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What is a university/college farm for?

Written by:

James Standen NSch

July 2025

A NUFFIELD FARMING SCHOLARSHIPS REPORT

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A NUFFIELD FARMING SCHOLARSHIPS REPORT (UK)

NUFFIELD Farming Scholarships

Date of report: July 2025

"Leading positive change in agriculture. Inspiring passion and potential in people."

Title	Achieving excellence in University and College Farms. Implementing best practice from home and abroad. *What is a university/college farm for?*
Scholar	James Standen
Sponsor	The John Oldacre Foundation
Objectives of Study Tour	To identify best practice in operating a University/College farm, what works, what problems do they share. And to further identify how they operate in the wider agricultural sector and what opportunities are available for assisting the UK's productivity drive.
Countries Visited	United States of America, Republic of Ireland, Germany, New Zealand, United Kingdom
Messages	1. University/college farms are important facilities not only for the institution they belong to but the wider industry. 2. University/college farms should be managed in-hand and be open and transparent with management information. 3. Good governance structures and management systems are essential for their success. 4. University farms should be the backbone of an innovation network across the UK. Acting as hubs, which should then link to other demonstration farms to speed the uptake of new innovations and technology. 5. Knowledge exchange and extension should be built into the services University and College Farms provide. 6. Central funding should be directed towards existing university/college and research farms, where it can be leveraged to assist farmer uptake and also train the next generation.

EXECUTIVE SUMMARY

University and college farms are indispensable to the UK's agricultural teaching and research landscape. They serve as platforms for educating the next generation, facilitating research and promoting innovation in farming practices. These farms not only provide students with hands-on experience, equipping them with the skills needed in the future, but also offer an opportunity to produce insights into sustainable and efficient farming systems. The loss of agricultural colleges and the closure of experimental farms not only highlights the importance of protecting the farms that we still have, but also shows the opportunity that they offer to help the broader sector both now and in the future.

University/college farms have similar challenges with perhaps the most fundamental being to answer the question, 'what is a university/college farm for?' Different institutions have different answers to this question depending on whether their focus is education or research, or a combination of the two. But all face the challenge of financial sustainability and how to balance the commercial realities of operating a farm while trying to deliver quality education and research.

There is no right or wrong answer to the above question but there are a number of consistent themes of best practice that successful universities and colleges with farms demonstrate. Some are familiar to every farming business including having a strategic plan, monitoring performance, being adaptive to change and good governance/management. But others such as having a strong advocate for the farm may be unfamiliar to those outside education establishments.

Demonstrating the importance of the farms within a university or college is important, particularly where they aren't the main focus of an institution. A strong advocate for the farm is essential: someone senior who can secure support, finance and recognition that are, in some cases beyond the reach of the farm manager. The farm's identity inside and outside the institution is a key factor; reputations count and having the right systems, plans and people in place is vital. However, staff retention can be a problem, particularly where internal procedures are overly bureaucratic or conflict with or try to replicate good farming practices and systems that are already in place.

One of the most important factors in the success of university/college farms is their ability to provide a facility to deliver teaching and research. That might be in terms of farming systems, equipment, or staffing and its importance cannot be overstated: creating the right environment within the farm for the wider institution to utilise is the foundation of a successful farm. Universities/colleges with farms also provide an excellent opportunity to link researchers with farmers and industry and offer an opportunity to disseminate research findings. In some countries this link is built into policy and funded but, in the UK, it is driven by project or person.

Given the similar issues university/college farms face and the ability they have to help UK agriculture face its future challenges, there is an opportunity for greater collaboration and some strategic capacity building in the sector. This should, perhaps, be part of wider co-ordination in the UK research/demonstration farm environment and link in with government policy and funding.

The long-term success of university/college farms will translate into good education, good research and a positive impact on farming. A combination of the efforts of institutions, supported by clear thinking and backing from the wider industry and government, will all be part of delivering excellence.

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CHAPTER 1: INTRODUCTION



Figure 1: James Standen, the author. Photo: author's own.

I am the Farms Director for Newcastle University and a partner in a 300 acre tenanted farm in North Yorkshire. I am chair of the AHDB Cereals & Oilseeds Sector Council and I am an AHDB Board Member. Previously I was the North East Regional Nominee for the NFU Combinable Crops Board and a member of the AHDB Cereals and Oilseeds Council also chairing their Research Committee.

I grew up in Sussex, spending as much time as possible with my grandfather, who managed a mixed farm and, after retiring, worked as a lookerer. That is where my ambition to become a farmer started. After leaving school I went to Wye College where I graduated with a degree in Agriculture and then remained another year to complete an MSc in Agricultural Economics.

I then joined ADAS as a Farm Business Consultant, providing advice and farm management services to a range of clients. In 2009, my largest client asked me to go full time, and I became the Farm & Estate Manager for The Montreal Estate.

In 2017, my wife and I fulfilled a lifelong ambition by taking on a 300-acre tenancy in North Yorkshire and becoming farmers in our own right. The farm is a mixed farm with a holiday cottage and fishing lakes.

In the same year I was offered the role as Farms Director of Newcastle University. I now manage the farms and facilitate the teaching and research that goes on across the units. Having taken on the challenge of reinvigorating the farms, I could not have asked for a better-timed opportunity than the Nuffield Scholarship.

CHAPTER 2: BACKGROUND TO MY STUDY SUBJECT

Before becoming Farms Director at Newcastle University, I had been involved with two rural colleges with farms as a governor and had assisted another college farm in a turnaround role. All faced similar challenges: investment, profitability and, most importantly, how best to support teaching and research. After joining Newcastle University, it became clear that, alongside the commercial challenges faced by every farm, a university or college farm must provide services and resources that other farms do not. It must also operate within an organisation that is often not designed to manage a farming business and may impose systems and procedures that frustrate or impede normal operations.

The study came at exactly the right time. Having taken up the position at Newcastle University, I had effectively been given a blank sheet of paper with which to restructure and develop the farm. An opportunity to identify best practice and put it into effect immediately on the ground seemed an ideal measure of the success of a Nuffield Scholarship.

I also wanted to explore the wider role university and college farms could play beyond teaching and research, such as extension, filling the role of the old experimental farms, promoting technology and also how collaboration around facilities and resources could better assist the development of UK agriculture.

