

**The Farmers Club Charitable Trust Agricultural Educator
Awards – 2016**

**Education in agriculture: what can we learn from the
United States of America?**

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Abbreviations

AHDB	Agriculture and Horticulture Development Board
BPS	Basic Payment Scheme
CPD	Continued Professional Development
FBM	Farm Business Management programme
FFA	Future Farmers of America
KTE	Knowledge Transfer and Exchange
MAAE	Minnesota Association of Agricultural Educators
NAAE	National Association of Agricultural Educators
SRUC	Scotland's Rural College
QMS	Quality Meat Scotland
YFC	Young Farmers Club

Executive summary

This report sets out to evaluate the delivery of agricultural education in the USA and identify best practice that could be incorporated into the Scottish system. It focuses on the delivery of education in schools, colleges, universities and Continued Professional Development (CPD) and Knowledge Transfer and Exchange (KTE).

The research identified a number of key areas based on discussion, observation and participation in agricultural educational events and meetings across Minnesota, Iowa, Nebraska and Maine. These key findings were then considered in the context of how they could be applied in the UK, Scotland and within SRUC as a deliverer of agricultural education. Four such key findings were observed.

Engaging with schools and promoting the agricultural sector: specialised agricultural educators are more evident in schools in the USA, primarily driven by the significance of the employment opportunities offered by the agriculture and food sector. In Scotland, this engagement of agricultural educators within schools is much less evident. In a number of instances it is a means of distraction for those with low academic interest.

Creating work ready students: there is a huge emphasis on developing life skills, rather than depth of knowledge in the education system in the USA. There is also an innovative approach to learning programmes and support groups to help develop skills in leadership, cooperation, team working, delegation, problem solving, encouragement, empathy, acceptance, inclusion etc. This is less evident in the UK where the emphasis remains of academic understanding.

Links to industry to improve learning: this relationship is evident in the USA and the UK.

Promoting continued education within the farming community: it was evident in the USA that CPD and KTE are available to farmers in formal education programmes. These have a limited engagement with academic learning, focusing on applied business issues, such as financial performance, business efficiency, budgeting, setting missions & aims and succession planning. These issues are generic to agri-businesses in the USA and UK.

The report concludes by making the following recommendations:

- I. Continue the expansion of agricultural education in schools to ensure all students receive agricultural education from an earlier age. This should be done in conjunction with other bodies and be encouraged and facilitated by the Scottish Government to meet the wider social and economic significance of agriculture and food.
- II. Greater utilisation of innovative learning methods and of industry expertise to deliver the necessary skills to ensure graduates are ready to work in the industry.
- III. Creation of an extended educational support network that provides for continued learning at all career stages.

1. Introduction:

The basis for this project arose from a conversation with colleagues in relation to how educational institutions such as SRUC (Scotland's Rural College) can engage further with farmers. Interest in Continued Professional Development (CPD) through post-graduate and distance learning programmes is growing amongst many in advisory or farm management positions. However, there is limited engagement with the typical small family farm that dominates the industry profile. Thus, this Farmers Club Charitable Trust Agricultural Educator Award was used to visit the states of Minnesota, Iowa and Nebraska to evaluate how agricultural education is delivered within the mid-west region. It may seem odd to compare agricultural education in Scotland to the United States. Scotland extends to 30,420 sq. miles (78,789 sq. km) being similar in size to Maine and South Carolina; the 39th and 40th largest states in terms of land area in the USA. The reason for choosing the USA was based on the social issues associated with land, which are currently high on the political agenda in Scotland with ratification of the Land Reform (Scotland) Act 2016. This legislation aims to bring about change in the agricultural tenanted sector, something at the heart of my teaching here at SRUC. As these social debates over land in Scotland continue, similarities to the USA can be made. In particular, two books, with similar titles, examine these social conflicts relating to land in detail: *Who Owns America?: Social Conflict Over Property Rights* (Jacobs, 1998); and *The Poor Had No Lawyers: Who Owns Scotland and How They Got it* (Wightman, 2015). Given this connection between the two countries, the project was undertaken in the summer of 2016 with the following aims and objectives:

1.1 Research aims: To evaluate the delivery of agricultural education in the USA and identify best practice that could be incorporated into the Scottish system.

