



**EVALUATING THE IMPACTS OF COVID-19
ON KNOWLEDGE EXCHANGE IN AGRICULTURE
STAKEHOLDER INTERVIEW ANALYSIS
FINAL REPORT
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1. Introduction

COVID-19 has disrupted the normal way information and advice is shared and accessed in agriculture in the UK, most fundamentally by restricting face-to-face interaction. It has also brought new opportunities for the use of digital media and tools. This research aims to examine responses to COVID-19 in the UK Agricultural Knowledge and Innovation System (AKIS), specifically asking: How is the AKIS responding and what are the implications and opportunities for the future.

A rapid appraisal methodology, using an online survey, a workshop and semi-structured interviews consulting farmers and key AKIS stakeholders, was undertaken in the period Feb-April 2021, which was underpinned by two overarching questions:

- What has been the impact of COVID-19 on knowledge exchange activities?
- What are the opportunities for future knowledge exchange activities?

Although knowledge exchange activities are the main focus of the research, the research is underpinned by the AKIS framework, defined as: a system of diverse actors from the private, public and non-profit sectors that links people and organizations to generate, share and utilize agriculture-related technology, knowledge and information (Birner et al., 2009)¹.

As such, the research is concerned with both knowledge exchange activities (KE) and with the wider system. It asks: how are stakeholders responding to restrictions on face-to-face interaction? How are they adapting to digital ways of communicating? What has been the impact on knowledge flows? What are the opportunities for future digital delivery that can facilitate interactive knowledge sharing, learning and innovation? What are the AKIS responses more widely in terms of AKIS adaptability, governance, connectedness and innovation capacities?

This report presents the analysis for the interviews, it complements analysis presented in two accompanying reports: survey and workshop.

The findings of these interviews will be used to inform the co-design of an online platform in the Farm-PEP project that allows the agricultural sector to collaborate and share knowledge.

2. Methodology

Project approach

A rapid appraisal methodology of the AKIS drawing on Schut et al (2015)² was conducted using complementary methods of an online survey of farmers and stakeholders (knowledge providers), a workshop, and semi-structured interviews with key AKIS stakeholders. The survey was oriented towards the farmer community, while the workshop and interviews aimed to consult stakeholders representing organisations engaged in KE delivery across the AKIS, although it recognised that the

¹ Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., ... Benin, S. (2009). From best practice to best fit: A framework for designing and analyzing pluralistic agricultural advisory services worldwide. *Journal of Agricultural Education and Extension*, 15, 341–355.

² Schut, M., Klerkx, L., Rodenburg, J., Kayeke, J., Hinnou, L.C., Raboanarielina, C.M., Adegbola, P.Y., van Ast, A. and Bastiaans, L., 2015. RAAIS: Rapid Appraisal of Agricultural Innovation Systems (Part I). A diagnostic tool for integrated analysis of complex problems and innovation capacity. *Agricultural Systems*, 132, pp.1-11.

boundary, between those who produce and provide information and advice and those who use it, is diffuse. The survey collected farmer (together with stakeholders) experiences and adaptations with respect to KE activities, the stakeholder consultations examined KE providers' perspectives and their adaptabilities and capacities (and implications for the AKIS overall). This combination of quantitative and qualitative methods allows a broad understanding of patterns of KE delivery and use (survey) together with an in-depth analysis of these patterns (workshop and interviews). Clearly an online survey precludes those farmers, who cannot or will not engage digitally, from responding. This was addressed by asking some questions about broader issues in farming and giving them the opportunity to add additional comments and answer the open question at the end. Furthermore, participants in the workshop and interviews were specifically asked to consider farmers who do not engage digitally.

These methods were run sequentially (with some overlap between the workshop and interviews) each validating, and steering the other through iterative analysis (Fig 1). The survey analysis provided insights for structuring (and seeking feedback at) the workshop, while the survey and workshop analysis informed the interviews. Themes identified in the survey formed the basis for the subsequent analysis.

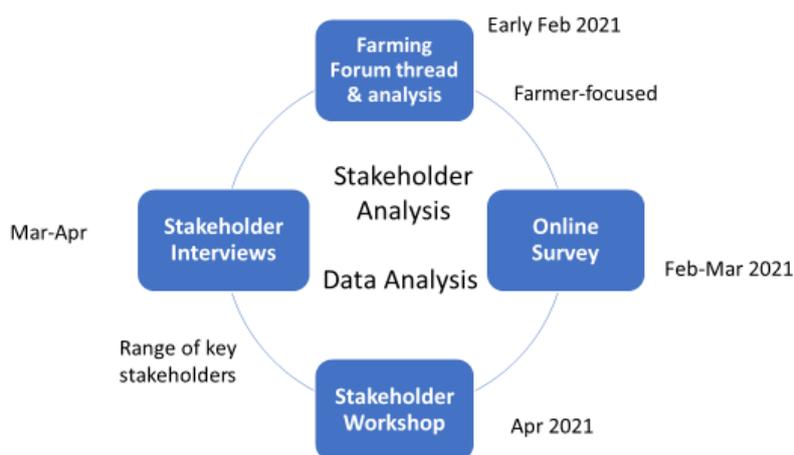


Figure 1 The main phases of the rapid appraisal methodology

A rapid stakeholder analysis was carried out in consultation with project partners and members of the steering committee, which involved a mapping exercise framed around categories identified previously (Knierim et al., 2017)³, shown in Table 1 in blue. Each grey cell was populated by the team with a number of organisation and stakeholder names. This provided a sampling framework for the survey, workshop and interviews.