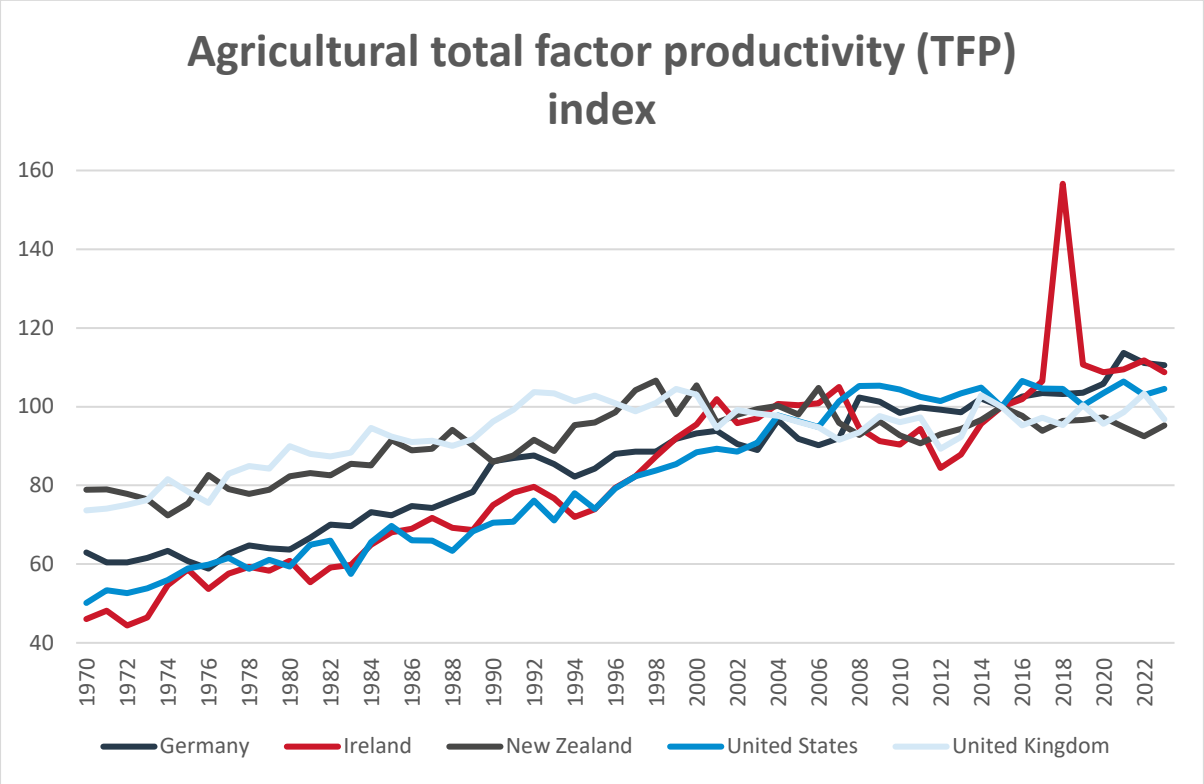

Figure 2: Total factor productivity (TFP Index) of selected countries. Source: US Department of Agriculture (USDA) Economic Research Service. Selected data from https://www.ers.usda.gov/data-products/international-agricultural-productivity

UK agricultural productivity has grown more slowly in recent decades than that of several comparable countries (Figure 2). I hypothesised that part of the reason lay in the loss of extension services and the dispersal and sale of the UK's network of experimental farms, alongside a broader lack of recognition of the importance of agricultural research. A number of studies have proposed explanations for the decline, including cuts to research and development spending and a lack of investment. Some have also speculated about the impact of the loss of extension services. It is also worth noting that a number of these studies suggested that changes in farm size may have additionally contributed to productivity declines, further acknowledging there was a big range between farms. In any case, if you consider those countries with higher productivity gains they, on the face of it, seem to invest more in R&D and extension and are driven by policy direction from government.

Experimental and research farms can be a key driver in the adoption of technology and shifting farm practices, regardless of where they are in the world. Here in the UK the adoption of technology is seen as a real challenge in many sectors, but especially in agriculture, where Innovate UK recognise the slow adoption of innovation as a significant barrier to agritech uptake (https://iuk-

business-connect.org.uk/news/accelerating-agritech-adoption-in-the-uk/). Their report highlights that both training and communication are important measures to overcome adoption barriers. However, extension, demonstration and applied research are not among the measures that Innovate UK propose to overcome adoption issues.

Government policy does not reference support for university and college farms, though it does recognise the importance of agricultural universities and colleges. This is also supported by a Research Strategy published by the Agricultural Universities Council (AUC, 2023) that recognises the value of research capabilities across UK higher education institutions. It goes on to confirm that research farms are essential infrastructure allowing long term experiments and studies that are higher risk or require intensive monitoring. The report sensibly notes that the value of these farms relies on ongoing investment; however, as the study also states, much of this investment has historically been project focused. Only 5% of the total spend on projects is typically used to expand or enhance these research farms, which is perhaps why the report concludes that some of the farms considered are degraded and at risk of closure. The report's findings mirrored my own thinking, in that while it found 'ample evidence of knowledge exchange', it also suggested a fragmented, chaotic and confusing patchwork of initiatives that are crowding the area.

Whilst I agree with many of the findings of the report, I perhaps thought there were alternative solutions to the issues. With this as background I hoped my Nuffield study would help deliver the following in the context of my understanding of research farms:

1. Recognising good practice in systems and management
2. Sharing problems and solutions to challenges
3. Identifying opportunities to deliver additional services to assist farmers
4. Exploring any collaboration or partnerships
5. Showcasing best practice

CHAPTER 3: MY STUDY TOUR

My study tour focused on countries facing challenges similar to those in the UK but whose agricultural sectors were performing more strongly in terms of productivity and output. In addition to the destinations listed below, I conducted a number of online and in-person meetings, particularly during the COVID-19 pandemic, with various organisations and also hosted visits at Newcastle University.

Destination	**Reasons for Visit**
UK	I wanted to explore common themes and issues that UK Institutions had, investigating what solutions had been found, and explore best practice and any potential for collaboration.
Ireland & Northern Ireland	Ireland has a co-ordinated approach to teaching, research and extension through Teagasc, and I wanted to see how this worked in practice. I also wanted to explore how Universities fed into this approach and how any links operated between the FE and HE institutions. It was also useful to see how Northern Ireland differed in their approach to operating research farms.
California, Iowa USA	The USA has great facilities and a research and extension programme closely aligned to universities, all backed up through the Land Grant. Their productivity is higher than the UK's and I wanted to explore how Universities and Colleges operated and used funding to further education and research. I wanted to understand how funding was distributed, how programmes were delivered and how policy translated into practical action.
Germany	This visit provided an opportunity to see how a commercial company worked in partnership with universities and research farms through both site visits and online discussions.
New Zealand	I was very interested to see how Universities linked with industry, government and levy bodies to promote activities. There are also a number of independent farms in New Zealand conducting research funded by government and levies, including projects involving farmers as contributors to the work. I wanted to see the scope of operation of these farms and how they fitted into the system. I also wanted to explore how the university system operated within a different agricultural support framework and alongside other industry organisations.
Online	Various online meetings with key people relevant to the study.

CHAPTER 4: THE STUDY

Overview

In the UK, there are a number of universities and colleges that have farms. Those universities with farms normally have a linked agricultural education programme, e.g. Newcastle, Nottingham and Reading, although there are one or two that have farms, but use them primarily for research or allied subject teaching, such as Leeds and Lincoln. These farms vary in size and scale but are normally mixed with perhaps a focus on one enterprise or another.

Colleges with land-based teaching programmes such as Askham Bryan College, Myerscough College, and Bishop Burton College, also have farms. These farms are normally mixed and used more for vocational training where students gain practical skills in farming.

Both university and college farms play a critical role in agricultural education, research and knowledge exchange. These farms are integral to higher and further education institutions, providing facilities for students and researchers.

In addition to university and college-owned and operated farms, the UK is home to a number of dedicated research farms and units operated by independent research institutions, often backed with some government funding. These include organisations like Rothamsted Research, the James Hutton Institute, and the National Institute of Agricultural Botany (NIAB). These organisations conduct research with student involvement normally limited to PhD student projects and typically linked to an education institution.

Many of these education and research institutions host long term trials, several of which have been running for over 100 years.

Demonstration farms are another component of the UK's agricultural research and extension landscape. These farms are used to showcase innovative techniques and technologies. They are normally commercial farms linked to an organisation such as the AHDB, LEAF or UK AgriTech Centres.

