

Integrating Research and Practice through Knowledge Exchange: A National Agricultural Business Improvement Programme

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Abstract: The integration of research and practice is driving forward agricultural Knowledge Exchange (KE). It is recognised that knowledge is no longer created by academic researchers in isolation, but instead the creation and effective implementation of knowledge is an iterative process between multiple stakeholders. The Agriculture and Horticulture Development Board (AHDB) Cereals & Oilseeds KE Monitor Farm Programme brings together groups of like-minded arable farmers to share critical performance data and develop and assess strategies for sustainable business improvement. The role of AHDB as an independent organisation is to provide a unique programme which farmers own and operate to draw on local experience and collaboration to improve farm production and profits. The programme engages with a variety of stakeholders across the agricultural sector, to integrate research and practice, and encourage and facilitate business improvement and the adoption of new technology, practices and innovations. 93% of respondents agreed that the Monitor Farm meetings had been a good use of their time, and 72% of them agreed that it had improved their business decision making. 87% of respondents agreed that they valued the opportunity to share experience and openly discuss issues in a non-commercial environment. 90% of respondents agreed that the meeting topics have been relevant to their business and 77% of respondents agreed that the meetings have helped them identify ways to improve their business. 85% of respondents agreed that the project has improved their technical knowledge.

Key words: arable, farm, business, knowledge exchange, productivity, research.

1. Introduction

Knowledge exchange (KE) is an established process which occurs during the meeting of two or more parties (Jacobs 2013). It is defined as “the iterative cycle of sharing ideas, research results, expertise or skills between interested parties that enables the creation, transfer, adoption and exploitation of new knowledge in order to develop new products, processes or services and influence public policy” (Lockett et al. 2008).

Traditionally, the producers of knowledge have been universities (Jacobs 2013) but this assumption is changing; knowledge is produced collaboratively by a variety of stakeholders (Fazey et al. 2014) whereby each individual involved in the process has their own viewpoints, ideas, and motivations (Contandriopoulos et al. 2010). Knowledge exchange, and the use of knowledge, is influenced by its relevance, credibility and accessibility (Contandriopoulos et al. 2010) and therefore researchers are increasingly required to demonstrate economic and social impacts, increase knowledge sharing and ensure that research delivers relevant, valid and practice solutions (Fazey et al. 2014). Bruce (2016) identified the importance of effective KE for the benefits of the participants, in this instance farmers and agronomists, but also to provide feedback to the research community.

There is, and always will be, a need for explicit knowledge which is based on “facts, observations, classification, measurement and cataloguing in addition to principles, rules and ideas of science and technology” (Klerkx and Proctor 2013). In health care, for example, KE is underpinned by a scientific evidence base (Contandriopoulos et al. 2010). Alternatively, tacit knowledge is based on the implementation of skills at a practical level (Klerkx and Proctor 2013). In order to do this, improved access to information is needed through farmer-to-farmer networks in addition to technology platforms and tools to complement these

meetings (Bruce 2016). The Beef and Lamb New Zealand's Monitor Farm Programme has been helping farmers, supported by industry experts, to improve their businesses (Beef and Lamb New Zealand 2016).

Effective knowledge exchange is complicated, and the multi-actor interactions require facilitation (Jacobs 2013). Within a KE network there will be actors of perceived differential status which facilitators need to recognise and manage to avoid bias in the interaction of group members (Thomas-Hunt et al. 2003). Greater information sharing occurs between parties where pre-existing relationships, and therefore trust, already exists and is reinforced in a cyclical process of continued communication (Gruenfeld et al. 1996; Contandriopoulos et al. 2010).

The evaluation of KE, to determine its "value, significance, worth or condition" (Chapman et al. 2007) is lacking but is increasingly becoming a focus of funding bodies (Jacobs 2013). The uptake of research is complex, as it can take place and form over a range of temporal and spatial scales (Beyer and Trice 1982). Measurable changes in participants are therefore necessary to evaluate KE strategies (Jacobs 2013), involving quantitative assessment of repeated behaviour, which can be a direct change in action or a confirmation of existing practice (Contandriopoulos et al. 2010). Beyer and Trice (1982) reported on methods of data collection which included participant observation, case studies, interviews and surveys.

