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Taking farmers on a journey: experiences evaluating learning in Farmer Field Labs in UK

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Abstract
This paper presents results from an evaluation of the Soil Association's Duchy Originals Future Farming programme which supported regular farmer group meetings (Field Labs) and problem based field experiments. Drawing on the theoretical ideas of the three learning loops (Argyris & Schön, 1996), the paper examines the nature and extent of farmer learning that can be attributed to participation in the initiative. Using data from a survey, detailed interviews and a discussion forum, the evaluation found that farmer understanding of Field Lab topic, practices and skills, and research methods has been enhanced to different extents as a result of participating in Field Labs. However, overall farmer learning is as much about being given the tools and the confidence to go away and try things, as it is about acquiring specific knowledge, skills and practices. The paper concludes by reflecting on methodologies employed for evaluation of learning approaches and arguing for a more embedded and reflective approach.

1. Introduction

A shift towards participatory and demand driven extension (Leeuwis, Leeuwis, & Ban, 2004) together with an increasing policy interest in peer to peer learning to foster innovation has led to the emergence of a range of participatory initiatives (operational groups, farmer field labs) in Europe. These are modelled on more established approaches such as Farmer Field Schools (FFS) and Stable Schools. A central element of these strategies is a learner-centred process that relies on discovery-based and experiential learning and critical reflection in groups. A common assumption is that these approaches lead to improved skills and knowledge, problem-solving and critical thinking, and enhanced empowerment and capacity building amongst participating farmers, as well as increased adoption and diffusion of sustainable and innovative practices. Verifying such claims and evaluating such approaches can be challenging methodologically (Douthwaite, Kuby, van de Fliert, & Schulz, 2003; Waddington & White, 2014).

This paper presents results from an evaluation of such an initiative, the Duchy Future Farming Programme (subsequently called Innovative Farmers). The programme[1] supports 'Field Labs', which are regular farmer (organic and conventional) group meetings and problem based field experiments guided by a facilitator with research expertise (MacMillan & Benton, 2014). Drawing on the theoretical ideas of the three learning loops (Argyris & Schön, 1996), this paper examines the nature and extent of farmer learning that can be attributed to participation in the initiative. The paper highlights the challenges of attributing learning to such

[1] This Programme was initiated by the Soil Association in partnership with the Organic Research Centre and UK retailer Waitrose, with funding from the Prince of Wales's Charitable Foundation.

interventions particularly in a retrospective evaluation and argues for an ongoing and reflective evaluation for the successor programme.

Understanding the nature and extent of learning or improving knowledge associated with interventions has been the subject of much scholarship (Coudel, Tonneau, & Rey-Valette, 2011). This scholarship reveals that multiple elements are contributing to the process of learning and acquiring knowledge (Baars, 2011) which any evaluation of farmer-centred learning initiatives should consider. In FFS evaluations, learning tends to be seen as enhanced knowledge of farming technology such as Integrated Pest Management practices and pest identification. Often these studies provide evidence via adoption, or, taking a broader view, of improved: analytical skills, critical thinking, ability to make better decisions, familiarity with practices, which lead to better decisions regarding inputs, yields and costs (Waddington & White, 2014). At a deeper level, empowerment and enhanced capacity to learn are also indicative of improved and more transformative learning (Duveskog, Friis-Hansen, & Taylor, 2011). The methodology in this evaluation sought to examine and understand these different dimensions of learning.

The SA define field labs as farmer-led meetings, open to all (both organic and non-organic), where producers examine innovative approaches, share existing best practice, learn how to run effective producer-led trials and identify real gaps where academic research would make a crucial difference. Field Labs are designed to empower farmers as innovators, increasing the impact of their informal research and enabling them to influence the formal research conducted in their name. They aim to build knowledge of specific topics, an understanding of the research process and associated skills and develop critical thinking amongst individual farmers. Typically, Field Lab groups meet 3-4 times to address the topic that had been identified and discuss its salience to participants practice. The FL were evaluated against these aims. Specifically, the aims of the evaluation reported here were to assess the effect of participation on 1. farmer learning in farming techniques/best practice and 2. farmer learning in research/innovation skills/critical thinking and other learning outcomes.

