



**A Nuffield Farming Scholarships Trust
Report**

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**Land based education policy
in the 21st century:
what can the UK learn
from the rest of the world?**

Liam Stokes

September 2014

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A Nuffield (UK) Farming Scholarships Trust Report

Date of report: July 2014



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Inspiring passion and potential in people."*

Title	Land based education policy in the 21 st century: what can the UK learn from the rest of the world?
Scholar	Liam Stokes
Sponsor	The Young Nuffield (Bob Matson) Award
Objectives of Study Tour	<ul style="list-style-type: none"> • To establish how government policy can use land based education to drive a national agricultural policy • To research different methods of structuring and funding a land based education system • To identify how land based curricula can be kept up to date with new innovations
Countries Visited	Ireland, USA, Hungary, Canada, Poland, Belgium and Austria
Findings	<ul style="list-style-type: none"> • Land based education can be used as a tool to deliver agricultural policy if ministries of agriculture take an active interest. • A successful system can be driven either by ministry of agriculture engagement or by land-based university coordination. • Training agricultural educators can be seen as a distinctive academic discipline. • Vocational, practical courses should contain academic study to "future-proof" their students. • Upstream research is as important as applied research and support for one should not be to the detriment of the other. • You can't train "too many". A well-constructed land based curriculum is a good education for anyone. • Land based subjects can be incorporated into pre-16 education either as a supplement or as a distinctive route. • There is genuine concern about the proliferation of providers of Higher Education. • Agriculture as an industry can be supported by a host of other subjects in addition to agricultural science.

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DISCLAIMER

The opinions expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust, or of my sponsor, or of any other sponsoring body.

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Nuffield Farming Scholars are available to speak to NFU Branches, Agricultural Discussion Groups and similar organisations

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1.0. Introduction

I have worked in land based education for five years but, like many people in the land based sector today, I started teaching with very little idea of what land based education was or what it could achieve. Despite growing up in rural Staffordshire and always being around farming, field sports and the countryside, I followed a very traditional academic route through school and sixth form and headed off to King's College London to study history. This did not go well. Thoroughly homesick I returned to the Midlands at the end of my first year entirely dispirited and directionless.

After a long period of introspection I eventually decided to head to Harper Adams University College (as it was at the time), where I experienced the transformational effect of land based education first hand. Four years later I had a BSc in Countryside and Environment Management and a year's work



The author, Liam Stokes

of experience with the Game and Wildlife Conservation Trust, where I had worked as a field assistant; but still little idea of what I wanted to do in the long term. Then I saw a vacancy for a teaching post at Wiltshire College, Lackham. I didn't know exactly what such a post entailed but saw it as an opportunity to talk extensively about the passions I had developed at Harper - conservation, wildlife management and sustainability.

What I in fact found was the most vibrant and engaging career and a genuine opportunity to shape young people and our land based industries. Lackham is the land-based campus of Wiltshire College, a college with four main campuses spread across the county, where we deliver courses in agriculture, animal management, conservation, horticulture, land based technology, gamekeeping and horse management. We teach students - with no past qualifications - on entry level programmes through to degree programmes, and from ages 14 to 60 and above. Having started my professional life as a lecturer in wildlife management, I have been a personal tutor, a programme leader, college shoot manager and latterly curriculum manager for agriculture and countryside management. I have also completed my Professional Graduate Certificate of Education (Lifelong Learning).

Over the past five years I have become something of an evangelist for land based education and everything it can achieve, and am totally committed to both optimising the system we have in the UK and to raising its profile. To this end I write about education for a range of shooting magazines, including the Shooting Gazette, Countryside Alliance Magazine, Modern Gamekeeping and Shooting Times.



2.0. The background to my study

The task of feeding a growing population while maintaining a commitment to sustainability is a challenge that will shape the 21st century. I believe that the solutions required will include a new synthesis of efficiency and localism, and of intensification and environmental stewardship. These syntheses can only occur through innovation and technological advancement, and these innovations and technologies must be developed and guided by those who understand agriculture on a systems level. Furthermore they must then be communicated back to those who will actually be implementing them on the ground. To all of these challenges agricultural education is the key.

Environmental policy emanating from both the European Union and the UK Government are putting increasing demands on British producers, and the education systems needs to keep pace to equip producers to meet these demands. Despite this there is no cohesive policy framework for agricultural education in England and Wales. Landex act as a voice for those colleges offering land based provision, but beyond that there is little in the way of cooperation; in fact competition is used as a key policy tool with a view to driving up quality in England especially, with the result that land based colleges within close proximity will not cooperate for fear of losing students. Furthermore there is little incentive for schools and colleges to cooperate, as both are encouraged by funding mechanisms to focus on retention and recruitment at all costs, arguably to the detriment of individual students. I have personal experience of students being advised by their schools to stay in sixth form and pursue academic qualifications despite this being clearly contrary to their land based career goals.

... there is little incentive for schools and colleges to cooperate, as both are encouraged by funding mechanisms to focus on retention and recruitment at all costs

... when working at the coal face of an agricultural college there is little sense that there is any support from DEFRA for what we are trying to achieve.

At the government level there is little acknowledgement that agricultural education is in any way distinctive. Land based students do attract a modicum of additional funding in acknowledgement of the cost of their programmes, but when working at the coal face of an agricultural college there is little sense that there is any support from DEFRA for what we are trying to achieve.

This report seeks to find if there is another way; to find whether there are models of land based education that are joined up with the agricultural and environmental policies of their governments. If such models exist, then I hope to establish what such an education system might look like, how it would attract students to enter into it and how it might be used to communicate new skills and techniques through vocational training whilst also moulding the academic minds we will need to tackle the challenges of tomorrow.



3.0. My study tour

England, January/February 2013. It was important to speak to the major agricultural organisations to see how they were being served by the agricultural education sector in this country. I also sought out leaders in agricultural education to gain their perspective on current and future policy developments and to establish where they saw good practice abroad.

The Contemporary Scholar's Conference (CSC), March 2013. The CSC is a gathering of each year's Nuffield Farming Scholars and included a wide range of field trips and training, designed to hone our skills and expose us to a range of on-farm practices and the wider policy framework in the host country, in this case Ontario, Canada. Meeting with Nuffield Farming Scholars from around the world also allowed me to further clarify where I might find best practice examples around the world.

Ireland, May 2013. Ireland was identified very early in the study as an example of a coherent national agricultural strategy supported by a network of agricultural colleges. I wanted to ascertain how these colleges functioned and were funded, how they were supporting the government strategy and how in turn government was supporting them.

USA, July 2013. The University of Florida was highlighted as a centre of excellence for agricultural education. It became apparent that agricultural education in the USA means something different to the common understanding in the UK, and in fact refers to a very specific academic discipline. I travelled to Gainesville, Florida to investigate what it meant and how it was supporting industry.

Hungary, August 2013. I wanted to see best practice in a range of land based subjects, and through contact with the International Council for the Conservation of Game and Wildlife I was put in touch with a professor at Szent István University in Hungary, a leader in the field who invited me to see how wildlife management can be optimally delivered as a science.

Canada, October 2013. During the CSC it had become apparent that Ontario had a ministry for agriculture that was closely involved with the agricultural education system. I wanted to see how this relationship operated. I had also noted that unlike in the UK, where colleges and universities are fairly disparate, all the educational infrastructure appeared to be clustered in Guelph, as were all the agricultural representative bodies. I hoped to learn how this came about.

Poland, April 2014. Poland has undergone a rural economic miracle since its accession to the European Union and has the youngest farming work force in Europe. I wanted to learn if there was correlation between the EU accession and their agricultural educational structure.

Belgium, April 2014. I headed directly to the European Commission in Brussels to speak with representatives from the agriculture and education departments about European Union policy towards agricultural education, to gain a better understanding of the framework in which my recommendations would have to operate.

Austria, May 2014. Almost every person I asked regarding best practice in agricultural education had suggested Austria, and every article on vocational education suggested the same. It was fitting



to end the study with a visit to arguably the most comprehensive land based education system in the world to understand how it works and how something similar might be made to work in England.



Figure 1 The author (far right) with some of his students at a Wiltshire College Lackham Prize Day



4.0. The UK context

There appears to be a consensus that until recently there has been a lack of a coherent agricultural education policy in the UK, a consensus supported by most of the meetings I have undertaken in the UK and acknowledged by both of two recent reports on the future of the agricultural sector: the industry driven Future of Farming report and the government's AgriTech Strategy. However with the publication of these two reports there is now a genuine opportunity to move forward and introduce a measure of consistency to our approach to land based education.

In the early stages of my research, before the AgriTech Strategy was published, there were concerns from some within land based education about a lack of a strategic objectives focused on education. The final report, entitled A UK Strategy for Agricultural Technologies, does however contain a number of actions directly relevant to education, as can be seen in figure 1 below.

Action 2: Building on existing reports, the Leadership Council will work with the research councils to identify the skills needed to support the agri-tech research base. This could lead to targeted interventions along the lines of the Aerospace Engineering Masters Programme.

Action 7: The agri-tech sector will build on the work of the Agri-Skills Forum, Lantra and the Agriculture and Horticulture Development Board (AHDB) to:

- improve clarity and communication of available training and advice
- establish and communicate the future skills needs for the sector
- participate in the design and investment in courses and vocational training

Action 8: The agri-tech sector will improve co-ordination and integration of on-farm demonstrations and use of demonstration and monitor farms to share best practice. These will establish clear links and networks with the Centres for Agricultural Innovation.

Action 9: The Government will work in partnership with the agri-tech sector in the design of the next Rural Development Programme to identify opportunities to support skills development and knowledge transfer.

Figure 1: Actions relating to skills and education published in
A UK Strategy for Agricultural Technologies

These actions build on the earlier Future of Farming report, which again featured a number of educational recommendations (see Figure 2 on next page).

Each report recognised the limitations of the current land based education framework and these actions and recommendations flow from these limitations. These recommendations are cause for optimism, as education is clearly on the agenda.



Recommendations

- ❖ We call for the industry to continue to work hard to keep agriculture firmly embedded in the National Curriculum and we think this role could be taken on by a body such as FACE.
- ❖ We support efforts to co-ordinate work with schools highlighted by Lord Curry. This includes showcasing the exciting nature of careers in farming, teaching schoolchildren about how food is grown and the need to train ambassadors, support FACE and the work they are doing with Bright Crop in this area.
- ❖ While welcoming the NFU's and AHDB's involvement in IGD's 'Feeding the Future' initiative, we call on the farming industry to widen their participation in this scheme.
- ❖ We support the need to develop and invest in graduate placement schemes and would like to see further exploration of schemes like 'Fertile Minds' graduate programme concept, aimed at attracting bright graduates to experience the agricultural sector.
- ❖ We welcome the forthcoming Agri-Tech Strategy, developed by Defra and BIS, and urge the Leadership Council to address the skills development needed to address this gap in postgraduate research.
- ❖ We consider that the development of highly rated and regarded vocational qualifications by the industry itself is essential, working closely with educational institutions and course designers (including LANTRA and LANDEX) to develop courses that are understood by the industry and are taken up by students.
- ❖ We support the work being done to make apprenticeships work better in agriculture and encourage farmers to support and take up these schemes.
- ❖ We feel that improved business training is crucial to farming and to new entrants. Delivered mainly by mentors, it should be a condition of publicly funded schemes.
- ❖ We call on the Agri-skills Forum to drive forward the development of ways of demonstrating professionalism in agriculture.
- ❖ We call on the farming industry itself to take more responsibility for the education and skills development of the next generation of farmers and farm workers.

Figure 2: Recommendations pertaining to education in the Future of Farming report.

There are however limitations that need to be addressed. The government objectives as set out in Figure 1 reflect a desire to build the research base, communicate the need for skills and knowledge transfer and participate in the design of courses and vocational training, but do not point to a system of education with a clear structure of qualifications. The Future of Farming, which pre-dates and in many respects anticipates the AgriTech Strategy, recognises achievements in schools and again looks to an improvement in the research base, offering support for the development of qualifications it appears the authors hope to see emerge from the AgriTech Strategy.



Both sets of objectives share a focus on postgraduate research and on vocational training, which is usually taken to mean apprenticeships, and extension. Neither includes explicit consideration of full time further education programmes. The Future of Farming recommends that hard work be done to “keep agriculture firmly embedded in the national curriculum”, although the rest of the report suggests that work needs to be done to see it embedded in school-age education at all (see Figure 3).

5.3 The way that schoolchildren are taught about farming is vital to sustain their interest in it as a possible career. We believe that agriculture is an excellent way of teaching science and geography, as we said in our response to the Department for Education's (DfE) National Curriculum consultation (see **Annex D**). The industry needs to keep up the pressure on DfE to ensure that farming features in the national curriculum and on schools' agendas. **We believe that this is a task that falls to one lead body, such as Farming and Countryside Education (FACE).**

Figure 3: Extract from the Future of Farming report

Not everyone within the sector agrees that the pressure on the Department for Education (DfE) referred to in Figure 3 is required. I interviewed people within the agricultural sector who believed that the demands of the industry required young people to spend their time at school mastering the basic traditional curriculum before progressing to either university or an apprenticeship, which would perhaps explain the focus on these two areas in both of these reports. Furthermore it is not entirely clear that the DfE is the body upon which pressure needs to be placed. As was pointed out to me by Baroness Byford, the Department for Business, Innovation and Skills (BIS) and the Department for Environment, Food and Rural Affairs (DEFRA) have as much interest in land based education as the DfE, and yet on this issue the three rarely coordinate.

There are however other reasons to be cautiously optimistic that the limitations in the government's approach to land based education may be coming onto the radar of policy makers. While BIS does not list agriculture as an industry in its own right the fact it has published A UK Strategy for Agricultural Technologies is encouraging, and while BIS are leading, DEFRA would seem to be following. As well as the Future of Farming and the UK Strategy for Agricultural Technologies we also have the Feeding the Future report, detailing innovation required to support primary production to meet the growing need for food. One of the research priorities includes education, which again could further influence future policy development. Dr David Llewellyn, Vice Chancellor of Harper Adams University, told me at the outset of my research that these reports and AgriTech especially could be the catalyst for progress in the land based educational sector, with the possibility of funding following the actions, recommendations and research priorities.

So while there is a great deal to be positive about within these recent reports questions still need to be answered, perhaps - above all - how are these actions and recommendations to be pursued? The need to build a recognised and integrated system of land based qualifications and to communicate the needs of industry are clearly recognised, but what is this going to look like and to whom will this information be communicated?



5.0. Government engagement with land-based education

Having identified that there is no joined up approach to land based education from within the UK government, it is important to look abroad to see if alternative models exist. My meetings at the European Commission highlighted that in the UK and many other countries in Europe a tension exists between agricultural ministries and the need to provide an agricultural education. No one at DEFRA was able to answer questions regarding the ministry's role in education, reflecting the comments of those in both the agricultural and educational sector that DEFRA does not perceive an educational role for itself beyond following the lead of BIS.

5.a. The Irish Department of Agriculture, Food and the Marine

This attitude from DEFRA is very different to the role the Irish Department of Agriculture, Food and the Marine plays in education. In much the same way A UK Strategy for Agricultural Technologies and Feeding the Future are intended to guide the future of UK agriculture, the Irish department is guided by FoodHarvest2020. One of the recommendations of this report was the establishment of a Research Stimulus Fund to be administered through the Department of Agriculture and used to financially support research goals identified by industry.

Background: FoodHarvest2020

FoodHarvest2020 builds on previous policy documents such as Agrifood 2010 and Agrivision 2015. In Ireland 2009 was a poor year for agriculture and the economy in general, as the country's export focus meant that the global collapse was particularly badly felt. In assessing Agrivision 2015 the report was deemed to have had achieved 90% of its goals and the minister wanted to look for a new way forward. It was decided early on that this new direction would be industry driven rather than department driven, and that the food industry was now going to be key.