1.2 Research objectives:

1. To visit a number of educational institutions in the USA to develop an understanding of the following aspects of the education system:
 - a. Institution profile – where agricultural education fits in the organisation, department structure, staff roles
 - b. Student profiles – target audience, numbers, student backgrounds, graduate destination, completion rates, funding
 - c. Course content – programme definition, contributing departments, modular content, practical work
 - d. Delivery methods – academic year, distance learning, block delivery, training courses, work placement
 - e. Professional links – engagement with industry, content development, guest speakers, case study visits.
2. Compile a written report summarising the USA model and comparing and contrasting it to the Scottish system.
3. Make recommendations to enhance the delivery of land-based education in Scotland based on research findings. It should be stressed that these recommendations will be focused on the delivery of land-based education in Scotland by SRUC. However, they should remain applicable to other educational institutions across Scotland and the UK.

4. Publish a journal article based on the research project.

1.3 Primary visits:

- The Minnesota Association of Agricultural Educators (MAAE) summer meeting in St Cloud from 5th to 8th July 2016.
- The Leopold Center for Sustainable Agriculture Program - Iowa State University – 11th to 14th July 2016.
- The Institute of Agriculture and Natural Resources – University of Nebraska (Lincoln) – Tuesday 19th July 2016.
- Camp Cedar, Casco Maine – 25th to 28th July. This visit was part of a planned holiday with family at the end of the study tour, but proved to be a significant part of the research.

1.4 Subsequent engagements:

Participation in the following events came about due to the publicity surrounding the trip to the USA. The events have proved useful in the analysis stage and relating research findings to the UK scenario.

- Paper presentation at “Land reform in Scotland: legal, historical and policy perspectives” conference – Aberdeen University, Friday 26th August 2016. Paper entitled: “Issues of agricultural land - different approaches; same old problems”.
- Participation in Scottish Government event “*Developing the future of agriculture and young people*” - Science and Advice for Scottish Agriculture (SASA), Edinburgh, Wednesday 5th October 2016.

2. Agriculture in the Mid-West

The landscape in the parts of Minnesota, Iowa and Nebraska visited was dominated by corn and soya (Figure 1). These three states account for 41% of all USA and 15% of global corn production (National Corn Growers Association, 2016). In Iowa, corn and soya account equally for around 24 million of the 30.75 million acres of agricultural land. Bioethanol production across the USA accounts for around 38% of corn production, but this varies regionally. Iowa is home to 42 of the 199 (21%) bioethanol plants in operation across the USA. Between them, Iowa, Nebraska and Minnesota account for 47% of all bioethanol production (National Corn Growers Association, 2016). Most of the remaining corn is used for grains in livestock feed, with less cut whole and fed as silage. Iowa has the highest number of acres dedicated to soya production across the USA, with Minnesota ranked third and Nebraska seventh (USDA, 2015). Soya is grown as either animal protein feed or vegetable oil, with over 40% of soya grown in the USA destined for export markets (USDA, 2016a).

Livestock production within the three states varies with dairy, beef, pigs, sheep, turkeys and egg production all significant. In 2014, Nebraska and Iowa were the two largest producers of commercial red meat (beef, veal, pork and lamb & mutton) of all states (USDA, 2015). Iowa is ranked the number one state for pig and egg production, whilst Nebraska was second only to Texas in terms of all cow and calf numbers in 2015. In contrast, Minnesota is home to

460,000 head of milking cows, making it the seventh largest state in terms of numbers (California has the largest herd with 1,778,000 head) (USDA, 2016b). Like the UK, local commodity markets are strongly influenced by global trade. Low returns mean many producers are struggling to make ends meet and there is a general belief that the small family farms are disappearing. Some are bucking this trend with investment and one Minnesota family had recently opened a new 6,500 head dairy venture. The dairy sector is reliant on Hispanic labour and these employees are low skilled and not going through the local education system.



Figure 1: examining corn growth.