2. Literature Review

This review of the literature builds on insights that focus on understanding the context in which farm business operates, the way in which the literature on farm learning has tending to not be attentive to the significance of the context and in this point to the novel elements of the subject of the study.

The focus on innovation and learning has recently become a policy prescription on the basis that through Schumpterian effort meaningful economic growth can be resumed after the crisis of the 2008. This implies in part that agricultural businesses and farmers were deficient in innovation and knowledge previously, in a British context this can be seen on the focus on export based agricultural technologies as well as food commodities in the Taylor Report (Herbert & Lord Taylor of Holbeach, 2010). Rather, as we argue, this paper illustrates the agricultural industry in the UK through self-organisation is attempting to realise important sustainability goals that it has set for itself. The wider British agricultural industry has already made clear its preference for farmer-led participatory approaches which are divergent from government policy and provision (Defra, 2013; Gibbs, 2013; OECD, 2015; Sutherland et al., 2013). This may have wider implications as others emulate the process or learn from it, but also speaks to the scholarship around farmer learning and innovation.

Much of the literature on innovation and participatory learning has its roots in learning with large organisations and the process of transformation that lead to organisational innovation,

suggesting that this is not simply a question of agency but also of enabling structures (Coudel, Tonneau, & Rey-Valette, 2011). In order to transport some of the insights about such learning scholars concerned with agriculture and farming have had to adapt to what Coudel and colleagues identify as a more "loosely structured environments"(Coudel et al., 2011:121). This reflects a broader totalizing tendency in much of the literature to assume that all agricultural contexts are sufficiently similar that comparisons and analogies can be made between projects and enterprises (Waddington and White 2014).

The project which is the focus of this study typifies much of the context of British agriculture but differs in significant elements. Firstly, the food supply chains in the UK are retailer led with their influence not only influencing commodity prices but also on-farm practices, especially those related to food safety (Marsden, Flynn, & Harrison, 1999). Farm level autonomy is circumscribed by such relationships as is the flow of information through and within the farm business. Secondly, the state has a significant role within the agricultural sector through agri-environmental interventions both in terms of legislation, but also through payment schemes to ensure environmental improvement (Jane Mills et al., 2011). Again this represents considerable flows of not just money but information between and within farms (J Mills et al., 2016). Many farms remain multi-generational, family owned and operated enterprises, that have high levels of capitalisation and technology, which is reflected in the developmental trajectories they have adopted (Ingram, Gaskell, Mills, & Short, 2013). Innovation at the farm level in this context is modulated by a complex, but not necessarily sophisticated, interaction between major private sector corporations, the implementation of EU schemes by various state agencies and devolved government bodies and familial requirements.

To leave the account of the context at this point would also reduce the complexity of the context. The project is led by an organic farming organisation, and most, but not all, of the participating farmers were also organic. Organic farming has been noted throughout the literature as having particular epistemic practices that differentiate it both practically and philosophically from much of the wider agricultural sector (Morgan & Murdoch, 2000). The practices of certification and market creation for the organic sector have been reflected in a particular organisational form as well as a distinct market profile, with a much greater uptake of schemes as well as a greater tendency towards use of some short supply chains (Lobley, Butler, & Reed, 2009). Further scholars have argued that organic farming is part of a wider social movement that has wider civic and political goals that challenge both how agriculture is practised and its status within broader society (Reed, 2010; Tovey, 1997). In recent years this has seen organic farmers allied with other groups in protests about GM crops and debates about the future role of agriculture (Reed, 2008). This suggests that agricultural sustainability innovation may have a wider social and civic impact that often recognised.

Recently social movement scholars have come to focus on the productive, epistemic actions that result from the collective action that is undertaken by movements as participants work on what they want to replace the present (Crossley, 2002; Melucci, 1996). Rao, writing from business studies notes how the rise of organic food was related to the role of activists, and from technology studies Hess argues that organic agriculture is the product of a social movement (Hess, 2004; Rao, 2009). This significant as it indicates other social influences, in terms of flows of information and values that are not often accounted for the in the farmer learning/innovation literature but also another type of organisation, the social movement, which has a very high capacity to foster learning and innovation. Castells in his study points of the innovations introduced through the 'Occupy' protests and the importance of internet augmented deliberations in a relentless process of interaction (Castells, 2012). It may be that through a movement many people have experienced profound changes in values or societal

understanding that require pragmatic changes. The innovation literature can help in the analysis of how these change occur.