³ Knierim, A., Labarthe, P., Laurent, C., Prager, K., Kania, J., Madureira, L. and Ndah, T.H., 2017. Pluralism of agricultural advisory service providers—Facts and insights from Europe. *Journal of rural studies*, 55, pp.45-58.

		FARM SECTOR			
		Arable & horticulture	Livestock & Grassland	All, mixed systems	Env
AKIS CATEGORY	AKIS SUB CATEGORY				
PUBLIC SECTOR	Policy/context setting				
	Advisory services (incl levy board KE)				
PRIVATE SECTOR	Advisory services				
	Agri-tech/digital businesses and services				
FARMER BASED ORGANISATIONS	Unions, Cooperatives Buying groups, Clusters				
NETWORKS/ PARTNERSHIPS	Farmer centric networks & partnership initiatives				
NGOS & CHARITIES	Initiatives with non-commercial aims				
RESEARCH & EDUCATION	Universities, HE				
MEDIA	Farming press/online forums				

Table 1. Stakeholder analysis framework

Details of the methods and analysis are given in the respective reports. All methods were designed iteratively with project partners. In designing the online survey, The Farming Forum analytical tool FarmIQ and a discussion thread was initiated to identify any particular trends in KE activities or topics of concern in the farming community which needed to consider.

The workshop questions and the interview schedules were designed according to: the aims of the project, the inputs from the survey analysis and with reference to key elements of the AKIS such as capacity and governance (Birner et al., 2009).

Interview methods

Sixteen semi-structured interviews were undertaken with a range of stakeholders purposely selected to represent a cross section of knowledge exchange activities in the AKIS, according to the stakeholder analysis stage which provided a sampling framework (Table 2).

The interview questions were framed around the two key questions of the rapid appraisal:

- What has been the impact of COVID-19 on knowledge exchange activities and the AKIS more widely?
- What are the opportunities for future knowledge exchange activities and the AKIS more widely?

The interview schedules was also designed using inputs from the survey analysis and with reference to key elements of the AKIS such as capacity and governance (Birner et al., 2009).

Participant Number	Sector	Stakeholder Category
ADAS_01	Agronomy	Independent adviser
ADAS_02	Agronomy	Agri-Chem
ADAS_03	Advisory	Advisory Service
ADAS_04	Advisory	Advisory Service
ADAS_05	Livestock	Independent adviser
ADAS_06	Livestock	Independent adviser
ADAS_07	Horticulture	Advisory
ADAS_08	Fertiliser	Agri-Chem
ADAS_09	Environment	Advisory (NGO)
CCRI_10	Livestock	NGO, advisory
CCRI_11	All	Agri-tech networking
CCRI_12	Crops	Media (Press)
CCRI_13	All	Media (Online forum)
CCRI_14	All	Farmer membership organisation
CCRI_15	All	Data
CCRI_16	All	Policy

Table 2. List of interview participants

The interviews were recorded, transcribed and analysed (with consent of individuals) to look for common themes (extending those from the survey analysis). These interlinked themes reflect and expand on those which came out of the survey and workshop analysis, as shown in Figure 2.

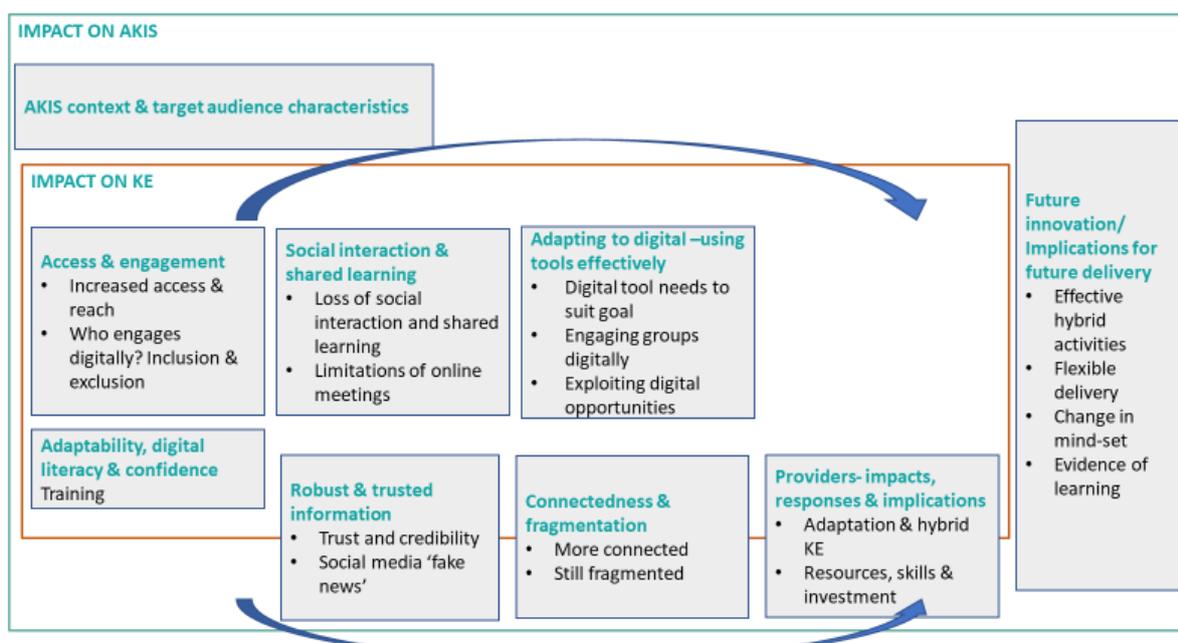


Figure 2: Key themes revealed in the analysis

3. AKIS context and target audience

This theme (which is specific to the interview analysis) looks at the AKIS context, the scope of activities and the target audience. The range of KE activities and approaches is illustrated in the list below of stakeholders interviewed. This spans from traditional advisory services to emerging agritech networking and data management intermediaries. It also illustrates the significance placed on face-to-face interaction (both face-to-face and interactive innovation approaches such as field labs and monitor farms) across the AKIS.

