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Why we need a National Academy for Sustainable Agriculture

By Jo Price

Food Research Collaboration Policy Insight
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FRC Policy Insights

The FRC Policy Insights are short reports highlighting gaps and opportunities for improvement in emerging food policy in the UK. The aim is to put detailed, specialist knowledge into the public domain at a critical time for the food system.

Brexit, Covid, the climate and environmental crises, the disruption to supply chains caused by the war in Ukraine, and the UK's acute cost-of-living crisis all have consequences for food policy.

In response, there have been new laws and policy proposals, covering all aspects of the food system, from land use and agriculture to health, trade, labour, technology and innovation.

While policy is being developed, there are opportunities for improvements and course-corrections. We hope these Policy Insights will help to inform that process. If you would like to contribute, please contact the Food Research Collaboration.

Why agriculture education needs radical reform

Until the Covid pandemic and the war in Ukraine, national food security rarely featured in UK politicians' rhetoric. This is no longer the case: a welcome development, for regrettable reasons. The 'perfect storm' that faces British agriculture and the food supply chain is now only too visible. In 2022 news reports showed parched crops during the summer heatwave, mounds of unpicked fruit and vegetables resulting from labour shortages post-Brexit (an unresolved problem), and distressed pig farmers unable to slaughter their stock because of a shortage of labour (abattoir workers and lorry drivers). The shortage of eggs has resulted not only from avian influenza but also rising input costs, and recently supermarkets rationed tomatoes and other salad crops because of climate-related weather problems in Spain and Morocco. British growers are unable to address the shortage because glasshouse heating costs are too high.

For the first time in decades, spiralling inflation is having a real impact on food prices as the costs of farmers' 'inputs' (the things they need to buy in order to produce food, including fuel, fertiliser, animal feed and medicines) escalate. Agricultural inflation runs at roughly three times national inflation, food inflation is at ~18% and, as powerfully articulated by Henry Dimbleby's Independent Review for the National Food Strategy (*The Plan*)[1], food poverty in the UK encompasses growing numbers of people unable to afford nutritious food. This all proceeds as the global human population exceeds eight billion and the consequences of human-induced, inadequately addressed climate change relentlessly unfold. This convergence of circumstances explains why food security - the concern over how and whether populations can be securely fed[2] - is once again on the UK's political agenda.

Across the world 300 million people face food famine. It should go without saying that in addition to tackling immediate issues, the UK should fulfil its longer-term commitment to the UN's sustainable development goals (SDGs)[3]. Together with the rest of the global community we must address the challenge of how best to convert prevailing agricultural systems from being one of the deleterious causes of climate change to part of the solution for moderating climate change, sustaining biodiversity and filling eight billion mouths with nutritious food.

Glossary

Agriculture
For the purposes of this report, this includes horticulture crops (unless specified)

Further Education
Education beyond secondary level that is not part of a degree programme

Higher Education
Tertiary level education leading to the award of a degree

Land-Based Education
Includes agriculture, horticulture, animal care, equine studies, countryside and wildlife management, environmental conservation and closely related subjects

Regulated Qualifications Framework (RQF)
Accredits qualifications in England, Wales and Northern Ireland. An RGF qualification means full recognition of the course and award and every unit and qualification has a credit value.

Utilised Agricultural Area
All arable and horticultural crops, uncropped arable land, land used for outdoor pigs, temporary and permanent grassland and common rough grazing

Agriculture is only part of this picture, but an important one. The Utilised Agricultural Area (UAA) in the UK is ~8.9 million hectares and accounts for 69% of the total area of England[4]. Agriculture contributes around 0.5% to the UK's economy, provides half of the food we eat and employs almost half a million people[5]. There is of course no single 'solution'. UK agriculture relies on many unrelated, privately owned enterprises widely different in size and type. It is thus peculiarly unresponsive to either single technological solutions or focussed policy decisions imposed from on high. Thus, it may always be difficult to ensure acceptance and implementation of any intellectually coherent, universally beneficial national policy for agriculture.