2. The Monitor Farm Programme

The Agriculture and Horticulture Development Board (AHDB) is a UK statutory levy board, established in 2008 from dissolved predecessor levy boards. The AHDB is funded by farmers, growers and others in the supply chain, and independent of both commercial industry and of Government. The purpose of AHDB is to "*equip levy payers with independent, evidence-based information and tools to grow, become more competitive and sustainable*" achieved by delivering extensive research and development programmes (AHDB 2016a). The AHDB covers six sectors, namely: Pork, Dairy, Beef & Lamb, Horticulture, Cereals & Oilseeds, and Potatoes.

The AHDB Cereals & Oilseeds research and knowledge exchange strategy was formulated following analysis and consultation, and will run until 2020 (AHDB 2015). The top 5 business challenges in the strategy are: cost/price pressures; pesticide availability; weed management; weather volatility; and legislative impacts. In accordance with the strategy, levy funds will be spent on:

1. Informing on-farm activities to increase productivity
2. Improving business opportunities through understanding product quality and making the most of market potential
3. Preparing the industry by assessing future challenges and conducting activity in response to these challenges.

The AHDB Cereals & Oilseeds knowledge exchange programme on which this report is based, is known as the Monitor Farm programme (AHDB 2016b) and was initiated in the UK in Scotland in May 2011. Currently, nine monitor farms exist in Scotland. In England & Wales, the first phase consisted of the launch of six farms in June 2014. A second phase of nine farms was completed in December 2014, a third phase of eight new farms in June 2016, and a fourth phase in June 2017. The distribution of monitor farms is shown in Figure 1.

The programme brings together groups of like-minded farmers to share, discuss and evaluate critical performance information to encourage and facilitate business improvement. The farmers direct the content of the programme, resulting in issues and solutions being relevant to the local area, and has demonstrated the importance of integrating research and practice to

best drive sustainable business improvement activities. The engagement of stakeholders across the agricultural industry including those involved in research, development, and implementation, ensures that farmers are challenged and supported to learn and interact. Key messages and technical communications are transferred to the wider agricultural industry through effective KT which utilises a variety of written, verbal and social media channels.

The integration of research through the participatory model that has been implemented has generated similar initiatives in other crop and livestock sectors. These provide a platform for the demonstration of research for more technically produced and high value specialist crops. The evaluation of KE impact allows farmers to measure their own business improvement, as well as the assessment and continual development of the overall programme.



Figure 1. Map of AHDB Cereals & Oilseeds England & Wales Monitor Farms

3. Measuring impact

A paper-based and online survey was conducted after three years of the programme in 2017 with 346 total number of respondents. The survey determined the participant's level of involvement in the programme, duration of farming experience and current farming system. A series of three-level Likert Scale questions were asked to determine opinion on the impact

of the Monitor Farm programme on time use, business decision making, sharing experiences, business relevance and improvements, and technical knowledge. Respondents were asked to identify the most important aspects of the programme, as well as their motivation to attend, and changes to their business management. The Agriculture and Horticulture Development Board operates across six sectors, with separate but collaborative research and knowledge exchange teams. Respondents were therefore asked about changes to their current and future involvement and opinion of AHDB. Data were collected from the surveys and combined. Written responses were analysed by identifying the most frequently occurring words.

4. Results & discussion

Respondents were asked to identify their involvement with the monitor farm programme, as shown in Figure 1. The highest percentage of participants were local farmers (66%), who share and discuss information in addition to directing the programme. The importance of farmer-to-farmer learning was reported by Wood et al. (2014) and Mulholland et al. (2017) who stated that farmers place value on the ability to learn from farming experiences to prompt changes in behaviour. Franz et al. (2009) investigated preferential learning by farmers in the United States of America (USA). The authors reported that farmers gather information from experiences, experts, watching and reflecting through hands-on, demonstrations, farm visits, field days, discussions and one-on-one interactions (Franz et al. 2009). The Monitor Farm programme encompasses all of these criteria on a host farm; the importance of a host farm has been reported to be an essential component to ensure impact of peer learning initiatives (Mulholland et al. 2017).