- traditional advisory services (private, independent and public advisers) providing face-to-face advice on farm to a range of mainstream sectors and the environment)
- levy bodies and NGOs with established interactive KE activities (participatory approaches, monitor farms)
- agritech networking organisations linking different businesses (previously using face-to-face meetings)
- media – online discussion forum and farming press
- data organisations who act as intermediaries between supply chain and farmers
- farmer membership organisation with 550, 000 business members, lobbying and supporting activities such as CFE
- policy maker

AKIS characteristics

The AKIS is described as being fragmented with multiple providers not acting in an integrated way. The disconnection between public and private research and KE was also highlighted. Some interviewees point to the sophisticated KE approach of commercial companies when they launch products, for example, compared to the outreach of publicly funded research, which struggles to get to farmers, and cannot easily be reported in the agricultural press. The point was also raised that some private online services are charged for. Another interviewee described the multiplication of providers in the environment domain, despite attempts to bring them together under one umbrella. Non-traditional organisations are emerging as important players in the AKIS such as intermediary networking organisations, data management services, agritech businesses and online farmer forums.

The influence of providers was perceived to be different depending on the domain: type of knowledge the mode of delivery, and the audience. For example, AHDB are viewed as a major player due to the target audience of levy payers and their emphasis on KE. Equally, The Farming Forum plays an influential role facilitating informal peer to peer online exchange, with 32,000 active members and daily visits by 30-50,000 farmers.

Characteristics of audiences

The scope of the target audiences of the stakeholder organisations involved in the interviews is indicative of the AKIS as whole, it covers:

- Interviewees from advisory services tended to perceive their audiences as innovative, progressive and as seeking to learn new information.

- Networking (agritech) organisation members were described by interviewees as more forward-thinking farmers that are used to “pushing their own boundaries and kind of thinking outside the box”.
- NGOs that engage farmer networks describe their farmers as often more progressive and more interested in regenerative agriculture, conservation, soil health.
- The online forum represents all types of farmer businesses although as an online platform it requires digital engagement.
- The farmer member organisation represents all size and types of farm businesses, although their council, regional and county representatives often come from larger businesses.

Policy - innovation and adoption

Interviews reminded us that the policy environment is in transition in the UK and this has an impact on policy goals, KE approaches and as well as the capacities and motivations of the KE organisations and the farmers. The policy interviewee explained that there is no knowledge exchange policy per se in England, but that the R&D innovation programme is relevant and sits within the overall agricultural transition, and the future for farming food and the environment programme, they described the main principles:

CCRI_16 *“Within that, there are core principles of how do we go about policy and delivery. And one of those is co-design... So, a co- designed user led model for knowledge exchange is about saying to farmers, what works for you, what would make it easy for you to, you know, take on or take up these novel approaches and accelerate adoption across the sector ...”*

The aims of the R&D programme, to deliver productivity and sustainability goals through the three stranded farming innovation pathways, were also described. The focus of the third strand, which is on using knowledge exchange effectively post-project to accelerate adoption, is particularly relevant to this study, as the participant explained: “It’s [the strand] about trialling evidence, evaluation, knowledge exchange adoption outcomes” with an emphasis on communicating and demonstrating real world benefits to farmers. The participant continued:

CCRI_16 *“[we ask] how do we support sharing of that information, how do we enable farmers to access the information in a way that's not written by academics, but it's written in a way that speaks to farmers, makes it easy for them to understand the benefits to them as users and farmers, and then gets this kit or process much more widely adopted much quicker than normal”.*

Policy - the needs of target audiences

Stakeholders agreed that any discussion of KE should be considered against the backdrop of the transition in payments, the introduction of ELMs, and the post -Brexit trade negotiations, since COVID-19 is not the only driver determining change in the AKIS. Knowledge exchange is regarded as a priority in this context and supporting all farmers is seen as the responsibility of all:

CCRI_14 *“I mean, I think from our point of view, as representing all farmers, including probably some of those farmers who aren't engaged, I think we were probably aware that a lot of them are blissfully unaware of what is coming down the track [post Brexit]... So I think we probably are engaging with researchers and knowledge exchange type activity to try and get the combined brainpower of everybody involved to think about that group.... as an organisation we wouldn't want to see them just left behind”*

4. Access and Engagement

Greater access and opening up knowledge

The way in which COVID-19 has led to an increase in online events, particularly webinars, was viewed as positively impacting the access to knowledge by farmers and the wider industry. This has also opened up access to experts within UK and internationally. A strong theme relating to the benefits of COVID-19 restrictions, is convenience, the reduction in the need to travel to events so farmers are no longer constrained by location. This increased access to information through online events, has been popular among farmers and the increase in online knowledge exchange was viewed as being a permanent change beyond COVID-19, as demonstrated in this quotation:

ADAS_07 - "We started all this [webinars] because of COVID but obviously if COVID goes away we'll carry on doing it because you're able to get farms in Cornwall, Lincolnshire on the computer at the same time, in real time, that we could never do before"

There have been noticeable benefits for providers as they can extend their reach beyond a limited geographical area (meetings and trials). They have attracted more people than face-to-face events previously and feedback has been positive, especially from those who could not previously attend due to distance and time. Private industry stakeholders highlighted that they have managed to engage a wider audience. However, the agri-chem representative questioned how many farmers were attending webinars compared to the wider industry stakeholders (employees from organisations or independent consultants). This viewpoint was only expressed by this interviewee, but it is important to consider the audiences of online events.

It was noted that the hosting of online meetings or webinars was positively received by the industry as a way of adapting work practices to overcome the challenges of COVID-19. The quotation below expresses the view that the provision of online events has been positive because face-to-face was not an option and that a wider audience was reached: "I think we've all missed the face-to-face, but actually I think we've all appreciated the fact that we couldn't do face-to-face and we probably got to a wider audience" (ADAS_02).

Increased reach but depth of engagement questioned

Some of the interviewees have monitored the amount of views or listens that a podcast or webinar receives and have recorded significant increases in numbers attending, for example, events pre pandemic that may attract 20-30 attendees have increased to 'literally hundreds' and some webinars and podcasts have received over 800 views. However, formal monitoring or the effectiveness of online events was not being extensively undertaken by those interviewed. These numbers were supported by statistics from traffic on online interactive forums: "We saw that same step change, about 15% of traffic just went up across the board, Farmers are just doing more online" (CCRI_13).

However, there is some question about how effective the engagement is when such large numbers are involved. It was suggested that some people may have a webinar on in the background whilst completing other tasks and not engage, as illustrated by the quotation below. Therefore, although the viewing figures can be perceived as being high, if participants are passively engaging then it is important to investigate the effectiveness of their participation. Additionally, it is important to highlight that some events will require more participation than others. For example, if there is a

discussion required then attendees will likely be actively participating, rather than if there is a webinar, lecture or podcast where attendees can passively learn knowledge.:

ADAS_09 *“So I think, people got to the point, with some webinars that they were sort of just, you know, they were kind of just prepared to tune in and listen, and not really, necessarily participate in chat”*

Who engages digitally? Inclusion and exclusion

Overall there is a sense of positive engagement and experiences among farmers with most people who engage being comfortable now going online. Sectors cannot be characterised and stereotypical views of livestock farmers being less engaged were queried. The farmer online forum, for example, has more livestock farmers than arable active on their forum, they tend to join for social benefits as they are more isolated. While others point out that some livestock sectors are further ahead in digitising than a lot of cereal farms. Also horticulture was highlighted as a sector which has always had a lot more technology. Rather than influenced by sectors, it appears to be an individual preference about whether to engage:

CCRI_10 *“There's a portion of the population farming community, though, you know, absolutely loving the fact that more things are online. And then there's definitely a fraction that, you know, lump that”*

In some businesses such as those that engage with agritech networking, they are already competent and engaging online is not a barrier:

CCRI_11 *“We deal with people that are, you know, continually innovating or producing new digital products. That's something they're already used to. But I think overall, it's definitely pushed everybody's boundaries”*

Inclusion - reaching new people

The numbers and diversity of people engaging has increased with more online provision attracting people who would/could not attend meetings previously so, according to one participant: “you're reaching a different audience you haven't engaged with before”. Participants also remarked that activities moving online has forced people to become ‘digitally savvy.’ The online environment also provides a safe/anonymous forum for some: “it might empower some people who wouldn't necessarily speak up in a meeting, maybe feel more empowered to put their hand up” (CCRI_14).

This was reported for technical questions about, for example, fertiliser:

ADAS_08 *“So we don't obviously tend to get a lot of questions, because people perhaps don't want to ask something that they think is a silly question ...whereas when you're behind the screen, and no one else can see what you've asked, or who's asked it, then, yeah, we tend to get some of the well, say, for example, an hour long webinar, we might get more questions in, whereas if you're in a room of people, you might be lucky to get two questions”*

Exclusion - disengaged

However, there will be individuals who will not engage due to personal preference, for example, more traditional farmers or those lacking confidence/digital skills (see next theme). Rural broadband remains a significant barrier to accessing information and online events in some regions, this is an issue that the NFU are lobbying on, on behalf of their members.

ADAS_02 *“Broadband is the biggest issue and with teams in large meetings sometimes you lose bandwidth. In rural areas internet is not very good. And you lose the personal feel because you everyone switches the camera off, so you get more bandwidth and you're not sure whether anyone's there. When you when you present you kind of look at your audience and you can*

pick up stuff. You can see he's not interested and trying to engage them or get the audience involved"

There is also a group that would not have attended face-to-face meetings and will not attend online. Additionally, it was noted that farmers could suffer from online fatigue, especially as currently interviewees felt that there was a significant amount of online events and that it can be difficult for farmers or growers to have the time to decide which events are the most suitable for them to attend.