Notwithstanding, recent policy initiatives provide some room for encouragement for the future of sustainable agriculture (e.g., the Sustainable Farming Incentive (SFI)[6] and the Farming Innovation Programme (FIP)[7]). But if the policy is starting to take shape – are research and pedagogy keeping up? Also, to what extent are policy development and implementation informed by the scientific evidence base?

Agricultural education providers - a diverse group of enterprises - need to be sufficiently enlightened to be able to fine-tune their activities to best respond to the inevitably broad-brush policy framework. Are there sufficient opportunities for existing and aspiring farmers to learn new ways of farming that support sustainable agricultural policy? If not, why not and how can that be remedied?

Clearly agriculture urgently needs a workforce that has appropriate technical skills. However, while facility with complex practical tasks should never be undervalued, the application of such skills is not sufficient, by itself, to support the progress in the agricultural industry that current challenges demand. The necessary educational and scientific base to inform such progress requires involvement at the highest possible levels of research, thought and scholarship, which cannot be taught at school or college level or through delivery of knowledge exchange to the existing workforce. If we wish to support delivery of enlightened national agricultural policy objectives, and to implement the vision for agri-food innovation that the government proposes, then we also need to encourage the best minds, educated to the highest level, to contribute to developing a long-term strategy and vision for the use of our land, our influence on the environment, and production of our food.

The focus of the argument of this Policy Insight is that the successful development and implementation of sustainable agricultural policies depends on well-funded, high-quality and high-prestige teaching and research in universities, as well as in colleges of further education and other institutions. It proposes a long-term strategy for education and training in sustainable agriculture that will ensure that the UK produces sufficient food in a sustainable way.

As a start on this journey it calls for the establishment of an institution that takes ownership of the higher reaches of agricultural thought-leadership. Perhaps a National or Royal Academy for Sustainable Agriculture? The primary purpose of such an organisation will be to lift the sights of those engaged in agriculture from practical skills and competencies to include the highest, most critical scientific concepts and feed these into the machinery of enlightened practice and national policy making.

Our contention is that effective and relevant agricultural policy depends on high-quality, up-to-date, impartial knowledge, and on having highly trained experts who can discover, test and teach it.

Agricultural policy must be rooted in knowledge

The recent Government Food Strategy recognises the importance of education:

> *'We will seek to ensure that by 2030, pay, employment and productivity, as well as completion of high-quality skills training, will have risen in the agri-food industry in every area of the UK, to support our production and levelling up objectives.*
>
> *'We will work with industry to review existing skills programmes, identify improvements, and tackle barriers that currently prevent uptake. This should help to drive up completion of skills training, pay and productivity in all areas of the UK to support levelling up.[8]'*

However, this focuses on only one part of a complex education ecosystem, specifically the training and skills of those already working in the industry. To tackle this, the government has established The Institute of Agriculture and Horticulture[9] (TIAH), which is useful as far as it goes – but there are two limitations. The first is that while the initial scope of TIAH is to cover improving the skills of pre-farm-gate agriculture and horticulture workers, it is also described as the 'professional body' for agriculture and horticulture. While TIAH clearly has the potential to play an important role, there is an inherent risk in designating it as the sector's only professional body (by implication the equivalent of the Institution of Chartered Engineers or the Royal Institute of Chartered Surveyors). While implying that agriculture is a profession, it does not fully embrace the requirement for higher-level education implicit in comparable professions.

The second limitation is that by aligning the workforce proposals in the Government Food Strategy to the framework of the Further Education (FE) Skills White Paper[10], the government perpetuates the idea of employees in the agricultural industries being manual workers who need instruction on how best to practically employ the tools of their trade. This risks exacerbating the low demand for university courses in agriculture and related subjects, compared to significant growth in demand to study subjects allied to health. This is despite the UK being home to some of the best universities in the world, making us ideally placed to produce the agriculturally literate population capable of addressing the major strategic challenge of establishing an environmentally beneficial, commercially successful agricultural industry. Unlike the case with equally practical subjects like medicine or engineering, there is limited recognition that agriculture, while often requiring considerable practical skill, also requires significant intellectual involvement; or that Higher Education has a key role to play. Pupils in schools rarely see role models in agriculture and anecdotally teachers tend not to advise careers in agriculture for their brightest pupils.