Figure 2: Corn extension meeting – Iowa, 12th July 2016

Agricultural production remains very input intensive. This was evident at a corn extension meeting on July 12th 2016 (Figure 2) where Dr Alison Robertson of Iowa State University was presenting to the group as a renowned corn specialist. One of the key points of debate related to the use of a late application of fungicide to corn. There was no scientific justification of this to prevent yield loss, but farmers believed the application increased yield and extends the harvesting window. However, this reliance on chemical inputs may well be challenged by an on-going Law suit. A case brought by the Board of Water Works Trustees of the City of Des Moines could have far reaching implications. This case involves the utility company trying to sue three counties in Iowa for high levels of nitrate pollution in the drinking water supply¹.

Issues of land tenure provide an interesting comparison and contrast to Scotland. Like Scotland, land remains a class issue in the Mid-West as families of white settlers are able to utilise the economic asset of land that was inherited or taken. Unlike Scotland, Iowa State law restricts the acquisition of agricultural land by non-residents and foreign businesses. This means that 80% of land is owned by full-time Iowa residents; a figure deemed too low by the Iowa General Assembly. Much of the missing 20% has passed through inheritance to family living out of state. 55% of agricultural land in Iowa is farmed under lease (similar in

¹ For further information see: The Board of Water Works Trustees of the City of Des Moines, Iowa V Three counties and several drainage districts e.g. <http://www.desmoinesregister.com/story/money/agriculture/2015/01/18/water-pollution-lawsuit/21929897/>

Minnesota). Historically this is a one year rolling lease with no security for tenants. It could be argued this encourages excellent husbandry as the most important factor influencing land letting is good land stewardship. The average age of farmers is similar to Scotland, with 56% of land owned by people aged over 65 (Iowa State University, 2014). Succession planning is seen as an on-going issue with a decreasing circle of investment and reduced ability to retire. Many new entrants don't enter through normal means, with adding value on a smaller scale noted as one entry mechanism. One alternative way of encouraging new entrants was to use contract purchase agreements as outlined by Dr Neil Hamilton, Director of the Agricultural Law centre (Hamilton, 2016). This process requires the vendor to essentially act as the bank. The two parties agree a market value for the property (adding in interest). The vendor receives instalments, rather than a lump sum. This spreads the financial outlay for the purchaser, but they gain ownership of the property at the end of the agreement. If payments are missed, then the deal is void and the purchaser loses their investment (they need to take on some element of risk).

3. Agricultural education in the United States

This section introduces and explores the key elements of agricultural education observed during the study tour.

3.1 Agricultural Educators

The National Association of Agricultural Educators (NAAE)² is the professional organisation of 7,600 agricultural educators across the USA. It operates at the national and state level, with members from across the FE and HE sectors. The vision of the NAAE is to ensure members are "*professionals providing agricultural education for the global community through visionary leadership, advocacy and service*" (NAAE, 2016). As a national organisation, individual states operate regional groups. The Minnesota Association of Agricultural Educators (MAAE) held its summer meeting in St Cloud from 5th to 8th July 2016 (Figure 3). 220 members attended the conference, forming training and CPD provision with speakers, workshops, meetings, seminars, demonstrations etc. A similar event is held in February.

It was evident at the MAAE conference that agriculture and agricultural education is held in high regard. Political lobbying played an important role within the MAAE as individual institutions cannot lobby. A key part of the lobbying process is to secure funding for education and the data collated through education are used to help justify and inform changes in policy (see section 3.3). The agriculture industry also makes a significant contribution to education through the provision of experts, services and funding. One example of this was noted during the study tour, where the MAAE held a Knowledge Transfer and Exchange (KTE) event in conjunction with John Deere. This event involved staff receiving induction and training for the use of John Deere supplied machinery (Figure 4). In return, many of the colleges use John Deere machinery that has been loaned or bought.

² Until 1997, the National Association of Agricultural Educators was known as the National Vocational Agricultural Teachers organisation.