Government departments including BordBia (the agricultural marketing board) and Teagasc (the Department of Agriculture's educational organisation) were involved in developing the background and the discussion papers on the proposed strategy, so by the time the FoodHarvest committee was set up the background work was done and a public consultation had been completed. The committee of industry bodies were then given 3-4 months to concoct a strategy using the analysis provided by the government. According to Marian Byrne, Head of Food Division at the Department of Agriculture, the industry bodies were very clear in the targets they wished to set, and the whole process ensure excellent industry buy-in.

By 2010-11 the economic condition of agriculture began to improve, partially because of FoodHarvest2020 but with a number of wider economic drivers, which secured even greater buy in. Ongoing participation has been ensured through the creation of sub-committees that call in industry bodies to work to set shorter-term goals and aims, essentially asking industry how government could create an environment in which industry can operate.

Marian Byrne summarised the report as simply an "industrial policy that has been of benefit to farmers".

Within this industry-led research stimulus lies the genesis of a comprehensive government-coordinated system of education and extension. FoodHarvest2020 contained within it the seeds of Origin Green, a branding strategy being drive by BordBia, the Irish agricultural marketing board. Origin Green is an ambitious strategy that seeks to brand all Irish produce as sustainable, or "green". To do this, sustainable farming techniques need to be developed and then they need to be

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embedded into the industry. To allow BordBia to make the claims they want to make, it is seen as vital for the land based education system to instil sustainability into future farmers. As such, within every funded research project onus lies on the research project coordinator to disseminate information, a role embedded and described in each project coordinator's contract. The department makes sure to engage in informal activity to make sure information generated by funded research is disseminated effectively.

The most commonly used vector for this information is Teagasc, the Department of Agriculture, Food and the Marine's educational organisation responsible for full time post-16 colleges as well as extension and advisory. Whilst not directly run by the Department, Teagasc is required to submit annual plans, one for education, one for advisory and one for research, all of which must pursue the aims of FoodHarvest2020. This unique level of integration means that developments in research or in national policy are almost instantly translated into curriculum within the colleges. FoodHarvest2020 identified a need for farmers to increase dairy farm production, so a new professional diploma in dairy farm management was developed. Dale Crammond of the department's Research Division told me that when a government funded research project identified spring as the best time to apply slurry manure this was rapidly formulated into advisory materials and was embedded into the college curriculum.

"The integration of education, advisory and research is a huge benefit"
Dale Crammond, The Department of Agriculture, Food and the Marine

Teagasc represents the most distinctive part of the Irish government's engagement with land based education. Teagasc sits under the Department of Agriculture, Food and the Marine in terms of oversight and funding and receives a grant in aid of €120-125 million per year, supplemented by approximate earnings of €40 million in farm advisory, education fees, research funding, and the produce from the various college farms.

Irish legislation has always mandated the Department of Agriculture to provide education for farming, a situation in which Tony Pettit, Head of Education at Teagasc, sees many advantages. He told me it ensures Irish agricultural education is attached to research, advisory and extension and nurtures a very healthy staff turnover between the colleges, the government department, the extension offices and industry. Echoing Dale Crammond, Tony Pettit highlighted that new innovations are instantly in the qualification specifications, whereas those produced by the Department of Education can be up to 40 years out of date!

There are however certain disadvantages, as the Department of Education can become entirely disconnected from land based education. Within further education establishments in the UK there is extensive continuing professional development in teaching and learning strategies, which is not the case within Teagasc colleges. Funding for teacher training and for ongoing training in literacy, numeracy and ILT cannot be accessed in Ireland outside of the Department of Education. It is also difficult to access financial support for students outside of the Department of Education. As seems to



be the case around the world, funding is being tightened. Each student attracted €12,000 five years ago, but now draws down €6,100.

There was no suggestion from within Teagasc that government involvement was intrusive (unlike the Canadian experience, as will be detailed later in this chapter). Quality improvement is mostly internal, with two Teagasc internal verifiers inspecting each college every year and reporting to a central Teagasc authority (which includes representatives from industry). The quality improvement process is therefore more flexible than those associated with centralised government oversight - a paper is presented to the authority from each college, covering the net cost per student, the staff:student ratios, the contact hours the students receive, the organisation of the courses and the ratings the students have given to each module and to the college overall. This information is then transformed into an index and used to identify areas of good and poor practice and responded to accordingly. Graduates of Teagasc colleges are surveyed five years after they leave college to ascertain career development and uniquely to measure “practice adoption”; the latter seeking to understand whether the techniques being promoted within the colleges are being implemented. This allows the government to justify the level of investment and engagement with land based education, as a case can be presented to tax payers identifying how agricultural practices are being shaped through education.

This method of quality assurance is very different to that implemented by Ofsted in England, which tends to be very data driven, with success rates (the percentage of students who start the course and who complete with a qualification) being first and foremost in any judgement of quality. Completion rates have never been reported in the Teagasc system. Interestingly one of my interviewees in the UK commented that the “fastest way to improve further education would be to decouple success rates from the grading of colleges”.



Figure 4: The Importance of Agriculture to the Irish Economy
a poster in the window of the Department of
Agriculture, Food and the Marine in central Dublin



Much like the AgriTech strategy, FoodHarvest2020 also promotes the development of the research base, yet another objective being pursued through Teagasc. Alongside the core grant Teagasc receives (see above), the Research Stimulus Fund expressly encourages Teagasc to work with universities to draw down research funding. Any research considered a “large project” in 2013 had to include three partners, with each partner receiving at least 10% of the total budget to discourage tokenism. Other partners were frequently Institutes of Technology, and vocational institutes of higher education, for whom the Department of Agriculture, Food and the Marine has provided call seminars and training to help prepare them to take on new research.

In so doing the Department hopes to not only improve agricultural education and the research base, but also to make smaller educational institutions strong enough to compete for non-exchequer funding, thereby growing the land based education infrastructure even more strongly. Professor Alex Evans, Dean of Agriculture at University College Dublin (UCD) did however note that coordinating universities is “politically challenging”, although UCD in particular is thoroughly involved throughout the government’s education mechanisms. The Teagasc education committee includes a representative from UCD, and many UCD faculty sit on the sub committees responsible for writing curriculum for different specialisms.

5b. The American State Departments of Education

The central government’s approach to land based education in Ireland contrasts starkly with that seen in the USA, where education has always been a state issue (it is mandated as such in the constitution). As such each state spends money on vocational education in different ways; some have used money to build technical colleges, some have integrated vocational education into their schools and others (such as Florida) have invested in their community colleges.

As such, government engagement with land based education in the US refers to state departments of agriculture and education, and therefore varies from place to place. However, despite this, a very strong agricultural presence began to emerge in schools in the 1970s, in contrast to the Irish focus on post-school education. There are now 80 universities in the USA with faculty dedicated to training educators to meet the demand for agriculture teachers. This demand can only occur with some level of government involvement, as many state departments of agriculture have a team dedicated to liaising with the department of education and the local school districts to encourage the uptake of agriculture subjects. It is worth noting that such a team is recommended in the Feeding the Future report. Professor Edward Osborne of the University of Florida told me that supporting these teams was a key role of the university’s own Agricultural Education department, and that a similar role is played by many universities across the country.

This role in encouraging uptake is very important in the American system. In a four year high school the core subjects of maths, science, English, history etc. will not add up to the 18 credits needed to graduate, so the rest are electives. There is a perception that to get into college students need to do more maths, science and English and will shun electives like music, art and agriculture. Convincing schools and students to take agriculture as an option for delivering the science curriculum is one of the challenges facing these state-wide agricultural education teams. They also help small schools that don't have the critical mass to put on these programmes; for example by helping them pool resources with other small institutions or twinning them with larger ones.

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5c. The Ontario Ministry of Agriculture, Food and Rural Affairs

Canada governs education in a manner similar to that seen in the USA, with education policy devolved to the province. The Ontario provincial government is very active in the promotion of land based education, albeit predominantly indirectly through the use of research funding. The Liberal premier was until very recently the agri-food minister, which according to almost everyone I spoke with in the province has had positive impacts for the industry. Mark Wales of the Ontario Federation of Agriculture noted that this had never happened before and that there had never been a high profile for agriculture among ministers, whereas now the agriculture portfolio is drawing a lot more government attention.

One of the premier's particular interests is a food strategy through which the government wants every 16 year old to be "food literate", defined as able to prepare 6 meals from scratch. As such the premier is driving a home economics curriculum into Ontario's Local Food Act. Mark Wales pointed out this educational policy had a lot of ramifications for industry despite not being directed at future agriculturalists. He told me that if children understand healthy food they will need and want to know where to get it, which creates new markets. Home economics lessons will also deal with preventing waste (half of Canadian produce is wasted). Politically it is hoped these efforts will also impact on to the public health effort to drive down the cost of health care.

Within the province of Ontario, agriculture's role in economic development is being consistently promoted by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). As in Ireland the ministry generates research priorities based on the diversity of successful crops and enterprises in the province, generating over 100 research priorities each year.

Home economics lessons will also deal with preventing waste (half of Canadian produce is wasted).

This government collaboration revolves around a partnership agreement between OMAFRA and the Ontario Agricultural College, which is a part of the University of Guelph. The president of the university and the agriculture minister meet annually, whilst the vice principal in charge of research is co-located with the ministry's director of research who together administer the partnership agreement.

The partnership agreement revolves entirely around research and has no direct financial impact on teaching and learning within the university. That said the partnership injects 70.8 million Canadian dollars into the Ontario Agricultural College each year, supporting faculty and facilities which clearly has a huge effect on students. Some of this funding is used for an agri-food lab for the testing of food standards and milk testing, and some is used for animal health labs, but most is put into developing new methods of food testing, new animal testing procedures and other very applicable processes. OMAFRA owns the research stations and laboratories and then pays the university to run them, which in turn generates 25 million Canadian dollars in income which is then ploughed back into the university, again affecting teaching and learning.

This model of actively supporting infrastructure to allow educational institutions to generate their own income is similar to that seen in Ireland where, as already noted, Teagasc colleges and research facilities are empowered to generate income through advisory and research grants.



By using this model OMAFRA avoids the need to employ researchers. Instead money is put into the industry. This avoids collecting all sorts of costs, allows the model to change and be reflective and allows the ministry to support commercialisation without owning intellectual property (IP).



Figure 5: Vinelands Research Station, Ontario Canada

Outside the partnership OMAFRA also contributes to the development of graduate students directly. As an example Mike Toombs, Director of OMAFRA's Research and Innovation Branch told me about an annual research update day the ministry runs for the graduate students. The ministry brings together producer groups and allows the students 60 seconds to pitch their ideas and their research to them in a bid to help them learn how to speak plainly. There are often poster competitions at these days to help train the researchers in expressing themselves in different ways.

The Ontario model of government involvement is perhaps unique in its total focus on research but, like the Irish use of "practice adoption" as a measure of success, it allows a very substantial amount of funding to be funnelled directly into agricultural education in a manner that can be justified to the tax payer.

5d. The Austrian system

One interesting aspect of the Canadian system was the level of input OMAFRA had directly into the dominant land based university. There was a certain degree of disquiet about this among the academics at the University of Guelph (see *What is University For? Chapter 7a, page 39*). The Austrian system of land based education is orchestrated entirely from the Federal Ministry of Agriculture, Forestry, Environment and Water Management, yet the one genuinely land based university, the Universität für Bodenkultur (BOKU) is completely autonomous. It can implement new



professorships or new curricula without needing to refer to any ministry. All decisions are run through a university senate and a directorate. Professor Martin Gerzabek, Rektor of BOKU, stressed just how important this independence is to the generation of new ideas and new thinking, which he saw as the purpose of a university (see *What is University For? Chapter 7a, page 39*).

University aside however, there is a complex and comprehensive land based education system that is run through the Schools, Teaching and Research department of the Federal agriculture ministry. The ministry maintains secondary (ages 16-18) colleges in agriculture, forestry and horticulture, and next year there will be one in environment and natural resource planning with two of the existing colleges adding this latter subject to their curriculum. Each of these colleges receives its financing directly from the agriculture ministry.



Figure 6: The Federal Ministry of Agriculture, Forestry, Environment and Water Management

As well as these agricultural secondary colleges the ministry is involved in supporting a vast number of agricultural vocational education and training (VET) schools, responsible for apprenticeships and full time practical education for those not wishing to pursue the more academic secondary schools. These VET schools in fact belong to the regional governments in terms of funding and administration, but the federal agriculture ministry asks each of them to maintain a similar curriculum with a standardised exam at the end of the programme. The ministry also supports these VET schools by providing comprehensive training to those who teach in them, through the delivery of undergraduate programmes in agricultural education similar to those found in the USA. These programmes are delivered at Hochschule für Agrar- und Umweltpädagogik, which again belongs to the Federal Ministry of Agriculture, Forestry, Environment and Water Management (See *Training Agricultural Educators, Chapter 10, page 50*).

The process of curriculum development and the government's contribution to it was unique among the countries I visited. Across the range of programmes delivered in the VET schools and the ministry's own secondary colleges and teacher training college, the ministry works with the ministry of education and women to set appropriate educational standards. They then invite representatives from industry to discuss the curriculum. A law is then proposed to set them in stone, which will be valid for ten years. If during this time changes need to be made then the federal ministry for education is approached by the agriculture ministry to negotiate any required updates. Unlike Ireland, where the speed at which innovation is embedded in the curriculum is a source of pride,



there was a belief in Austria that innovation is to be kept at higher education level and that stability is what is important in educating younger people. This also contrasts starkly with the situation in the UK, where education policy and qualification specifications change with great frequency. By way of example BTEC long level 2 and 3 qualifications have changed substantially at least 3 times in their assessment methodology in the past five years.

**"It is important to be conservative in the schools,
to make sure there is stability for young people".**

**Margareta Scheuringer, Federal Ministry of
Agriculture Head of Schools, Teaching and
Research Department**

The secondary colleges in particular are very much oversubscribed, and it is a priority of the Federal Ministry of Agriculture Schools, Teaching and Research Department to build the number that can be educated, an objective that is supported with €130million per year. The reason for this focus is an institutional belief that it is becoming increasingly difficult to be a farmer without a high level of education.

The Austrian government has an agricultural strategy that is very similar to the Irish strategy - organic and green. As such the agriculture ministry is looking at new curricula for secondary schools and considering how many hours a student should spend learning about organic farming. This strategy is in turn supported by an educational target: 100% of farmers to have a basic agricultural education, of whom 20% have achieved a secondary college education. Those in farming already are included in these targets through the incentivising of adult education. The ministry provides funding to farmers who have achieved further qualifications, a pattern I also found in Poland and Ireland. Pillar 2 funding from the Common Agricultural Policy is used to fund the training and to provide additional subsidy to farmers who have achieved the basic educational standard; more if they achieve the rank of Master Craftsperson through additional study.

This additional funding for further qualifications continues the trend of justifying spending on agricultural education. Raphaela Kitzmantel-Losch of the Hochschule für Agrar- und Umweltpädagogik told me that the Austrian press always wants to know what else farmers can offer to society. Some of the policy initiatives include social projects such as "green care" (social care for the elderly and disabled, using gardening and small scale agriculture and production horticulture as a method of therapy); and a "school at the farmhouse" (a programme that links the farm to a school

**"It's no longer enough to produce potatoes, you
need to explain how you produced the potatoes
and why you produced the potatoes".**

**Margareta Scheuringer, Federal Ministry of
Agriculture Head of Schools, Teaching and
Research Department**



district to assist with education). To access this funding, producers need to achieve qualifications.