You can date the history of agricultural colleges and their associated farms back to the 19th century. Their formation was rooted in the national need to improve farming efficiency and rural education. As the Industrial Revolution transformed urban Britain, agricultural productivity became a concern, prompting the government and other benefactors to invest in agricultural education. The growth of these colleges was driven by agricultural depression in the late 19th century, followed by food security concerns during the two world wars, when the government recognised the strategic importance of domestic food production. As a result, many county councils in the UK funded agricultural colleges.

The institutions flourished in the post war decades; however, from the late 1980s the number began to decline. Several factors contributed to this which included declining rural populations, changing educational priorities, policy shifts and financial pressures. In addition, reforms to further and higher education sectors centralised funding and encouraged market competition, which ended up being at the expense of local agricultural colleges. There were a number of mergers, or even closures, of colleges, with others having to sell farms or parts of their farms, and many needing to close enterprises, in a push for financial viability.

Alongside the changes seen in the college/university farm sector, the UK's experimental farms also suffered during this period. Post-war these farms would take research and implement it on farm helping the industry move practices forward. However, from the 1980s the shift in policy towards short term research and market-led science meant that the longer-term trials and farm practice research delivered by experimental farms became harder to justify, and so these farms were sold or outsourced to other providers.

During my travels I visited institutions that both taught and conducted research or specialised in one or the other. Fundamentally all the people I spoke to at these places valued having a farm available. It should be noted that institutions that undertake teaching and research in agriculture nearly always have a farm for those activities. It is very rare for an institution to conduct 'on farm' research without a farm, or at least access to a farm.

I visited a range of university, college and research farms. There were clear differences between higher and further education institution farms and those only conducting research. However, fundamentally all seemed to share many similar issues, challenges and concerns. This was reassuring, as it confirmed that it wasn't just me at Newcastle that was experiencing challenges. Nevertheless, it was also frustrating to see that the same issues were apparent at other institutions. That said, many had found solutions and workarounds to these issues that made for valuable learnings.

Common issues that came up repeatedly were:

- Financial
  Most places I visited, whether involved in teaching, research or both, were (or had been) under pressure financially. There were a number of reasons for this and different views on profitability which will be discussed later.

- Capital/Infrastructure
  In most places the repair of infrastructure and building of new facilities would sit within the remit of the 'Estates' department at each institution, normally an approach decided at Executive Board level. However, nearly all farming staff were frustrated with this, given that most of the Estates Departments were not familiar with agriculture or farming and tended to use high-cost contractors.

- Policies and Procedures
  Most farms are part of larger institutions and so must comply with policies and procedures designed for that organisation rather than a farm or agricultural business.

- Procurement
  Although the rules and procedures have changed since BREXIT, where all universities and colleges would have had to follow EU procurement rules. They now generally follow the UK Procurement Act. The requirements often lead to drawn out procurement procedures and higher costs due to the regulations in place.

- Investment
  Investment is a challenge, and it was apparent across the sites visited that the farms could drop down the priority list, particularly given demands from other parts of their parent institutions. Ongoing investment, as might occur on commercial farms, does not normally happen and is 'lumpier' and more inconsistent.

4.1 What is a university/college farm for?

I set out on my journey asking questions about best practice, systems and activities, but perhaps just as importantly to ask what a university/college farm is for.



Figure 3: Karen Ross, Secretary of the California Department of Food and Agriculture, pictured with the author. Photo: Author's own.

Karen Ross (Secretary of the California Department of Food and Agriculture) was very clear that where the farm is attached to the university/college it should be used for teaching, whereas experimental farms should be used for research. However, things are never quite that clear-cut when most institutions in the UK only have one farm which has to provide teaching and research services, unlike universities in the USA where they might have multiple farms. Nevertheless, it was clear that university/college farms should and do play a vital role in education and research.

It was also clear that there wasn't a simple 'one answer fits all', but a universal truth that emerged from my travels was that those institutions that did not know what the farms were 'for' weren't performing as they should be. Regardless of whether this was poor financial performance or a lack of teaching/research activity, the outcome always seemed the same – this being for the institution to then ask, 'why do we have a farm?' or 'do we need a farm?'

It was even more frustrating for the people in those institutions that felt they had answered the question and knew what they were doing. These people still spoke about individuals who kept asking the question and it was clear that this was a source of annoyance. It's not always easy managing a farm within a much larger institution and some of those challenges will be discussed later.

Having completed my travels, I concluded that a university or college farm is first a facility for teaching and research, second a bridge between research and farmers, and only third a commercial business. It should be judged in that order.

4.2 The challenges

While every university or college farm is different, the challenges they face are remarkably similar. However, it is worth noting two key challenges here that appear to be particularly common: finances and definition. The financial challenge is particularly relevant at the moment with many institutions in the higher and further education sector trying to cut costs, with the definition challenge relating back to the question 'what is a university/college farm for?'.

In most cases, the first question people ask about a university/college farm is 'does it make money?' not 'how many students use the farm?' or 'what research has it undertaken?' or 'what's its wider value?' While it might be a valid question, it's frustrating because there is probably not a quick answer, especially in light of the second challenge concerning definition. In all my travels it was very clear that university/college farms are not like other farms. They might produce milk, meat or grow crops, but they cannot behave or function in the same way their purely commercial neighbours might. The requirements of teaching, research and the restrictions placed on them being part of a larger organisation mean they cannot function in the same way as other farms. But the reality is they shouldn't; they are part of educational and research institutions and should be questioned and challenged in that regard.

4.3 Exploring university and college farms

Financial

During my travels, I was keen to explore whether the farms I visited were profitable and how they were costed. It was interesting that nearly every university/college had a different idea on how to approach costing and whether their farm made money.

It was interesting that many of the people I spoke to considered that the farm was losing money when they joined the institution. James Lamburn at the University of Reading described how, before he joined, the farm was losing money, much like Alan Still at Massey and George Baikie at SRUC. It would seem a loss-making farm is a key driver in personnel change. Both James and Alan then described how they went on to turn the business around, whereas George

had only been in his role about three weeks and so had only just started this process!

But what is a profit for a university/college farm? Tony Norris at RAU described how there was an educational transfer to the farm of around £70-80k per annum, although he felt this didn't cover all the costs. Everyone I spoke to acknowledged there was an additional cost to hosting students and research. Nevertheless, this was the only direct transfer I uncovered, although other institutions subsidised teaching and research activities in different ways. Dan Sehnert at UC Davis explained that the aim was to break even but that the University covered 65% of staff costs. Discussing this further with Dan, I came away with the impression that the full costs of the farm were not allocated to it and, in reality, the comment was based on net margin break even accounting rather than a full profit and loss basis.

Within the university system particularly, a farm can sit as a resource within the school or as a central service within Estates. The financial return did not seem to differ between the two approaches, but there was a clear preference for farms to sit within schools as a resource rather than within an Estates department. Danny Donaghy, Deputy Head of School at Massey, was pushing hard for the Farms to come under the remit of the School rather than Estates. He felt that there was a lack of accountability for the farms to provide teaching and research services as an Estates resource.

Tony Norris explained that RAU in 2000 employed a Farms Director with the task of making the farm bigger and simpler and the Farms Committee set a target area of 4,000 acres. The aim was to give the farm size and scale to provide a return to the college. This approach continued for about four years, at which point the Governors identified it as a risk, which arose from the view of the Higher Education Funding Council. In short, the farm had moved away from being an educational resource, with the result being a decline in student engagement and a lack of appetite to try new things. In my experience, you tend to see this pattern when a contracting or farming company take over the operations of a university/college farm.