Figure 3: Nick Prince presenting at the MAAE conference, 7th July 2016



Figure 4: MAAE member training day run by John Deere, 8th July 2016

The MAAE event was also attended by representatives of the Future Farmers of America (FFA) organisation. The FFA was established in the 1920s in an attempt to slow down an exodus from the industry (FFA, 2016). The motto of the FFA is to make “*a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education*” (FFA, 2016). Similar in some ways to the Young Farmers Club (YFC) in the UK, the FFA provides an organisation for those in agriculture from high school to the age of 21 (NFYFC, 2016). In Iowa, the FFA has 14,700 student members in 226 chapters across the state (Iowa FFA, 2016). This compares to 25,000 members of the YFC in the UK across 630 individual Clubs in England and Wales (NFYFC, 2016). To put these figures in context, the number of farms in Iowa extends to around 88,000, whilst there are upwards of 210,000 holdings in England and Wales (Prince, 2012).

It appears that the FFA differs in its role to the YFC as it promotes more formal links to education and leadership skills development. The YFC has a more obvious social element to it, delivered through various competitions, travel and the annual convention (NFYFC, 2016). That said, the Scottish Association of Young Farmers Clubs is currently pushing a personal development programme at the current time. This is done “*not just because it makes for an effective membership body, but it also helps equip members with the skills they will need to lead, make decisions, empower and be active citizens in a democracy*” (SAYFC, 2016).

Despite this YFC initiative, there appears a notable difference in the approach to education in the USA to that in the UK. This point was emphasised during a discussion with Jeff Hacker, co-owner and director of Camp Cedar, Maine. Jeff is heavily involved in the promotion and development of teaching with the summer camp community. He noted that the North American way is to teach ‘*life skills for the 21st Century*’. In simplistic terms this means that you don’t need to provide students with in depth knowledge; just the ability to be able to find it. Instead they focus on life skills – this involves leadership, cooperation, team working, delegation, problem solving, encouragement, empathy, acceptance, inclusion etc. It is perhaps an unjust stereotypical view that Americans are loud, bold and have limited in depth knowledge compared to the quieter, more educated and reserved British persona. Yet

there does appear to be a significant difference here between the USA and the UK. Graduates from agricultural institutions in the USA are leaving for jobs paying on average around \$60,000 (£45,000³), compared to their British equivalents earning £25,000 (The Student Money Site, 2016). Perhaps the life skills acquired by USA graduates make them more 'work ready' than the more academically advanced UK graduate⁴?

The group of FFA delegates had a notable input at the conference. They participated in the Team Ag Ed meeting, bringing in their own experiences to inform MAAE direction. One such example of this related to encouraging young people into the agriculture sector. FFA members noted how agriculture is not seen as an appealing career pathway for many and how educators need to engage with diverse audiences. This formed an interesting discussion on attracting diversity into the agriculture industry. Lecturers were focused on colour and ethnicity as being the diversity, but the FFA members just wanted diversity – one member commented that there were 52 nationalities represented in her High School in Minnesota. This theme appeared a number of times at the conference with a belief that diversity was a long term project. Educators could not just drop in occasionally to schools, but needed long-term and continued engagement. An example of the Somali community was given. Many Somali people had left the country to get away from agriculture. As such, the Somali population would need a great deal of convincing to return to a sector they have bad experiences of.

Through the MAAE conference it was obvious that agricultural education within High Schools is more significant than it is in the UK. One explanation for this offered locally by MAAE members was the significance of agriculture and food processing for employment opportunities. Comments were made on a number of occasions that the sector provides one in five jobs across the USA. In Nebraska, this ratio is higher, with "*the agricultural industry employing one in every three Nebraskans*" (Nebraska Agricultural Education, 2016). In comparison, around one in seven working people are employed in the agri-food sector in the UK (Defra, 2016). It is important to note that these employment classifications differ. In Nebraska, the sector includes agriculture, food and natural resources (Appendix 1). The UK definition is more specific to the agriculture and food sectors. Using World Bank figures, it is possible to compare directly the provision of employment opportunities through agriculture. It should be stressed the most recent figures are for 2010, where agriculture alone provided two per cent of employment in the USA and one per cent in the UK (World Bank, 2016).