Significantly in their study of organisational innovation with regards to Gay and Lesbian advocacy Foldy and Creed note the importance of wider social movement activism in fostering these changes (E. Foldy & D. Creed, 1999). Through their detailed account of the activism within and without the businesses in questions they observe that "a closer look reveals an intertwining of single-, double-, and triple-loop approaches, a maze that resists simplification" (p.214). They do not abandon the schema but refine it to be able to analyse the particular, suggesting that whilst it is necessary for the first loop to succeed before second and third loops can this sequence is not linear, or easily observed to be serial, "They happen concurrently, sometimes cross-fertilizing and sometimes at cross-purposes, but ultimately, it is that continuous interaction out of which change efforts grow" (p.224). This suggests that we need to be attentive to the the dynamic ways in which analytical frameworks are heuristic guides not to be mistaken for the reality they interpret.

We follow Coudel and colleagues in find the work of Foldy and Creed, helpful in outlining how to discern the three loops of learning in a complex situation (Coudel et al., 2011). Single loop learning addresses the actors 'strategies or the assumptions behind those assumptions to reach their goals more effectively or efficiently. Significantly they suggest that actors can here be individual or collective. Double loop learning is where actors come to question and change the values that are driving their activities, and triple loop is beyond the individual's values to those of the surrounding society or system of values. Foldy and Creed provide examples which whilst illustrating what they mean triple loop, such as companies changing their family friendly policies to recognise those of Gay and Lesbian parents. They are clear that triple loop learning can be achieved if a process of questioning is realised rather than achieving a substantive change (E. Foldy & D. Creed, 1999:208). This presents a picture of the various loops of learning being situated in a complex and multifaceted context, with an attention to the role of processes such as the development of questioning attitudes not simply the measurement of outcomes.

3. Methods

Given the theoretical understandings of learning and the evaluation context (ex post), client requirements and aims, the methodology focused on evidence of learning in individuals as an indication of the FLs impact (but on the understanding that any individual learning was most likely connected to wider group learning), and aimed to establish whether different levels of learning could be distinguished

The evaluation took place towards the end of the three-year programme and the method was somewhat prescribed by the programme requirements. Three main methods were used in the following order: detailed interviews with farmers/growers, a facilitators' discussion forum, and a telephone survey by the research team of farmers/growers. Results from detailed interviews were used to inform and steer questions in the facilitators' discussion forum, likewise results from detailed interviews and the facilitators' discussion forum were used to develop the survey questionnaire. Also, the authors attended Field Labs towards the beginning of the evaluation and a facilitators/research workshop towards the end of the evaluation. The field labs were spread across a spectrum of experiences, from early examples that met only twice

with a group who only attended a FL once through to a group that became self-sustaining with a consistent cohort of participants, with most FLs between these two points.

Purposeful sampling from a list of participants from 22 Field Labs was used to select 12 interviewees, as well as the facilitators. These interviews were semi-structured. Random sampling was used to selected 30 telephone survey respondents from a sample of 221 farmers/growers and advisors (representing 14%). Interviewees and respondents were asked to what extent they had gained new knowledge and information; learned new farming practices and skills, come to understand some of the underlying principles beneath these practices, come to understand and acquire research skills, and reflect on their learning overall. Survey respondents ranked statements using a Likert-like scale.

Drawing on qualitative and quantitative methods allows patterns as well as processes to be explored; the telephone survey reveals patterns in responses whilst the detailed interviews and discussion forum provide some explanation for these patterns and insight into processes involved. In this respect, detailed interviews allow some in-depth analysis of the nature of learning while the survey can be used to extend this analysis and obtain some idea of the extent of farmer learning. This mixed methods approach also allows some triangulation, for example, farmer self-reported learning or practice change could be validated by facilitators (Moran-Ellis et al., 2006).

3. Results

It is apparent that significant learning has occurred as a result of attending Field Labs. Good correspondence between the three data sources confirms that topic knowledge, practices and understanding, and research understanding has been enhanced to different extents. Selected survey results are presented in Figures 4.1 – 7. The intention here is to distinguish and frame the results using a simple interpretation of learning loops and not to provide a thorough analysis and critique of learning loops theory.