When it comes to agriculture, there are also problems with the locally defined approach to skills development advocated in the FE Skills White Paper, involving collaboration with Local Enterprise Partnerships (LEPs), college providers and employers. In some regions agriculture will not be a priority for the LEP or local employers; nor may agriculture be a priority for the local education provider because a significant amount of land-based specialist provision is now delivered by large, general FE colleges which have other priorities. The implication from such a localised focus is that recruitment into agriculture will only be facilitated in (usually sparsely populated) agricultural regions.

The idea that the problems of modern agriculture can be solved by providing 'skills training' for current and aspiring agricultural workers is a legacy issue. At the time of the industrial revolution, when agricultural production systems needed to be transformed to feed a growing urban population, agricultural thinking was largely confined to the enlightened gentry who owned the land and in whose interests it was to maximise food production and thereby increase their income. The specialist agricultural college that these gentry established, the Royal Agricultural College[11], (now University) was to train their farm workers; its primary purpose was not to address the science of agriculture. Despite this obvious limitation, the Royal Agricultural College model became a blueprint for other agricultural colleges established across the world. After the Second World War, a network of land-based technical colleges was established in every county to help boost productivity and ensure national food

Table 1. UK Institutions offering undergraduate BSc degree programmes (Level 6) in Agriculture and Horticulture.

Universities	Agriculture BSc	Horticulture BSc
Aberystwyth	X	
Bedford	TU	
Harper Adams (S)	X	
Hartbury (S)	X	
Hertfordshire	X	
Newcastle (RG)	X	
Nottingham (RG)	X	
Nottingham Trent	X	TU
Queens	X	
Reading	X	
Royal Agricultural University (S)	X	
Writtle	X	X
Colleges		
Askham Bryan	X	
Bedford College Group	TU	
Bishop Burton	X	
Coleg Sir Gar	TU	
Cornwall College	X	X
CAFRE	X	TU
Dartington Trust	X	
Duchy College	X	
Hadlow College		TU
Myerscough	X	
Reaseheath	TU	
Scotland's Rural College	X	X
Sparsholt	X	
Somerset, Bridgewater and Taunton	X	
Warwickshire College		TU

CAFRE: College of Agriculture, Food and Rural Enterprise. FYE: Final Year Entry. RG: Russell Group University. S: Specialist Land-Based University. TU: Top Up (for those who have successfully completed a Higher National Diploma (HND) or Foundation Degree and want to study further and progress onto the final year of an honours degree programme).

Source: The author, from https://www.whatuni.com/

security. These colleges were also not established to be centres of high strategic scientific vision, and had little direct involvement in research, but were meant to be purveyors of practical, evidence-based solutions. As such they inevitably played an important role in boosting agricultural productivity in the last century. However, since then not only has agriculture got more complicated, but the colleges have widened the focus of what they teach so that 'land-based education'[12] now includes companion animals, countryside management, etc., with only a relatively small proportion of their students studying agriculture and horticulture.

Many colleges teaching land-based subjects also do not have their own 'degree awarding powers', which means their degree programmes, which are mainly at foundation level, are validated by larger universities. A foundation degree is the academic equivalent of two thirds of a Bachelors degree, at level 5 of the Regulated Qualifications Framework (RQF)[13]. Foundation degree courses normally focus on developing technical skills, while also providing a route for those looking to study a full undergraduate qualification. Validating university partners may have little or no academic expertise in agriculture, since agriculture is a niche subject at university level. Of the 24 Russell Group[14] universities, only three offer undergraduate degree programmes in the subject (Table 1).

Horticulture degrees (or combined Agriculture and Horticulture degrees) are as rare as hens' teeth, with only two members of the Agricultural Universities Council (AUC)[15] teaching this subject. The small proportion of research funding spent on horticulture (as opposed to agriculture) reflects a potentially catastrophic lack of academic expertise in this area. This inevitably reflects a policy framework that encouraged reliance on imports (~70% of our fresh fruit and vegetables). The recent lack of availability of horticulture products should be a stark reminder of the need for a radical overhaul of our food supply system and review of the academic ecosystem that supports it. If government policy is to be enacted to '*enable growth in key sectors, including horticulture and seafood, making the most of post-Brexit opportunities*'[9], now is the time for some joined-up thinking.

