange, and pedagogical training at Harper Adams through its SSFF is also an important factor in curriculum development for agri-food Lifelong Learning Pathways. Harper Adams must strike a careful balance between increasing focus on adjacent subjects that allow learners to acquire 'clean growth' knowledge and skills, such as EVs, low-carbon energy, ecological manufacturing and construction, and green finance, and maintaining its comparative edge in agri-food education. The aim must be to enhance and integrate the various skillsets and knowledge areas that help prepare learners to become well-rounded future agri-food workers—not to dilute or fragment their specialist learning development.

Lifelong Learning Pathways should be constructed in a way that ensures that learners 'major' in agri-food, but also allow room for 'minor' or 'elective' concentrations in adjacent subjects such as agri-engineering or agri-tech, especially at levels 4–6. This would be functionally equivalent to blending the existing system of occupational maps by allowing learners to transfer horizontally 'across' or diagonally 'across and up' between the different maps, as long as they are sufficiently close together that they still meet the necessary entry requirements of their new course. In practice, this strengthens the case for Harper Adams to diversify its partnership-building strategy to construct teaching arrangements with education institutions (including other land-based colleges and universities), and to form incubator agreements with businesses that cluster research, innovation, and learning provision in these adjacent subject areas.

At the same time, one of the major effects of the Covid-19 pandemic has been the growth of blended, hybrid, and remote learning, assisted by increasingly diverse and sophisticated digital and virtual technologies. This includes advances in videoconferencing technology and robotics that allow for remote instruction even in highly complex branches of research, such as medicine or precision engineering, as well as a vast expansion of Massive Open Online Courses and other forms of open-source or open-content online distance learning. These create the capacity for pedagogy and knowledge exchange that does not exclusively rely on face-to-face teaching.

Harper Adams should use this new generation of virtual technology and distance learning to open up the accessibility of its courses and Lifelong Learning Pathways. This especially includes how it deploys its unique physical learning assets. **A shorter-term option would be to use ‘flipped classroom’ teaching methods to enable distance learners to spend designated week-length intensive ‘residential sessions’ on-site at the Living Labs or Ni.PARK as part of courses that are otherwise conducted entirely through remote or online learning platforms. A longer-term option would be to invest in a full, highly detailed ‘virtual reality’ rendering of both the Living Labs and Ni.PARK, allowing learners to experience both learning environments wherever they are based.**

An alternative approach would be for Harper Adams to prioritise remote instruction, creating partnerships with a UK-wide network of land-based tertiary education institutions that also have the same capital infrastructure: laboratories, knowledge clusters, even their own form of ‘in-house’ innovation test sites associated with some branch of the agri-food industry. This would allow distance learners to take Harper Adams courses closer to where they live and work, using the physical learning infrastructure of a partner institution; on a reciprocal basis, learners in Shropshire would be able to use Harper Adams’ infrastructure to take courses offered by its partners. This would be a powerful way to expand Harper Adams’ ‘hub-and-spoke’ model to give it both a ‘four-nations’ (and beyond) reach and a ‘place-based’ presence across the UK, using an increased digital and virtual capacity to embed its teaching model into a range of local economies.

Introducing ‘major/minor’ courses and distance learning arrangements into Lifelong Learning Pathways makes it even more crucial to build a sector-wide credit transfer, exchange, and interoperability agreement. Its core task is to recognise that learners benefit from being able to freely and fluidly access the wide-ranging portfolio of knowledge and skills training offered by the UK’s full roster of agri-food education institutions.

On that basis, this system must allow learners to combine modular courses offered through a variety of delivery methods by these institutions, each of which has its own geographical and sectoral centre of gravity. It also needs to take account not just the precise level (from 1 to 8) at which these courses sit, but also the progression from each one to the next. And ultimately, it has to pay close attention to ‘educational realisation’ for each Pathway, to make sure that at every ‘stop’ along the way it provides learners with everything they need to become the workers businesses expect and need them to be at that skills level.