3.1 Single loop learning –improved learning about the Field Lab topics and practices

Single loop learning is understood here as changing the way of working within a set frame of thought through incremental learning. The focus is on techniques and practical and locally applicable answers to questions rather than questioning underlying principles. It is akin to the ‘know-what’ and the ‘know-how’ described by Lundvall and Johnson (1994).

The majority of survey respondents (25/30) agreed that the Field Lab gave them a clearer understanding of the topic they were investigating, those who did not agree already possessed high levels of knowledge about the topic (Figure 4.1). Although the majority (80%) were satisfied with the level of learning in the Field Lab, only 37% agreed that the Field Lab they attended gave them a chance to learn new skills and practices such as how to grow cover crops effectively (Figure 4.2). The gap between these figures is accounted for those who had not attended long enough to engage in learning or develop new skills.

Acquiring new knowledge from others at the Field Lab was mentioned by most of the interviewees who agreed that they had learned new facts about the Field Lab topic by sharing information with co-participants. According to the detailed interviews this learning depended on the nature of the topic, and on the baseline knowledge of the participant. Participants agreed that the format of the Field Lab in most cases allowed a good combination of technical, practical and financial information to be discussed. For some the Field Lab format, compared to other similar formats, was thought to provide a good context for learning about facts and figures, as one farmer remarked “They are more focused than a farm demonstration or walks and as trials are undertaken in a semi-controlled environment they should produce better facts and figures”.

Larger FLs with a "good healthy breadth of views and experiences," including some experts were considered to lead to most learning of this type compared to Field Labs described as not particularly with only a few participants or less successful in implementing the participatory approach. For more informed participants, the extent of this learning was not that pronounced. For some it was described as more about "joining the dots" rather than picking up specific information about the topic.

3.2 Double loop learning – learning about underlying principles

As described above, 'Double loop' learning refers to learning that alters underlying values, rules, and assumptions. This evaluation found evidence of learning about the principles underlying the topics and practices in Field Labs and learning about how to apply experimental and research protocols on-farm. This is akin to the acquiring the 'know-why' dimension of knowledge described by Lundvall and Johnson (1994).

Four of the interviewees agreed that the Field Lab had enhanced their understanding of the basic principles underlying the new techniques and measures. For example, for the Foam Weeding Field Lab, one interviewee said "Yes we did learn more about the underlying science behind the technology, particularly the role of the foam as a wetting agent, and the role that played".

In some cases Field Lab participants felt they had been given the tools, and the confidence, to go away and try things for themselves, as this comment demonstrates:

> "It was more theoretical, we walked and talked and had a look at things, although we did handle compost, and the final mix etc. We got the basic recipe to go away and experiment with. We would have been confident to try it out." (Wood chip compost)

This theme of taking control of details and feeling enabled was picked up by an interviewee participating in a weed control Field Lab:

> "I was trained as a conventional farmer and we spent a lot of time looking at detail, for organic farmers. The temptation is to think that you can't do anything other than sow your crop and hope for the best. This brought us back to the details which I think has been missing in many organic situations. What happens is that you think things are so huge, subject to so many vagaries, and out of your control, but this helped remind us there are things you can control."

With respect to learning how to conduct research, survey respondents were less likely to agree that they had learned research skills and results suggested that learning about research methods was not something they had considered as relevant. However, some 40% agreed they wanted to get more involved in research as a result of attending a Field Lab. Also notably a number of respondents and interviewees were already well versed in research skills and understanding. The interviews provided more depth on this subject, revealing how some farmers valued, and learned from, carrying out trials. For some participants the practical hands-on measuring was a distinctive element of the Field Lab. As one interviewee who had attended the 'Compost Teas' Field Lab remarked "Basically we were physically doing the trial ourselves, actually doing it, not a researcher doing it and reporting back."

3.3 Triple loop learning – learning how to learn

Triple loop learning here refers to learning how to learn. It allows participants to reflect on and learn how to evaluate and appreciate their own experiences and viewpoints, as well as those of others. This is aligned to transformative learning impacts which entails a deep seated shift in perspective (Duveskog et al., 2011; Percy, 2005).