There were some farms that made surpluses. James Lamburn stated that he had returned surpluses since 2009 and Alan Still said that the farms at Massey University returned a surplus now, but most farms made a loss. It is interesting to note that the farms that did return a surplus had size and scale. Massey University milks 840 cows in two herds and Reading has 500 cows. However, as at most university/college farms, the financial data wasn't published and so it was hard to see to what level costs were allocated to assess the performance. It is also interesting to note that the RAU approach of size and scale perhaps went beyond the aim of the institution (teaching and research) and so there is always a balance needed.

The Demonstration Farms visited in New Zealand: Owl Farm, Southern Dairy Hub and Dairy Trust Taranaki, all showed a positive return. However, these weren't teaching farms, or truly research farms. They were taking research and demonstrating it at scale and the financial returns were part of the demonstration.

Perhaps the question of 'should university/college farms make money?' is wrong and should be rephrased as 'can they make money?' The previous approach at RAU of paying £70-80k per annum as a payment for services the farms provide was interesting. Tony thought it reflected some, but not all, of the cost of the farm being part of the university. All the managers of university/college farms I spoke to agreed that there is a cost of providing a facility for teaching and research, which is often not reimbursed.

So, what should be costed? Most institutions were allocating variable costs and outputs to the farm. Labour was costed although sometimes subsidised. Rents and direct costs were in the most part allocated to the farm. However, there was inconsistency in the approach with other costs, including insurance, repairs and capital spend. I could not determine whether the differences had any impact to the overall performance or view of the farm (by their own institution), but any statement of financial profit or loss should always be taken with a pinch of salt. I concluded university/college farms could make money, where they had the right scale and the cost of hosting teaching and research was recognised, but profit should not be their main measure of success.

In terms of financial structure, all of the farms visited sat within their own institution. None of them were set up as separate limited companies or other structures. All were set up as a cost code or profit centre within the organisation. I explored this further at Newcastle University with the Finance Director who asked, "what would the motivation be for the University to continue to invest in another company?"

People, systems and governance

There was a common thread during my studies that most institutions had some form of governance and reporting system in place. The importance and effectiveness of it varied, but it was clear that judging a farm solely on its financial results isn't a good measure; you get a better general feel for how the farm is performing by simply talking to the manager.

Most governance boards were made up of key internal staff, such as the head of school, finance representative and academic/research staff. They also had external members, normally farmers to provide an industry view and a context of how the farm might be performing. It was clear that having a governance board was important to these farms, as was the make-up of its members and support it gave the farm. On one visit, where I felt the farm lacked this support and structure (it would be unfair to name the institution), the manager felt very exposed; morale across the farm was low and staff turnover was high. This was

due to a number of reasons, but it became apparent the internal systems of the university were burdensome, there was no buffer or sounding board between the farm and those systems and the manager felt very under-supported and demoralised having to deal with it all.

Context can be important. This is especially true in larger institutions, where internal systems and compliance can be particularly burdensome. Most institutions run one recruitment system and have one payment structure for staff that the farms need to follow, which is often mismatched to commercial farm practice. In addition, the H&S and procedures that need to be followed are written for a large university, not a farm, and some can be contradictory or lead to higher costs. In terms of research, there is compliance to be considered, and all projects must receive ethical approval, where for anything involving animals, the approval must also go through an animal welfare review body (AWERB) for sign-off. Further compliance may be necessary depending on the type of work being conducted with animals and in some cases Home Office approval is required, in which case named animal welfare officers also inspect the animals. It may seem burdensome to those farmers who just want to get on with things, but a sanity check on the impact of the research on the welfare of the animals is important.

Even the demo farms visited in New Zealand had to receive ethical approval for their work. Jason Rolfe at Dairy Trust Taranaki explained that they, like all other research/demo farms in the country, used the ethical review committee at AgResearch. AgResearch is a Crown Research Institute in New Zealand and conducts and funds research. He said that while sometimes cumbersome and frustrating, it meant they were compliant and the pragmatic way an ethical committee was set up to consider farm research seemed to function well in New Zealand. Conversely, on a trip to one institution in the UK, it was clear that the requirement was too burdensome, where staff felt constantly threatened and watched and as a result staff turnover was high. There is clearly a balance needed here with so many processes at play, and getting it right is a challenge.

Case Study – Massey University, New Zealand

Massey University farm's main site covers around 2,000 hectares. It has two dairy herds operating at the main farm: a 600 cow herd on a conventional seasonal production system and 240 cows on a once a day system, a small deer farm, mainly hosted for the Vet School, teaching and forage plots, a dairy support block and a sheep unit. About 13km north, the university has a further 400ha, 100ha of flat land and 300ha of hill country for beef and sheep research, plus another farm, an hour's drive away, with beef and sheep. It is managed by Alan Still, who is the Farms Director.

The Vice-Chancellor of the University approached Alan to review the farms, as it was felt there was a disconnect between them and the academics. As part of the review, Alan undertook interviews with all the staff and found:

1) there was a real issue with the staff environment

2) the farms were unorganised

3) the farms were being farmed for profit.

In addition, maintenance was being deferred and there was a poor return, in terms of teaching and research, to the university.

In response to the list above, Alan's first action was to set up a Governance Committee (Board of Directors), comprising independent farmers, academics and key university personnel. The committee assisted in managing conflicting objectives, i.e. commercial vs. research, and also teaching/research demands. This committee also acted as a buffer between the farm and academics who might grumble about the cost of research and was there to identify and omit spurious research and manage access if required.

The farm holds full staff meeting (farm, technicians and scientists) three times a year when projects are reviewed and future plans, farm issues and performance are discussed.

In terms of finances, the farm is 100% within the University but operates as its own profit centre. At the end of each month a financial report is run to review performance. Alan has been asked to benchmark the farm against other farms, but maintains the business is not the same. Whilst there is research income, for example, there is also notable business disruption from research and teaching, making such comparisons unfair.

The structure, reporting and management Alan has put in place has given the University confidence to invest in new facilities (around $20 million over the last five years). More interestingly, it has brought other organisations to the farm, including AgResearch.

During my study, staff - or rather the issues around staffing - and especially recruitment, came up repeatedly. Most agreed, particularly in the UK, that it is not only a challenge to recruit, but also to move staff on, if they don't meet expectations. This wasn't just an issue in the UK; a farm director on a visit abroad stated that "…it's almost impossible to remove bad staff." Another common theme across most UK institutions was the challenge around payroll structure and grading. For example, a position would be approved at a certain grade, at a salary band for a set/agreed position, but with no flexibility during recruitment to appoint promising candidates who might require additional training to fit the job specification, or to appoint experienced candidates that might fit the role well,

but lack the exact qualifications requested in the advert. In short, the inflexible nature of recruitment and the systems used was a constant complaint.

It was clear that when systems and policies were working against good farming practices, it could be demoralising, with staff turnover in some institutions high as a result. However, there are notable exceptions to this and when I met Hugh McClymont, he had worked at and managed Crichton and Acrehead, and later Barony, for over 40 years. We discussed the farm in depth and, although we shared frustrations, it was clear he had an excellent understanding of the needs of the users, stakeholders and others who used the farm. He had built a good reputation and was approachable and, while I did not question him on it directly, I suspect he had had to build a bit of a thick skin to survive. So, longevity is possible but the few that show it are exceptions rather than the rule.