4.2.2 LOCAL, NATIONAL, AND INTERNATIONAL PARTNERSHIP STRATEGY

Lifelong Learning Pathways rely on institutional partnerships that build on both the ‘place-based’ and ‘hub-and-spoke’ aspects of Harper Adams’ strategic engagement with the wider agri-food sector. They boost interaction and cohesion among, and between, education providers and learners, businesses and workers, and (through the LSIP model) local authorities and local residents on two levels.

Within localities, they encourage community-building around the local specialisms, converting what might otherwise be a somewhat sterile and incidental cluster of institutions into an integral social identity that is shared by the people who make up these institutions. *Between* localities, these partnerships encourage a different way of putting local areas within the context of a bigger social picture, not as static spaces sat within a series of concentric geographic circles of increasing size, but instead as nodes in a very specific sectoral network that interact dynamically with other nodes over a wide national or even global area.

In view of this, Harper Adams should adopt a dual strategy towards regional specialisation. Within its locality (Shropshire, the Marches, West Midlands), it should become a leading advocate for 'leaning into' a forward-looking, interdisciplinary approach to agri-food. **It should build on its bilateral in-degree placement agreements to form multilateral knowledge exchange partnerships with local food producers, manufacturers, wholesalers, and retailers.**

Since the West Midlands is a clear growth area for UK agriculture, Harper Adams should aim to become the regional leader for agri-food education provision, as well as a key anchor for regional coalitions aiming to attract local and national investment into the agri-food sector. **This means working closely with Shropshire Chamber of Commerce to ensure that precision agriculture is at the heart of the Shropshire LSIP. It also means that Harper Adams must engage with the CoCs which are the Employer Representative Bodies for all other West Midlands LSIP areas to ensure that an agri-food skills strategy is coordinated on a regional scale.**

Beyond the West Midlands, Harper Adams needs to target its partnership 'spokes' at localities and institutional partners in the other growth regions for UK agriculture, especially the South West, South East, East Midlands, and East of England. Overall, this is one of the areas most in need of strategic development at Harper Adams. Strategic partnerships are vital not only for knowledge exchange but also 'best practice' exchange on questions of course development, practice-led pedagogy, teacher training, and innovator incubation. Potential partners include:

- Universities and colleges: the members of AUC-UK and the Landex network of land-based colleges and universities, as well as industry-engaged co-development with the top five universities in agricultural studies (University of Edinburgh, University of Leeds, Newcastle University, University of Nottingham, University of Reading).
- Agri-tech Centres for Agricultural Innovation: fostering collaboration (and, wherever appropriate, encouraging mergers) with the Agri-EPI Centre farms and hubs beyond the Midlands hub based at Harper Adams, and with the other national CIEL, CHAP, and Agrimetrics centres.
- Demonstration farms: especially the new Sustainable Farm Network.
- Training farms: the LEAF network (including LEAF Innovation Centres), the Soil network.
- Public bodies: Agriculture and Horticulture Development Board strategic farms.⁶⁴

This also means expanding channels between Shropshire CoC, the Shropshire LSIP and the innovation and skills improvement strategies being formulated in agriculture-intensive areas around the UK. **The same principle applies to global partnerships, which would allow Harper Adams to extend the reach of its education model to the multinational agri-food sector.** These are currently an underexplored resource for Harper Adams; it should aim to act as a conduit for global aspirations around health and sustainability, and for 'best practice' around nature-friendly and sustainable farming, in UK agri-food policy space.

4.3 SUMMARY

The agri-food sector has the chance to pioneer a radical new approach to sectoral training and upskilling, centred on a system of Lifelong Learning Pathways. Government can intervene to create a favourable environment of funding incentives for businesses and learners to boost industry and learner demand for these Pathways as well as the supply of Pathway providers and ultimately Pathway-educated workers. Education institutions across the agri-food sector and beyond should respond by increasing their technological and infrastructural capacity to make these Pathways available to as many learners as possible within and beyond the UK.



5. CONCLUSIONS AND RECOMMENDATIONS

The agri-food industry in the UK has experienced significant changes over recent decades that have yet to be fully incorporated into UK industrial strategy. This has led to unresolved supply- and demand-side pressures on the knowledge and skills level of the agri-food workforce that are becoming more and more urgent thanks to rising focuses on sustainability, security, and accessibility.