5e. Hungary

My visit to Hungary came at a time of some political unrest and my interviews reflected a severe discontent with the government's approach to all education. A period of liberalisation in education had led to a proliferation of colleges and universities which the government was now struggling to finance, leading to a period of unwelcome reforms.

Following a period of expansion in which large numbers of new degrees were accredited, a period that some interviewees likened to the current trend in England, successive recent governments have been trying to reduce the numbers of students in total. Agriculture and environmental science subjects have been particularly badly hit, as the media perpetuates a very strong sense that there is no future for agriculture. With the exception of the University of Gödöllő numbers in agricultural subjects are falling across the country.

Interestingly however a backlash against this trend is beginning as the Hungarian government is now saying agriculture is important, despite previous efforts to reduce numbers of agriculture students. There are a set number of places the government will fund in different subjects and in recent years members of the Higher Education National Committee fought hard for the number of funded agriculture places to be raised by 15%, but the education minister refused. There has however been a recent change in attitude and now student numbers in media and related subjects are being reduced. One of the most interesting perspectives of government intervention in land based education came from discussing the Hungarian situation. Professor Sándor Csányi, Professor of Wildlife Conservation at Gödöllő told me that the process of allocating student numbers had become extremely politicised and centralised. He told me that you cannot guess how many students will be needed in five years' time when they will graduate from their courses. The solution is somewhere in the middle, not too centralised, as Hungary had become, and not too liberal, as he suggested England especially might be heading.

"No one knows what we will need in 10 years' time. Politicising the system is not helpful. The students will work in 5 years' time, no one knows what will be happening at this time. I graduated in 1983. Communism fell in 1989, no one saw it coming. We were taught to work in cooperatives not private businesses. But we could adapt because we knew how to learn and how to change. Analyse careers in agriculture, wildlife or forestry and you will see a pattern of change. This mobile phone I carry contains more information than my first personal computer. No one predicted this. I studied computer studies at university but everything I studied then is now out of use completely."

Professor Sándor Csányi, Professor of Wildlife Conservation at Gödöllő, explaining why trying to plan the training needs of the future is virtually impossible.

5f. Poland

In Warsaw I attended a conference marking the 10th anniversary of Poland's accession to the European Union, a conference at which Poland was acknowledged as being the most expert nation

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at using EU money to further agriculture. The conference was attended by the Deputy Prime Minister of Poland, and both the current Minister of Agriculture and his predecessor. My hosts stressed this highlighted how seriously the Polish government takes agriculture and rural development.

All who spoke talked about a 10 year epoch in agriculture following accession, citing improvements in animal welfare, ecology, infrastructure, parity of incomes (noting a trebling of incomes in the agricultural sector in this period), and farmers' quality of living (supported by sociological research). Having been a net importer prior to accession it was noted that now 100,000 farms are very competitive in the European market and Poland is now a net exporter and leader in income growth in the EU. As well as incomes the EU's biggest growth in food production, especially per capita, is associated with Poland. The food production industry value grew 4.5% annually in last 10 years, whilst agriculture increased in value by about 25% overall. The education framework supporting this unprecedented growth therefore warranted investigation.

Poland is now a net exporter and leader in income growth in the EU.



Figure 7: Janusz Piechociński, Deputy Prime Minister of Poland, addressing a conference marking the 10th anniversary of Poland's accession to the European Union

Following Poland's accession to the European Union, the Polish government's system of intervention in land based education has begun to mirror that seen in Austria. Exactly as in Austria there is a network of agricultural vocational schools that are under local authority. There are 555 of these schools in total, but 45 are run directly by the Ministry of Agriculture. The rural counties are legally obliged to run agricultural schools, and originally these 45 were run directly by the ministry in the poorest regions, those that could not afford to meet this legal obligation. Now however these 45



ministry-owned schools have a unique purpose, operating as exemplars of best practice in land based education from which the county-operated schools can learn.

Exactly as in Austria there is a department within the ministry that runs the 45 directly-managed schools and forms curricula for all. The ministry has input into the development of all the curricula in all 600 schools, but due to the 1998 decentralisation of government the local authorities were tasked with school education, so all the non-agricultural topics in the schools are guided by local education authorities (*see Academic Skills in Vocational Programmes, Chapter 8, page 47*). Again following the Austrian model, the Ministry of Agriculture established a teacher-training college to provide staff for these schools and to participate in extension.

When asked for an example of how the ministry works to develop curricula, Aleksandra Chlebicka of the ministry's Foundation of Assistance Programmes for Agriculture (FAPA) told me there is concern that there is a lack of modern programmes leading to new markets, so the ministry is working to embed marketing, entrepreneurship and agribusiness into all the programmes delivered at the vocational schools.

FAPA's role is to support agriculture and rural development within Poland, taking on roles broadly equivalent to Ireland's Teagasc (minus the direct responsibility for schools/colleges, which in Poland sits in a different department) and elements of OMAFRA, particularly in the role of coordinating research and extension. Also like OMAFRA, FAPA runs events to link bright young agriculturalists with research careers. Annual competitions include a project entitled "How to Modernise My Father's Farm", a "Best Young Farmer" award and an "Olympics of Agricultural Knowledge". These competitions give direct access to university agricultural programmes, which are phenomenally competitive, not least because in public universities the places are free. FAPA and other areas of the ministry also administer scholarships for the brightest pupils.



Figure 8: The imposing Polish Ministry of Agriculture

Within the Polish national development plan constructed as part of EU accession there are strategies to encourage young people to stay in farming. This allows FAPA to draw down funding for "enabling young farmers to operate within agriculture" from the European Union; a figure that totalled €420million 2007. This money is used for helping young farmers develop business plans and finance investments and, exactly as was the case in Ireland and Austria, to access this money requires a certain level of education. Unlike these other European countries however there is an option to

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receive this training or investment before the education has been undertaken, by agreeing to achieve qualifications within three years. FAPA's Head of Section Analysis, Aleksandra Chlebicka, told me this was a huge driver of demand for agricultural courses as people are encouraged to improve their skills and education. This increased demand for courses.

One note of caution regarding government coordination of research, teaching and extension was sounded by one interviewee who suggested that government could sometimes act as a brake on research reaching extension agents in particular, as it had to be filtered through an unwieldy bureaucracy rather than passing directly to the extension agents on the ground. This problem is however circumvented in the maintenance of the school curricula through a unique system of collaboration between government and the major Polish Life Sciences Universities. The Ministry of Agriculture will assist universities to put on conferences for agricultural teachers in which recent research is discussed.

Unlike the complete autonomy of BOKU in Austria, there are regular meetings facilitated by the agriculture ministry in which industry representatives can discuss current industry need with universities. By way of example Dr Nina Drejerska, Vice Dean for International and Domestic Cooperation at the Warsaw University of Life Sciences (SGGW), explained that the ministry is currently pushing cooperatives very hard as a business model. This then drove the need for a conference for agricultural teachers covering the economics and business theory behind cooperatives and also led to a proposed new MSc specialism in cooperatives within the faculty of economics.



Figure 9: The Warsaw University of Life Sciences, the SGGW



6.0. Structuring education

The way in which land based education can be structured varied considerably around the world. In England there are elements of agriculture that appear in the national curriculum for school age pupils, including geography and rural and land based science GCSEs and the option to undertake BTEC Diplomas in land based subjects, but the focus of land based education has always been at post-16. At this juncture there are BTEC and City and Guild Diplomas delivered full time at land based colleges and apprenticeships delivered in the work place. Apprenticeships involve workplace assessment and either a day per week in college or occasional block release to college. These qualifications are modular and include functional skills qualifications in maths and English where these have not already been achieved at GCSE grade C or above. They are divided by level, with Level 2 being GCSE standard and Level 3 being equivalent to A levels (the precise number of GCSEs or A levels to which a qualification is equivalent is dictated by the learning hours involved). Beyond this are a range of higher education (university-level) qualifications available, including Advanced Apprenticeships, Foundation Degrees (the first two years of a Bachelor's Degree) and Higher National Diplomas.

My own observations coupled with research in industry found a number of issues with the English system as it stands, not least that it is extremely complicated and changes frequently. There were also questions raised by some in industry as to whether agriculture should feature in the school curriculum at all, or whether traditional academic subjects should be mastered first. Around the world there are a huge range of different structures being employed, in terms of the qualifications available, the institutions that offer them and the ways in which they are integrated.

6a. Land based education in schools

In Ireland and the USA the vast majority of students stay in school until they are 18, achieving a leaving certificate or a high school diploma respectively. In Ireland this typically involves studying between six and eight subjects, one of which may be agricultural science although only 20% of all Teagasc students arrive having studied this subject (possibly due to it being very outdated compared to the Teagasc curriculum). The leaving certificate is held by most in post-18 agriculture study but it is not a requirement of entry to Teagasc colleges, which set their own entrance exams.

There is much greater scope within American schools for agricultural training, where it has been a part of the school curriculum since 1900. It is known as Career and Technical Education, as vocational is somewhat looked down upon as a term. As already mentioned there are as many different education systems as there are states in the USA, but in Florida there used to be one vocational school in every county, related to two high schools which would bus students over to it in the afternoon. The facilities and faculty were of a very high standard but they were very expensive to maintain. The vocational programmes still exist but now they tend to be part of the high school, sometimes in a standalone centre. Each vocational subject taken will contribute a certain number of credits towards the overall high school diploma. In agriculture a typical programme in school would constitute around 50 minutes per day or roughly one sixth of the timetable. In Florida students can opt for an agricultural education in the 4th grade (age 10), although other states think this is far too



early. Although not as dramatic as the streaming that takes place in Austrian institutions, this is similar to the discernment process that takes place in central European countries at a similar age. Out of 800 high schools in Florida 300 deliver programmes in agriculture, which is reflective of national trends, with a network of 80 university agricultural education departments seeking to drive this number up.

A cornerstone of the agricultural education system in the USA is ongoing professional development. Within the University of Florida Agricultural Education department there is someone tasked with finding out what the teachers need to know, sifting through new research and technological developments and updating school districts and teachers as appropriate. This is similar to the role played by the SGGW in Poland (see section 5f, page 16).

Professor Kirby Barrick of the University of Florida's Agricultural Education Department has been instrumental in spreading this method of delivering agriculture in the schools to other countries, including South Korean, Egypt and Swaziland.



Figure 10: Professor Kirby Barrick and a plaque commemorating his role in establishing the Future Farmers of Egypt

In Canada specialist agricultural high school majors have developed over the last few years. Although there is no equivalent network of university agricultural education departments, professors and (uniquely) students from the Ontario Agricultural College contribute to the delivery of these



programmes. The OCA offers conferences and teaching resources to high school teachers and runs one-day events in schools in which faculty and university students give careers advice to children and parents. Notably, despite their positive impact on recruitment, these efforts are financed through commercial fund raisers rather than through the university baseline. Agricultural societies, large agribusiness and alumni organisations contribute well over \$100k per year to these programmes.

One of the most innovative uses of land based teaching of school-age children in Canada can be found in the University of Guelph Arboretum. Every year grade 11 (16-17 year old) students will spend a semester at the arboretum, in which time they teach English, biology, fine art, anthropology and environmental sciences (all from the standardised curriculum) to grade 4 (9-10 year old) students using the arboretum as a resource. This programme is accessible to all high school students, with the places filled through a competitive application process. The programme is run as a collaboration between the city school board and the arboretum, with the school board renting the space from the university. The board accredits the programme to make sure it meets the national curriculum. Chris Earley, Education Coordinator at the arboretum, told me the standardised test scores of the participants are improved by participating in this innovative method of teaching. They are accompanied by one teacher throughout the programme, provided by the school board, and children pay \$3-400 to be in the programme.

Similar programmes exist across Ontario, but rather than a formal structure the genesis tends to be in a forward-thinking teacher selling an idea to a local school board. The limiting factors to a wider uptake of this type of teaching are as one might expect - funding and the availability of sites with suitably varied habitats to allow a diverse curriculum to be delivered. When done well, however, Chris Earley asserted that this type of education can be very effective in bringing the best out of students not well served by purely class-based studies. A lot of the students passing through the arboretum's education programmes go on to field research, teaching and environmental law. Chris Earley was in fact planning to travel to Costa Rica, where this is being carried out on a considerably larger scale.

6b. Technical/vocational colleges

The central European education model leans heavily on vocational institutions and from a much earlier age than typically seen in the UK, Ireland or the US. In Hungary students choose to attend either an academic, professional or vocational school at the age of 14. Almost 100% of those attending academic schools (gymnasias) go to university, as do the majority of those attending professional schools (which include forestry and agriculture schools). In theory students choose where to go although oversubscribed academic schools find ways of selecting. Ten per cent of university entrants to agriculture programmes studied at agriculture professional schools, but a common theme among European countries was that students progressing from these schools often struggle at university. It was suggested in Austria (where 20% of undergraduates in agriculture programmes are from agricultural colleges) that this may be because they are often taught academic subjects such as maths, foreign languages and history by agriculture specialists.



The Austrian system also involves a decision at 14, at which point students can attend academic high schools, or (if choosing land based subjects) a land based secondary school or a Vocational Education and Training school.

A typical land based secondary school is Schönbrunn, in Vienna. Home to 140 students at any one time, Schönbrunn teaches horticulture and landscape design but does so in the context of a stunningly varied timetable. Whereas a full time horticulture qualification in England would generally be post-16 and would study nothing but horticulture and maybe English and maths, the Schönbrunn curriculum includes history, religious studies, foreign languages, sociology, economics and business studies.



Figure 11: Schönbrunn, a horticultural high school in Vienna housed in a modern eco-building

With 140 places Schönbrunn is very competitive, drawing students from across Austria. As such around half the students live in halls of residence despite the young age of entry. A qualification from a land based secondary school guarantees entry to university, which is the route chosen by about 33% of leavers. A further 33% will take up posts in the land based sector whilst the remainder will progress to jobs in other sectors.

As discussed in Section 5, these schools belong to the ministry of agriculture and are very well funded. The buildings I saw at Schönbrunn were brand new and very well equipped. Garden design was supported with a modern design studio, earth sciences with a new laboratory, and every classroom was designed to minimise noise penetration from outside. Interestingly however, despite the high level of investment there were no interactive electronic white boards, as these were deemed inferior to traditional chalk boards and white boards.

As well as horticulture there are schools in agriculture, forestry (including wildlife management) and uniquely a very popular school in rural housekeeping school. Overall the ministry of agriculture is



Figure 12: Schönbrunn's new earth science laboratory



Figure 13: Schönbrunn's garden design studio. Note the chalk board and the overhead camera used to project paper designs from the desk onto the wall.

responsible for 4000 students in secondary schools, 470 in teacher-training college and 14,000 in apprenticeships! This emphasis on apprenticeships is facilitated by an organisation called the LFA that certifies employers as competent to take on apprentices by working with them to develop in-company training programmes. In return for taking on apprentices these employers receive a

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substantial amount of money from the government and do not contribute to the training cost of the student.

Those undertaking these apprenticeships attend one of the hundred or so vocational schools, which can also be attended on a full time basis. These qualifications last for three years and do not grant entrance to university, although they still maintain a strikingly varied curriculum of academic subjects, even in the apprenticeships. The only way to enter university is to move to a secondary school, a step-change most students find extremely challenging.

The Polish system again introduces choice at a comparatively early age. General education is mandatory from the age of 6 to 15. At this stage students choose between secondary school, leading to state exam granting entry to university, or a 3 year vocational school which does not lead to the exam. As in Austria and Hungary there are agricultural vocational schools. Interestingly these used to be very popular but are now disappearing as the sector becomes increasingly technical and the need for a university level education is recognised.