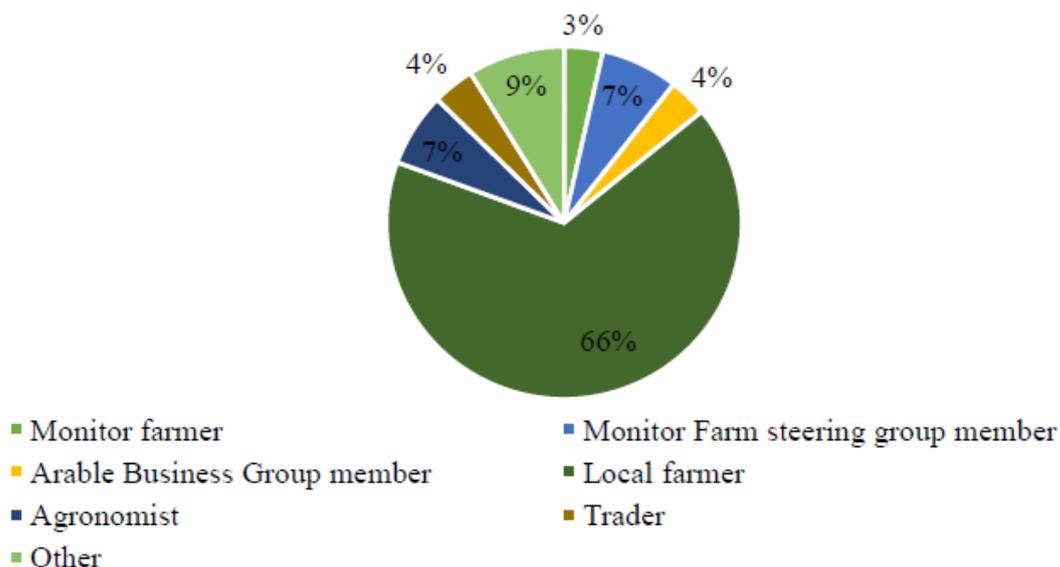


Figure 1. Participant involvement with the Monitor Farm programme.

Agronomists in the UK act as agricultural advisors to farmers on crop protection and production products. Ingram (2008) reported that the interactions of agronomists and farmers can be both positive and negative, whereby there is an element of mistrust in some cases compared to others where the two parties can work together to improve farming practices. In the Monitor Farm programme, agronomists make up 7% of the overall attendees and are often linked to the host farm or the members of the farming group. The issue of trust, therefore, is somewhat minimised due to the pre-existing relationships, as described by Gruenfeld et al. (1996).

The geographical impact of the programme can be determined by the distance travelled to meetings (Figure 2). The highest percentage of attendees, 36%, travelled between 0-10 miles, followed by 11-20 miles (29%) and 21-30 miles (19%).