Harper Adams operates a model of agri-food skills training that achieves a significant degree of integration between education and industry, through a network of partnerships that bridge agri-food research, knowledge exchange, and lifelong learning. It also sits at the forefront of agri-food curriculum development, especially around designing a new generation of higher technical qualifications, the shift to modular course delivery, and creating the outlines of a sector-wide accreditation, interoperability, and transfer framework.

Its approach should be used to inform the development of a new system of Lifelong Learning Pathways for continuous, 'step-on/step-off' level 1–8 skills and career progression, funded by a combination of learner grants, business tax incentives, and Government strategic funds. To support and expand its teaching model, Harper Adams should also embrace the possibilities of interdisciplinary and online distance learning to open up agri-food skills to workers in adjacent industries and build out its strategic 'place-based' and 'hub-and-spoke' partnerships within and beyond the UK.

RECOMMENDATIONS FOR POLICYMAKERS:

1. Categorise food security, accessibility, and sustainability as a public good, and give the agri-food sector the status of a strategic industry.
2. Develop a system of Lifelong Learning Pathways as the primary framework for skills and career progression in agri-food, and expand this framework to all UK strategic industry sectors and employment areas.
3. For skills areas covered by Lifelong Learning Pathways, expand the Lifelong Learning Entitlement into a Pathway Premium combined tuition and maintenance grant, set at the equivalent of six years' worth of full-time tertiary education (currently £55,500 p.a.) and living costs.
4. Add a 'strategic innovation rate' to SME R&D tax relief (at an extra 64% of qualifying costs deductible from profits), and a 'strategic innovation credit' band (at an extra 5% of qualifying expenditure) to R&D expenditure credit, to cover business innovation activity within strategic priority industries such as agri-food.
5. Add a 'strategic innovation multiplier' of 1.5 to the Annual Investment Allowance, to cover business investment in capital projects in partnership with tertiary education providers.
6. Introduce a 'strategic skills tax credit' at a rising rate proportional to the number of industry placements and employees undertaking 'on the job' training and upskilling.
7. Unify the system of disparate local skills funding pots into a single resource under the auspices of the Local Skills Improvement Fund tied to the operations of Local Skills Improvement Plans (LSIPs), made available to all education providers across the relevant LSIP area, and with a mandatory agri-food funding and strategy strand.
8. Recognise agri-food as a growth industry for the UK and convert the Rural England Prosperity Fund into a 'Breadbasket of England' strategic fund designed to support innovation, knowledge exchange, and training developments in key agri-food growth regions (South West, South East, and West Midlands), following similar models operating in Scotland, Wales, and Northern Ireland.
9. Develop a single sector-wide accreditation, quality assurance, credit interoperability, and credit transfer system for agri-food qualifications.
10. Create a UK-wide network of agri-food incubators and Living Labs test sites, supervised and operated by a consortium accountable to The Institute of Agriculture and Horticulture (TIAH).

RECOMMENDATIONS FOR HARPER ADAMS UNIVERSITY:

1. Develop the IfATE agriculture, environmental, and animal care occupational map into a full prospectus of agri-food Lifelong Learning Pathways, constructed around 'majors' in agri-food, along with 'minor' or 'elective' concentrations in adjacent subjects, building on work already undertaken to support the development of apprenticeships and the current review of undergraduate curricula.
2. Pilot or roll out flexible and (where appropriate) modularised delivery for teaching, including online/blended and 'day-release' optionality, and convert level 3–6 provision into short credit-bearing courses that are either standalone or stackable into larger qualifications at each Pathway level.
3. Issue clear subject guidance for Harper Adams students about how these modular courses should be grouped together, and the requirements they must meet to count as 'foundational', 'advanced', or 'capstone' modules to allow learners to progress along their chosen Pathways.
4. Develop the four-year Harper Adams learning model into a '2+2' approach, with two years of study for an accelerated degree course and two years of in-depth work-based learning, and identify courses that can be used as pilot case studies.
5. Expand the use of hybrid and virtual teaching methods to offer more online distance learning options, such as 'flipped classroom' teaching with on-site 'residential sessions', remote learning 'deals' with other education institutions, and 'virtual reality' environment rendering to widen access to the Demonstration Farm sites — Living Labs and Ni.PARK.
6. Extend the in-degree placement scheme with industry partners into a post-graduation 'business practitioner' secondment system and strengthen 'visiting study' agreements with other agri-food education providers to let Harper Adams and other students set up learning exchanges and other knowledge transfers.
7. Work with all West Midlands Chambers of Commerce to develop a coordinated regional agri-food skills strategy, and clarify the balance between depth (upskilling existing workers) and breadth (attracting new workers to the sector) in workforce training.
8. Build capacity within the School of Sustainable Food and Farming for an interdisciplinary hub for rural connectivity and agri-food innovation, 'clean growth' knowledge exchange with adjacent sectors, and 'Teach First' training programmes for mixed-methods agri-food pedagogy.
9. Create 'best practice' exchange partnerships focusing on cutting-edge innovation, curriculum design, and teaching infrastructure development with agri-food education institutions and industry bodies in the other growth regions for UK agriculture (South West, South East, East of England) and beyond the UK.
10. Collaborate with Mayoral Combined Authorities (MCAs) across the UK to raise awareness of Harper Adams, and of agri-food as a high-level learning and career option, among school leavers and workers in adjacent sectors who have the higher technical skills needed in agri-food.

ENDNOTES

- 1 House of Commons Library, 'Industries in the UK', <https://commonslibrary.parliament.uk/research-briefings/cbp-8353/>; Department for Environment Food & Rural Affairs, 'National statistics — Chapter 14; The food chain', <https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2021/chapter-14-the-food-chain>; Office for National Statistics, 'Gross Value Added (Average) at basic prices', <https://www.ons.gov.uk/economy/grossvalueaddedgva/timeseries/abml/bb> (accessed 11 September 2023).
- 2 Office for National Statistics, 'UK SIC 2007', <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>, pp.27–8; Office for National Statistics, 'GDP output approach – low-level aggregates', <https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/ukgdpolowlevelaggregates> (accessed 11 September 2023).
- 3 Office for National Statistics, 'JOB502: Workforce jobs by industry', <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/workforcejobsbyindustryjobs02> (accessed 11 September 2023).
- 4 House of Commons Library, 'Industries in the UK', <https://commonslibrary.parliament.uk/research-briefings/cbp-8353/> (accessed 11 September 2023); Office for National Statistics, 'UK SIC 2007', pp.41–2.
- 5 Office for National Statistics, 'UK SIC 2007', p. 44.
- 6 HM Government, *Industrial Strategy: Building a Britain fit for the future* (2017), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf, pp. 40, 75 (accessed 11 September 2023).
- 7 *Ibid.*, pp. 43, 47, 145.
- 8 *Ibid.*, p. 188.
- 9 *Ibid.*, pp. 84, 86.
- 10 HM Treasury, *Build Back Better: Our plan for growth* (2021), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/968403/PfG_Final_Web_Accessible_Version.pdf, p. 65 (accessed 11 September 2023).
- 11 *Ibid.*, p. 88.
- 12 HM Government, *Levelling Up the United Kingdom* (2022), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052708/Levelling_up_the_UK_white_paper.pdf, p. 124; Green Jobs Taskforce, *Report to Government, Industry and the Skills Sector* (2022), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003570/gjtf-report.pdf
- 13 HM Government, *Levelling Up the United Kingdom*, p. 116.
- 14 *Ibid.*, p. 185.
- 15 *Ibid.*, pp. 147, 183.
- 16 *Ibid.*, p. 197.
- 17 HM Government, 'Academic year 2022/23 – Apprenticeships and traineeships', <https://explore-education-statistics.service.gov.uk/find-statistics/apprenticeships-and-traineeships> (accessed 11 September 2023).
- 18 The Food and Drink Sector Council, *Preparing for a changing workforce: A food and drink supply chain approach to skills* (2022), <https://www.fdf.org.uk/globalassets/resources/publications/fdsc-workforce-skills-report.pdf>, p. 8 (accessed 11 September 2023).