The nature and extent of this deeper learning is hard to gauge from the survey, with responses to statements about the nature of learning inconclusive. The results from the interviews, facilitator's discussion forum and participant observations, however, show that learning in Field Labs is as much about changing perspectives as learning new facts or practical skills. Interviewees explained that the Field Labs made them question things and as one explained "it introduced a different way of thinking about the problem".

Another element of this learning is building confidence in decision making. For example, in a Field Lab experimenting with mastitis control in cattle some farmers felt empowered to manage mastitis more effectively by either using herbal treatments and being 'brave enough' to make decisive management changes. The openness and sharing ethos of working in a group were highlighted as important in instilling confidence and a sense of empowerment. As with first and second learning loops this was enhanced when groups were of a sufficient number (generally >10), had a good mix of participants and provided a good breadth of views and experiences. The opportunity for Field Labs to develop this learning over time relies on sufficient continuity within groups with participants committing and returning to events and reflecting together on outcomes. The commitment, enthusiasm, honesty and expertise of host farmers were also seen to generate effective group learning and inspire confidence.

Facilitators suggest that the whole Field Lab process is one of deeper learning. In the early stages, for example, farmers learn how to formulate and agree to ideas to test, as one facilitator remarked, this learning involves "knowing to ask the right questions". With respect to setting up research in the Field Labs, facilitators focused on leading the farmers through the research process. They described how some farmers are inclined to just test "with and without" rather than setting up randomised trials, or to be over ambitious with their research questions, one facilitator explains:

> "it's taking them through this process, and the how do you measure it? What are the parameters you are measuring? Its saying to growers how are we going to do it then? It demonstrates to them that doing research isn't like falling off a log".

According to facilitators this realisation is part of the Field Lab learning process that farmers should go through, although the extent to which different farmers do so is unclear and hard to gauge or measure directly. Overall, rather than point to specific learning achievements, facilitators said that Field Labs were more about "taking them [farmers] on a journey to understand how to look at their farms". This again highlights the importance of building up continuity within groups, which facilitators noted was absent in many Field Labs.

Although facilitators have these aspirations for farmer learning, they voiced concerns that farmers did not always understand what a Field Lab entails. Several had clear examples of farmers not understanding what they were participating in:

> "Is it what they thought it was when they signed up? It is clear in the information but still people who turn up, and they don't understand the concept of the Field Lab –and why should they? It's the topic that's drawing them in, not the process."

The management of expectations had two facets, as above those of the farmers, but also those of the researchers: "There is a perception that farmers expect to get spoon-fed by researchers and once they understand it is not like that then are much more likely to get involved ….". In the more successful and longer term Field Labs there was a sense that those perceptions are changing, that dialogue and reflection between farmers and researchers is leading to more open-minded and appreciative learning.

4. Discussion

These results suggest that the Field Labs are supporting and building farmer innovation capacity. They do this by facilitating collaboration for sharing and processing information and knowledge, by enabling farmers to identify and prioritise problems and opportunities through experimentation, by fostering confidence in practical and research skills, and by nurturing new perspectives and outlooks.

The results highlight the difficulties in assessing changes in learning ascribed to Field Labs, especially in regard to evaluating improvements in farmers' analytical skills, critical thinking, ability to make what they feel to be better decisions; as well as changes at a deeper more transformative level that are associated with third loop learnin . A recent meta-analysis of FFS programme evaluations noted the difficulty in ascribing changes specifically to the intervention. It concluded that the evaluations are broadly not sufficiently rigorous and there are dangers of 'systematic overestimation of impact' particularly with respect to diffusion and scaling up '(Waddington & White, 2014). This review and others challenge the notion of a causal chain or linear outcomes in complex situations and identifies an 'attribution gap' (Douthwaite et al., 2003). The review of FFS also highlighted the challenge in evaluating softer outcomes such as empowerment and capacity development compared to other impacts where studies have shown improved farmer knowledge and adoption of beneficial practices with participants feeling more confident with problem solving and decision making (Duveskog et al., 2011; Van den Berg & Jiggins, 2007; Waddington & White, 2014).