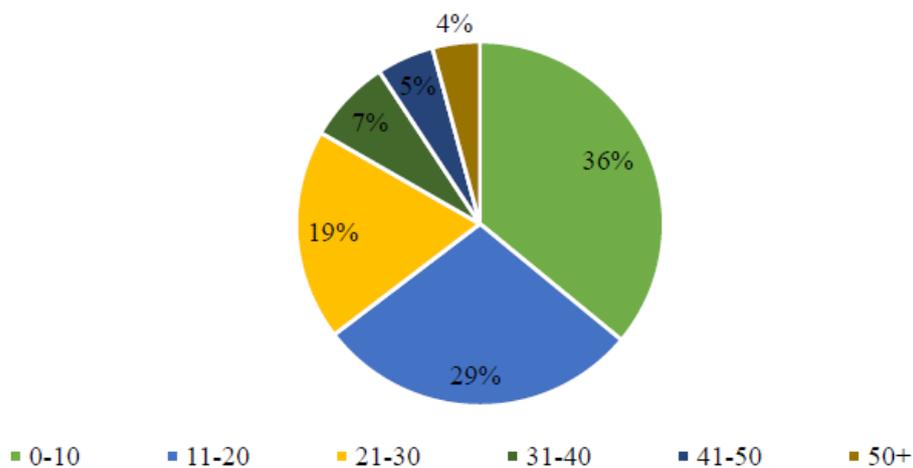
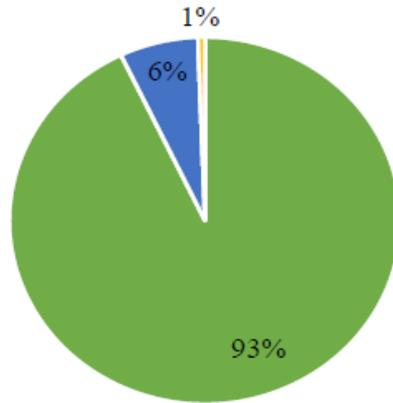


Figure 2. Travel distance (miles).

The Monitor Farm programme reaches a total of 259, 273 hectares (ha) across England & Wales, with the greatest proportion of respondents working with wheat (98%), barley (88%), oilseeds (80%) and oats (51%). The greatest percentage of respondents (29%) had between 41-50 years of farming experience.

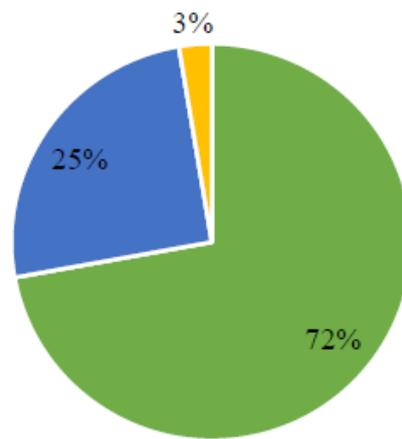
A series of three-level Likert Scale questions (agree, neither agree nor disagree, disagree) were asked to determine opinion on the impact of the Monitor Farm programme on time use (Figure 3), business decision making (Figure 4), sharing experiences (Figure 5), business relevance (Figure 6), business improvements (Figure 7), and technical knowledge (Figure 8).

93% of respondents agreed that the Monitor Farm meetings had been a good use of their time, and 72% of them agreed that it had improved their business decision making. 87% of respondents agreed that they valued the opportunity to share experience and openly discuss issues in a non-commercial environment. Similarly, Bowyer (2015) reported on knowledge transfer in UK agriculture, and stated that farmers favour peer-to-peer learning in an independent setting, rather than where it is associated with a commercial company and thus an invested interest in sales. Some farmers, identified as managers, did value the input of commercial organisations (Bowyer 2015) which highlights the importance of meeting the multiple interests and requirements of different actors in a KE environment. The interaction of different actors in the monitor farm programme is valuable for access to multiple viewpoints and experiences, but requires facilitation to ensure that the information is delivered in an appropriate format, as the way in which experts perceive the appropriate presentation of information does not always align with that of the farmers (Franz et al. 2009).



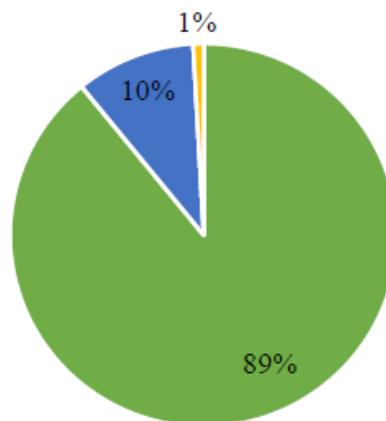
■ Agree ■ Neither agree nor disagree ■ Disagree

Figure 3. Attending the Monitor Farm meetings has been a good use of my time.