“Polish farmers are increasingly recognising the need to develop into new markets and use new techniques, especially in the wake of EU accession. This means people are valuing agricultural education more highly and more agriculturalists are wanting to go to university.”

**Dr Nina Drejerska, Warsaw University of Life Sciences
Vice Dean for International and Domestic Cooperation**

Polish secondary schools are divided into generalist, similar to the Hungarian gymnasiums and Austrian high schools and lasting 3 years; and specialist, equivalent to the Hungarian professional schools and Austrian land based secondary schools. There are specialist secondary schools that focus on agriculture and these are growing in popularity. Like their Hungarian and Austrian counterparts they maintain a well-rounded and comprehensive curriculum of academic and vocational subjects, focussing particularly on agribusiness and sustainable farming.

In Ireland Teagasc colleges are very popular but can only be accessed following the completion of high school at the age of 18, with the most common vocational qualification being the baseline level 5 certificate in agriculture. Once this is completed Irish students have a number of options. Those planning to return to the family home who want to access various incentives will proceed to the level 6 special purpose certificate in farm administration, generically known as a “green cert”. This qualifies the holder to substantial stamp duty savings on the transfer of land, for example. Around 50% of Teagasc students will choose this route. Forty per cent will opt to study a level 6 specialist certificate, with a view to working for someone else rather than on their own farm. The third option is to progress to higher education.



Figure 14: Teagasc, the Irish Ministry of Agriculture's teaching, research and extension organisation, is responsible for the running of vocational agricultural colleges.

As already mentioned, Teagasc colleges set their own entrance exams. Interestingly this often proves an indicator of future performance and commitment to the programme, as those with better leaving certificate grades often do not perform so well on the Teagasc entrance exam as they tend not to take it so seriously.

The US misses this level of education altogether. Like Ireland all students stay in school until they are 18, but after this the only routes for further study are universities and community colleges (the latter of which do tend to be technical and vocational, but are technically higher education institutions). Pre-18 vocational education is embedded into High School programmes (*see section 6a, page 20*).

6c. Higher education

In Ireland arguably the pinnacle of taught education (as opposed to research degrees) is the Bachelors of Agricultural Science, a four year programme including an integral internship lasting between one year and three months and delivered at University College Dublin - in contrast to the large number of universities and associated colleges offering degree programmes in England. That said, certain Teagasc colleges are partnered with UCD and are able to deliver level 7 certificates (one level below the Bachelor of Agricultural Science), which tend to be more vocational in focus. A further seven Irish universities and Institutes of Technology offer level 7 degrees in agribusiness, forestry and equine sciences.

In both the USA and Canada students arrive at college with a major chosen, but they will continue to study a wide range of subjects from across faculties and can change their major a limited number of times. This flexibility can be of tremendous benefit to the land based learner. Professor Dorota Haman, the University of Florida's Chair of Agricultural and Biological Engineering, pointed out that

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agriculturalists can take courses from across her department to gain a thorough understanding of engineering whilst still graduating through the school of agriculture.



Figure 15: University College, Dublin

Agriculture students are entering higher education in Ireland through one of three routes: direct entry straight from school, as mature students, or as transfers in from the level 7 qualifications mentioned above. Similarly half the students at the University of Florida will have undertaken two years of college at a local community college before transferring to the University of Florida to complete their major, which is increasingly common across the US. The pressures driving this trend are similar to those in the UK - the cost of living and the desire to study from home first among them. Professor Edward Osborne did however highlight that there was an additional benefit to agriculture students who maybe could not justify moving away from their family farms to study.

A similar flexibility exists in the Canadian system, but it is managed in a far more sophisticated fashion. Whereas the Irish and American systems are similar to that in England, where a two year programme can be directly converted to a degree through a top-up programme, the Canadian system seeks to support two very distinct higher education qualifications in land based subjects: the diploma and the more traditional degree. The diploma is a two year programme broadly comparable to an English Higher National Diploma, delivered in Ontario primarily at the University of Guelph's Ridgetown Campus, a working farm that doubles as a research station. The diploma initially supported students wanting to go back onto the farm, but is becoming increasingly popular with people without a farming background. Mark Wales of the Ontario Federation of Agriculture suggested this growing interest is being driven by the Local Food Act and a growing enthusiasm for small, localised producers leading to new agri-business start-ups.



Professor Jonathan Schmidt, Associate Dean of the Ontario Agricultural College (OAC), highlighted the importance of keeping a qualification of this nature distinct from the degree programme, focussing on practical skill acquisition to differentiate the diploma. He explained that vocational and academic higher education streams have emerged over time driven by the understanding that a framework of hierarchical competence can distort the fact that some people are more suited to the vocational than the academic. As such the diploma has its own prestige without being simply the first two years of a degree programme.



Figure 16: The Ontario Agricultural College, University of Guelph

Having arrived at this point “organically”, the government is now looking at how transferring between the diploma and the degree can occur given the differences in emphases and the desire to keep the diploma as something unique. The result is the development of transferrable learning outcomes as opposed to credits. Although many countries seek to ensure there is the possibility of movement between practical and academic education, this was a unique approach on my travels. Rather than simply accruing credits attached to qualifications (which leads to the distorting hierarchies mentioned above), students can claim to have achieved certain learning outcomes. Making this strategy work is a key area of policy development in Ontario at the moment and the resulting system is very sophisticated. This use of learning outcomes avoids diluting degree programmes and maintains the integrity of the diploma.

Higher education vocational qualifications are less common in Central Europe. In Austria these qualifications are administered by technical institutes called fachhochschulen, but there is only one programme in agriculture. The Austrian agriculture ministry is considering founding their own but this idea is very much in its infancy and would need the permission and funding from the Ministry of Economics and Science. As already mentioned in Section 5, the agriculture ministry does however maintain a teaching college that trains the teachers for the VET schools and apprenticeship programmes (a full degree is required to teach in the land based secondary schools).

Other than these two options, university in Austria is quite strictly defined. This may be because there is no need for alternatives to university as, in Austria, there are no tuition fees and universities are not allowed to limit numbers! The “matura”, obtainable from many of the academic and vocational routes outlined in previous sections, allows Austrian students to go to whichever

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university they wish. With accession to the European Union this right has been extended to those holding similar qualifications across the EU. This unsurprisingly results in poor international rankings for Austrian institutions as there is no selection, resulting in typical success rates lower than 50%. Around 35% of all students in Austrian universities drop out half way through the first year, and Professor Martin Gerzabek pointed out that if success rates were calculated after this point then BOKU in particular would post success rates of around 77%. This method sounds very counter-intuitive but allows all students to explore their potential rather than being judged on past performance.



Figure 17: Universität für Bodenkultur, Vienna

As already mentioned in Section 5, Austrian universities maintain staunch independence from any government interventions, and BOKU has designed a curriculum that they feel “future proofs” their students. All students, regardless of degree programme, study a programme that includes 25% natural sciences, 25% technical sciences, and 25% social and economic studies, with the remainder making up the student’s specialism. This apes the Canadian and American system of maintaining a range of academic disciplines all the way to degree level.

In Poland and Hungary there is slightly more diversity in higher education options. There are “Higher Vocational Schools” in Poland and regional colleges in Hungary, comparable to Irish Institutes of Technology, as well as universities. These institutions are focused on teaching rather than research and are permitted to award BSc and MSc degrees depending on the staff and facilities they have. In both countries the ministry of science and higher education takes the decision as to whether an institution is capable of running a particular programme. Far stricter criteria are applied than is common in England, with the result that in Polish and Hungarian universities all staff hold at least PhDs and are engaged in current research. Once the ministry has decided to allow an institution to deliver degree programmes it then dictates how many students the college or university can recruit,



with the institutions' boards then deciding how to divide this number between their departments. A strict ratio of staff to students needs to be maintained in order to be accredited to issue degrees.

This state-driven approach to higher education is at odds with the independence maintained by BOKU, but can perhaps be explained by the generous government funding of students, particularly in Poland where there are no fees. This approach leads to much smaller groups than are found in Austria, where the lack of entry criteria means classes can sometimes top 500. One hundred and twenty students is typical for an agriculture programme, split into 4 groups for when they need splitting for seminars, and 8 groups for practical sessions. Each group has roughly 600 hours per year, evenly split between lectures and labs, which is about 50% more than on a typical programme in England.

6d. Post graduate

There is not a strong tradition of taught post graduate programmes at University College Dublin, which means the majority of postgraduate work in Irish agriculture is research intensive. Of all graduates in the agricultural department, around half will continue their education but many do so outside of department, which is considered a missed opportunity. Of those staying in education their destinations include teacher training, job-specific training and MBAs, rather than agricultural research.

Conversely BOKU has a very strong emphasis on teaching post graduate students, even maintaining their commitment to a broad curriculum into master's programmes. A master's qualification from BOKU involves 15% natural science, 15% social and economic science, and 15% technical sciences, with the remaining 45% making up the master's specialism.

6e. The proliferation of providers

A common theme in all the countries I visited was some brake on the number of institutions accredited to deliver land based programmes. This was particularly notable in the case of degree programmes. In England it is increasingly common for universities to franchise and allow further education colleges to deliver foundation degrees and bachelor's degrees on their behalf. This supports the government's much publicised ambition to send 50% of young people to university.

In Hungary the 1990s saw a proliferation of courses that my hosts compared to that currently seen in the UK, in which there was an explosion of degree programmes and secondary level institutions were delivering courses up to Masters' level. Within five years of this trend taking off the government recognised that colleges were delivering programmes for which they had neither the teaching staff nor the resources. The government tried to reverse the trend in 2000 and now courses will not be accredited by the government if a university cannot demonstrate the need for it, the quality of the resources available, and the suitability of the staff. However there is perhaps undue reticence to accredit as more courses mean more government expenditure. A further restriction exists on the delivery of land based subjects, which must include a practical placement period to receive accreditation.



“Everyone knows that if you want to offer good courses you need infrastructure and human resources, which are usually found at large or specialised universities. Small colleges are not large enough and not equipped to deliver the whole spectrum of education.”

Professor Sándor Csányi, University of Gödöllő Professor of Wildlife Conservation

An almost identical system exists in Poland, where a complex matrix of factors including available facilities, a staff-to-student ratio, the qualifications and publication history of the staff, plus the employment records of graduates, are used by the government to limit the accreditation of degree programmes. Much like in Hungary there was a period of proliferation of awarding institutions in which degrees were delivered by colleges on behalf of universities, but again this was brought to an end. Professor Krzysztof Klimaszewski, Warsaw University of Life Sciences Assistant Professor of Zoology, told me he could not understand the idea of giving degrees without checks and limitations on who can deliver them, but did concede that lecturers need to be good teachers as well as current researchers, and in Poland this aspect of their work is not regulated at all.

This question of who is able to teach on a degree programme caused consternation in many of my meetings, with many interviewees quite stunned that people without advanced degrees were teaching at university level. There was a consensus that people teaching on degree programmes should have participated in the creation of new knowledge. Furthermore there was concern over teaching loads. In Poland, for example, Professor Marek Klimkiewicz, professor of production engineering at the Warsaw University of Life Sciences, told me that the maximum teaching any member of staff would do would be 320 hours per year. Anyone with research commitments would be asked to teach 210-250. This compares with over 800 hours per year asked of those delivering degree programmes at some colleges in the UK. It was questioned whether such teaching loads allow staff to produce lectures of the standard required of a degree programme.

Professors I met in the USA spoke about need to have a range of facilities - impossible in small college environments - to deliver all aspects of an agriculture or agricultural engineering degree. Similarly in Canada the professors at the University of Guelph expressed real concern about the excessive number of providers in England. In Canada universities have to justify why they wish to offer a programme that is already offered elsewhere. The government will look for justification such as increasing local access to education, or perhaps a different focus for the programme. There is a firm policy to avoid spending money to fund competition, which allows the OCA to work with OMAFRA so closely. The government's position is that colleges and universities need to be distinct, and there is currently a moratorium on colleges acquiring the ability to bestow degrees.

“When there are lots of entities drawing from the same trough it makes sense to define credentials rigorously, and the government needs to see that people at university are exposed to people who are generating knowledge”

Professor Schmidt, Ontario Agricultural College Associate Dean



6e.i. Competition

In England competition is used as a driver for quality improvement. College and university funding is tied to recruitment and as such all institutions compete for students. This approach is viewed with approval by many in the agricultural sector, as many in agribusiness put great value on competition. Industry representatives within the UK told me NFU competition is good and leads to efficiency and specialisation. There are drawbacks however. Colleges refuse to cooperate with local competitors, and are incentivised to retain students who might be better served by moving to other institutions. In my personal experience students who would clearly benefit from joining a land based college have been advised by school careers advisors to stay in sixth form, advice clearly motivated by a desire to draw funding rather than to guide a student well.

In Ireland the Teagasc colleges as a collective are theoretically motivated to compete with universities for students, as they are funded on a per-student basis. In reality however the colleges are oversubscribed. There is no competition between the Teagasc colleges as they are all run directly by Teagasc, in turn reporting directly to the ministry of agriculture. As a result the principals from all the colleges get together 8 times a year to discuss common issues and ways to cooperate. Similar situations exist in Poland and especially Austria, where state owned and managed agricultural colleges are under no competitive pressure but rather exist purely to serve the interests of the agricultural ministries. There is a level of competition between universities in Poland, but in Austria there is only one agricultural university so again competition is not an issue.

One might expect a social-democratic approach to education in Ireland and central Europe, but even in Canada the government has proactively avoided competition between agricultural colleges and universities, if not general universities. As already mentioned the government will not fund programmes that will directly compete with existing provision. The Ontario Ministry of Training, Colleges and Universities (MTCU) actively promotes collaboration between providers and regulates competition for students. Instead, the MTCU act to foster competition around how well courses can be delivered, by centrally determining the number of places that can be offered at each university. As a result of this policy the agriculture professors at the Ontario Agricultural College felt that their main task was not to win students from competing institutions, but rather to convert the best students to agricultural education. Additionally the OCA keenly feels the need to compete with universities outside the province and internationally. Professor Schmidt said it was this competition that drives innovation in teaching and learning. People I met at the Ontario Ministry of Agriculture, Food and Rural Affairs reinforced the fact that there is real strength in having one agricultural institution taking the lead on research and education. Oswald Zachariah, manager of OMAFRA's Knowledge and Innovation Branch said that a lack of competition is in fact vital in giving departments the freedom to try new ideas.

This latter idea was strongly echoed by Professor Gerzabek, Rektor of BOKU, who argued that a lack of competition and indeed government intervention gives a university the independence to try new programmes without fear of failure.



6e. ii. Guelph: a case study

The benefits of a system which has no competition between institutions is most clearly demonstrated in Guelph. Agribusinesses and industry representative bodies have coalesced around the Ontario Agricultural College, established in 1874. OMAFRA moved to Guelph 30 years ago, initiating the city's emergence as an agricultural centre. Careful use of the planning system allowed industry bodies to move around the research hub the university, creating a unique centralisation of agricultural knowledge and influence.



Figure 18: Innovation is everywhere in Guelph, even hanging from the lampposts!

6f. Funding education

The greatest challenge to education is surely funding. In the UK one FE college principal told me that if there is not an improvement in the funding of this level of education then college education will simply cease to operate.

In Ireland education is almost entirely government funded. Teagasc as a whole receives €120-125 million each year in addition to the €40 million the colleges make in farm advisory, education fees, research funding, and produce from the various farms. Very little money is made from the actual students themselves. Similarly tertiary education is free, with the government paying universities on a per head basis alongside a general university maintenance grant.