ENDNOTES

- 19 AHDB, *Driving productivity growth together* (2018), https://projectblue.blob.core.windows.net/media/Default/Market%20Insight/Horizon_Driving%20Productivity_Jan2018.pdf (accessed 11 September 2023).
- 20 HM Government, *A UK Strategy for Agricultural Technologies* (2013), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/227259/9643-BIS-UK_Agri_Tech_Strategy_Accessible.pdf (accessed 11 September 2023).
- 21 Harper Adams University, *Application of Science to Realise the Potential of the Agricultural Transition* (2022), https://cdn.harper-adams.ac.uk/document/page/705_Application-of-Science-to-Realise-the-Potential-of.pdf (accessed 11 September 2023).
- 22 LEAF Education and School of Sustainable Food and Farming, *How Do Young People Perceive and Value the Agri-Food Industry?* (2023), https://issuu.com/linking-environment-and-farming/docs/issuu_teenager_research_report_2023_40fa0272f10dd3?fr=sYjM1MDYyMzQ4MTE (accessed 11 September 2023).
- 23 Farming UK, 'UK "leading the way" for global agri-tech investments', 6 March 2023, https://www.farminguk.com/news/uk-leading-the-way-for-global-agri-tech-investments_62194.html (accessed 11 September 2023).
- 24 Office for National Statistics, 'GDP output approach – low-level aggregates', <https://www.ons.gov.uk/economy/grossdomesticproductgdp/datasets/ukgdpolowlevelaggregates> (accessed 11 September 2023).
- 25 Department for Environment, Food, and Rural Affairs, *National Food Strategy: Independent Review* (2020), <https://www.gov.uk/government/publications/national-food-strategy-for-england> (accessed 11 September 2023).
- 26 NOCN Group, *Greening the UK's skills* (2022), https://www.nocn.org.uk/Data/Landing_Downloads/GreeningUKskillsreport.pdf (accessed 11 September 2023).
- 27 Department for Environment Food and Rural Affairs, 'Environmental Land Management schemes: overview', <https://www.gov.uk/government/publications/environmental-land-management-schemes-overview/environmental-land-management-scheme-overview> (accessed 11 September 2023).
- 28 Department for Environment Food and Rural Affairs, 'Environmental Land Management (ELM) update: how government will pay for land-based environment and climate goods and service', <https://www.gov.uk/government/publications/environmental-land-management-update-how-government-will-pay-for-land-based-environment-and-climate-goods-and-services/environmental-land-management-elm-update-how-government-will-pay-for-land-based-environment-and-climate-goods-and-services> (accessed 11 September 2023).
- 29 Department for Environment Food & Rural Affairs, *UK Food Security Report 2021*, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1077015/United_Kingdom_Food_Security_Report_2021_19may2022.pdf (accessed 11 September 2023).
- 30 HM Government, 'Official Statistics – UK trade in numbers', <https://www.gov.uk/government/statistics/uk-trade-in-numbers#full-publication-update-history> (accessed 11 September 2023).
- 31 Department for Environment Food & Rural Affairs, *Government food strategy* (2022), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1082026/government-food-strategy.pdf (accessed 11 September 2023).
- 32 The Food and Drink Sector Council, *Preparing for a changing workforce* (2022), p. 3.
- 33 Chris Skidmore, *Mission Zero: Independent Review of Net Zero* (2023), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128689/mission-zero-independent-review.pdf, pp. 16, 32, 91, 114, 128, 163, 173–7, 271 (accessed 11 September 2023).