The difficulty of attracting the disengaged when they are not identifiable was highlighted:

CCRI_10 *"So the digital world has made me realise that the ones we are communicating with are very digitally connected when you start seeing the same names and places ... But then we you never see the ones on the digital media aren't connected in that way"*

5. Adaptability, digital literacy and confidence

Digital re-set but not for everyone

COVID-19 has accelerated change. Interviewees agreed that COVID-19 has certainly focused people on the digital technology availability and the ability to use it, and this would not have happened otherwise. Some farmers have been historically slow to adopt some digital services: “I think farmers were a little bit behind the curve in terms of sort of online peer to peer networks” (CCRI_13). However, COVID has forced farmers to change and this has improved their digital literacy skills making them more technology aware and more capable, according to this interviewee:

CCRI_15 *“And in more than one way, because what it's also caused people to do is have to embrace digital. So two years ago, if you'd asked the farmer about zoom, or teams, he would not have known what he talked about. Now, they will know exactly what you're talking about, and have probably used it. Yeah. So what it has done is put a fantastic digital reset into the community. And it's made people more technology aware, and more capable, through necessity of using the technology and have available to them, which wouldn't have happened without COVID”*

Participants typically described themselves as having to learn and adapt to new technology but they accepted that this was necessary given the pandemic restrictions. They described the process of adapting to new technology as an inevitability that has been accelerated by COVID-19 but a number of them cautioned that those who were less IT capable or engaged could be left behind:

ADAS_01 *“We are forced down using it more like say for example we have a WhatsApp group for our clients and you can see you know the more IT savvy clients like that sort of thing, But the less IT savvy clients could too since then get left behind because they don't use that information and we have to be very careful as a company when we send that information out by that route, not all our clients will receive it and that, that can create uncertainties”*

Participants reported that the industry had responded well to having to use online tools more frequently but it was noted that it could be due to the demographic of the groups and that the interviewees mainly characterised the farmers they engage with as being quite forward thinking:

ADAS_06 *“I think because there's been so many webinars and things in the last year and I haven't given them any specific instructions or training on zoom, I think they've just picked it up. To be honest, most of the guys I deal with are reasonably young, you know, there's a few that are probably my age, you know, mid 50s sort of thing. But most of them are younger than that. So and then, you know, they've got their phones, they're all on social media, they picked it up fairly well really to be honest with you. I don't know, the only thing that's the only thing that holds a few of them back is the broadband”.*

However, a view repeated by some interviewees is that farmers are able to join but do not want to in many cases. “I do think we're at the point where technology isn't the limitation anymore” except for those with very poor connectivity, since many have access to devices: “I don't think it's possible to farm in 2021, without an enabled device of some kind” (CCRI_13). This is supported by two interviewees who suggested that farmers may be self-excluding from online learning:

ADAS_05 *“I think that some [farmers] of them are maybe more confident about using technology. At the outset some of them had no idea. But there's always a kind of continuum you know there are some people who just don't do techie stuff”.*

ADAS_09 *“I think there's some [farmers] that aren't too comfortable with it [online], so it's harder to build that kind of rapport with them. It seems to kind of stay for more stilted for longer than I think we'll do in person, and perhaps some people aren't as comfortable talking*

about more personal stuff I think there's just a kind of perhaps a slight nervousness about you know, and some of them say, is this being recorded or I don't want anyone to see this".

This echoes concerns raised in section 4 about some farmer becoming excluded from KE activities if they are predominantly online.

6. Social Interaction

Loss of social interaction and shared learning

Typically the social interaction element of traditional (face-to-face) knowledge exchange is reported as an important to the farming community. It is felt that online cannot replicate the peer to peer learning that happens in face-to-face events, nor provide social benefits for isolated farmers. The opportunity to socialise with other farmers was viewed by many participants as an important element of the whole knowledge exchange event itself. Interviewees described farmers as isolated in terms of their day to day and that the 'down time' of face-to-face events was important providing social benefits and the chance for spontaneous conversations with their peers:

ADAS_05 *"I think if you probably asked the farmers this as well, they just miss the social. It's a key part of knowledge exchange activities, and particularly the peer to peer stuff it's also very much a social thing. I don't think I don't think we should underestimate that. I think it's it fundamentally actually is part of these kind of businesses where, you know, you're not in an office, you may only have family members, particularly in the red meat sectors, as any family members of staff bracket, and a lot of them if you ask them why attend or why come to these meetings, the social side is quite high up as well as the learning is and you think that's kind of because farming is as a job is quite isolating"*

CCRI_10 *"I do hope we go back to face-to-face because there is a multitude of approaches, isn't it? And lots of people respond in lots of ways to information and building knowledge at different times. So I do really believe in the value of peer to peer learning and face-to-face because you, you just get to dig into things a lot more, like tactile and physical. We are like social creatures"*

CCRI_12 *"You know when they're doing group trials for example, any farmer will tell you that it's not just about the information they get from it, but it's the whole element of that social interaction with the, with the group. It's this group of like minded people coming together, and just the talking that banter exchange of ideas that they get so much more out of it. And it goes beyond just the data itself, and the results of whatever they're trialling, and you can't quite put your finger on it. And that is the element that you simply cannot replace through any other medium apart from farmers, physically getting together and talking to each other"*

It was also noted that people doing knowledge exchange on farm are providing more than one service, they are offering social support and networks to more isolated farmers. This was viewed as important for mental health of the farming community and particularly in the current wider agricultural context, with COVID-19 and Brexit transition worries common among farmers.