This disregard for the agricultural sciences in the latter part of the last century by the academic establishment, in favour of more fundamental sciences, may well be causally related to our decades-long lag in agricultural productivity (and literacy), behind those of our international competitors. There is no 'ideal' metric for measuring productivity, but one that is widely used is Total Factor Productivity (TFP)[16], which measures how efficiently agriculture and horticulture convert all inputs to outputs. TFP in the UK has only grown by 18% since 1991, compared to TFP growth in the Netherlands of 52% and in France of 82%[17]. Another inevitable consequence of the refocusing of agriculture research towards discovery science is that farmers, industry groups and other stakeholders now quite understandably have frustrations about the impact of publicly funded research in the UK.

The lack of productivity has also been compounded by a fragmented system for 'knowledge transfer' (in this context this is the sharing and disseminating of knowledge generated from scientific research to farmers and producers), as highlighted in a recently published report from Harper Adams University.[18] To address this, the government plans to develop a '*What Works Centre to provide farmers with evidence that supports the adoption and on-farm take up of new innovations*'[19]. However, the success and credibility of this centre will depend on an accepted scientific evidence base, and this needs to be established through the usual processes of science involving universities, agri-tech centres and research institutes. This evidence base would be the equivalent of a set of NICE guidelines[20] for agriculture.

Finally, as in other industries, education at all levels should be able to address the major cultural, technical and economic issues that we face in the agriculture sector. This will require a new attitude to agriculture in all its forms and involve a joined-up, systems-based approach across government departments, universities, colleges and schools involving engagement with the public as well those who produce our food.

So what is needed to elevate agriculture from being perceived as a series of practical skills to a set of evidenced-based sciences requiring research and scholarship at the highest level? Why is it assumed that engineering and medicine require a hierarchy of organisations ensuring educational and professional standards while agriculture does not? Is it not self-evident that national excellence in medicine and engineering actually benefits from such recognition and regulation in ways that agriculture could do also? Perhaps agriculture could benefit from raising its intellectual sights?

Before considering potential solutions, it is worth looking more closely at the various reasons why UK agricultural education is currently in a precarious and unsatisfactory situation.

Time to reverse a history of decline

As already noted, from the time of the industrial revolution, the UK was recognised as a global leader in agricultural and veterinary research, innovation and education. However, although a number of leading UK universities had thriving departments of agriculture, this subject never became embedded in the natural portfolio of a 'complete' university in the same way as other essentially practical subjects such as medicine, veterinary medicine and engineering. To address this acknowledged deficiency, in the last century the UK established a network of outstanding agricultural 'research institutes' focusing on research of direct relevance to the food and farming industries, nationally and globally. In 1981 the Agriculture and Food Research Council (AFRC) oversaw and financed 30 research institutes and 12 research units, although its funding had been gradually declining. By 1985 the AFRC was described in a news article in the journal *Nature* as 'the least favoured of the British research councils' and faced yet more devastating budget cuts[21] .

The reason for this shift was that the political context had changed; once the country moved beyond the immediate shadow of the Second World War, UK food production ceased to be an issue of significant public or political debate. Either it 'just happened' or, if it didn't, it could be replaced by imports that were often cheaper and more diverse than foods produced domestically. Being part of the European Union (EU) further encouraged a disengaged approach to agricultural production because our farmers operated within a European policy framework. In 2002 the Ministry of Agriculture, Fisheries and Food (MAFF)[22] was dissolved and merged into the Department for Environment, Food and Rural Affairs (Defra). This 'diluted' the government's focus on agriculture, and until Brexit the influence, capacity and capability of Defra as a government department diminished.

Since agriculture was no longer perceived as essential for national prosperity, funding for agricultural research and teaching was reduced. Universities have a well-developed instinct for funding opportunities and these were more easily available in basic science than agriculture. A focus on scientific quality rather than practical impact was encouraged by previous iterations of what is now the Research Excellence Framework[23] exercise. Applied agricultural research has not featured significantly in 'high impact' science journals because they have traditionally focused on subjects of more general scientific interest - the fundamental biosciences or human health. Agricultural research therefore was not a subject to achieve either status or funding for those universities that produced it.