At the other end of the spectrum the USA easily led the field raising funds from industry and private individuals. Professor Dorota Haman highlighted a range of projects that had been supported by donations from alumni foundations. As a professor of engineering this was close to Professor Haman's heart, as there are major costs associated with the subject. Her department at the University of Florida is already considering differential tuition - in addition to the lab fees already

Land based education policy in the 21st century: what can the UK learn from the rest of the world? .. by Liam Stokes
A Nuffield Farming Scholarships Trust report ... generously sponsored by the Young Nuffield (Bob Matson) Award



being charged - to take account of the greater cost of teaching an agricultural engineering student. These methods do not however replace the reliance on private donors. Professor Haman told me the University of Florida Veterinary Hospital was one of the best in the world and was built entirely with private donations. Part of this philanthropy is motivated by the fact that all donations to education institutions are tax deductible.

Canadian and Austrian education systems are financed through a mix of private and public funding. Canadian university places are funded on a per student basis much like in Ireland, but individual faculty positions at the Ontario Agricultural College are funded by private organisations such as the Grain Farmers of Ontario. Similarly Vienna's BOKU receives two thirds of its income from a contract with the Austrian government, in return for which a range of needs are met and delivered. This latter system introduces a remarkable degree of financial stability, although as already mentioned one aspect of the government contract is an agreement to take all qualified students who apply to the university, making planning extremely difficult. The remaining one third of income is from external funds. In vocational education, however, the Austrian system is funded much like the Irish - all funds are drawn down directly from the ministry of agriculture.

The Hungarian situation was in a state of flux financially as well as politically at the time of my visit. The introduction of university tuition fees had precipitated a 25% decline in the last 3 years: from 130,000 students in 2010 to 90,000 in 2013. This has resulted in a real world loss of university income of 33%, causing salary freezes across the sector and a perilous financial situation at many institutions. The government sets the fees the universities charge and, in response to this loss of funding, has recently raised the price of university programmes, doubling the cost of wildlife courses without any relation to the cost of delivering the programme. It is too soon to tell what effect these changes will have.



7.0. Life Science University

A notable trend across central Europe was the development of agricultural colleges to become Life Science Universities. Whereas in the UK, and England especially, agricultural colleges tend to merge or become land based campuses of larger institutions, these European colleges have instead remained independent and grown in their own right by diversifying into a wide range of academic subjects. Subjects such as economics, business studies and sociology are offered with a rural emphasis. These institutions are called Life Science Universities.



Figure 19: The Universität für Bodenkultur

A prime example is BOKU, the Universität für Bodenkultur in Vienna. Spanning three sites and a number of research stations, BOKU was founded in 1872. The university's development mirrors the turbulent history of central Europe. The need for an agricultural university was recognised by the Austro-Hungarian Empire in 1818, resulting in an institution being founded in Hungary, but as the Hungarian region of the empire became increasingly autonomous, BOKU was founded in response to the need for a German-speaking institution in Austria. Forestry, wildlife management and civil engineering were added to the agricultural curriculum in the late 19th century as a response to a series of natural disasters, with food and biotech subjects added in October 1945 in response to the glaring issues of food security highlighted by the Second World War.



Today the institution is the fastest growing university in Austria, having increased the student body from 4000 to 12,000 in ten years. Of these 20% come from outside Austria. They are instructed by 200 professors, one third of whom are not Austrian. This may sound substantial, but these figures pale in comparison to the neighbouring University of Vienna which has 95,000 students and 10,000 staff. Yet Rektor Professor Martin Gerzabek told me that maintaining BOKU as a small, independent university was key to its success and future growth. He suggested that all the flexibility to develop and respond quickly to changing industry need would end immediately were BOKU to merge with a larger university. BOKU was faster to commercialise and faster to internationalise than any other university in the country, resulting in more commercial income than the University of Vienna (mostly from agro-tech and chemical contracts) and more English language masters' programmes than any other university in Austria. Professor Gerzabek believes BOKU is a model for small land based universities, being exactly the right size to maintain efficiency without being unwieldy.

"Independence is vital to prevent land based subjects from being side-lined."
Professor Martin Gerzabek, Universität für Bodenkultur Rektor

This pattern of development from pure agricultural college to something more diverse but independent is equally marked in Poland. Unlike in Austria, in Poland there were a number of agricultural universities, including Olsztyn, Lublin, Krakow, Poznan and Szczecin, all of which are morphing into diverse universities of life sciences.



Figure 20: The Principalship of the SGGW



One of the oldest of these is the Warsaw University of Life Sciences (SGGW), founded in 1816 and responsible for the establishment of many newer agricultural education institutions, including the Ukraine University of Life Sciences. Considerably larger than BOKU, the SGGW offers a more varied but still land-based curriculum across 13 faculties, serving 28,000 students. These faculties include the expected Agriculture and Biology, Food Sciences, Veterinary Medicine and Forestry but also subjects such as Economic Sciences, Humanities, Wood Technology and Applied Informatics and Mathematics. These faculties facilitate research into sociological and economic trends in rural communities. It was research from these faculties that allowed Polish politicians at the conference I attended to explain that investment in rural infrastructure was improving quality of life indicators among farmers, as well as improving public perception of the industry - both of which are important in justifying future investment in the eyes of the electorate.

The land-based focus of seemingly non land-based courses is maintained through a combination of curriculum, internships and facilities. All bachelors programmes at a Life Sciences university in Poland include an internship. Even an economics student will spend 4 weeks working on a farm, to maintain the land-based nature of the programme. In the case of economics this is followed with a 7 week placement focussing on economics. This insistence on industry placements is not unique to Poland - I found similar requirements placed on all practical or vocational degree programmes in Hungary. The SGGW facilities include an arboretum, stables, machinery workshops, glasshouses, animal clinics and off-campus agricultural and forestry stations, all of which were integrated into teaching and the internship programmes.



Figure 21: The enormous agricultural faculty building at the SGGW

Some of these unique faculties serve to bring diversity to more widely recognised degree programmes. For example the faculty of Animal Sciences combines zoology with animal hygiene to create an animal biology programme, but it also delivers game management to wildlife and forestry students and maintains a guiding focus on agriculture. Professor Krzysztof Klimaszewski told me that even his zoology research had to sit in a life sciences context, which is to say remaining directly applicable to managing the rural environment. Research interests within the faculty include agricultural animal husbandry, the management and breeding of wild and captive animals and the bioengineering of animals, while still serving as a base for students wanting to focus on wildlife management, conservation and taxonomy.



Figure 22: The engineering faculty at the SGGW

A defining feature of a Polish Life Science university is an agricultural engineering department, although the definition of agricultural engineering is different both to ours in the UK and to that I found in Florida. The SGGW Faculty of Engineering delivers three programmes; agriculture and forestry technology; renewable energy technology; and production engineering. Agricultural and forestry technology is essentially mechanisation, while production engineering covers robotic milking, trialling soil canals and the reduction of emissions. Other departments within the faculty look at physical properties of extruded foods. The renewable energy technology programme looks at solar technology, recycling, geothermal technology and biofuels. This definition of land based engineering was broadened even further at BOKU and the University of Florida, where these departments included elements of civil engineering such as drainage and irrigation.



Figure 23: A lecture on robotic milking in the SGGW's department of production engineering



**Figure 24: Production line management
in the SGGW department of fundamental engineering**

Although typical of Central Europe and not really replicated elsewhere, the Ontario Agricultural College was in many ways very similar to these Life Science Universities. The key difference was in the independence - the OCA is part of the University of Guelph. That aside the similarities are numerous - the faculties include animal and poultry science, plant agriculture, a department of food science, a department of food and resource economics, a school of environmental sciences and a school of rural development (including landscape architecture).

Much like the SGGW, the OCA encompasses an arboretum, three regional campuses, research stations scattered across the province and a centre for equine programmes. Within these faculties and departments the OCA delivers an enormous range of degree programmes, including bachelors of landscape architecture, commerce, economics, equine management, environmental science and lots of majors within agricultural science. The staff within the OCA also brings an agricultural perspective to the University of Guelph's Bachelors of Science, Bachelor of Animal Science and plant biology majors. Professor Shmidt said that the OCA was the model for the Royal Agricultural University!

7a. What is university for?

The persistent question that was raised throughout my travels was the issue of what a university is for. In England policy is very much driving towards widening access to university in as many ways as possible, by creating as many institutions capable of delivering degrees and as many routes to achieving a degree as possible. This approach is borne out of a utilitarian belief that a university education is about preparing an individual for the world of work, and for servicing an industry with the research and the skilled individuals that it needs. Widening access is also seen as a driver of social change, improving social mobility. These aims are perhaps laudable, and certainly aims that tend to be supported by those in industry who want to see qualifications and research objectives kept as industry-relevant as possible. All curriculum development centres on the needs of industry. This is laudable, but it is not an approach that is universal. The alternative is a focus on academia as



something distinctive, usually coupled with a system of higher technical education to service industry while allowing universities to continue to be something unique.



Figure 25 Professor Marek Klimkiewicz with a demonstration engine in the SGGW's Agricultural and Forestry Technology Department

The two countries I visited that were making the move towards vocational relevance rather than academia both exhibited a degree of tension in their research infrastructures. The Irish academics I met told me that the criteria for promotion within their institutions was increasingly linked to outreach and extension and contribution to the immediate public good rather than to the production of peer reviewed papers. I was told that when staff considers research proposals they need to look at the government's FoodHarvest2020 strategy from 2008, and consider how their research might stimulate sustainable agricultural production regardless of their land based specialism. This was reflected in an emphasis on preparing students for jobs and the application of knowledge in the curriculum. While those in government were keen to highlight this as progress, many academics I spoke to were concerned that this approach threatened to negate knowledge for its own sake, seen by them as the primary role of a university.

A similar divergence of research philosophies was encountered in Canada, where upstream research and applied research were funded very differently. The OMAFRA partnership with the university of Guelph was enviable in the funding that the University, and by extension the Ontario Agricultural College, was receiving. However this funding was very much channelled into research with a tangible and immediate application. Again this is very much in line with the demands of agriculture's representative bodies in the United Kingdom, but it was not universally accepted as a positive policy.

As in Ireland this debate about application versus academia again bleeds into the teaching curriculum. The Ontario Agricultural College was born out of a report with a similar methodology to



a Nuffield Farming project. Egerton Ryerson travelled to Prussia, Trinity College Dublin, to Berlin and to New England and produced a report that said there needed to be teacher training and vocational training in Ontario. On his return to Canada he founded a faculty of education, an experimental farm and an art college within the University of Toronto, as well as a community college for practical and technical education. These new vocational facilities sat alongside the pre-existing classical departments within the university, which had itself been modelled on the University of Cambridge and Harvard University. These new agricultural facilities would eventually evolve into the Ontario Agricultural College, which was founded on the basis that it was vital that the farmers of Ontario were at the cutting edge of agricultural science, but even at this time, back in 1874, some legislators argued farmers only needed to know how to look after a cow!

With a history of establishment to serve industry, OAC professors continue to need to engage in the community as part of their terms of service. This is part of the university agreement with trade unions and also forms part of the college's partnership with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). My interviews at OMAFRA strongly suggested a need to focus more on getting research to where it is needed, with government policy moving research to meet both commercial need and also policy demand. This is done by ensuring that researchers identify how their proposed work will be used by the end user, meaning the usual academic income streams are superseded by the need to speak at producer meetings and stay close to the ministry to show how they will disseminate their information. This has resulted in people who used to get funding no longer receiving OMAFRA support, because publication alone simply is not that interesting any more.

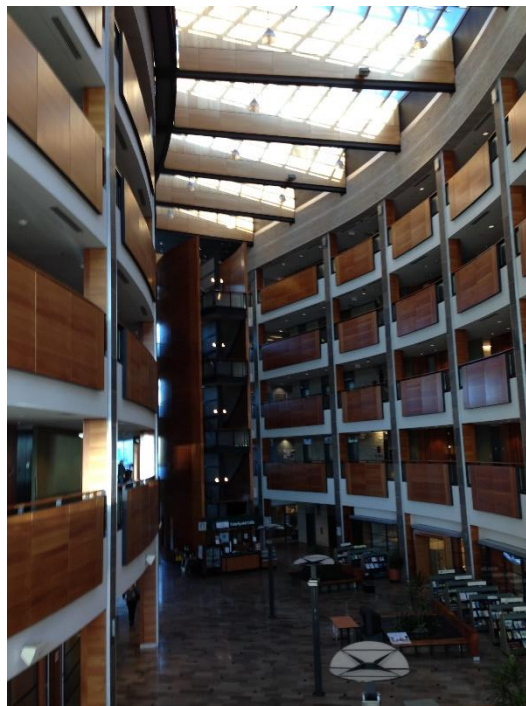


Figure 26: Inside OMAFRA

The message of shifting emphasis was further enforced at the University of Guelph Catalyst Centre, which operates as the university's tech transfer office and is the only one in Canada to have a distinctive agricultural expertise. Erin Skimson, the Director of the centre, highlighted the increasing



importance of industry relevance and a commercialisation plan in all research proposals. She pointed out that due to the “egoism of research” tax payer money was previously being spent on research that is simply “fascinating” rather than useful, and that this was unsustainable.

This emphasis on commercialisation affects all areas of land based studies. Chris Earley at the University of Guelph Arboretum said that, in ecology and wildlife sciences, the research funding is heading out of vertebrates and into invertebrates, as the control of invertebrates attracts a lot of money. He told me that he had seen a move towards graduate degrees that have no hypotheses but have direct application, citing the example of a PhD project that had focused on the creation of a smartphone application that identifies invertebrates within a greenhouse.

“Usefulness is in the DNA of agriculture.”

Erin Skimson, Catalyst Centre Director

Yet, despite this push from government and (arguably) economics, the University of Guelph academics I met echoed what I had heard in Ireland, sounding a note of caution about becoming too concerned with meeting the immediate needs of industry to exclusion of academic rigour and upstream research. Chris Earley said that knowledge for knowledge's sake is becoming less common, which means general observation is being phased out in favour of targeted data, with a resultant loss of knowledge. Yet I was assured that the fundamental coinage of academia is still publication, that peer review of research output is still vital, and that this is embodied in the publication process. I was also told that despite what I had heard at OMAFRA and The Catalyst Centre the majority of funding still reflects a need to publish.

In the UK the industry representatives I met were very keen to see a more vocational and industry-driven system, a system embodied by the policies I found in Canada. Yet Mark Wales of the Ontario Federation of Agriculture voiced doubts. He said that the focus on applied research means people have to get to market within a couple of years, which can mean that “blue sky thinking” simply doesn’t happen or, when it does, it is not linked to the future needs of farmers. Mr

Wales commented that it is primary research that results in the development of new strains of crops such as canola and various varieties of wheat, soybean and corn, but this work does not have the short-term application demanded by the drive towards commercialisation and application.

An underlying difference in the understanding of what needs to be accomplished with a degree exists between the UK and much of the rest of the world.

Interestingly a very strong note of concern was struck by the Canadian academics I met regarding the maintenance of academic rigour in UK universities, and they told me these concerns are shared internationally. An underlying difference in the understanding of what needs to be accomplished with a degree exists between the UK and much of the rest of the world. Professor Schmidt in particular pointed out that everywhere there is a need to demonstrate that universities are good value for money, either for the government or the student, and that the answer is to highlight that a quality higher education does represent a real increase in value of the student, but because there is no acceptance of “scholarliness” as a vocation, universities are a soft target for those who would say



academic rigour does not deliver value for money. I was told that universities should be defended from this charge because the ability to access and assess information and to promulgate it is vocational and useable, but in the UK we have begun to dilute the academic rigour by being too enthusiastic to widen access, meaning these skills are not being transmitted. The result is that vocational training and meeting immediate industry needs are all that is politically defensible.