The nature of the Field Labs programme and activities further challenged the evaluation, particularly in attributing farmer learning to participation in the Field Labs. This was because the labs were at different stages, a number having not yet developed sufficiently to result in measurable change in learning and the diversity of contexts, activities, topics and goals made comparison difficult. Further, the majority of respondents had only attended one meeting and as such their perspectives about, and opportunities for learning were limited, The different levels of participation and engagement in groups clearly has an impact on learning, as has been widely noted in other studies showing how learning is embedded in social and cultural contexts, and that people learn through their ongoing participation in these contexts (Sewell et al., 2014). Participants also started from different levels of understanding. Significantly a number were innovative farmers already experienced in (formal and informal) on-farm experiments, accustomed to finding solutions, and each with their own experiential knowledge to impart. Given these conditions, any evaluation has to recognise the situated and contingent environment within which farmers learn (Eshuis & Stuiver, 2005) and the contributions that farmers can make as co-learners (Baars, 2011).

The results of this study suggest the need for evaluation to be embedded within the initiative as a form of action research with in built M&E so that it can evolve, adapt and learn as it develops, allowing ongoing reflection to foster learning and innovation. In turn creating a virtuous loop of credible critical learning that will enable farmers to guide their farms to their goals within a context in which they are the experts.

5. Conclusion

The evaluation found farmer learning as a result of participating in Field Labs is as much about being given the tools and the confidence to go away and try things, as it is about acquiring specific knowledge, skills and practices. The learning process within Field Labs is about "joining the dots" and learning how to formulate ideas and "to ask the right questions" rather than specific skills or techniques. Although single loop learning is occurring, double loop is more apparent. Field Labs also aim to enhance farmers' critical thinking and help them 'learn how to learn', yet, whilst there is some evidence for this, there is an indication that not all farmers understand the concept and ambition. Overall Field Labs were described as

'taking farmers on a journey' rather than achieving defined outcomes. This approach presents particular challenges for evaluation unless the evaluators are part of that journey in a continuous process of M&E and critical reflection. The successor programme (Innovative Farmers) has made provision for this by incorporating M&E from the outset through an action research approach. It has also brought in changes in response to this evaluation including a stronger emphasis on group continuity whereby farmers become member of group that meets on an ongoing basis, running successive Field Labs.