The staffing structure also matters. Most university farms employ two distinct groups: farm staff, who run the commercial aspect of the enterprises, and technical staff, who support research and teaching through sampling, data collection and trial management. Their priorities, skills and working patterns differ, and I only found one institution during my travels that combined the staff roles, where farm staff were also technicians. I felt this led to a blurring of roles and either left the research squeezed by the demands of the farm, or farm work held up by research. No farm manager, academic or researcher I spoke to saw separate teams as a problem and most felt they worked best that way with clear responsibilities and roles. However, it was clear that one overall management structure for the farm and technical teams was preferable so that planning, resources and communication were smoothed and well co-ordinated. At Massey, full staff meetings bringing together farm staff and technicians under the Farms Director showed how this could work.

Value

The value of a university/college farm is never really discussed, and I wanted to see if anyone had put a value on it. While my originally planned trip to New Zealand was postponed due to COVID, I spoke at length, via Skype, to Peter Kemp who, at the time, was the Head of School of Agriculture at Massey University. He had repeatedly been asked 'why do we have a farm?' and so decided to commission a report to demonstrate the farm's value and support the restructuring Alan was undertaking. It was completed by the School of Economics within Massey University, independently of the farm, and it reviewed the value of the Massey Agricultural Experimental Station (Farm) to students, academics, the University and wider economy. It revealed some fascinating findings including:

- 54% of students would favour a Massey course with farm access over other institutions without it.
- 50% of students stated the most useful part of the Massey Farms was the practical experience they provided.

- The overall financial performance of the farm was closely linked to output (milk in this case) prices.
- Although turnover was circa NZ$3.3 million, the direct contribution of the farm was NZ$28 million, with the total contribution to the economy valued at NZ$111.5 million.
- Massey University could miss out on NZ$4.09 million in student-related income and NZ$3.42 million in PhD enrolments if the farm did not exist.
- Massey University could draw increased attention to the positive impact Massey Agricultural Experimental Station (Farm) has on the New Zealand Economy.

Peter stated that the report was 'well worth doing' and it enabled him to make sure people never forgot the value of the farm. During my eventual visit to Massey University, I was shown around by the Farms Director, Alan Still, and saw the results of recent investment in the site and had discussions with Danny Donaghy highlighting how this had encouraged increased academic use of the farm. It was clear that the report that Peter had commissioned had helped support the business case for these investments.

Adding numbers to what the farm does was an interesting approach. It not only put the farm in context but also allowed business cases for investment and continued support to be developed. This was exactly what the team at Massey used it for, in combination with the restructuring that Alan put in place.

This was the only example I found of a consolidated measurement of impact and value of the farm; many institutions have metrics, but they tend to be for the institution as a whole or for specific projects or courses.

Teaching and students

One of the main purposes of a university/college farm is teaching. In the UK at least, the form that this activity takes varies; further education colleges use their farms much more practically than higher education institutes (universities). Throughout my travels I wanted to see how farms were used in other countries.

Case Study – UC Davis Animal Science Department, USA

I met with Dan Sehnert, the Animal Facilities Co-ordinator, and Lisa Holmes, the Teaching Co-Ordinator, at UC Davis. They operated a number of systems to integrate the students into the farms.



Figure 4: Dan Sehnert and the author at UC Davis, USA. Photo: author's own.

The campus farm is designed to bring the animals to the students. There is a 120 cow dairy unit, four horse facilities (two for the vet school, one for teaching/research and the other for recreational riding), a pig unit, sheep barn, beef barn, a goat facility and slaughter facilities, all within walking distance for students.

Student involvement goes further than teaching, and there is good integration for students within the farm. Timetabling is set up around the farming calendar as much as possible and the first year of student study is very much more practical, with students expected to work on the farm, or at least be shown practically how to do things to link this back to the theory taught in classrooms. Internships are offered to students, ranging from a few hours a week helping out around the farm to much more involved roles, depending on business and student need.

Each week the students have a different focus. In the week I visited it was beef. The picture below showed the set up for a lab practical. As part of their assessment, students were expected to know what each item of equipment was and what it was used for. In many cases they were also expected to be able to demonstrate how to use it. The following week was 'dairy week' where students would have to do the same sort of practical activity, including learning how to milk by hand. Some of the practical ventures also generated income, such as the meat cutting room, where cuts of meat were sold to students, staff and the public.





Figure 5: Laboratory and board cutting, left; teaching notice outside the room at UC Davis, right. Photos: author's own.

While the University employed full-time facility managers, many of the facilities had rooms for students, where they could work for around 10 hours per week in lieu of rent. There were 23 student spots across all the facilities, which were offered for 12 months with a minimum of nine months residency.

The approach at UC Davis was very much one of getting the students involved and providing the opportunities for them to do so.

UC Davis was an exception as a university, with the first year much more practically driven before moving to more theory-based teaching in subsequent years. This first year echoed most further education (FE) colleges in the UK, which are also practically focused, and much more so than UK higher education (HE) institutes. James Ryan, the Principal at Kildalton College, explained how their students were not only given weekly updates on the dairy unit, but were also given a group of cows to manage, including measuring grass growth for their cows to graze. James Terry at West Hills College, California, explained how the Farm Manager was responsible for the day to day operations of the farm but would organise farm activities for the students to complete with instructors each day. These sorts of activities were commonplace within FE colleges. Some staff went further by offering additional extracurricular activities; Hugh McClymont hosted Young Farmers' Club activities on the farm, for example, making farm facilities available for events such as stock judging. Most universities provided fewer practical opportunities than further education colleges, although many retained strong links to research and practical teaching activities.

Transparency

There was a real difference in the data provided across the whole farm from the demo farms I visited compared to university/college farms. That's not to say the university/college farms weren't open in explaining what they did, or failed to provide data for research, but the whole farm data, performance and commentary were openly communicated far more effectively by demo farms.

Case Study – Owl Farm, New Zealand

Owl Farm is a 140ha platform with 320 cows split into two groups, 200 and 120 to fit the capacity of the shed. The farm is owned by St Peter's School Cambridge, a private school for years 7-13.



Figure 6: The notice board at the entrance to Owl Farm, New Zealand. Photo: author's own.

The farm does not undertake trials but implements sound research on farm to demonstrate how it can be used, its costs and its impact on business profitability.

The farm is linked to Lincoln University but also has a number of partners, including DairyNZ, PGG Wrightson Seeds, Ballance (Agri Nutrients), Westpac and Fonterra. Management of the farm is through a governance committee that meets four times a year to discuss budget, KPIs, welfare and compliance reports and future management. There is no payment from the school for access to the farm and its use in teaching; however, the partners contribute financially or with in-kind contributions.

Owl Farm is open with its data, like many other research farms across New Zealand. Historically they would hold weekly farm walks that anyone could join, although this has now moved to four focus days each year. These visits not only included good news stories but also dealt with issues across the farm in more detail. In addition to the generally open nature of the farms, they were open with their data. Jo Sheridan (Demonstration Manager) produces weekly newsletters giving key figures, with a commentary on the key focus areas of the farm and sections on farm performance, animal well-being, business health, environment, quality workplace and community.

It was refreshing to see how open and transparent Owl Farm was with its data, including financial figures. They aim to be in the top 25% for financial performance and provide commentary on progress and where they actually are against this target.

In the UK, most institutions were transparent around projects or research topics (depending on the funder of course) rather than as a whole business. This was consistent with most university/college farms I visited elsewhere, but no other institutions were as open as the demo farms in New Zealand.