■ Agree ■ Neither agree nor disagree ■ Disagree

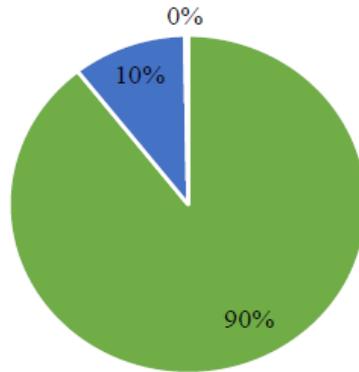
Figure 4. The project has improved my business decision making.



■ Agree ■ Neither agree nor disagree ■ Disagree

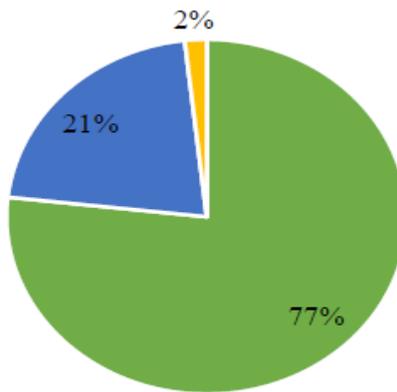
Figure 5. Value the opportunity to share experience and openly discuss issues in a non-commercial environment.

90% of respondents agreed that the meeting topics have been relevant to their business and 77% of respondents agreed that the meetings have helped them identify ways to improve their business. 85% of respondents agreed that the project has improved their technical knowledge.



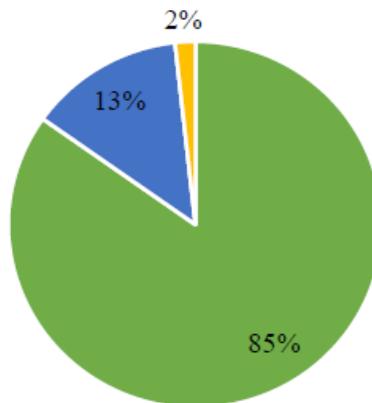
■ Agree ■ Neither agree nor disagree ■ Disagree

Figure 6. The meeting topics have been business relevant.



■ Agree ■ Neither agree nor disagree ■ Disagree

Figure 7. The meetings have helped me identify ways to improve my business.



■ Agree ■ Neither agree nor disagree ■ Disagree

Figure 8. The project has improved my technical knowledge.

Respondents were asked to identify the three most important aspects of the programme from a pre-determined list (Table 1). The top three most important aspects were farmer led agenda (53%), independent (45%) and locally relevant (42%).

Table 1. The most important aspects of the programme.

Aspect of programme	Percentage of respondents (%)
Independent	45
Farmer led agenda	53
Participate in discussion	30
Locally relevant	42
Understanding technical issues	22
Addressing business management challenges	24
Benchmark my business	22
Field scale demonstration of new techniques and systems	17
Opportunity to share experience with other farmers	39

Respondents were asked to identify their motivations to attend the Monitor Farm meetings. The most commonly occurring words were determined by frequency of words used in the responses (Table 2).

Table 2. Motivation for attending the Monitor Farm meetings.

Word	Frequency	Word	Frequency
local	59	opportunity	15
farm	52	gain	14
knowledge	50	issues	13
learn	44	monitor	13
farmer	36	meet	12
improve	33	technical	12
business	31	experience	12
relevant	27	see	11
interest	27	share	11
new	22	discussion	10
ideas	21	challenge	10
understand	17	look	10
topic	17		

Respondents were asked to identify any changes that they have made as a result of attending the Monitor Farm meetings. The most commonly occurring words were determined by frequency of words used in the responses (Table 3).

Table 3. Changes made to business as a result of attending Monitor Farm meetings.