ENDNOTES

- 34 HM Government, *Powering Up Britain: Energy Security Plan* (2023), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1148252/powering-up-britain-energy-security-plan.pdf (accessed 11 September 2023).
- 35 Harper Adams University, 'New courses launched as Harper Adams rises to meet future challenges', 4 October 2022, <https://www.harper-adams.ac.uk/news/206904/new-courses-launched-as-harper-adams-rises-to-meet-future-challenges> (accessed 11 September 2023).
- 36 Harper Adams University, 'Harper Adams New Entrants Incubator Pilot', <https://www.harper-adams.ac.uk/courses/short-course/201109/harper-adams-new-entrants-incubator-pilot> (accessed 11 September 2023).
- 37 Harper Adams University, 'Careers and placement – Placement', <https://www.harper-adams.ac.uk/university-life/place-ment-and-careers/place-ment.cfm> (accessed 11 September 2023).
- 38 Harper Adams University, 'Work With Us – Offer a placement', <https://www.harper-adams.ac.uk/work-with-us/employers/> (accessed 11 September 2023).
- 39 Harper Adams University, *Placement survey 2021/22*.
- 40 Harper Adams University, 'Harper Adams becomes education partner for Future Farm Technology Expo', 6 March 2020, <https://www.harper-adams.ac.uk/news/203478/harper-adams-becomes-education-partner-for-future-farm-technology-expo>; Harper Adams University, 'Applications open for Farm of the Future demonstration event', 15 February 2023, <https://www.harper-adams.ac.uk/news/206966/applications-open-for-farm-of-the-future-demonstration-event> (accessed 11 September 2023).
- 41 Harper Adams University, 'UK space and agricultural sectors to be brought together in Agri Living Lab project', 3 March 2022, <https://www.harper-adams.ac.uk/news/206785/uk-space-and-agricultural-sectors-to-be-brought-together-in-agri-living-lab-project> (accessed 11 September 2023).
- 42 Harper Adams, *Application of Science*, pp. 3, 5, 13.
- 43 Office for Students, 'Student characteristics data: Population data', <https://www.officeforstudents.org.uk/data-and-analysis/student-characteristics-data/population-data-dashboard/> (accessed 11 September 2023).
- 44 Harper Adams University, 'Report finds Harper Adams among UK's most popular universities for students aged 50 or over', 24 March 2023, <https://www.harper-adams.ac.uk/news/207987/report-finds-harper-adams-among-uks-most-popular-universities-for-students-aged-50-and-over> (accessed 11 September 2023).
- 45 Harper Adams University, *Introduction Student Feedback 2021/22: Quality Enhancement Themes for 2022/23 – Learning, Teaching & Student Experience Committee paper* (2022).
- 46 GuildHE, *Practice-Informed Learning: The Rise of the Dual Professional* (2018), <https://guildhe.ac.uk/practice-informed-learning-the-rise-of-the-dual-professional/> (accessed 11 September 2023).
- 47 Institute for Apprenticeships and Technical Education, 'Occupational maps – Agriculture, environmental and animal care', <https://occupational-maps.instituteforapprenticeships.org/maps/route/agriculture-environmental-animal-care> (accessed 11 September 2023).
- 48 Harper Adams University, "'Farm of the Future: Net Zero in Practice" event to be held at Harper Adams in 2023', <https://www.harper-adams.ac.uk/news/206939/farm-of-the-future-net-zero-in-practice-event-to-be-held-at-harper-adams-in-2023> (accessed 11 September 2023).