Collaboration and relevance

A claim made by most institutions is that they collaborate with external partners. UK colleges like Myerscough or Bishop Burton have good links with industry for the benefit of their students. Bill Meredith, Principal at Bishop Burton, explained how they were developing a pig enterprise on the farm in conjunction with a private business, which would be operated jointly, share returns and provide a facility for their students. Rauri Martin, Farms Director at Myerscough, told me about commercial companies linking with student dissertations. These were simple but effective links. Universities also maintained industry links, but the depth of industry involvement in governance and management was notably greater at the New Zealand demonstration farms.

Case Study – Southern Dairy Hub, New Zealand

The Southern Dairy Hub (SDH) covers around 350 hectares near Invercargill. It is managed by Andrea Dixon and is jointly operated by DairyNZ, AgResearch and the Southern Dairy Development Trust. The farm is leased from the Southern Dairy Development Trust.



Figure 7: Andrea Dixon, Southern Dairy Hub, and the author, New Zealand. Photo: author's own.

In addition to the owners, businesses and farmers have made significant investment. This can be split into both independent businesses and those that invested in the Southern Dairy Development Trust, which owns the farm, and includes farmers, banks, legal groups, Universities, dairy companies and other businesses. Many of the farmers contributed up to $2,000 to help fund the purchase of the farm. For the independent businesses, mainly allied farming companies, support was most often offered through continued sponsorship. All those who invested are acknowledged both at the site and in published material from the Hub. Andrea was keen to set out that innovation was linked to prosperity and the contributions from farmers and businesses reflected that.

The farm runs 716 cows split into different farmlets (different system/management groups) depending on the type of research being undertaken. Each of the farmlets has a document, drawn up by Andrea, which sets out the management/decision rules for the group. These were put in place in conjunction with farmers and are useful to the scientists and farm team to help understand why decisions are taken. They are also useful reference material to inform any decisions that have to be made.

Andrea and I discussed the farm and research projects, and I also talked to Dawn Dalley (DairyNZ), who was unable to be there in person and so dialled in via video.

The main focus of the farm is research, but it also has some demo function. The research strategy is focused on opportunities over the next 10 years with projects being brought to the farm by AgResearch and DairyNZ. Research is costed as accurately as possible, and Andrea confirmed that it was essential to charge properly for research, otherwise it impacts the overall financial performance of the farm.

Dawn described how the hub was developed, using farmers to help set things up. In 2017 there were four key themes, which were wintering, fodder beet use, reducing nutrient loss and paddock infrastructure. The paddock infrastructure theme was discontinued after review. The farmlets were all farm system studies and at the time they were foot-printing GHG emissions from the systems and working with other local farmers. Dawn and Andrea set out how running the farmlets with groups of 140-240 cows was an advantage, allowing them to run studies on a system at scale. Dawn was relaxed about the management of the groups, and the farm team understood the value in the integrity of the separate herds for research. She had just employed an additional member of staff who was responsible for all the data and its management.

New research project ideas and requests for bolt on studies to existing projects go through a Research Advisory Committee, which comprises representatives from the owners, farmer members and key stakeholders. Research projects still require ethical approval and the SDH uses the AgResearch ethical committee for this, as it is already set up for approving work in this area.

Dawn and Andrea discussed how the farm was undergoing a review and Andrea was focusing on costings and research charges and what the next phase of research projects would be. There were thoughts on brassicas vs. fodder beet or optimising one or the other to reduce environmental impact.

The farm hosts three field days each year, with each attracting 60 - 100 farmers, although Andrea would like to see more farmers attending. She is also introducing a quarterly newsletter and wants to push more comms out. She felt communication was a key element in promoting activities at the Hub.

When considering relevance, a farm needs to consider how relevant it is to the university/college as well as the sector. It's important to consider how a farm might fit into a large institution, particularly when they are small in comparison. Take UK universities such as Newcastle, Reading or Nottingham, for example, operating farms with a turnover of £2-4 million within institutions turning over £400 - 800 million. The farm as a commercial operation is less than 1% of the universities' turnover. When compared to organisations such as Harper Adams or SRUC, which are primarily rural, you can see how sometimes the farms might get 'lost'. It's therefore important to make sure the farm is relevant to an organisation both in terms of activities but also in how it promotes itself or tells its story. Hugh

McClymont believed that how the farm manager engaged with the wider institution and sector was crucially important to how the farm was viewed, with benefit to be gained by being out in the community, generating recognition and respect from stakeholders and other local farmers. Most institutions consider their relevance through the projects and research work they conduct, but as Hugh pointed out, people are important.

Research, knowledge exchange and extension

Knowledge exchange or extension within universities tends to be project focused, so runs for the duration of the project or, more likely, towards the end. There is no consistency, or funding, for continued knowledge exchange. This is exacerbated further by the way the researchers and academics are recognised through the Research Excellence Framework (REF), which rewards academics and universities by the quality of their published research papers rather than the transfer of knowledge. For universities, the quality of their REF returns drives grant value from government. I wanted to explore the way extension linked to research and universities, particularly in the USA.

I visited Cindy Daley at Chico State University. The University was creating a Regen Centre at the farm as part of their research and the University's target of reaching net zero by 2030. She described how the farm was running several projects linked to state funding for demo programmes. These included:

- Soil Health Academy – up to 50 farmers using a state funding pot of up to US$250,000 to run a three year demo programme.
- BEAM (Biologically Enhanced Ag Management) – focusing on the use of compost and wastes.
- Mentor Farm Programme – Mentoring farmers into Regenerative Agriculture as part of an educational programme.

The programmes were linked to state and co-operative extension services through some additional grant funding. The team at Chico had set the farm on a regen path, with research projects across the site linking to their regen system and then set up research and extension projects to overlay the research and farm activities to push knowledge out to farmers. After the visit to Chico State, I called in to see Colusa walnut farmer Daniel Unruh, part of the mentor farm programme, to speak to him about how he was using the work to develop his farm. He had explored different ways of controlling nematodes and had trialled various cover crops and biological controls under his walnuts. He had met Cindy as part of the Soil Health Academy and was now part of the mentor programme. He had built his own crimper roller to destroy cover crops and had also designed a bug-gun to fire biological controls into the trees. He had found using cover crops with up to 15 species worked well to target nematodes. He had also built organic matter under the trees from 1.7% in 2012 to 3.5% by 2018 and reduced chemical and fertiliser costs from US$68k to US$18k per annum. According to

Daniel, the end result was that he had reinvigorated his existing walnut plots, saving up to US$800k in replanting costs.

I also met with Mark Lagrimini, the Vice Provost for Research and Extension at University of California Agriculture and Natural Resources, to discuss the Land Grant and the services this funding provided for farmers and growers, plus links to researchers and the University. The funding was a partnership between federal, state and county, with academics/researchers at a county level supported as advisers to do targeted research or disseminate research from universities. In his view, it was the only scheme of its type in the world. In simplistic terms, he said that the problems farmers faced at county level would be trialled/researched and if no solution was found then the problem was passed to the University for greater investigation. He did acknowledge the Land Grant on its own wasn't enough for all the work to be undertaken, but it was a good base for support structures and extension to local farmers. The system meant extension services (which could be provided by specialists from within universities) had a state-wide remit. These specialists would use the research undertaken by universities and disseminate it to counties within the state. This dissemination was done in part by those specialist academics but more so by county academics or local field officers.