Word	Frequency	Word	Frequency
cropping	43	machinery	8
cost	35	rotation	7
look	29	market	7
soil	26	production	7
cover crops	24	business	7
benchmark	18	fertiliser	7
farm	17	detail	7
none	14	costing	7
change	13	black-grass	6
drill	13	review	5
manage	9	mind	5
cultivation	9	wheat	5
control	8		

Figure 9 shows that 59% of respondents were involved with AHDB Cereals & Oilseeds before attending their first Monitor Farm meeting. Bowyer (2015) reported on knowledge transfer in UK agriculture and reported that farmers felt that levy board information, although good was not widely used. The second group, defined as larger operators or managers, did consider the levy board as a key players in knowledge transfer. Similar to the farmers, however, many growers and managers were not making use of levy board information. Figure 10, however, shows that 76% of respondents felt the meetings had improved their opinion of Cereals & Oilseeds, with 86% of them agreeing that it had improved their knowledge of how AHDB spends the levy (Figure 11). This could result in improved use of levy board information within these groups but also within the wider agricultural community.

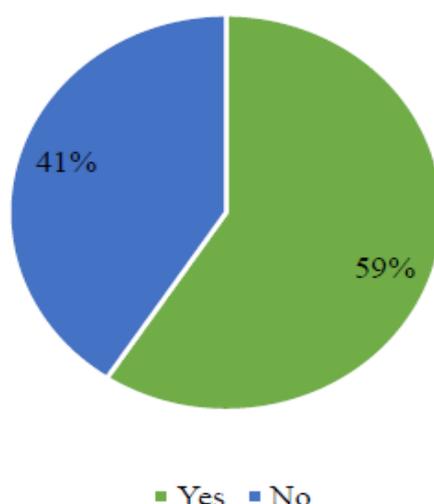


Figure 9. Involvement with AHDB Cereals & Oilseeds before attending first Monitor Farm meeting.

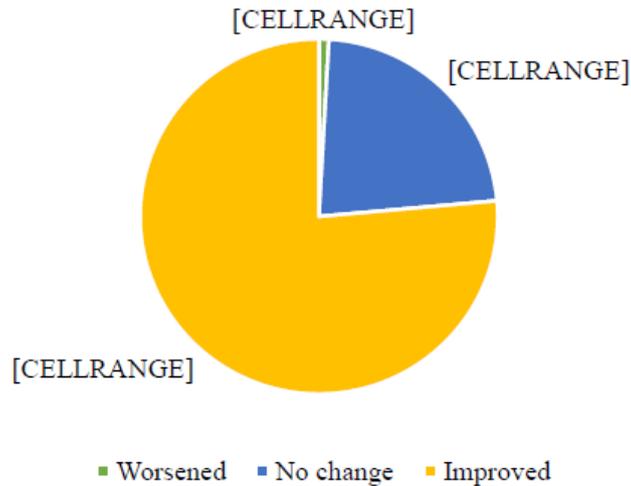


Figure 10. Opinion of AHDB Cereals & Oilseeds.

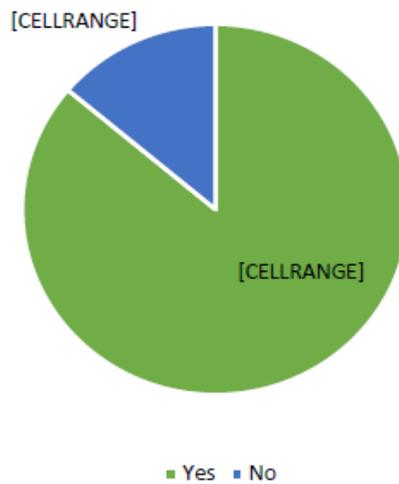


Figure 11. Improved knowledge of how AHDB Cereals & Oilseeds spends the levy.