Far from compensating for the universities' lack of focus on agriculture, by the end of the last century, the number of agriculturally relevant research institutes in the UK was reduced as a matter of policy, presumably to save money. Fortunately the Biotechnology and Biological Sciences Research Council (BBSRC)[24], now the main funder of UK agricultural research, took a long-term approach and has been instrumental in continuing to invest in remaining research institutes as a strategic national resource (all but one of the eight research institutes funded by the BBSRC conduct agriculture and food-related research). Clearly, the main focus of these BBSRC institutes is research, not education, even though they have links to universities, so they contribute little to attracting those of school-leaving age into agriculture. And because few of the institutes have links to the land-based colleges, they are unlikely to attract as research students the colleges' graduates, who have vital sector knowledge. The contribution of some of the institutes to industrial productivity is also not easy to quantify.

This context of the changing agriculture-research environment is relevant to any discussion about agricultural education, because traditionally success in the UK higher education system has been built on a close relationship between research and teaching. A thriving research environment supports and informs teaching and attracts and inspires the next generation of pioneers, thinkers and innovators. Few would contest that there was limited or no growth in academic capacity in agriculture-related disciplines during the decades at the end of the last century, although research funding for agri-food has significantly increased since the last Research Excellence Framework exercise in 2014. The trajectory looks set to increase as the need to address the contribution of agriculture to Net Zero becomes more urgent.

In 2016, the major political upheaval of Brexit shifted the spotlight back to UK food production, and Michael Gove was put in charge of Defra. In August 2018, Greta Thunberg missed school to protest about climate change, the same year that Defra published the *Health and Harmony paper*[25] setting out its vision for food, farming and the environment. The contribution of agricultural systems to climate change and biodiversity loss moved from being a debate for a narrow group of academics, NGOs and specialist policy advisors to one of significant public and political interest.

In the *Health and Harmony* paper Gove painted a picture of the future that involved support for sustainable farming within the framework of 'public money for public goods'. The direction of travel was

clear: the primary focus of government support for land use would be environmental enhancement rather than food production. *'The principal public good to be invested in is of course environmental enhancement,'* the report said. Gove recognised that the agricultural transition would require a skilled workforce: *'I believe we should also invest in technology and skills alongside infrastructure, public access and rural resilience.'* However, while the government has taken on board the need to address the skills gap he identified (although the problem remains unsolved), a key point that Gove had made in an earlier speech has been overlooked - namely that *'we have an opportunity, outside the EU, to design potentially more effective, more rigorous and more responsive institutions ... [and] if we take these opportunities to create these new institutions, we cannot just help protect our precious environmental assets, we can also create an economic asset for the country*[26]*.'*

Few in the Higher Education sector supported the decision to leave the EU, but those working in agriculture-related disciplines were cautiously optimistic that when Michael Gove mentioned the potential contribution of institutions his thinking was to build capacity in agricultural research and innovation in universities. This, alongside the increased public awareness of agriculture and food systems, would potentially attract more students.

However, in order to provide the increased number of gifted students studying agriculture in ways necessary to meet society's needs, there needs to be a major shift in the way that agriculture is perceived as a subject. Perceptions remain outdated, conjuring up images of muddy fields, cold cowsheds, wet cows, and unskilled, poorly paid jobs. Many students on agriculture courses recount how their schools and families tried to discourage them from taking this career path, and how their peers in multi-faculty institutions see them as 'outsiders' beyond the recognised academic fold. Agriculture, the subject on which civilisation depends, has in the view of our society become a low-status, second-rate subject characterised as high in physical labour and low on intellectual and financial reward.

A national strategy as a first step

Nick Hillman, director of the Higher Education Policy Institute, reflected at the time of the late Queen's death[27] that in 1952, the year she ascended to the throne, the Education Year Book called for universities to work more closely with technical colleges. Sixty-nine years later the FE Skills White Paper11 called for 'collaboration not competition between FE and HE'. What better moment than the present, at a time of national reflection and reinvention, with a new monarch and new prime minister, for those responsible to work together with government to develop a long-term strategy for education and training in sustainable agriculture that will ensure that the UK produces sufficient food in a sustainable way?