Face-to-face meetings are equally important for connecting progressive farmers who gain a lot from meetings, picking up business information and ideas. "It's a huge basis of exchanging ideas you know they hear from other farmers what they're doing and they take those ideas home and they put them into practice on their farm" (CCRI_12).

In-field interaction

The need for interaction in the field was also highlighted as important in understanding the farm environment, whether in one to one advice or in bigger groups. One interviewee thought that the decision-making process with farmers can be longer by having to do things online because spontaneous discussion is lost:

ADAS_09 *“If you're, out in a field and say they've got a stream or something, and you're talking about buffering it or not buffering it or doing a different type of crop in that field or something, it's a lot easier when you're both sort of looking at it, and you can kind of chat about options there. And then if you're not together, I suppose then afterwards, you'd have to follow up, but you might not have that kind of to and fro conversation then or it might be quite stilted, you know, it might take longer to go through a few options”*

For the agricultural press respondent, who prepares profiles of farmer cases stories by visiting farms, it is hard to really understand a farmer's experience unless it is face-to-face: “you can do it over the phone, but you don't get the same feeling, you don't get as good an article” (CCRI_12). It is also difficult to build a rapport or conversation with a farmer over zoom:

CCRI_12 *“That is not the farmers' natural environment... it's not until you actually get out onto the farm, and you get them into their natural environment, that's where the story always comes out...You're not getting right into what makes the farmer tick, what their passions are, and things like that. And that's the, that's the essential difference that comes up, comes across, when you're actually on their farm in that situation”.*

These problems can be addressed to some extent when advisers have longstanding, established relationships with farmers. For example, familiarity with the farmer or grower was highlighted as a benefit by the horticultural attendee, who remarked that moving knowledge exchange online has been successful for him, partially due to the knowledge that he has of the growers beforehand.

Limitations of online meetings for social interaction

For those who do not have a prior relationship with the group or the audience they are intending to engage, there is a perception that it is difficult to build a rapport with farmers online. Other interviewees had longstanding relationships with their group of farmers, and they thought that online events were useful in retaining engagement of their groups. However, the difficulty in building new relationships with farmers through online events is an important component of face-to-face interaction that cannot be replicated online.

Some stakeholders are missing personal contact and networking that usually happens around meetings. For example, journalists cannot now attend press briefings which provide valuable insights through social interaction:

CCRI_12 *“So you've come away from it with a really good rounded idea of what the story is and what all the angles are behind it [...whereas with zoom...] you don't get the insight into the industry that you do from these get-togethers, and so that's something that agricultural journalists, technical journalists are really missing at the moment”*

Online events are “no replacement for actually .. seeing people and the interaction that you get from that and also the feeling, you know, you get the mood of the industry”. Although it is acknowledged that you can attend several webinars in one day and pick up a lot of information.

However, for others digital delivery is seen as a springboard as it can help to connect people and launch new contacts.

CCRI_11 *“Certainly, from experience, from our events, digitally, we've seen a lot more interactions, like through in the chat, it's a really good springboard, I think, for people to share their experiences, that you just haven't got that available in a physical format [which is] I think in a way a bit more passive. Just the engagement happens differently”*

For those in alternative supply networks which have sprung up, knowledge is circulating in a different way. There is a ‘huge amount’ of Google searching and internet resources that have been needed to support them in trying to identify the right people or support networks.

7. Adapting to digital – using digital tools effectively

Delivery needs to be suited to the aim of the meeting, form of knowledge being communicated, the context and audience. Interviewees reported that they adapted the design of online events compared to face-to-face events. They agreed that digital delivery has a role and can be effective for many KT activities but there were some intangible elements of KE that can only be captured in the field or farm visits, as noted above.

Engaging groups digitally – enabling social interaction

Getting the right platform to enable networking and creating a good digital social experience was identified as important by a number of interviewees. Some stakeholders have had good experiences with certain platforms and received positive feedback, however, it was emphasised that you cannot just replicate a physical event online:

CCRI_11 *“We had a day long conference ... you could almost get the bonus that you get from a physical event where you can see a lot of people chatting and interacting. We've been able to kind of successfully replicate that as much as possible in the digital format”*

CCRI_11 *“People are missing face-to-face events. Because there's all these anecdotal conversations that you'd have, you know, in the queue to go to lunch or whatever, there is no way you can replicate that and, you know, aware of that, yeah, something I think in our events we've been really careful to do is just not bluntly replicate what a physical event is to digital because it just doesn't work... so it's about taking a completely different approach”*

CCRI_14 *“I think it can work if people understand how to use the chat function, I could start to engage more that way. But then you can quite often see quite a lively chat going on”*

It is also thought possible to create a community of practice around a particular online facility, with a sense of loyalty. One participant described the The Farming Forum as:

CCRI_12 *“A classic sort of replicating what you get in the farmer groups or whatever in the, in, in a virtual world if you like,... if you're a regular user you get to know people and you get to know what their points of view are and why they say particular things”*

Interviewees agreed that it is important to create a good online experience because if farmers think that they have had a negative experience, “they won't necessarily come back, and that can rub off the and affect the sector as a whole, so it's in everyone's interest to run a good event”. This extends to making it as easy as possible for farmers to register and join events.

Engaging groups digitally – enabling social interaction

Participants concurred that digital tools can be used effectively for KT. Providers of KE are conscious of the number of events online, and have expanded the range of events they offer to include shorter more targeted events, one offers a one hour express format which makes it easier for people to fit it into their day. This is particularly suits a KT style of delivery.