Figure 27: The corridors of the Ontario Agricultural College

A close relationship between government, university priorities and the immediate needs of agriculture were common themes in the Central European countries I visited. In Hungary universities only engage in very infrequent contracts with private companies to research very specific things, with all the remaining research priorities formulated by the government and in particular the department of agriculture. As a result immediate policy needs are the top funding priority, in particular the need to make agricultural production more environmentally sound and to perfect biofuels.

Yet in Central Europe there was none of the dilution of academic rigour Professor Schmidt had warned about, with the role of a university faculty compromised for the sake of neither vocational application nor widening access. Everyone teaching in universities across Poland, Hungary, the Czech Republic and Austria (and probably elsewhere, I only managed to directly speak with people from these countries) is engaged in research as well as teaching, as it is a requirement of employment.

*Yet in Central Europe
there was none of the
dilution of academic
rigour .. with the role
of a university faculty
compromised for the
sake of neither
vocational application
nor widening access*

Although in the UK it is possible to teach at universities without a PhD, in Poland (for example) a PhD is insufficient. After a PhD, a university lecturer has 8 years to achieve a qualification called a habilitation, broadly equivalent to a post-doctorate, without which it is not possible to be a professor. Achieving this qualification requires a number of publications, meaning that everyone teaching on an agricultural degree in Poland has been involved in generating new knowledge.



Austria has an intriguing answer to the question of what a university is for. Both the debate over application vs knowledge for its own sake, and the question of widening access, are answered emphatically and uniquely. As already mentioned there is one Life Science university in Austria. The Universität für Bodenkultur (BOKU) is completely autonomous, and as such is under no compulsion to tailor its curriculum either practically or vocationally. It can implement new professorships and new curriculum without needing to refer to any ministry. Rektor Martin Gerzabek said that in his experience the Austrian system is one of the most flexible in the world, with many other countries' universities needing to pass through statutory hoops to develop new curriculum, in contrast to the total freedom given to Austrian institutions to administer their own affairs as long as they achieve a general quality management certification once every seven years.

*the Austrian system is
one of the most
flexible in the world*

Yet this freedom is itself contrasted with the very regimented school and college system, and it is in the ministry of agriculture's colleges in which ministry-funded applied research is undertaken. It is in this context that the role of university is maintained as the generation of new ideas rather than meeting the immediate needs of industry or government.

As a result BOKU has implemented programmes for which there was no demand at the time - as an example Professor Gerzabek told me that when BOKU introduced a new degree programme in landscape planning the number of agriculture students halved as many opted for the new qualification, causing outcry from politicians and farming organisations. Today this programme is acknowledged as one of the most important offered at the university, crucial in balancing the needs of different users of the landscape. A further example is the degree in environmental resource management, which was established with a recruitment target of 80 undergraduates in 2004. Today there are 500 students studying on the programme and taking up employment in the increasingly lucrative renewable energy sector.

**"University is for something different.
University is for ideas."**

**Professor Martin Gerzabek,
Universität für Bodenkultur Rektor**

Yet despite this emphasis on academic rigour, the role the university plays in widening access is unprecedented. Anyone with the equivalent of high school graduation can attend BOKU; it is not able to set entry criteria nor cap numbers. This has funding implications for the government but, as already mentioned, also has serious implications for measuring quality. Success in UK education hinges on the ability to graduate students who have been taken on, sometimes shifting the emphasis to achieve off the student and on to the teaching staff. This can in turn incentivise universities to only accept those who can be relied upon to achieve, and indeed high entry criteria are seen as a benchmark of quality. Yet Austrian universities are insulated from this by both their scarcity and their independence. They are not held to account in the manner highlighted by Professor Schmidt as being so problematic for universities, and so can maintain an emphasis on academic rigour whilst



still widening access to all. Essentially BOKU suffers from an exceptionally high drop-out rate, due to a willingness to let anyone attempt a degree but a refusal to compromise on standards. This does damage international standing, but has no impact nationally.

7b. International development and collaboration

Something all the universities I visited around the world exhibited was an extremely diverse teaching team and student body, with many students and staff participating in exchange programmes. I am aware programmes such as Erasmus exist but I don't see a lot of engagement with them in the UK, and this observation was echoed throughout my travels. The SGGW's Professor Krzysztof Klimaszewski asked me why British students tend not to travel to study. BOKU's Professor Gerzabek wondered why British universities are so reticent to mix with international partners. I was told that when the Euroleague for Life Sciences (ELLS) was formed to facilitate the movement of land based students between universities only one British institution joined, and it left shortly thereafter. As well as networking seven European institutions today the ELLS also sends students to the USA, China, Israel and New Zealand, but there are no British participants.

*The SGGW's Professor
Krzysztof Klimaszewski
asked me why British
students tend not to travel
to study. BOKU's Professor
Gerzabek wondered why
British universities are so
reticent to mix with
international partners*

This is very much at odds with other institutions within the European Union - at the conference I attended in Warsaw the Vice Rector's welcome was heavy with references both to foreign students studying at the SGGW and to their own students who were studying abroad at one of their 300 partner universities. BOKU cooperate with all the land based Central European universities in the Danube region and many universities around the world, building programmes between institutions to allow them to share students from as far afield as Lincoln in New Zealand. BOKU in particular sees a role for itself in international development by facilitating the training of agriculturalists and forestry managers from countries such as Nepal and Ethiopia, whom they educate for free.

**"If wealthy European universities
won't educate the world's poorest
people, then who will?"**

**Professor Martin Gerzabek,
Universität für Bodenkultur Rektor**



Figure 28: Professor Andrzej Sadownik delivers a chemistry class in English to Belgian, French and German students.

Since almost all these courses are taught around the world in English it is somewhat ironic that it is British students who miss out on this international education. I observed a class in Poland, delivered in English, in which I was the only native English speaker. The students were Belgian, French and German. This trend is mirrored across Europe. In Hungary Szent István University started a Veterinary Science programme 20 years ago, and now has more international students studying on it than they do Hungarian. The number of vet students is strictly regulated in western countries, so Austrian and German students travel to Hungary to study instead. The students spend five years studying in English, achieve an internationally recognised degree and then take it around the world. It is very cheap to study and live in Hungary and yet the quality is still recognised as being very high, and as a result Budapest University teaches between five and ten thousand international students at any one time.

It is particularly in scientific and technical subjects, such as veterinary science, that students tend to travel in comparatively large numbers to study, possibly due to the costs associated with these subjects and the lower number of high quality facilities available. Agricultural engineering is one such area. Professor Marek Klimkiewicz of the SGGW engineering department teaches mostly in Polish but also delivers programmes in English, predominantly to Spanish students. The university has published a range of text books in English to support the course. In Florida Professor Dorota Haman told me she sees huge numbers of applications to her engineering programmes, particularly from India and China where expertise in robotics and high technology is greatly prized.

The number of vet students is strictly regulated in western countries, so Austrian and German students travel to Hungary to study instead.



8.0. Academic skills in vocational programmes

Recent legislation has compelled any student in England under the age of 19 to continue working towards a maths and English GCSE grade C until one is achieved. Students studying for a land based qualification such as an apprenticeship or an extended diploma have always had to tackle a range of academic disciplines, such as environmental sciences, anatomy, physiology and botany, but this introduction of additional academic qualifications is a new departure. Yet we have only begun to scratch the surface of the potential for embedding academic, transferable skills into these programmes.

The tension between the immediately vocational and the broader education was summarised by the University of Florida's Professor Kirby Barrick, who described it as a great philosophical debate between John Dewey and Charles Prosser; between preparing for life and preparing for a job. Professor Barrick argued that the Dewey approach allows people to solve new problems, to gather information and to think critically. Professor Alex Evans at University College Dublin agreed, telling me that if a student can learn basic science, in particular chemistry, biology and statistics, and learn to solve problems, they will be able to respond to the challenges of the future. As already mentioned, students at BOKU have to undertake natural sciences, physical sciences and social and economic sciences regardless of their degree subject. In Poland agriculture students in their first year will be expected to study zoology, chemistry, biology and statistics before they study livestock.



Figure 29: Inside the Chemistry Department of the Agriculture Faculty, the Warsaw University of Life Sciences

This approach to higher education echoes the comments of Professor Sándor Csányi, who is adamant that a university education should primarily train the mind for a lifetime of change and adaptation, with vocational training a vital but secondary consideration. This approach is however



also seen in technical and pre-18 training around the world, where the emphasis on learning a skill or trade is not allowed to crowd out the need for a general education. Tony Pettit, Head of Education at the extremely vocational Teagasc, told me that one of his priorities is teaching future farmers to use IT to continue their own education and take full advantage of e-learning opportunities. In Poland the agricultural secondary schools teach agricultural science and agribusiness alongside a suite of general subjects such as maths, Polish, foreign languages and sciences. The Polish agricultural school curriculum is currently being reformed to embed marketing and entrepreneurship into all programmes, with the ministry of agriculture keen to ensure that all its school programmes are market oriented and modern.

The most striking example I found of the use of land based subjects to deliver a broad curriculum was in Austria. There all vocational teachers, mostly training students on apprenticeships, are expected to teach their students economics, politics, foreign languages, history and geography as well as their vocational subjects. The curriculum becomes even more diverse at the Ministry of Agriculture's high schools. Dr Kellner, the director of one such school at Schönbrunn, talked me through this extraordinary timetable, taking up to 35 hours of lectures per week and including subjects as diverse as religious education and genetics. Ensuring that all students are exposed to environmental and sustainability concerns is also seen as vital. Margareta Scheuringer, Head of Schools, Teaching and Research at the Austrian Ministry of Agriculture, was both surprised and concerned to hear that vocational qualifications in the UK were not so comprehensive, particularly that our students could stop studying foreign languages at 16. This was a common source of surprise and amusement among my interviewees in Austria!

8a. Keeping courses practical

Of course there is a balance to be struck. Land based learners tend to be practical by nature and their career choice reflects that. Indeed it is often the practical elements of the course that make the academic elements more palatable than they would have been in traditional school. The 14000 agricultural apprentices in Austria are only spending 10 weeks per year in school studying the extraordinary timetable of subjects discussed above. The agricultural secondary schools nearly all have their own land based enterprise, either a farm, orchard, vineyard or commercial forest. As well as spending time working on these enterprises students are also required to work for a company with a "teaching authorisation", an accreditation from the government similar to that used to administer apprenticeships.

Universities also have their methods of staying practical. In all practical-oriented bachelors - a formal classification of degree in Hungary - one semester out of the seven that constitutes a degree must be spent out on placement in industry. All bachelors' programmes at Life Sciences universities in Poland must include an internship, some of which must be farm based regardless of degree specialism. At University College Dublin all Bachelors of Agricultural Science students are required to undertake a one year internship, while students at the University of Florida are not required to take up internships but are strongly encouraged to do so.



9.0. Can you train too many?

Something that became clear during my study is that meeting need is a misnomer; there should be no worry about training too many students. Almost everyone I met emphasised that land based programmes are a great education for anyone. Tony Pettit said that more students apply to Teagasc colleges than can be trained, but the limiting factor is how many can be resourced and handled, not any idea of societal need - because an agricultural education is a valid education for anyone.

This point was firmly restated by Professor Kirby Barrick, who told me that research was demonstrating that high school students in the USA opting for agriculture electives are testing better at science and maths standardised tests than their peers. Given that the American system is geared towards the relentless pursuit of test scores, causing strenuous debate over whether students can get a good, broad education and a good test score at the same time, Professor Barrick sees agricultural science as an example of how test scores can be improved while broadening students' horizons.

Perhaps the strongest indicator that it is impossible to take on too many agriculture students is the recruitment and employment statistics of BOKU in Austria. BOKU is obligated to take on any and all applicants and cannot raise tuition fees. Despite this and the large numbers of students it generates, after 6 months of graduating 95% of alumni have jobs and, after 18 months, 85% have a full time permanent position.

Prof Schmidt at the Ontario Agricultural College told me about some fascinating research into the jobs available for every Canadian agricultural undergraduate. Interviews were undertaken with employers within the agriculture and food sector across Ontario. Across the province 220,000 people are employed in the sector, including those working in related business and financial support. The interviews gathered evidence from organisations responsible for 16% of this employment. Two key findings emerged from the research: firstly the sector is projecting a growth in the number of employees required of around 20% in the next five years, and secondly two out of three respondents said they would always prefer to employ people who had formal training in agriculture, but were currently having to employ people without that background.

There is an argument that the total number of people the agriculture sector needs to employ will outstrip even that prediction. Science journalist Michael Pollan argues that as modern agriculture uses more calories of fuel than it produces, and that, quite apart from debates over whether a localised, diversified agriculture can feed the world, it may have to once the fuel runs out. Pollan goes on to suggest that what this form of agriculture will require above all else is an increase in labour and a change in consumer behaviour. We also need policy makers to provide the legislative framework in which the necessary changes can occur. If Pollan's predictions are correct then this can only amplify the number of people in need of an agricultural education. Professor Edward Osborne at the University of Florida suggested this trend is already taking hold, and accredits the "local food" movement with bringing people into farming. One of the trends his department has identified is the four-fold increase in farms of between two and ten acres in size that has occurred in Florida in the last ten years, which in turn has increased the number of individuals requiring an agricultural education and raising interest in agriculture more generally.



10.0. Training agricultural educators

In the UK people teaching land based subjects in further education colleges and (where it occurs) in schools will have to have undergone generic teacher training, taking qualifications such as the Certificate of Education and the Professional Graduate Certificate of Education. These qualifications are identical regardless of whether the teacher is going to be teaching agriculture, plumbing or IT. It is generally held that each trainee brings a body of vocational knowledge to the course and then to the job; the role of teacher-training being to help each person communicate this knowledge to their students.

There is merit to this approach. Our land based lecturers tend to be experienced in the industry and well educated in the subject before they enter the teaching profession. There are however other options. There are parts of the world in which agricultural education - the study of communicating knowledge and ideas about agriculture and the land based sciences - is treated as a distinctive academic discipline. In the USA and Austria undergraduate students undertake bachelor's degrees in agricultural education, spending three years preparing themselves to teach in American High Schools and Austrian Vocational Education and Training schools. In Poland graduates from Life Science universities can take post-graduate training in land based education to prepare for a career in Polish agricultural secondary schools. These training programmes are supported by state departments of agriculture in the US, the ministry of agriculture in Austria and the government's Foundation of Assistance Programmes for Agriculture (FAPA) in Poland.

In the USA agricultural education has a very specific meaning - the preparation of future agricultural educators, agri-science teachers, extension agents and public relations operatives. I visited the University of Florida's Agricultural Education department, where 23 faculty members specialise in high school education, middle school education, extension education or public relations. Graduate students in the department research the best methods for teaching and training people in agricultural science and technology and the whole faculty publishes peer reviewed papers on the subject.



Figure 30: The University of Florida, home to one of the largest Agricultural Education departments in the USA.



The department services the very specific model of land based education that operates in the US and has been outlined above - many schools run agriculture programmes that contribute to high school graduation, and these programmes are delivered by graduates from agricultural education departments. Students within the department study one of two streams, either education or communication. In the former they study curriculum development, programme planning, teaching methods, youth development, experiential learning, teaching and learning theory and educational psychology; in the latter communication theory, design, media, journalism, and social media. Alongside these educational subjects the students require 30 credits of agriculture, which must include agricultural economics, agronomy, animal science, entomology and food science with the option of some agricultural mechanisation. Having originally split from the department of education over what Professor Osborne described as a “philosophical divide”, the agricultural education department approaches teacher-training with the ethos that agriculture education students need to be immersed in the local farming community while studying, and throughout their school teaching or PR careers. The department has a much stronger experiential learning focus than does the department of education, focussing entirely on training people to engage with the public and with school children as consumers and potential agriculturalists. The Agricultural Education Department is one of fifteen within the School of Agriculture and Natural Resources, and sees itself as the people-facing part of the agricultural equation. Not only do their graduates educate the public about agriculture, they also collaborate with other departments to offer insights into why people act and respond to certain practices in the way they do.