Figure 12 shows the level of interest for joint sector events, whereby 46% of respondents were interested in joint events, of which 41% (Figure 13) of respondents were interested in Beef & Lamb joint sector events. The interest for joint sector events is more relevant in mixed farming systems, for example those that operate in Scotland whereby livestock and arable enterprises are integrated. The Monitor Farm programme in Scotland has therefore been implemented as a joint venture between AHDB Cereals & Oilseeds and Quality Meat Scotland (QMS) (AHDB 2017). On the England and Wales Monitor Farms, where specific topics are requested on a case-by-case these are fulfilled and may involve cross-sector activity. Although cross sector initiatives have not been developed, similar programmes have been implemented in AHDB Potatoes, AHDB Dairy, AHDB Dairy and AHDB Beef & Lamb.

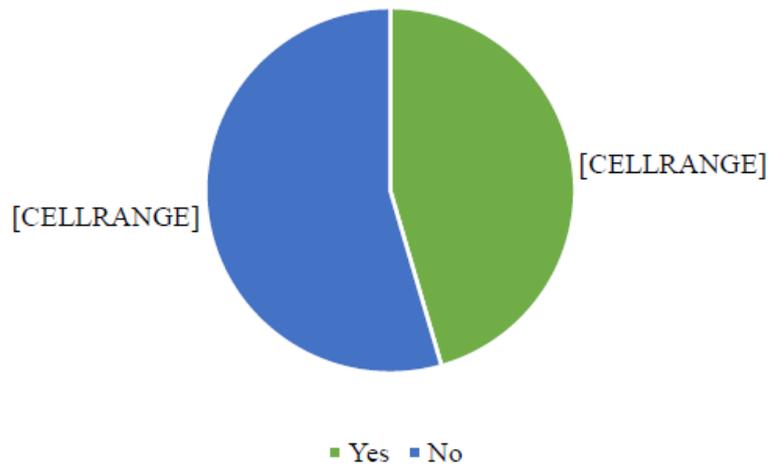


Figure 12. Interest in joint events with another AHDB sector.

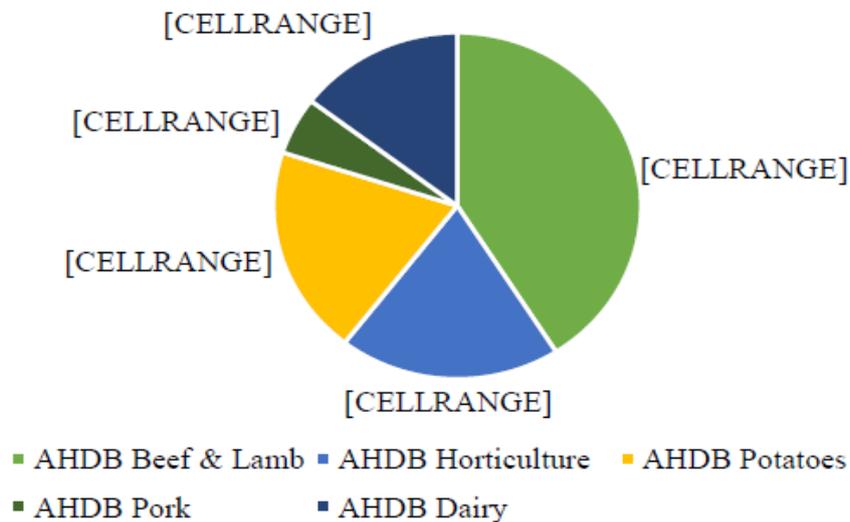


Figure 13. Sector interest for joint events.

5. Conclusions

The legacy of the programme, and key learning outcome of the Monitor Farm programme thus far, is that meetings with a farmer led agenda, that are independent and locally relevant are a good use of time and improve business decision making. Farmers, agronomists, traders and many stakeholders in the UK agricultural landscape value the opportunity to share and discuss experiences to identify business improvement opportunities and practices and improve technical knowledge. Individual changes to businesses may not be significant, or immediately apparent, but they can be identified across a range of business aspects including soil management, crop protection, marketing, and financial and cost management. Sector relevance is an important aspect of the Monitor Farm programme in the UK, where the integration of multi-sector systems is not prevalent. The ability to adapt this model in the future, under different farming systems, is important and cross-sector working and communication at an internal organisational level will be essential.

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