This education strategy should not be developed in isolation, but should be aligned with strategies for research, innovation and knowledge exchange in sustainable agriculture. The result could be a coherent suite of policies for agricultural education and research that drives productivity and creates value for society, while providing the evidence base for policy-makers to determine what works and what does not.

Development of an Integrated Agriculture Strategy would require all relevant government departments (principally the departments for Science, Energy and Technology, and the Department for Education as well as Defra) to come together (perhaps by forming a Commission?). It would also require different ways of working between educators and researchers and between academia and industry.

In the UK, research is overseen by a public body, UK Research and Innovation (UKRI). Its new strategy[28] specifies 'connectivity' as one of the four 'shifts' required for building an outstanding *research and innovation* system. The same principle should apply to building an outstanding *education* system and joining the two together. The Integrated Agriculture Strategy should therefore be seen as complementary with the Government Food Strategy and aligned with strategies for research developed by the funders, BBSRC specifically. Its focus needs to be on agriculture, horticulture and the wider food system, not 'land-based education'[29], which encompasses a far broader range of subjects. It is not that these subjects are unimportant, simply that the need for an immediate focus on agriculture and horticulture is more pressing.

The recommendations proposed below should be considered as part of the strategic planning process.

Agriculture should be classified as a STEM subject

If society wishes to attract the best and most innovative young brains into agriculture it has to reverse the perception that agriculture is for outdoor enthusiasts with low academic aspirations and little

commercial ambition. As a recent survey by TIAH[30] has shown, it is vital to change young people's perceptions of agriculture and horticulture if they are to pursue careers in the industry directly and as its educators and researchers.

The classification of some subjects (science, technology, engineering and mathematics) as STEM[31] was designed to distinguish them as subjects that provide the critical knowledge base for a successful modern society. It is a distinction recognised by governments around the world and it carries with it not only status but funding implications for the organisations that provide education in these areas. In the UK significant resources are directed towards improving and supporting STEM provision in schools, colleges and universities. These range from new facilities to teacher development initiatives. STEM subjects are part of a 'club' understood by parents, pupils, employers and the wider public as being 'proper' academic subjects. Consequently the number of students studying STEM subjects is increasing.

The study of agricultural sciences, food and natural resources involves biology, chemistry, ecology, genetics, engineering, physics, geology/hydrology, economics and other disciplines. The complex and changing nature of food production will require more and more emphasis on technological innovation (agri-tech) and far greater reliance on science and an evidence base to transform production systems, including nature-based systems. Any rational consideration of which subjects to include in STEM would include agriculture. That agriculture should not be considered a STEM subject says more about the lack of penetration into policy-making committees by agricultural scientists than it does about the rightful place of agriculture as STEM subject. It also may reflect a reluctance to make a special case for agriculture and horticulture, in case this argument puts other subjects defined as 'land-based' (e.g., animal care or equine science) at risk of a funding reduction.

To govern is to choose. Formal recognition by government that agriculture and horticulture are included within the STEM family would start to address the problem of poor status, poor funding and inadequate recruitment and help direct ambitious students towards working on sustainable agricultural systems.

In short, that agriculture and horticulture should be recognised as STEM subjects is a 'no-brainer' and it is difficult to understand why the government does not accept that recognising this could be transformational.

Agriculture degrees should be funded at a higher level

One of the challenges facing colleges and universities offering agriculture, horticulture and land management teaching programmes is that they are expensive to operate, requiring land, animals, laboratories and related facilities to support the delivery of practical skills training. In universities, these facilities are also important research resources for students, staff and industry.

The pressing requirement for students to gain proficiency in technology and data management places extra demands on providers. Drones and the hardware and software for handling big data are expensive capital investments. It is also a struggle to manage farms in education environments commercially, and for colleges to be eligible for the FE Specialist Funding Allowance (an additional payment from the Education Skills Funding Agency, ESFA)[32] it is a requirement to run *'credible land-based enterprises, operated to industry standards through 365 days per year, needing cover for 24 hours per day'.*

One of the other main challenges facing FE Colleges is a serious shortage of teaching staff with the appropriate expertise to teach emerging themes and technologies (e.g., agri-tech, net zero and sustainability). Non-competitive salaries here are a major factor. It is also important that staff are provided with relevant Continuous Professional Development (CPD) support, because the industry is changing so rapidly.