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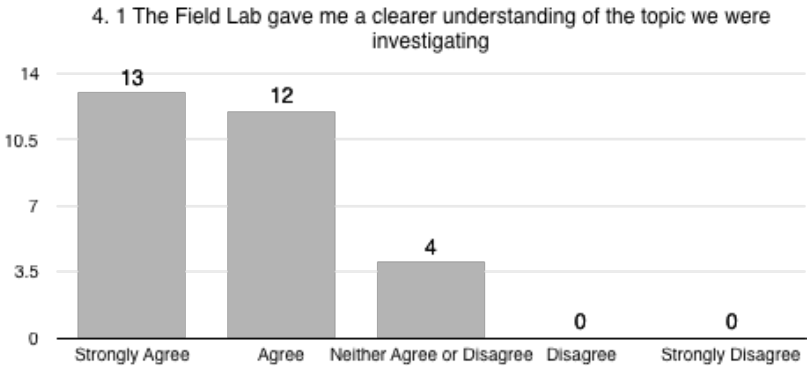
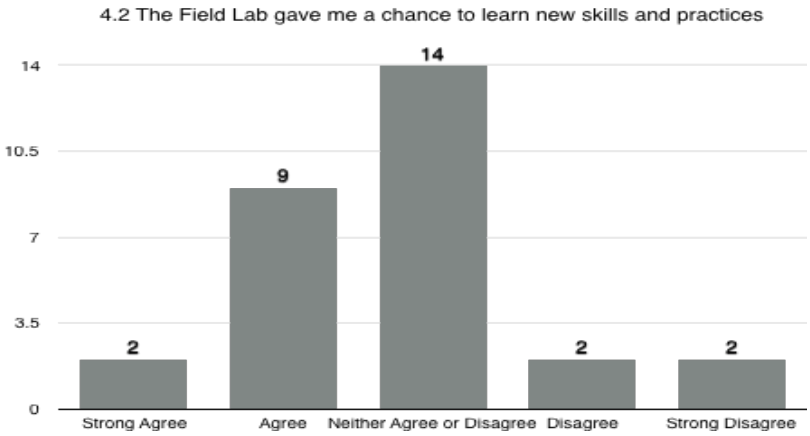
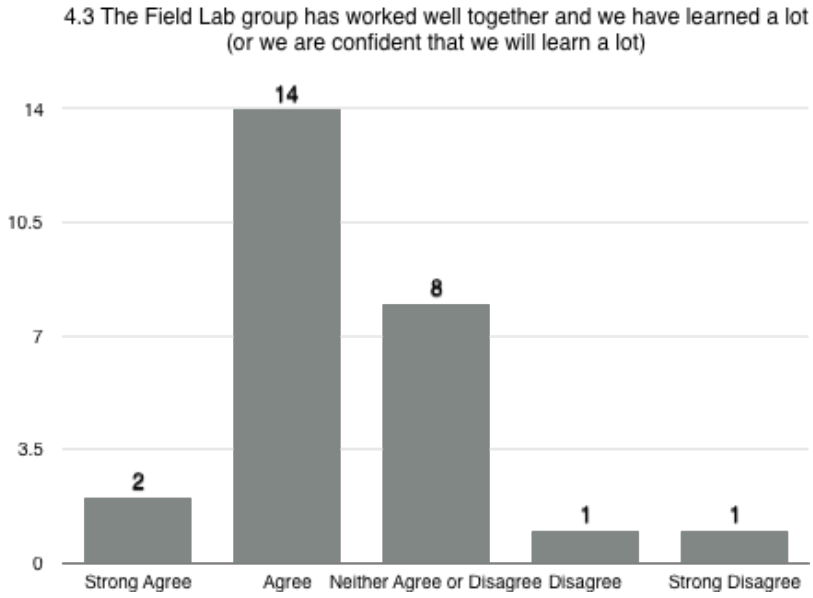
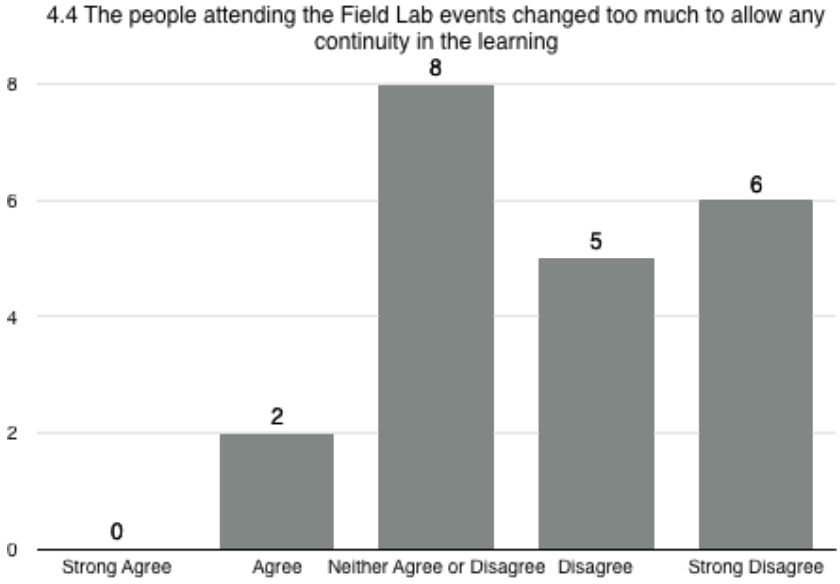
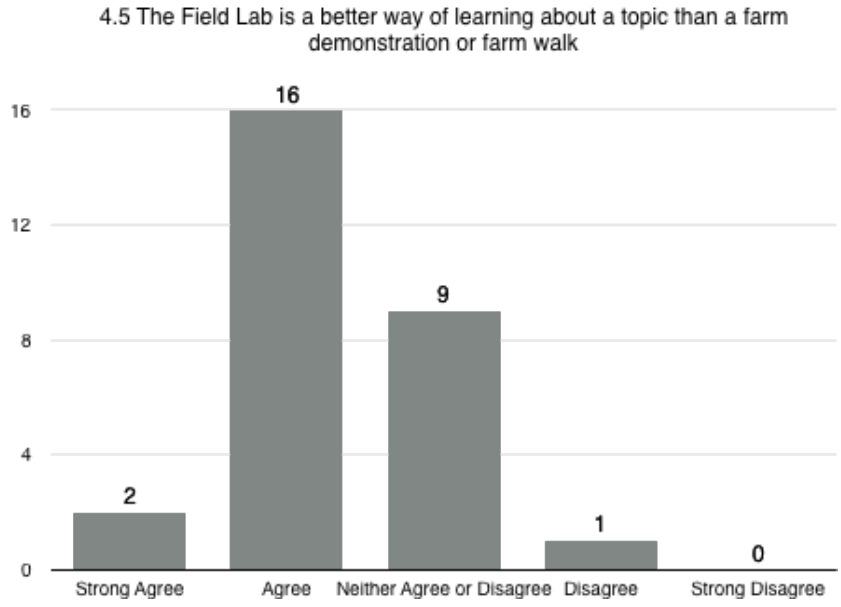
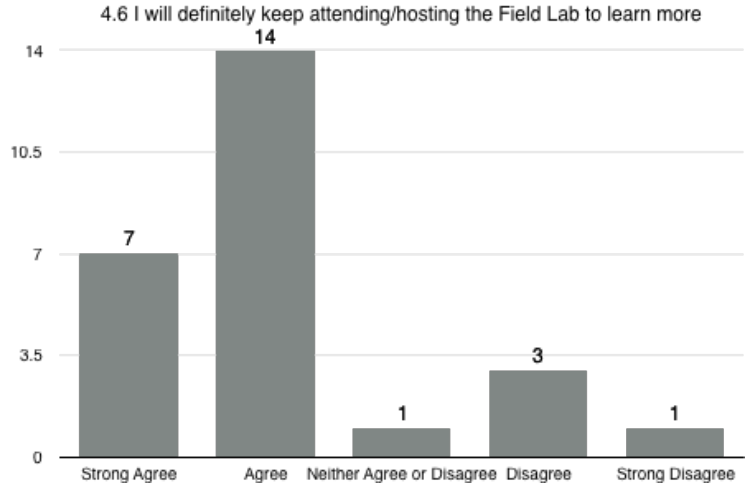