The typical student in the University of Florida’s agricultural education department likes people and likes farming, but doesn’t necessarily like the large amount of science demanded by a pure agriculture degree. Interestingly agricultural education seems an appealing route into the industry for female students. Female students constitute 60% of all agriculture programmes at the University of Florida but 80% of the department of agricultural education.

The department posts some very strong employment figures, and in fact struggles to meet the demand for agricultural educators in schools and as extension agents across Florida. Each year group contains approximately 25 students, and each year there are approximately 30 vacancies each year in Florida schools. Eighty per cent of the department’s alumni are teaching agriculture in schools, with the rest working in extension, agricultural public relations and research within the department.

The undergraduate programme is not the only route into agricultural teaching, but regardless of prior experience, there is no route into the profession without an agricultural education qualification - a generic teaching qualification is not sufficient. The role of post-graduate conversion is played by the department’s master’s programmes. Students on these courses are required to teach while undertaking their qualification (42 hours/week).

Where the US has around 60 agricultural education departments spread across universities around the country, Austria has one equivalent – the Hochschule für agrar- und Umweltpädagogik (which roughly translates as the college for agricultural and environmental pedagogy). This is due in part to the comparative size of the two countries, but also Austria’s predilection for having one outstanding facility rather than a range of competing institutions (see BOKU as the only land based university, for example). The Hochschule offers programmes to those who have achieved master’s degrees from BOKU and will teach in the ministry of agriculture’s secondary schools, but the majority of the



Hochschule's 540 students come directly from the agricultural secondary schools and will teach on apprenticeship and full time courses at one of the Austria's many vocational education and training colleges. Their programme is very similar to that seen in Florida, with a range of educational methods taught alongside classes in agricultural or land based subjects delivered at BOKU.



Figure 31: Hochschule für agrar- und Umweltpädagogik

During my time at the Hochschule I was fortunate enough to observe a class on "Green Pedagogy", a technique developed and popularised by Beate Kralicek and her colleagues at the Hochschule. The system involves instigating conflict among groups of students to help them think critically about key issues. Students are encouraged to take on contradicting positions on key issues such as organic farming, predator control, to think and research their way into opposing points of view and debate the topics. Through rigorous debate and the suspension of personal prejudices solutions are sought to complex questions, and by introducing conflict into the classroom it becomes very likely the future teachers will be exposed to some of the attitudes they may come across in their careers. The method is taught to future agricultural and environmental teachers at the Hochschule, where Beate and her colleagues have also published articles and handbooks on the subject for current teaching staff.

**"The process of thinking is started
by the feeling of irritation!"**
**Beate Kralicek, Hochschule für
agrar- und Umweltpädagogik**

As already mentioned there is a department within the Polish Ministry of Agriculture that directly runs 45 agricultural high schools and forms the curriculum for hundreds of others. The ministry also takes responsibility for the training of the staff these schools require, and have recently established a centre for training of agricultural teachers! Around one thousand teachers are trained annually in



Figure 32: Green pedagogy in action. Agricultural and environmental education students are introduced to a controversial topic and encouraged to share different opinions.



Figure 33: Students are then encouraged to share their ideas and debate the topic, considering the issue from every perspective and seeking to understand the conflict.

this centre, including current teachers who are upskilling, new teachers, plus those looking to work in the extension service. The creation of the curriculum for the training centre is the responsibility of the Federation of Assistance Programmes for Agriculture, which works with the Life Science Universities to identify new information to be filtered both into extension and into the training of teachers (new and current). The principal difference between this approach and that seen in the USA



and Austria is that these trainee-teachers are expected to hold an agriculture degree before commencing training.

However, direct training of agricultural educators by government-owned or -supported institutions is not the only way agricultural education can be supported. In Ireland Teagasc supports the development of land based education practices through PhD and masters studentships, looking at topics such as distance education, e-learning, practical training, benchmark farms, evaluating social media for education and the uptake of business tools, all with a view to improving Teagasc's educational provision. As already highlighted, the Ontario Agricultural College regularly holds conferences for school science and geography teachers, training them to embed agriculture into their classes.



11.0. Agricultural engineering

The maintenance of an agricultural engineering department in the teeth of ever increasing costs of machinery and technology is one of the great challenges of a modern land based institution. Another challenge I came across on my study was actually defining the term. Depending on where I was it was used to refer to agricultural machinery, robotics, civil engineering, irrigation and drainage. Some countries had stopped doing it altogether, while others had always seen it as a collaboration between generic engineering departments and trained agriculturalists.

In Ireland all students have the option within the level 5 Teagasc programme to undertake one unit in engineering, and most will do it. At level 6 the programmes are specialised, with one available specialism being crops and machinery and another being agricultural mechanisation. The Limerick Institute of Technology runs a Higher Certificate of Agricultural Technology. Teagasc's Tony Pettit suggested that while these programmes are certainly expensive and need minimum group sizes to run, this is not a problem because recruitment is very healthy. Echoing the UK experience Mr Pettit felt that losing key teachers to retirement was much more damaging to the subject.

The maintenance of an agricultural engineering department in the teeth of ever increasing costs of machinery and technology is one of the great challenges of a modern land based institution.

A more blended approach to agricultural engineering could be found in the USA, where Professor Dorota Haman, Chair of Agricultural and Biological Engineering at the University of Florida, explained that she thought the UK system of managing courses was far too restrictive. At the University of Florida, two out of every three students in the agricultural engineering department actually graduate through the college of engineering, rather than agriculture, because there are so many opportunities to study different disciplines. The American degree system allows each student to take courses across the college to tailor their programme and most engineers rely strongly on courses offered in the college of engineering. All of these courses are very, very scientific and mathematical with a basis in calculus, statistics and physics. What was particularly striking was the complete lack of agricultural or mechanical background in the student body. Professor Haman said most come with a passion for engineering and an interest in sustainability, food production or conservation rather than any sort of agricultural mechanisation. Most specialise in biological engineering, packaging engineering or water conservation rather than machinery.

The costs of these programmes at the University of Florida are so immense that the university is considering differential tuition and already charges lab fees. As already noted the department proactively seeks donations from individuals and from industry to maintain up to date equipment. Interestingly Professor Haman thought it would be even harder to bring money and recruitment into a pure agricultural engineering department rather than into a comprehensive department like that at the UoF.

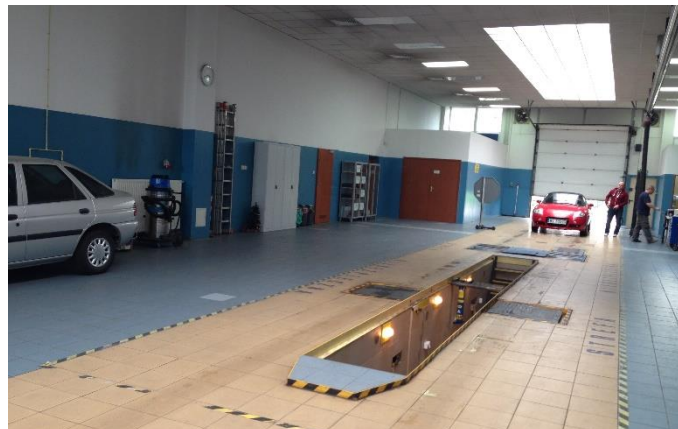
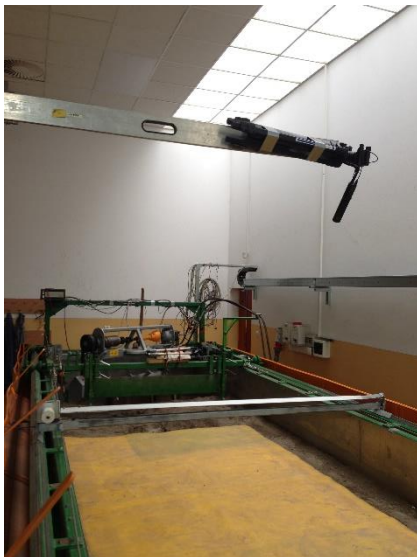
In Canada, according to all the sources I spoke to, there is no agricultural engineering programme. At the University of Guelph's Catalyst Centre I found that there is no overlap between the university's



engineers and the Ontario Agricultural College, and that no engineers pull on the OMAFRA funding even though a lot of engineers are working towards agricultural and particularly horticultural objectives. The interaction between farming and engineering has not been well defined and not that frequent, but it has been identified as a relationship to improve. Erin Skimson, Director of the Catalyst Centre, said that developing robotics for the greenhouse sector is a research priority at the university, and highlighted the need to integrate engineers into precision agriculture as a field.

**“Do you assign two sets of eyes or one well trained one?”
Erin Skimson, Director of the Catalyst Centre, questioning which is
preferable: one agricultural engineer or a collaboration between an
engineer and an agriculturalist.**

The policy experts at OMAFRA echoed this opinion. Agricultural engineering is seen in some ways as a dying profession because there is less of a need for system specialisms because of the level of technology being implemented. As a result commodity specialist engineers and structural engineers are being phased out. The overriding sentiment was that engineers and systems specialists need to work together.



**Figure 34 and 35: A soil canal and the vehicle testing station
in the engineering department of the SGGW**

The opposite approach is taken in Poland, where Professor Marek Klimkiewicz took me around the three engineering departments at the SGGW as already discussed. Here machinery, robotics, recycling, the uses of biofuels and bio-composites and even the physical properties of extruded foods are all researched and taught. The department is equipped with a range of machinery, renewable energy production equipment, production lines, soil canals and research engines. Unlike in the USA the research and teaching was very practical and applied, with machinery maintenance deemed a vital part of the programme. This focus on the practical even generates some of the income needed to run such an expensive department - the students and staff run a vehicle testing station, equivalent to a British MOT station!



12.0. The European context



Figure 36: A lapel ribbon worn by a Ukrainian delegate at the conference marking 10 years since Poland's accession to the European Union

Any changes to the education system in the UK will have to occur within the context of the European Union, which is why I travelled to Brussels to sit with members of the European Commission. Interestingly one of the first things I learned was that education is seen as something of an untouchable issue by the EU. Paul Holdsworth, Head of Section for Adult Learning, told me that education is so tied up with transmission of national culture that the EU is very wary of interfering with educational systems. As such the purpose of the education Directorate General is to encourage individual countries simply to learn from each other.



Figure 37: The DG for Education and Culture, Brussels



The closest the EC comes to legislation on practical education is the recommended key competencies for lifelong learning; recommendations that vocational education includes literacy and foreign language, mathematics, STEM, digital, culture, entrepreneurship. Unfortunately vocational education and training (VET) is a separate department within the Directorate General to the department for education, which Mr Holdsworth identified as a real barrier to any further progress on sharing good practice between nations. It seems that within the European Commission VET is very much the poorer relative of higher education, and it is only the recent economic crisis that has led to an increase of interest in VET and in particular a new policy emphasis on apprenticeships. The economic crash has highlighted that an emphasis on sending more people to university has not increased skills but rather diminished the overall quality of higher education, leaving people unskilled and in some cases even illiterate despite a university education. Yet despite this growing realisation that vocational education has a big role to play, economically it is still seen as a remedial option for those who couldn't succeed academically. I was told that this attitude needs to change, and VET absorbed into the department of education, to see real progress on a European level.

Interestingly there was originally an idea that there might be a "golden system" of vocational education training that might be transportable between countries, but it seems cultural differences make the idea inviable. For example Central European businesses are fully invested in the idea of apprenticeships and formalised internships, while the Mediterranean countries have no similar culture of work-based learning.

"Ask them how they are going to deal with the strategic challenge of replacing their retiring farmers with a poorly educated work force? The global market cannot be the answer- we don't know what's in the food and we don't know what it will cost. It's also unethical, wealthy nations buying on world market during failed harvests drives up the prices for everyone else. To address this strategic problem we need policies designed to support agricultural education."

John McClintock, Directorate General for Agriculture and Rural Development

The impact of culture also infused my conversation with John McClintock of the Directorate General for Agriculture and Rural Development. Mr McClintock saw the cultural approach to agriculture as the biggest brake on progress in countries such as Britain, Sweden, the Netherlands and Denmark, all of which have a political philosophy that sees little value in agriculture, maintaining that they can source their food from somewhere else and buy it more cheaply than they can produce it. The countries where the best agricultural education can be found are those where there is more prestige for farmers. These tend to be landlocked countries which have always had to steward their own resources against attack, rather than sea-faring, trading nations.

This cultural contradiction is a problem not only for education, but for European agricultural policy more generally. Mr McClintock said that the agenda is beginning to be shaped by the fact that the farming population is ageing. The Northern European nations are free trading and will not see this as a problem, but there are those within the European Commission who argue that the world market is a precarious place. Price volatility caused by surges in demand and the vagaries of weather can

Land based education policy in the 21st century: what can the UK learn from the rest of the world? .. by Liam Stokes
A Nuffield Farming Scholarships Trust report ... generously sponsored by the Young Nuffield (Bob Matson) Award



affect our domestic consumers (it was pointed out that according to recent statistics over 200,000 people in the UK can't afford to feed themselves), but internationally when the 500 million consumers of the EU need to buy grain during a shortage this will drive up prices in the poorest parts of the planet. This is why the European Commission seeks an industrial policy towards agriculture, embodied in the Common Agricultural Policy, and it is reasoning that Mr McClintock feels applies equally to the need for government-driven agricultural education. In parts of the European Union (such as I had seen in Poland) the CAP is driving education, with the Rural Development Funds used by member states for developing knowledge transfer and education. In the UK this funding is used for the Stewardship Schemes.



Figure 38: Agriculture I love you!
Outside the DG for Agriculture and Rural Development

Mr McClintock is adamant that the overwhelming issue faced by UK agriculture is that it is not a government priority, leading to problems with prestige and political support. Not enough people work in the countryside, leading to a fixation with the financial services industry which can itself be a liability as often as an asset. This cultural fixation can be contrasted with that in Ireland, where most people feel close to agriculture and it is seen as almost recession proof. The only solution to this situation that Mr McClintock could see is to make farming pay better. He said there are two ways of looking at the situation - do you start with the need to change the culture, which politicians will then follow; or do you use a tool such as the European Commission to make the industry pay better, leading to a change in cultural perception.?



13.0. Discussion

13a. An active role for government

It is clear from my travels that there is a role for government in the managing of an agricultural education system. I was made aware by my conversations in Brussels that I had travelled to countries in which ministry of agriculture engagement with education was unusually strong, but this was not a coincidence. From my earliest conversations I had sought out the best systems in the world, and it turned out this directly correlated with government involvement.



Figure 39: The Austrian Ministry of Agriculture, home to the most comprehensive agricultural education system in the world

This government input took many forms. The most striking was clearly the Austrian system of direct management of secondary colleges of the highest quality, and coordination of hundreds of local vocational education and training schools. What made this most impressive however was the recognition that state driven, conservative education is ideal for vocational training but has severe limitations, a recognition that results in the total independence of BOKU.

Similarly impressive was the blending of extension, research and training in Ireland's Teagasc colleges, with University College Dublin playing the role of BOKU as the source of new ideas. Yet North America showed it is possible for departments of agriculture to play a significant role in



education without direct management of centres and resources, principally by working with universities. This can either involve channelling research funding into faculties specialising in land based education, as is done by the Ontario Ministry of Agriculture, Food and Rural Affairs and the Ontario Agricultural College; or by working with faculties of agricultural education to coordinate local land-based education in schools and colleges as in the USA. Given the entrenched nature of land based colleges and universities in the UK, this latter option is likely to be the most successful.