ENDNOTES

- 49 Institute for Apprenticeships and Technical Education, 'Vet technician (livestock)', <https://www.instituteforapprenticeships.org/apprenticeship-standards/vet-technician-livestock-v1-0> (accessed 11 September 2023).
- 50 Harper Adams University, 'BEng (Hons) Agricultural Engineering', <https://www.harper-adams.ac.uk/courses/undergraduate/201013/agricultural-engineering> (accessed 11 September 2023).
- 51 Harper Adams University, 'New qualification for dairy farmers to be delivered by Harper Adams', 23 February 2011, <https://www.harper-adams.ac.uk/news/201270/new-qualification-for-dairy-farmers-to-be-delivered-by-harper-adams> (accessed 11 September 2023).
- 52 Agri-TechE, 'Government Food Strategy – time to be bold', 20 June 2022, <https://www.agri-tech-e.co.uk/government-food-strategy-time-to-be-bold/> (accessed 11 September 2023).
- 53 Harper Adams, *Application of Science*, pp. 11, 14–15.
- 54 HM Government, 'Guidance – Research and Development (R&D) tax relief for small and medium-sized enterprises', <https://www.gov.uk/guidance/corporation-tax-research-and-development-tax-relief-for-small-and-medium-sized-enterprises> (accessed 11 September 2023).
- 55 HM Government, 'Guidance – Research and Development (R&D) expenditure credit', <https://www.gov.uk/guidance/corporation-tax-research-and-development-tax-relief-for-large-companies> (accessed 11 September 2023).
- 56 HM Government, 'Claim capital allowances', <https://www.gov.uk/capital-allowances/annual-investment-allowance> (accessed 11 September 2023).
- 57 *Levelling Up the United Kingdom*, p. 54.
- 58 Department for Environment Food & Rural Affairs, 'Guidance – Rural England Prosperity Fund: prospectus', 3 September 2022, <https://www.gov.uk/government/publications/rural-england-prosperity-fund-prospectus/rural-england-prosperity-fund-prospectus> (accessed 11 September 2023).
- 59 Scottish Government, *Environment, natural resources and agriculture – strategic research 2022–27: overview* (2022), <https://www.gov.scot/publications/environment-agriculture-and-food-strategic-research-2022-27-overview/pages/strategic-research-programme-2022-to-2027/> (accessed 11 September 2023).
- 60 Welsh Government, 'Rural grants and payments', <https://www.gov.wales/rural-grants-payments> (accessed 11 September 2023).
- 61 Northern Irish Department of Agriculture, Environment and Rural Affairs, *Independent Strategic Review of NI Agri-Food Report* (2022), <https://www.daera-ni.gov.uk/publications/independent-strategic-review-ni-agri-food-reports> (accessed 11 September 2023).
- 62 LEAF Education and School of Sustainable Food and Farming, *How Do Young People Perceive and Value the Agri-Food Industry?*
- 63 LEAF Education, 'Time for a fresh look: LEAF Education's research sets out to inspire the next generation of agricultural leaders', <https://leaf.eco/news-and-events/news/time-for-a-fresh-look-leaf-educations-research-sets-out-to-inspire-the-next-generation-of-agricultural-leaders> (accessed 11 September 2023).
- 64 The Institute for Agriculture and Horticulture, 'Demonstration and monitor farms', <https://tiah.org/demonstrations-farms/>; LEAF Education, 'LEAF Network', <https://leaf.eco/farming/leaf-network>; Study In UK, 'Top Five Agriculture Universities and Courses in the UK', 5 July 2023, <https://www.studyin-uk.com/study-guide/top-five-agriculture-universities-uk/> (accessed 11 September 2023).

ACKNOWLEDGMENTS

This report was produced by the Lifelong Education Institute (LEI), with the kind support of **Harper Adams University** and the **School of Sustainable Food and Farming**. The LEI would like to thank all those members of the steering committee at Harper Adams who contributed their time and expertise, including **Prof. Lydia Arnold**, Associate Pro-Vice-Chancellor (Learning, Teaching and Digital), **Steve Barnett**, Head of Educational Development and Quality Enhancement, **Alastair Boot**, University Placement Coordinator, **Rachel Brookes**, Widening Participation Officer, **Parmjit Chima**, Head of Engineering Department, **Dr Simone Clarke**, Pro-Vice-Chancellor (Education and Students), **Jaclyn Green**, Deputy Director of Marketing and Communications, **Carl Griffiths**, Head of Student Recruitment, **Alex Hardie**, Business Development Manager, School of Sustainable Food and Farming, **Clare Keegan**, Business Development and Apprenticeships Manager, **Prof. Michael Lee**, Deputy Vice-Chancellor, **Rebecca Payne**, Head of the Food Land and Agribusiness Management Department, **Ian Rowley**, Chief Global Impact Officer, **Prof. Ken Sloan**, Vice-Chancellor, and **Simon Thelwell**, Strategic Director, School of Sustainable Food and Farming.

We would also like to thank Dr Marius S. Ostrowski for authoring the report, and Mike Mavrommatis for project support.