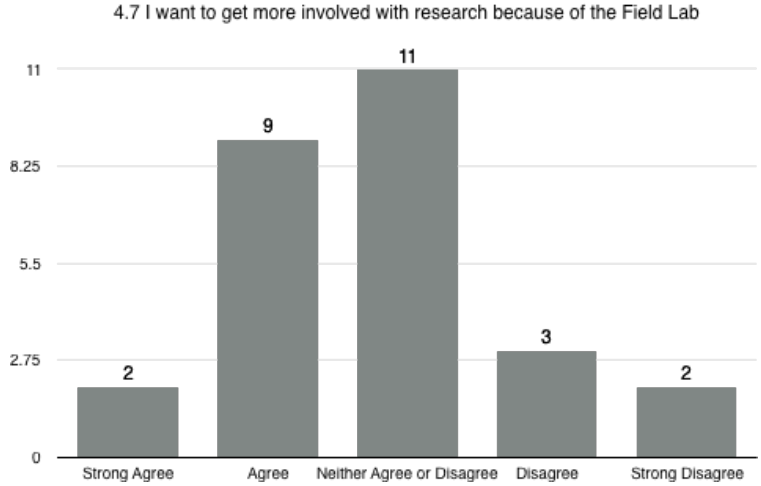



4.3 The Field Lab group has worked well together and we have learned a lot (or we are confident that we will learn a lot)
14
10.5
7
3.5
0
2
14
8
1
1
Strong Agree
Agree
Neither Agree or Disagree
Disagree
Strong Disagree


4.4 The people attending the Field Lab events changed too much to allow any continuity in the learning
8
6
4
2
0
0
2
8
5
6
Strong Agree
Agree
Neither Agree or Disagree
Disagree
Strong Disagree


4.5 The Field Lab is a better way of learning about a topic than a farm demonstration or farm walk
16
12
8
4
0
16
9
2
1
0
Strong Agree
Agree
Neither Agree or Disagree
Disagree
Strong Disagree


4.6 I will definitely keep attending/hosting the Field Lab to learn more
14
10.5
7
3.5
0
14
7
1
3
1
Strong Agree
Agree
Neither Agree or Disagree
Disagree
Strong Disagree


4.7 I want to get more involved with research because of the Field Lab
11
8.25
5.5
2.75
0
11
9
2
3
2
Strong Agree
Agree
Neither Agree or Disagree
Disagree
Strong Disagree