Mark also oversaw nine research stations across the state where, interestingly, anyone could use these stations for research projects, with state university projects normally subsidised while out of state universities or commercial companies would have to pay the full rate. He also oversaw a 'farmer fund' where farmer groups could apply to do their own research either on their own farms or at the research stations. There were good links between universities, county advisers, extension officers and Mark through the system, which allowed hard science to flow from campus to growers. While programmes were successful, Mark explained that funding could be very political and sometimes the best thing to do was to just get on with the job quietly. He did, however, go on to say that they needed to raise more awareness about the programme and how good the impact was across the programme rather than just on specific projects. He put forward that the programme had helped farm gate value triple since 1990 but needed more funding to continue with that level of impact. It was interesting that success was measured by impact rather than published papers.

During my travels and through discussions it was interesting to compare how research was translated to farmers. Dr Struve Carson, from John Deere, accessed a fund of around €4 million from federal money that could be used to pay universities to demonstrate new technology on farms and teach operators how to use it. New Zealand used demo farms to take research out to commercial units, although when I met Rhys Roberts and Clare Buchanan at Align Farms, their view was that the Lincoln University Development Farm had been relevant in this area. However, they felt it had lost its way recently and the Align farming business had now moved ahead and was doing better than the demo farm.

The Ireland model of teaching, research and advice was linked through Teagasc. Along with the research facility at Moorepark, the education colleges visited, including Kildalton, Clonakilty and Ballyhaise, who not only took part in research projects but also taught students based on that research. The advisory link, particularly for students after finishing education, linked back nicely and seemed to ensure everything was in line with new developments. Bringing the three together, teaching, research and extension makes for a very well-linked model.

CHAPTER 5: DISCUSSION

Every institution must develop its own system but there are some key principles which my research suggests are consistent among all well performing university/college farms, which will be discussed below. Similarly, there are some common institutional issues that I feel need to be addressed to better farm performance, with suggestions to overcome these also discussed. Lastly, the sections below also discuss the wider policy context of university/college farms. Where relevant this discussion draws upon examples of what I have already implemented at Newcastle University as a result of my study.

5.1 Institutional considerations

One of the most consistent findings from my study was that effective farms had a governance structure in place. The members of the committees varied as did the group size but in those farms that I considered as high performing, the committee normally included senior university staff. While assessing the performance of the farms is difficult given their opaque nature, I considered a motivated and positive manager, a strategy/plan in place and academic buy-in/support would be good indicators of performance. These are likely better metrics for this than financial figures, given that these are not normally available and, when they are, they are difficult to assess given variability in the way teaching and research projects are embedded. Another consistent finding was the importance of having a senior advocate for the farm: someone with sufficient influence to secure support, investment and institutional recognition. Where the farm had a good advocate, managers stayed in place for reasonably long time periods, there was investment in the farm and engagement was strong in terms of teaching and research.

In terms of structure of the farm, I didn't see any university farms that functioned as separate companies, and I believe there are good reasons for this relating to investment, control and long term ownership. Colleges tend to be smaller in terms of turnover and those that have farms have a rural focus, making the farm itself integral to their teaching. Universities can have farms that sit within schools or estates departments. Both approaches can function effectively; however, academics in institutions where farms sat within estates departments consistently expressed a preference for them to be managed within academic schools. As Danny Donaghy said, it gives the farms greater accountability when they are part of schools rather than sitting in a different cost centre. There seemed a clear challenge with any university/college farms that used farming companies to operate the farms, rather than directly employed staff. In these cases, there was a disconnect between the farms and teaching and no flexibility to work around research projects. The use of a farming company seemed to be linked to issues around recruiting good farm managers or farms being managed

through an estates department. However, these are really system problems, rather than inherent issues relating to the potential of the farm.

All farming businesses including university/college farms should be financially accountable. Whilst there were a number of different systems employed across the farms I visited, many were using gross margin costings and Excel to produce financial figures. At Newcastle we decided the only way to be accurate for budgeting and analysis was to run our own accounts for the farm. This entails taking each month's receipts and expenditure and importing them like a bank statement into Xero, an accounts package. We then use this to feed into Figured, a management system, which enables comparing budget against actuals, forecasting and scenario planning. This was also done to enable farm accounts to be accessible and used within teaching if required. This is nevertheless a time consuming process, as university/college finance systems are cumbersome and very poorly suited for analysing farm management data.

Staffing, or rather recruitment and retention, is something that universities/colleges consider as a whole organisation, rather than acknowledging that farms, or rather a commercial business operating within a teaching and research establishment, do need to operate a little differently. All managers agreed that recruitment was difficult, where advertising at approved grades meant a lack of flexibility with the candidates. Recruitment systems can also be cumbersome and can put potential candidates off applying, with the recruitment/interviewing stage being process driven, rather than focusing on results (which describes a lot of systems in universities/colleges). Retention and the ability to remove poor performing staff were confirmed as further common issues during my studies. Solutions, while seemingly simple, such as 'farm' opt outs for grading, alternative contracts for farm staff, and grading and reward systems to suit the more commercial aspect of the business, are very difficult to progress within institutions; I must confess that I've not yet managed to find solutions to these challenges at Newcastle – nor did I meet anyone else who had either!

Collectively, these measures provide a broader assessment of impact than financial performance alone.

Measuring the value of the farm was important. The Massey Report putting a value on a farm's impact showed what could be done and it helped Massey to leverage investment and change how it was considered internally. We took the decision to measure the value of the farms at Newcastle using a number of different metrics including:

- Value of research
- Value of teaching
- No. of students (undergraduate and postgraduate) using the farm
- No. of visitors
- Facility usage

Part of this information is collected using a sign-in system built for the farms, which not only allows us to manage who is coming to the farm, but also what they are doing there. This allows us to produce metrics on farm use for management purposes, improve biosecurity and identify any underperforming areas that might not be being used to their full potential.

Though challenging in practice, university/college farms need consistent investment in facilities. The investment driven through research tends to be for individual project delivery rather than for the wider farm, which while welcome does not always help the management and performance of the farm. Capital investment at most farms is up and down and this is evident when you visit them. Research project investment also tends to be driven by the researcher (which makes sense as it is for their project) but can result in facilities being built on the farm that are difficult to fit into day-to-day management. As research priorities and academic staff change over time these facilities either fall out of use or stay in use at a higher cost, or lower efficiency, for the wider farm. The facilities a farm hosts are normally driven by the research demands of the academic/research staff within those institutions. However, there is some replication across the UK of facilities and equipment, particularly when some of the recent UK AgriTech demo farms are included. This dilution of capital funds away from university/college farms has no doubt exacerbated the lumpy investment seen. FE colleges have better access to government funding compared to universities, but the funds are normally for investment in capital equipment or technology for a specific reason, rather than the core function of the farm.

5.2 University/college farms' position in UK agriculture

Throughout my study I met some impressive people and saw some excellent facilities. In the US I saw the co-ordination between the universities, research stations and extension officers; in Ireland how policy, teaching, research and extension were linked; and in New Zealand how universities linked with demo farms to show how research could be used to help farmers in the future. Whilst none of these systems were perfect, the co-ordination between sites is something the UK could and should adopt.

If we look at the current situation in the UK, there is no co-ordination of facilities across UK universities/colleges, or wider demo farm networks, or even the other organisations involved in research. I discussed this lack of co-ordination or system within the UK with Tom Hind, then at AHDB, and asked him whether this was a role for the AHDB. He indicated that wider industry co-ordination had not been a specific focus of the organisation. The 2023 Research Strategy from the AUC sets out co-ordinated knowledge exchange as a way of backing up existing work, rather than adding to the already complicated and crowded environment, supporting the recommendation made in Lord Curry's 2022 report.