ADVISORY BOARD

- Dr Fiona Aldridge – Head of Insight & Intelligence for the West Midlands Combined Authority
- Prof. Liz Barnes – Vice-Chancellor of Staffordshire University
- Douglas Blackstock – President of the European Association for Quality Assurance in HE
- Liz Bromley – Chief Executive of the NCG College Group
- Iestyn Davies – Pro Vice-Chancellor of the University of Wales, Trinity St David
- Kirstie Donnelly – CEO of the City & Guilds London Institute
- Prof. Vicky Duckworth – Professor of Further Education at Edge Hill University
- Dr Jolanta Edwards – Director of Strategy for London Higher
- Verity Hancock – Principal & CEO of Leicester College
- David Hughes – CEO of the Association of Colleges
- Prof. René Koglbauer – Dean of Lifelong Learning and Professional Practice, Newcastle University
- Prof. David Latchman – Vice-Chancellor of Birkbeck College, University of London
- Dr Joe Marshall – CEO of the National Centre for Universities & Business
- Prof. David Phoenix – Vice-Chancellor of London South Bank University
- Johnny Rich – CEO of the Engineering Professors' Council
- Prof. Keith Ridgway – Executive Chair of the National Manufacturing Institute of Scotland
- Prof. Susan Rigby – Vice Chancellor of Bath Spa University

BOARD OF PATRONS

- Sir Vince Cable – former leader of the Liberal Democrats and Minister for Business, Innovation & Skills in the Coalition Government
- Baroness Susan Garden – Liberal Democrat Peer and Deputy Leader of the House of Lords
- Lord Jo Johnson – Conservative Peer and former Universities Minister
- Lord Iain McNicol – Labour Peer and former General Secretary of the Labour Party
- Baroness Debbie Wilcox – Labour Peer and former Leader of Newport Council and of the Welsh Local Government Association

MEMBERS

- Activate Learning College Group
- Anglia Ruskin University
- Association of Colleges
- Birkbeck, University of London
- City & Guilds
- Doncaster Council
- Eastern Colleges Group
- Farnborough College of Technology
- Federation of Awarding Bodies
- Harper Adams University
- JISC
- Kaplan Assessments
- Mixed Economy Group
- NCG
- New City College
- Newcastle University
- Oldham College
- Peterborough City Council
- Sheffield College
- South Essex College Group
- South Thames Colleges Group
- Staffordshire University
- University College of Estate Management
- University of Bolton
- University of Chester
- University of Derby
- University of Leeds
- University of Salford
- University of West London
- Weston College



Lifelong
Education
Institute

A Report for the Lifelong Education Institute

This report addresses the opportunities and challenges facing skills provision in the agri-food sector. It explores how innovative structures of learning and skills training can help generate and attract the learner talent that the sector needs to help establish the UK as a global leader in agricultural production and sustainable food systems. It outlines a new approach to lifelong learning that integrates skills and career progression, which can help overcome the long-term mismatch between workforce skills and industry needs.

The report closely examines the experience of Harper Adams University, one of the UK's leading higher education institutions providing specialist learning and skills training for the agri-food sector, in setting up sectoral partnerships and undertaking curriculum reform to bridge the gap between teaching priorities and industry needs. It assesses what is needed for the future development of an advanced, precision-oriented agri-food sector capable of meeting the UK's imperatives for industrial strategy. This includes a radical new model of Lifelong Learning Pathways, an equitable portfolio of financial responsibilities, the importance of integrating new pedagogical means and methods, and an interdisciplinary approach to agri-food education, research, and knowledge exchange.

Using these findings, the report develops a series of policy recommendations for reforms to skills policy in the UK that can help to integrate lifelong agri-food learning and skills training as a vital component of the UK's mainstream education system. It proposes ten strategic recommendations for future national and regional legislation around skills training for the agri-food sector, and ten tactical action points for the leadership of Harper Adams University and other agricultural education providers to prioritise in their course development.



**Harper Adams
University**



ISBN: 978-1-908027-96-2

*ResPublica is the trading name of The ResPublica Partnership Limited
Company Registration No: 11068087 England and Wales*