The overall feeling was that agricultural education in Minnesota is doing okay. MAAE seems to be recruiting members again after years of limited recruitment. Many more are needed though as older people retire. Women are now a big part of the work force, with many of the prize winners at the MAAE awards ceremony being young female members. This point was also noted in Nebraska, where ten years ago there was a real issue with attracting women into the sector, now there are possibly more female agriculture teachers in Nebraska. This infusion of new entrants to the education sector is welcomed, but issues persist about how teachers gain an in-depth insight into agriculture if they haven't previously worked in the industry.

³ Based on a pre-Brexit exchange rate of £1 to \$1.33

⁴ It is accepted that many factors will influence graduate pay, but an in-depth discussion on this is beyond the remit of this report.

3.2 Post-secondary education – two plus two degree programme at University

The Morrill Act was established in 1862 with the aim of providing education in agriculture, home economics, mechanical arts, and other practical professions across every state in America. Each state was provided with federal land that they could sell or utilise to provide public colleges. Large tracts of land were made available, with 30,000 acres awarded for every member in their Congressional delegation. This process saw the provision of 69 colleges across the country (McDowell, 2003; Library of Congress, 2015). These Land Grant Universities now provide the largest agricultural programmes in the USA including, Texas A&M, the University of California – Davis, and Iowa State University. Iowa State University appeared to be a well-run and well-funded university programme. Divisions consisted of research, education and extension (consultancy). Extension is funded by Universities, but may work on cost recovery basis. Most members of staff appear to have a mixed contract that requires multi discipline engagement.

With the possible exception of investment, the undergraduate agricultural programmes observed in Iowa and Nebraska differed little from those offered in the UK. However, one innovative programme observed at Iowa State University was the Ag 450 Farm (Figure 5).



Summer 1971 Class

Figure 5: promotional shot of the Ag450 farm taken in 1971 (Iowa State University, 2016).

The Ag 450 farm is named after the module for which it is used. It was established in 1943, when the University purchased 187 acres specifically for the module. The current farm extends to 1,400 acres and is run as a stand-alone commercial farming enterprise. It retains specific mission and goal statements, which cover financial and learning outcomes. These

include a directive that it operates as a self-supporting unit and must return a profit for at least three years in every five (Iowa State University, 2016). Students are fully responsible for farm management decisions under the supervision of Greg Vogel, the instructor & farm manager. They are split into different management committees including crops, machinery, finance & marketing, public relations, customs & swine and buildings & grounds. Each committee takes sole responsibility, drawing on their previous learning to help inform decision making. When talking to the students they all expressed how much they enjoyed this module and valued the practical hands on management experience it offered. The longevity of the farm, which dates back to the 1930s means many farming families have an invested interest in it. It appears a number of parents are keen to offer advice to the students as they themselves managed the farm when they studied at the University.

3.3 Engaging with farmers

The Farm Business Management programme (FBM) was observed in operation in Minnesota. Its purpose is to provide education for active farmers and land managers beyond the age of the normal student profile. It is operated regionally across the state by a number of instructors, who have around 40 to 60 students each. Farmers are recruited as students voluntarily, or perhaps pushed by lenders, banks etc. They meet on farm with the instructor every 6-8 weeks' and cover a series of topics during the three year programme. Using the farm business as a focus of study, the programme starts with financial monitoring and efficiency assessment. After this initial stage, aims and objectives for the business are established to help plot future direction. The programme then moves on to look at business development, succession, structure etc. Successful completion leads to the award of a Diploma in FBM after three years. Students can remain within the programme to undertake an Advanced FBM diploma and the Agricultural Commodities Marketing Diploma (MSC&U, 2016). As farms vary in size, the focus of study for larger units would be specific to an individual enterprise, such as dairy, or pigs, or crops or a diversified interest (e.g. poultry enterprise). Students pay for the course, but these costs are subsidised by 40 per cent state funding. The onus is firmly on the student and they are expected to maintain portfolios, reviews etc., in a timely fashion. Records are maintained, but belong to students. However, data collected through the programme are anonymised by The Minnesota State Colleges and Universities System. This analysis is regionalised for Northern and Southern areas of Minnesota and provides an in-depth and comprehensive financial analysis of agriculture across the state (MSC&U, 2016).