Interviewees also agreed that it is essential that farmers can find information easily, by signposting- using videos and podcasts and recording webinars and ensuring the information is easily accessible to farmers.

One participant remarked that the style of communication is also important, suggesting that while KT is generally delivered 'in the third person', KE online should aim for 'first person', to personalise the message and experience.

Adapting with hybrid/blended approaches

Providers of KE have adapted over the last year based on their own experiences and feedback from audiences. Several examples of hybrid activities where face-to-face and online are combined to complement each other were described by participants. Most of them are non-simultaneous activities with organisations or advisers adapting using pre-recorded videos, as well as short WhatsApp videos as useful tools that can provide farm group members with information ahead or after of a farm visit:

CCRI_10 *“So we kind of have pivoted, and we've got now like an online e-learning platform...trying to allow farmers to still do the farm walk when we can't do it in person. So they've got their pre recorded video and had the farmer talking to a group as if they were there, and they tune in for a set period of time”*

The event below was created to comply within COVID guidelines but farmers were able to meet on farm:

ADAS_05 *“I did a mini podcast with the host farmer where he could give a lot of background information and just talk about the system and send that to the farmers that they could listen to before the meeting or in the car journey to the meeting. And then we literally had, I think, two, two and a half hours on farm, just to really see the farm to walk the farm. And, and to allow the group to ask the farmers questions. And then rather than having a sum up and the big kind of hour, hour and a half chat afterwards, I put the farmers to do an online feedback survey tool... I love the idea that when people were traveling to the farm, they had time to listen to it”.*

The quotation above demonstrates the adaptability of the interviewee and the thought and planning that they have had to consider due to the impact of COVID-19. The gathering of data beforehand was viewed as an effective way to ensure that the group did not spend a significant amount of time on farm. Additionally, the interviewee highlighted the fact that the online feedback has been more successful than the traditional feedback forms handed to farmers to complete at the end of an event as farmers were given time to reflect and the anonymity allowed them to more honest without the feeling of being watched whilst completing the feedback.

It is also pointed out by one participant that it is important to provide a follow up afterwards to optimise online events by creating a 'long tail' or lifespan for information:

CCRI_13 *“The key really to, to not think your job is done. When you finish the event, your job is done when it's written up and published in multiple places”*

Others agreed that publications online after an event can multiply the number of beneficiaries significantly and continue to outscale information and have an impact after the event.

These flexible arrangements were described by single advisers as well who are still visiting farms but using digital tools to support their work:

ADAS_01 *“In terms of how we transfer information to our clients has probably not radically changed, we still have to go to farm and look at the crops and see the crops and discuss with farmers but more online with them. We don't go to farm offices as much but meet people outside. Gatekeeper where I used to go sit in his desk in the office and sort it out and I'll log onto his computer remotely and sort it out using teams, it works really well”*

Only one example was given of a simultaneous online and in field activity where a technical adviser had relayed photos of crops to demonstrate plant disease.

8. Robust and trusted information

Trust and credibility

Survey respondents suggested that access to robust and trusted information was becoming an issue as more information came from new online sources. Supporting this, one interviewee highlighted the difficulty to validate information on the internet and that this is something people are conscious about when watching webinars from unfamiliar worldwide sources:

ADAS_01 *“All of a sudden we’re speaking to people in Australia, America and the UK based research organisations are possibly being put on the back foot by this and are behind in that knowledge, which brings massive issues because I have trust in UK based research organisations and suddenly I’m sat watching a webinar with an American guy talking away who I don’t know and I need to verify his information. I need to understand what he’s telling me and so the trust levels in the information being received nowadays from my own point of view are much lower”*

However, interviewees did not express strong opinions about this and felt that farmers could be discerning, also that credibility was perceived differently by different stakeholders, as this remark illustrates:

CCRI_10 *“It’s more about relatability, isn’t it? for them? That’s very credible. But for us, it might not necessarily be credible. And then the generally I find farmers will be quite aware of that’s coming from something they’re trying to sell me something. Yeah. which is one of your first principles, credible, critical, vested interest.... Whether they’re getting that [information] from, you know, the classic farming press like the Farmer Guardian, or from their own sort of specific topic. Because it is a different kind of credible, isn’t it? from a research perspective, you think, you know, n equals one was but you know, there’s still it’s true for that guy”*

One view was that it is important that scientific and technical accuracy are presented as well as farmer experiences, whether in publications or online. For example, for farmers to be able to communicate their own trials online using videos they need to show the scientific integrity and robust data behind the trial and the farmer’s experience.

In terms of trust, participants noted that a lot of pre-COVID KE activities were built on trust and these would continue, such as the one to one adviser relationship or sharing experiences in participatory groups. In the agricultural press, for example, trust was described as being important in terms of being true to the contributors and ensuring that they have been correctly represented as well as building a reputation for your magazine by ‘going the extra mile’. As the interviewee remarked: “I think people do trust the editorial, we’ve got quite a good reputation for editorial integrity and technical accuracy”. This is the same with ensuring transparency about the magazines relationships with commercial firms that advertise with them, and they “try to be as open and honest as possible”.

The extent to which these principles of trust translate to the online arena is interesting to explore. Self-regulation was described among farmers who engage with the online forum as a way of validating information, as this participant explained with reference to discussion threads: “Basically, it works on a feedback loop for the forum. So good content receives the most likes”. In this way it is not heavily moderated but relies more on the farmers’ ‘honest opinion’.