It is hardly surprising that with expensive facilities, relatively low student demand and the difficulties of staff recruitment and retention, many specialist land-based colleges have been forced to close (only 11 remain independent). Those that have been incorporated into larger, general FE Colleges have to compete with less expensive subjects and thus risk being off-loaded. Newton Rigg[33], a small specialist college that specialised in upland farming systems was the latest such casualty in 2021, when its campus was sold by Askham Bryan College.

Recruitment and retention of agriculturally literate academics, particularly at a senior level, is also a major problem for universities. Ongoing uncertainty around the UK's involvement in the EU Horizon programme, a significant source of agricultural research income for universities, is another significant risk, because of post-Brexit trade negotiations. This uncertainty is a major disincentive when it comes to attracting and retaining talented individuals in the agricultural sciences. Postgraduate students are traditionally the primary source of academic staff and provide industry and

government with higher-level skills. The recent REF[34] exercise has highlighted that doctoral training is less supported in agriculture than in biomedical and food sciences. Also of concern is the recognition that some of the smaller specialist institutions, whose research is more 'applied', are not involved in postdoctoral training partnerships.

The Government Food Strategy[9] sets out the government's intention to commission an independent review to *'assess and ensure the quantity and quality of the food sector workforce*'. Let us hope that the review's terms of reference include an analysis of the workforce in Higher and Further Education and research institutions, and recommend effective partnership working with sectoral bodies such as Landex[35] (the Land Based Colleges and Universities Aspiring to Excellence alliance) and the Agricultural Universities Council. The last review of land-based education, in 2020, commissioned by Gavin Williamson when he was Education Secretary, never saw the light of day, and as far as this author is aware never included significant consultation with universities.

One way to address the universally recognised knowledge/skills shortage and highlight the crucial importance of the agri-food sector would be to supplement the standard subject funding for agriculture and related degree programmes. This would encourage HE providers to recognise the value of agriculture, both as a taught subject and a research priority, and to invest in talent and infrastructure.

Funding for teaching and related activities primarily comes through students' course fees, with courses categorised into six price groups by the Office for Students (OfS), the independent regulator of HE in England. Agriculture falls into price group B and thus is eligible for high-cost subject funding. However, an even higher level of funding is available for very high-cost STEM subjects (chemistry, physics, chemical engineering, and mineral, metallurgy and materials engineering)[36]. This allocation is provided because not only are these courses costly to deliver, but the funding helps providers to maintain activity in subjects that have been vulnerable because of low student demand. Any analysis of student recruitment to the higher levels of the agricultural sciences would conclude that they qualify for inclusion in this definition and would benefit from the same remedy. At the end of September 2022, only two universities that teach agriculture did not have to enter the clearing system to fill the places they were offering (i.e., they were having to actively attract and recruit otherwise uncommitted students, rather than selecting from an excess of applicants for these subjects).

Implementation of such a preferential funding scheme could require HE providers to demonstrate that they met a set of criteria, defined and assessed by an independent panel, in the same way that World Class Specialist Status is awarded to a select group of institutions by the OfS[37]. One of the main criteria, in addition to a minimum number of students recruited (e.g., 30 annually), would be an ability to demonstrate effective and meaningful collaboration between FE colleges and universities, with industry, UKRI-funded research institutes and their associated Research and Innovation Campuses[38] (e.g., Rothamsted Enterprises and AberInnovation). This would facilitate sharing of expertise, particularly in niche subjects, enhance research-informed HE teaching in colleges, facilitate knowledge exchange, and enable facilities and equipment to be shared, improving value for money.

Finally, there needs to be a mechanism for providing oversight of what is taught and the level at which it is studied. This brings me to the title of this paper.