Figure 8: Map of Agricultural Universities Council (AUC) members in the UK. Source: AUC Research Strategy 2023.

If you look at a map of university and college farms (as members of the Agricultural Universities Council), there are one or two gaps but, overall, these sites give very good strategic coverage across the UK. A strategy to use these as hubs for teaching and research with investment to match, linking in with research institutions, with spokes to demonstration farms (such as those co-ordinated by AHDB or LEAF) or others, could create a nationwide network for innovation and extension that could help to drive productivity.

Conversely, if you consider the current map of research and demonstration farms across the UK, some of which receive government investment and some of which are more demonstration-focused (such as LEAF demo farms), it is confused and without a simple core focus.

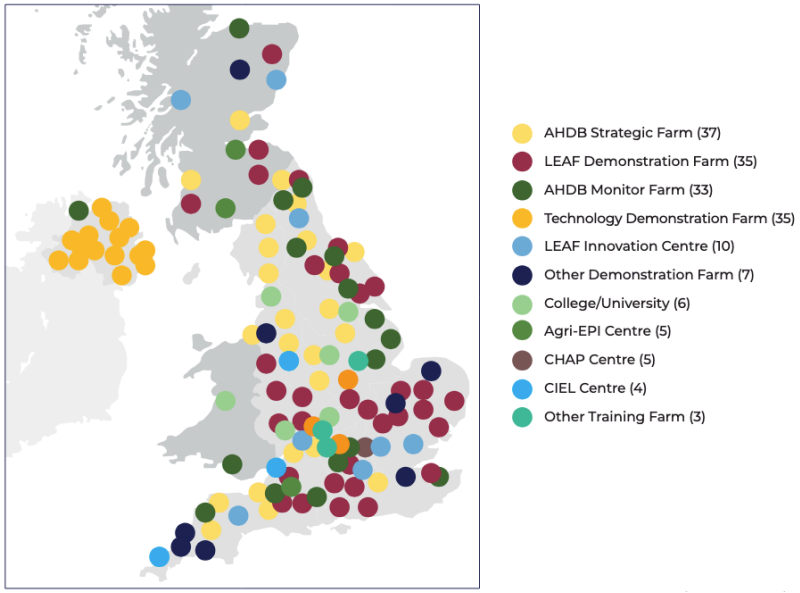

Figure 9: Research & Demonstration farms in the UK. Source: AUC Research Strategy 2023.

When you look at those facilities across the UK, there is replication and sometimes poor use, especially when investment was driven by a single research project or because government money was available, rather than any long-term strategy.

There are also examples where opportunities to maximise impact appear to have been missed with government funded facilities and equipment placed on commercial farms with a small catchment of visiting farmers, rather than on university/college farms with a fresh cohort of students every year plus a larger catchment of farmers for much wider impact.

A recommendation for national co-ordination seems ultimately sensible, but I would go further and use the university farms, along with key research institutions and some college farms, as the basis of a national network with demo farms feeding off those centres with investment to match. Funding for extension services and knowledge exchange across these centres could play an important role in improving productivity throughout UK agriculture.

CHAPTER 6: RECOMMENDATIONS

The following recommendations are drawn from the common themes identified during visits to universities, colleges, research farms and demonstration farms across the UK and overseas.

1. University and college farms should be managed in-hand and operate with open and transparent management information.

2. Institutions should implement systems that allow farms to operate efficiently and sustainably, with a clear understanding of costs and net margins. This includes recruitment, staff management, reporting structures, health and safety requirements, and other institutional policies.

3. Good governance structures are essential. In addition, every farm should have an advocate who is willing to support and represent the farm's interests.

4. Institutions should recognise the importance of their farms. The land they manage has value not only for teaching and research, but also through the delivery of carbon, biodiversity and other natural capital outcomes that should be recognised appropriately.

5. All farms should operate their own financial management systems. Institutions should benchmark both farm performance and cost structures to identify inefficiencies and reduce institutional drag.

6. University farms should form the backbone of a UK-wide innovation network, supported by key research institutions and further education colleges. This co-ordination would provide hubs, which would then link with other demonstration farms to speed the uptake of new innovations and technology.

7. Knowledge exchange and extension should be embedded within the services provided by university and college farms. Long-term funding should be made available to ensure these activities continue beyond the lifespan of individual projects.

8. Central funding should be directed towards existing research farms (university, college and research institutions) where it can be leveraged to not only assist farmer uptake of new technology but also train the next generation.

CHAPTER 7: AFTER MY STUDY TOUR

The Nuffield Farming Scholarship provided an ideal opportunity for me to reflect on the position of the farms at Newcastle University (NU), to learn from global good practice and to create a platform that would take NU Farms forward over the next 10 years. Since starting my study, I've taken the opportunity to bring what I have learnt from it directly into action at Newcastle, both as I was travelling and learning, and afterwards.

While COVID set back many academic studies at Newcastle, it afforded me the opportunity to set in motion good practice straight away. As a result, many of the learnings from my travels have already been implemented, with others being in progress or planned for the future.

For example, after returning from my trip to California, enthused and eager to make changes, I sat down with the farm team, and we set out our plans for the next five years on the farm. The plan was then sent around the University for consultation before implementation.

There were also wider impacts spurred on by the study. After we made a number of changes on the farm, the then Head of School, Rob Edwards, initiated a review of the agricultural and related degrees. Alongside this a strategy group was created to bring closer links between the farm and academics to help plan and manage scholarships, interns, research projects and teaching.

Having seen a visitor system at another institution, I had one built. It is used mainly to manage and track visitors to the farm, but it also collects information on the projects they are working on, the facilities they use or simply why they are there. This gives us metrics not only on how many people are using the farm but also on facility use and project support. This provides valuable evidence of how the farms are used and the contribution they make to the wider institution.

To further promote our activities a farm newsletter was set up, with a regular 'farm update' giving me an opportunity to communicate to a wide audience, often to complain about the weather, but also to provide updates on general farm management, issues and performance. A farm events calendar with open days, farm visits and project meetings was also established. These events were not just for farmers, as we also opened our doors to the public and wider university staff. More than 5,000 people work at Newcastle University and only a small proportion have visited the farm. Because the farms are some distance from the city, we also created maps for a virtual tour of the research and teaching areas.

More interestingly, and flatteringly, we have been approached by five other institutions who have all been keen to learn specifically about how Newcastle University operates, the systems we have put in place, how we link teaching and

research, and our governance and financial management, all of which I learnt and put in place as a result of my Nuffield travels.

Personally, following my studies I have taken on external roles that will benefit from the experience my travels provided. I joined AHDB's Cereals and Oilseeds Sector Council, where I chaired their newly reformed Research Committee and have since become an AHDB Board Member and Chair of the Cereals & Oilseeds Sector Council. I have also used the learnings from research at Newcastle and other places to alter the farming system our family uses at home.

Next steps will be to carry on building the system and farm at Newcastle University, probably focusing on one or two key areas as we roll into our next phase of development. At home, my family, whom I have promised to spend more time with, and I plan to continue building resilience into our farming system.

CHAPTER 8: ACKNOWLEDGEMENT AND THANKS

Firstly, I would like to thank my family: my wife, Frances, who has supported and encouraged me and covered everything at home while I've been away and, of course, our daughters Eve and Nancy who have both mucked in.

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Most importantly I would like to thank everyone who gave up their time to speak to me openly and honestly while on my travels. Your input, thoughts and opinions were valuable and insightful and without them I could not have learnt everything I did during my travels.

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