4. Education in agriculture: what can we learn from the United States of America?

Four key issues emerged during the study tour of the USA that are worthy of further consideration to see if they could benefit agricultural education delivery in the UK.

4.1 Engaging with schools and selling the agricultural sector.

It is probably fair to say that few people from outside the industry would consider a career in agriculture as either appealing or lucrative. The image of the hard working and long suffering farmer persists and most will not be aware of the relatively high utilisation of technology and innovation. Two surveys of public opinion shed differing views on the public understanding of

agriculture in the UK. Reader (2012) argued that the general public have a great affection for farming, but few understand the sector or its contribution to the economy. In contrast, a NFU (2014) survey reasoned that the British public are increasingly aware of the beneficial effect of farmers on the countryside and that the industry is a professional one. In Scotland, the reality at SRUC appears to be the vast majority of students entering agricultural education are from a farming background or are connected in some way to the sector. Over the past two or three years, SRUC have increased their connectivity with schools, but this is often as a more practical distraction for those with low academic interest. The scenario in the United States shares elements of this, but due to the sheer size of the food and agriculture workforce, education is becoming much more prominent within schools. It is accepted that this engagement is a long-term commitment to raise and maintain interest in the sector for those from outside the agricultural community. The process involves the education of both students and parents as to the potential opportunities in the agricultural sector and the breadth of jobs the industry supports. This is exemplified through the production of careers diagrams that visualise how the different sectors within agriculture can lead on to a wide array of employment in the industry (Appendix 1).

This need to engage with a more holistic approach in Scotland was touched upon at a focus group meeting hosted by the Scottish Government in October 2016. This event, entitled '*developing the future of agriculture and young people*' brought together a number of industry groups to discuss the key issues surrounding education and the agricultural sector. A key theme to emerge from the event was the need to link the different elements of education with external contributors (e.g. The Royal Northern Countryside Initiative) and industry support in a concerted effort to engage with a wider student audience. The focus group participants debated how this could be facilitated by engaging with the concept of 'food', given its significance to the social and economic development of Scotland. It will be interesting to see how these ideas and suggestions are developed and taken forward by either the Scottish Government or participatory organisations; experience suggests that despite enthusiasm of educators to take these initiatives forward, the realities of existing workloads will inhibit this. It will probably require a collaborative approach involving schools, colleges, universities and charitable bodies to drive forward the significance of the sector and encourage wider engagement for many social, educational and economic benefits. The sector should be proud of what it offers and its technological development; many more students should be given the opportunity to witness this and the breadth of career opportunities out there.

4.2 The approach to education and creating work ready students.

Over the past three years, the SRUC has been developing a new undergraduate rural surveying course accredited by the Royal Institute of Chartered Surveyors (RICS). This programme aims to prepare students for a career in the rural surveying sector, where they will advise farmers on property related issues. When discussing programme development with the industry, one common comment is that we should produce graduates who are '*ready to go to work*'. The industry requires graduates who know where information is, but also have experience of the issues they will face once operating in the workplace. In an attempt to provide these work ready attributes, teaching has taken on a more practical element. However, it has been suggested that this should go further, with sector specific skills, such as negotiation, being part of the syllabus. In many ways these requirements

resonate with the education experience in the USA. The focus is not on depth of knowledge, but the development of transferable life skills relative to a specific career.

The example of the AG 450 module demonstrates how these transferrable life skills could be delivered in the UK and prepares graduates for a career in farming or farm management. An organisation like SRUC has many farms as potential teaching assets. These are utilised for practical experience, but could be further utilised for management training purposes and help students develop their skill sets. This suggestion has so far been met with limited enthusiasm when discussing it with colleagues. However, the use of innovative teaching methods is popular with students. The '*Loirston Trust Winter Wheat Challenge*', run by SRUC, is one such example (SRUC, 2016). Open to students and external participants, this event is utilised for formal and informal teaching purposes. Small groups of students have to manage the crop within their allotted plot in their own specific way. They determine the application of fertilisers and pesticides and the winning team has the highest gross margin at harvest. There is no practical involvement for the students in the event, but the competition facilitates learning through interactive means. This interactive approach could be taken a step further through the use of management simulation IT packages. The Farm Simulator⁵ game is very popular amongst students and similar IT packages could be used for training purposes. This method of learning could also be used to introduce agriculture to a wider audience, with IT students being asked to develop games.