13b. Land based education is different

The great benefits of agricultural education can only be fully realised with the understanding that land-based education is distinctive. This distinctiveness is what justifies the involvement of a ministry of agriculture. Agricultural education is used to drive policy in Ireland, where the drive towards a focus on the export of sustainable dairy is supported by newly developed college courses; Poland, where government has identified a need for greater entrepreneurship training among rural populations; and Austria, where the drive towards organic farming is embedded into all training programmes. This is only possible because of this unique relationship with the government and moreover because of the unique way in which their institutions are held to account. In the UK Ofsted is used to assess the success of land based colleges, using identical measures as for general further education colleges but with a different set of benchmarks. This puts the emphasis on statistics such as “success” - the percentage of starting students who complete the course - rather than the holistic approach seen in Ireland, where measures such as “practice adoption” are used to see whether people trained in Teagasc colleges are implementing the ideas they were taught; or the employment approach seen in Austria, where alumni are surveyed two and five years after graduation to check their career progression.

13c. Unique training for agricultural educators

The idea that agricultural education could be a distinct academic discipline was completely new to me when I travelled to the USA. It is however a remarkably neat way of ensuring a steady supply of school teachers with agricultural and environmental backgrounds that can be turned to science or geography, if not to agriculture or environmental science classes. It also guarantees that those taking these posts are as good at teaching as they are knowledgeable about agriculture and, if done well, through an alumni network and frequent conferences, can keep these teachers up to date with developments in both agriculture and pedagogy.

I found this being done with various degrees of intensity. The USA has pioneered the idea and exported it in its entirety to South Korea, Egypt and Swaziland. Austria has taken the idea and developed something very similar to service the ministry’s own colleges with teachers. Poland has an institution dedicated to the training of agriculture graduates to teach in high schools. On some level this should not be hard to implement in the UK, and could be tremendously effective in driving agriculture and other land-based subjects into the curriculum.



Figure 40: The outdoor classroom at the Hochschule für Agrar- und Umweltpädagogik

13d. It is never too early

There is reticence in the UK to allowing students to start taking vocational subjects too early. There are increasing opportunities for pre-16 students to undertake a day or two per week out of school, but these are often seen by schools as opportunities to offload naughty children. This is a great shame. In Florida children in middle school (11-14 years old) have the opportunity to take agriculture, and emerging research is linking these programmes to improved standardised test scores. In fact a dedicated team within the University of Florida and the Florida Department of Agriculture works with local schools boards to encourage more children to take up the opportunity. In Austria the age at which education splits into vocational, academic and professional is 14. There are two crucial aspects to this policy that make it successful - firstly those who opt for vocational training, even apprenticeships, at the age of 14, continue to study traditional academic subjects alongside their work based learning; and secondly there is always the ability to move sideways between the academic, vocational and professional routes as young people develop and change their interests and aptitudes.

13e. Practical higher qualifications

There is concern, voiced especially in Canada, Austria and Hungary, that in England we are diluting the uniqueness of university as a place for ideas and academia. In an effort to widen access, people teach on undergraduate degrees without higher degrees of their own, something that would be impossible in any of the countries I visited. Not only is this damaging to universities, it is damaging to vocational education. In Canada especially the diploma is seen as something very valuable in its own right, the pinnacle of vocational skill and ability. Similar qualifications exist across Central Europe. We have the infrastructure to do the same in the UK and increasingly policy is swinging away from the emphasis on sending people to university. We have the option to instead help people towards higher national diplomas and advanced apprenticeships. The policy drivers in Europe are very slowly beginning to shift in this direction as the economic downturn highlights the problems of a neglected vocational education and training sector, and the UK would do well to be ahead of the curve.



13f. Is competition an unalloyed good?

Whereas in England competition between colleges is a key strategy for promoting innovation and specialisation - a practice industry tends to approve of - other nations see competition as essentially detrimental to education. In Ireland and Austria the amount of government control over the education infrastructure keeps competition to a minimum and ensures that resources flow to where industry requires them. In Canada it is government policy to keep competition between schools, colleges and universities to a minimum to ensure as much collaborative working as possible and to allow the government to invest heavily in a small number of high quality institutions.

13g. The value of academia at all levels

The biggest shift in my thinking during this study was over the question of academia. I began feeling very strongly that land based colleges and universities needed to be more industry focused, more responsive to the shifting nature of the sector. I was surprised to first come across academics in Ireland telling me that they were resisting excessive emphasis on industry need in their programmes, determined to maintain academic rigour.

Their views were compounded by the Canadian professors who told me of the value of “upstream research”; research that wasn’t being demanded by industry but was guided by scientific curiosity. I was doubly surprised to find that representatives from Ontario’s farming industry felt the same way, worrying about a loss of primary research.

But it wasn’t until I sat listening to Professor Sándor Csányi as he told me about living through the fall of communism that I understood. Yes, a vocational education has to provide for the immediate needs of industry and to furnish students for immediate employment. But the demands of industry can change radically, and while it is good to change the curriculum to reflect that, what about the students who already have their qualifications? They need to be equipped to cope with that change.

For this reason every system I saw in North America and in Central Europe maintained a broad academic curriculum for every learner, regardless of whether they were studying for an apprenticeship (Austrian apprentices study literature and religious education) or a degree. Similarly in research it is not enough to shift to meet the change, we need to drive the change, to do the research no one else is doing, to see where it leads.

There is clearly a need for both applied research and upstream research, and Ireland and Austria offered a possible way forward - in both countries applied research is increasingly occurring at technical and vocational colleges and schools, while upstream, primary research is left to the universities. This has the dual effect of ring-fencing the academic integrity of the universities while increasing both the vocational relevance and the funding of technical colleges. There is no reason why something similar could not be done in the UK.

.. every system I saw in North America and in Central Europe maintained a broad academic curriculum for every learner, regardless of whether they were studying for an apprenticeship or a degree.



13h. Life sciences

There are gaps in the range of land-based subjects we offer in the UK. One of the great strengths of the Life Science Universities found in Central Europe is that they furnish policy makers with a diverse range of subjects that allow interesting research into economic and sociological rural trends.

13i. The way forward

The battle for recognition for land based education is being fought on two fronts - the lack of prestige suffered by agriculture and the lack of prestige suffered by vocational training. This latter point is beginning to be addressed, as economic woes cause the government to realise that single minded focus on academic education has left the country very vulnerable. This is the time to be promoting ways forward in agricultural education, to take advantage of this shift. The technical baccalaureate is a step in the right direction, as it is tailored to provide a vocational education to the most able individuals, highlighting that vocational training is not necessarily a remedial option. It combines academic and vocational training in a way that is being recommended in this report. Now we need to see this approach taken in all vocational training.

The battle for recognition for land based education is being fought on two fronts - the lack of prestige suffered by agriculture and the lack of prestige suffered by vocational training.

Similarly the new university training colleges offer an opportunity to embed excellence in vocational training, but one that has as yet passed the land-based sector by. These UTCs require a university and a business to partner them, and as yet no land-based business has been able to do so. Perhaps it requires the sector to gather behind an organisation like the National Farmers Union to support the establishment of a UTC of our own, in partnership with one of our land based universities. Such an institution would certainly herald a new chapter in agricultural education in this country and represent a turning point in the status of both vocational training and of the land-based sector.



14.0. Conclusions

- Land based education can be used as a tool to deliver agricultural policy if ministries of agriculture take an active interest.
- A successful system can be driven either by ministry of agriculture engagement or by land-based university coordination.
- Training agricultural educators can be seen as a distinctive academic discipline.
- Vocational, practical courses should contain academic study to “future-proof” their students.
- Upstream research is as important as applied research and support for one should not be to the detriment of the other.
- You can’t train “too many”. A well-constructed land based curriculum is a good education for anyone.
- Land based subjects can be incorporated into pre-16 education either as a supplement or as a distinctive route.
- There is genuine concern about the proliferation of providers of higher education.
- Agriculture as an industry can be supported by a host of other subjects in addition to agricultural science.



15.0. Recommendations

- DEFRA needs to recognise the strategic significance of agricultural education and take an active interest in its development and promotion. This could be through the direct management of land-based colleges and their curriculum, but a more realistic option might be to work with prominent land based universities to coordinate the training of agricultural educators and the development of curriculum in their regions.
- This increased role for land-based universities in supporting vocational training should involve the development of undergraduate programmes for those wanting to teach in the land based sector. This would be particularly effective if some programmes within land based institutions could contribute to qualified teacher status, leading to an increased number of school teachers with agricultural training. Programmes like these could play a role in international development, training people to teach sustainable, productive agriculture to poverty stricken and war-torn countries.
- Policy should drive towards increasingly undertaking applied research in land-based further education colleges, to increase the research base, increase the vocational relevance of the colleges, and direct funding into their facilities.
- The land-based sector can support education by uniting behind local land based educational institutions and offering to take on apprentices and work experience placements. More radically industry needs to unite behind a university training college to drive forward higher vocational training in this country.
- Moves such as the new technical baccalaureate are very positive, embedding academic study into vocational training for more able individuals, but this approach needs to filter to all vocational programmes. Industry-relevant skills are important, but individuals are future-proofed by teaching them the reasoning, problem solving and cultural awareness that comes with a more diverse and academic range of subjects, which many students find more palatable in a land-based context.
- Given that many students do find core subjects more palatable in a vocational context, students should be able to leave school and opt for full time education or apprenticeships at the age of 14, while remaining in education until 18. It is vital that if such a scheme is implemented that it remain possible to move “sideways” from academic to vocational training and vice versa throughout this period, allowing for the mental and emotional development that takes place during this age range.
- Land based colleges can be given more freedom to introduce academic subjects and greater rigour if they ceased to be judged on success rates (the percentage of students who start the course who pass) and instead are accountable for employment, progression and the extent to which they shape behaviour in the land-based sector.



- The proliferation of undergraduate degrees and degree providers is damaging to the academic integrity of what a degree is and what a university is for. Government policy and our land-based further education colleges should focus on higher vocational programmes such as higher national diplomas and higher apprenticeships
- Land based universities should support the sector with a more diverse range of programmes, including undergraduate offerings in game and wildlife management, agricultural economics and “green care” (the use of land based resources such as gardens, animals, woodlands and farmland in social care).



16.0. After my study tour

The Nuffield Farming experience has had an enormous effect on me. Having begun this process as a lecturer in gamekeeping at Wiltshire College, Lackham, part way through my scholarship I had the opportunity to apply for the position of Curriculum Manager for Agriculture and Countryside Management. I believe it is thanks to the confidence, knowledge and skills I have developed through the Contemporary Scholars Conference and my Nuffield Farming travels that, despite my age, I was able to secure the post.

Since then I have worked to embed everything I have learned from my travels. I felt it was vital to provide additional higher vocational training and have worked with my teaching team to develop and launch a Level 4 (HE) Work Based Diploma in Agriculture. Similarly I wanted to bring a wildlife management degree programme similar to that I had seen at Szent István University, to the UK, something my contacts in the game management sector agreed we were sorely lacking. I worked closely with Professor Sándor Csányi to develop such a degree programme, writing modules and assessments to mirror what I had learned in Hungary. This Foundation Degree Game and Wildlife Management launched with its first cohort of students in September 2014.

I am very proud of these developments, but I want to influence the direction of policy more widely, to help bring about the structural change I feel we need. I have written about these changes for the Countryside Alliance Magazine and been interviewed about them on BBC Radio 4's Farming Today.

I have now been offered a Graduate School Scholarship to undertake a PhD at the University of Bath, researching Agricultural Education Policy and exploring how some of these changes might be implemented. In the medium term I want to play my part in making Lackham a centre of land-based educational excellence, but my future is in policy development both at home and abroad, optimising land-based educational systems.



17.0. Executive summary

Agricultural education in England today consists of a few major universities and a moderate number of education colleges. Within this framework there is little in the way of coordination and cooperation and certainly very little input from DEFRA. Having spent three years teaching in agricultural education and having become convinced of its significance to the lives of young people and the health of the land based industries, I wanted to undertake a study to see how it might be optimised.

The objective of my study was to find whether there were alternative models for delivering land-based or agricultural education, and particularly to see whether government engagement with education could be used to underpin a national agricultural strategy. Conversations with industry representatives and educators in the UK highlighted Ireland, Canada and the USA as having outstanding agricultural education facilities, so these were my first destinations. During my time in each country I visited colleges, universities, government departments of agriculture and industry representative bodies to learn how land-based education was structured and how it was impacting on the agricultural sector. Each meeting led to further recommendations, and following these I travelled to Poland to learn about Life Science Universities at the SGGW in Warsaw and to Austria to see the most comprehensive government-driven agricultural education system. Finally I travelled to Brussels to meet with representatives from the European Commission to get their perspective on the future of education in Europe.

The most persistent theme throughout my travels was that government departments and ministries of agriculture can take an active interest in education. This can take the form of direct government management of institutions such as in Ireland, Poland and Austria; through the provision of precisely targeted research funding like the partnership agreement between the Ontario Ministry of Agriculture, Food and Rural Affairs and the Ontario Agricultural College; or by coordinating the running of high school agriculture programmes in collaboration with university departments of agricultural education, as in the USA. Various different methods of structuring education were investigated, but what united some of the most interesting was dedicated training for future land-based teachers, either at undergraduate or post graduate level. Also of note was the great breadth of academic subjects embedded into vocational programmes in many countries; from apprenticeships and vocational colleges all the way through to degrees, it is common to find land-based curricula including maths, literacy, modern languages and a range of sciences and humanities.

My core recommendation is that DEFRA needs to recognise the strategic importance of educating the next generation of producers and consumers. Once this recognition is achieved work can begin to optimise our land-based education system. Realistically this could take shape around a collaboration with the large agriculture faculties, which with DEFRA support could work with land based colleges in their regions to develop curricula and train agricultural educators.



18.0. Acknowledgement and Thanks

My heartfelt thanks go above all to my wife Beth, whose unswerving support saw me through my travels and through a writing process that was hard in the easy times and almost impossible in the hard times. Living with a stressed-out educator with writer's block is (I imagine) not a pleasant experience, but is one Beth endured with grace and love. Anything I have achieved I have done so because she told me I could.

In education we are regularly reminded of the enormous impact of parenting on future success. So often we meet parents and think "Ah, you're the reason they're so good/so challenging". I am no exception, and I like to think my parents (all of them) will be pleased with what they've made me. I have certainly never wanted for encouragement or belief.

Professionally I have to express my gratitude to the Director of Campus at Lackham, Ian Revill. He has been a mentor to me since my first day at the college, both as a teacher and as a manager, giving me my start in the sector and guiding me every step of the way. He welcomed my opportunity to undertake this Scholarship, and without his support it would not have been possible.

Of course the whole journey was started by the Nuffield Farming Scholarship Trust UK. Thank you to Mike Vacher and everyone there for your patience and support.

I had the privilege to meet some wonderfully knowledgeable and passionate people on my journey, including some truly inspirational educators. I hope one day to be counted among them, and that I haven't left anybody out.

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Finally, if it isn't too trite, my thanks go to all the students I have taught over the past five years or so. It is often said that a teacher learns more from their pupils than the pupils ever do from the teacher, and I can attest that this is one cute cliché that has the added virtue of being true. It is my hope that, in return for the amazing education they have given me, I have helped shape at least a few of their lives for the better. It is the chance to do this that gives me the motivation to do what I do, and for that I couldn't be more grateful.