Why we need a National Academy for Sustainable Agriculture

Institutional autonomy lies at the heart of our university system, which means that institutions are responsible for what subjects they choose to teach, their curriculum design and their method of delivery. Although no longer the designated quality body for England, the Quality Assurance Agency (QAA) published a set of benchmark statements for agriculture and horticulture[39] to support the mandatory part of the UK Quality Code for Higher Education. In reality, the expertise of staff and institutional strategy have a significant impact on the balance and relevance of what each university teaches. It is no use an enlightened university hierarchy deciding to teach astrophysics if they have no staff who understand the subject at the level necessary. Institutions often recruit the staff that they can get on the basis of talent (and thus ability to do research, attract resources and stimulate young minds) rather than subject fit. Once appointed, these staff in turn select the curriculum they wish to teach (or are capable of teaching), choose the external experts who validate their degree programmes, and then choose the external examiners for their degree exams. Without input from professional bodies, this system is better at ensuring academic quality than industrial or professional relevance.

In the absence of oversight from an accrediting professional body, curricula may well concentrate on what has been taught historically and/or what interests the educators, rather than what is immediately useful or necessary for a professional workforce. While some

universities may engage industry advisory boards or the equivalent to ensure relevance, without a professional body in agriculture, industry involvement in curriculum design can be very patchy. The challenge for individual institutions is that agriculture includes diverse sectors and is dominated by small businesses from whom it can be difficult to obtain a consensus on degree requirements. Care must also be taken to ensure that industry preferences do not become a 'check-list' of competencies for a work environment increasingly dominated by bureaucratic compliance.

So how best to ensure that the country is supplied with sufficient numbers of agriculture and horticulture graduates equipped appropriately for the major intellectual and practical problems that we face? If STEM status and enhanced funding, backed up by active recruitment, might attract higher numbers of school leavers, how can we make sure that important emerging topics like regenerative agriculture, agroecology, agri-environmental economics and agri-technology are within the curriculum when they get there – and that these curricula are balanced with 'real farm' experience and business skills education? One solution would be to accredit degree programmes in the same way as in other professions; for example, to practice as a veterinary surgeon it is necessary to have a degree recognised by the Royal College of Veterinary Surgeons[40]. Similarly the Royal Institute of Chartered Surveyors (RICS)[41] accredits degrees in rural rand management.

If the status of sustainable agriculture is to be raised (and with it its attractiveness to students and credibility with policymakers), then an organisation needs to be established (which could be affiliated to TIAH), that regulates the higher as well as the lower reaches of the agricultural professions. This organisation would be responsible for accrediting degrees, but its reach should extend much further than that.

Given that we have a new king with a passion for rural life and sustainable agriculture, what better time to establish a locus for agricultural thought leadership, similar to the first Royal Society established in the time of Charles II? Such a locus could be a National Academy for Sustainable Agriculture, to sit alongside the four existing UK National Academies: the Royal Society[42], the Academy of Medical Sciences[43], the British Academy[44] and the Royal Academy of Engineering[45]. The core mission would be to promote excellence in the agricultural sciences and their application for the benefit of people and the planet. Its community of members and fellows from across academia, industry and government would provide constructive challenge, disruptive thinking and senior strategic leadership for industry, policy makers and research funders. Alongside a role in thought leadership and advocacy, the new Academy would, like many other professional associations, have a practical role in accrediting degree in agriculture and related subjects. Its role would help lift the sights of those engaged in agriculture from practical skills and competencies (no matter how important they are), and to encourage our best students to enter a thought-based career in a sphere that does not require the ownership of either a tractor or the land to drive it on. Perhaps now is the time for a major university to mark the coronation by establishing a Regius Professor[46] in Sustainable Agriculture? It is remarkable that no such chair already exists. It could almost be said that the absence of such a chair in any of our major universities is a disgrace!

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Jo Price is Emeritus Professor at the Royal Agricultural University (RAU), having served as Vice-Chancellor until 2021, the first woman to lead the specialist land-based institution since its foundation 176 years ago.

She joined the RAU from the University of Bristol where she was Head of the Veterinary School. After qualifying, she spent a number of years working in veterinary practice before returning to academia. She is a Council Member of the Biotechnology and Biological Sciences Research Council (BBSRC); Member of Council of the Dyson Institute for Engineering and Technology; Chair of the Board of the University College of Osteopathy; Trustee of the Royal Agricultural Society of England and Director of Food and Farming Futures.

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