4.3 Utilising links to industry to improve learning.

The link between the industry and the agricultural education sector was very obvious in the USA and is so in Scotland. SRUC are indebted to producers, suppliers and industry experts for their educational input and contribution to developing course content. One such example of this is the training of mechanisation apprentices in collaboration between CLAAS and SRUC Barony campus⁶. Within this symbiotic relationship the industry contributes expertise, facilities, machinery etc. and the learning institution provide work ready graduates who possess the relevant skill sets. Industry input extends beyond practical experience, with inclusion on academic boards and revalidation programmes. The significance of this industry engagement is widely acknowledged in documents such as the National Strategy for Land Based Education and Training (SFC, 2015).

4.4 Promoting KTE, CPD and continued education within the farming community.

Two elements of the KTE & CPD process observed in the USA stand out: the extension service offered by the University of Iowa; and, the FBM programme run in Minnesota. The extension service in Iowa appears very similar to the consultancy service offered in Scotland. In Scotland, there are two distinct elements to this service: public and private organisations offering agricultural consultancy services to paying customers; and government funded programmes that facilitate industry KTE offered by organisations such as SRUC, QMS and AHDB. One example of this is the Monitor Farm programme, introduced in 2003 with the aim of encouraging industry and farmer led learning (Scottish Government, 2016). This process has been well received by the industry, with a new programme of funding made available in 2016. One slight criticism of the monitor farm programme is that it

⁵ <https://www.farming-simulator.com/?lang=en&country=gb>

⁶ <http://www.claas.co.uk/fascination-claas/current/claas-news/14-claas-apprentices-graduate-from-sruc-barony/662770>

only engages with a certain number of farmers and many choose not to access the programme information. This issue is significant as those who choose to attend are often the more informed and proactive farmers. Those who miss out may often be the ones who really need the support to help improve business efficiency and profit margins.

This link between business efficiency and the need for additional KTE, CPD and continued education is a significant element of the FBM programme in Minnesota. Participation is encouraged by lenders and bankers and funding contributions are available. The FBM programme appears to be a success and continued engagement by farmers after the initial three year duration supports this. A similar programme could be adopted in the UK as a means of promoting continued career development support. Content could be adapted to meet the specific needs of the industry within the UK. Business planning and succession, for example, has implications for individual businesses and wider issues of new entrants. Thus, succession could be included within a learning to encourage forward planning of business asset transfer, as it is in the USA. The success or otherwise of such a programme within the UK would undoubtedly be underpinned by the availability of funding to meet some or all of the costs. As such, the development of such a programme would best be driven by an existing education institution, rather than the private sector. An organisation like SRUC would have the resources to develop programme content and be able to source potential funding. Encouraging farmer engagement would also be crucial to its success. In reality, it is likely farmers would only engage if pushed. This encouragement could come from lenders and banks as it does in the USA. However, it could also come from Government as a prerequisite for farm payments received in a similar way to the requirements of cross compliance and greening for the current BPS scheme.

5. Recommendations to enhance the delivery of land-based education in Scotland

Given the research finding discussed, three recommendations for taking agricultural education forward in the UK and particularly in Scotland are proposed:

- I. Continue the expansion of agricultural education in schools to ensure all students receive agricultural education from an earlier age. This should be done in conjunction with other bodies and be encouraged and facilitated by the Scottish Government to meet the wider social and economic significance of agriculture and food.
- II. Greater utilisation of innovative learning methods and of industry expertise to deliver the necessary skills to ensure graduates are ready to work in the industry.
- III. Creation of an extended educational support network that provides for continued learning at all career stages.

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Appendix 1: The Nebraska agricultural career education model (Nebraska Agricultural Education, 2016).