9. Connectedness and fragmentation

More connections

Overall there is a sense of stakeholders being better connected and linking up, enabled by digital delivery, as well as being exposed to more sources of information. One participant suggested that “because of all these webinars and online events, it's almost a node for people to go to, and see and talk to people, which would have been really difficult physically”.

For intermediary and networking organisations, participants explain that they aim to create new initiatives and partnerships:

CCRI_11 *“People come to us through, you know, to be open to new connection with, with other people... certainly, from experience, from our events, digitally, we've seen a lot more interactions”*

However, this connectedness does not appear to translate into greater integration in terms of more coherent or coordinated activities or delivery, although there are some areas which have emerged as a focus point for some integration, for example ELMs:

CCRI_10 *“I think there has been attempts to be more coherent, there's definitely movements in the regenerative farming organic sector to try and coalesce around ELMs. ELMs has definitely brought people together”*

Still fragmented

Despite this connectedness, increased online provision is seen by some to create additional complications to the existing fragmentation in the AKIS as there are now multiple platforms as well as providers. For KE providers and other professionals the amount of online activity can be overwhelming, making it hard to keep up and “you can't switch the digital world off”.

Independent advisers and agronomists still have an important role, particularly as farmers face a large amount of information from multiple (and competitive) sources and, according to one interviewee: “maybe feel a bit of dissatisfaction with the level of quality of information that they get from some organisations”. This remark suggesting that farmers often return to their adviser when they are faced with too much information, resonates with the comments about trust in Section 8:

ADAS_02 *“We're more and more competing for advice now... I think what we've got at the moment is a lot of info in silos. I think a lot of people will listen to various people and then go to their agronomists. We debate on re gen about how much we talk about it with our audience 'cause it's so trendy but probably 90% of our audience aren't ready to hear it yet. Yeah, they want to have solutions from the can and stuff, so it's a tricky one”.*

The proliferation of information online is regarded as a challenge for farmers and providers alike. It was pointed out that a lot of online material can get lost. For example, the lifespan of a discussion thread on an online forum was described as typically 20 mins. The view was therefore that there should be ways of ensuring information remains accessible, in a forum this would mean that a certain topic would have to keep “bubbling to the surface so people can find it”, according to one interviewee.

10. Providers: impacts, responses and implications

Implications for business

For some organisations, for example, for those concerned with data management, there have been more business opportunities following COVID-19:

CCRI_15 *“Well, from our perspective, it's been relatively positive. As things have become more digital as contact between people has reduced, there's been a bigger demand to do things remotely and, you know, certainly, in terms of data exchange, then that's at the forefront of what we do. And we've been supporting some significant developments in the sector to bring forward plans, as they had to reduce those some sorts of interactions”*

According to one participant, the online forum for farmers has also benefited from an increase in customers wanting to advertise due to restrictions on agricultural shows which meant there is more budget available for online advertising.

More efficient use of resources and flexible planning

Cost and time savings were frequently mentioned. For example, a horticulture consultant reported that by using technology he is able to decide whether it makes business sense to visit a potential client:

ADAS_07 *“Especially with new people you get a lot of information before you actually do the visit. Now, you can get a really good grounding with a, you know, a short Whatsapp Video and discussion about the basic production and marketing sort of issues and what they hope to do and whether it's realistic or not. And you could do all that before you travel. And do you drive all the way down somewhere and find the person you're going to see as a complete no hope so, you know, obviously we can be a bit more selective”.*

Participants described the opportunity for a wider reach for less costs and less pressure on staff compared to a previously inefficient system of extensive travel to meetings, where there was poor attendance. Those who worked for farmer funded organisations also questioned the value for money:

ADAS_03 *“The amount of hours that XXX staff spend on the road driving to deliver a three hour meeting and then drive hours back, you spend nine hours away from home, and you've spent two and a half hours in that meeting. That's not the most useful use of levy payers money. And it's not necessarily worth the benefit to maybe those 15 people who turned up to that event or 20 people that turned up to that event. So we do have a responsibility to keep getting smarter about how we do this. And we're definitely well on track to improving, and we've made a big, big jump forward”*

Another interviewee concurred, concluding that digital “is probably going to be the future of our delivery”, although acknowledged that this could exclude some farmers:

CCRI_14 *“But yeah, I think that the issue where we're all toying with as an organisation is how you reach people, the people you've missed, who, who don't, don't know how to use zoom, or teams, or don't always go online”*

New analytical tools

Participants pointed out that analytics are now available to monitor digital events, tracking the number of interactions and connections that people have made, which provides valuable information not available before. It is possible to see “who has really engaged, for example, track the average time that people have been listening in, into a session”. These analytical tools are valued by providers as they can help target activities and make them more responsive to people needs.

The potential for online forums to use analytics to identify trends and natural language processing to target messages was highlighted. Through this, according to one interviewee, with the right data it is possible to use AI to undertake profiling and target messages towards certain individuals and potentially reach the disengaged:

CCRI_16 *“I think the key thing with knowledge transfer these days is identifying who you want to hit....Digital does actually enable you to get to some of those guys who won't pick up the magazine every week, probably aren't reading anything over social media. But if they're there, and you know where they are, and you know how they farm, and you take time to learn who they are and what they do, and listen to them”*

Capacities and capabilities

Demanding on skills and time

Several interviewees mentioned that their organisations had some online presence or ambitions previously but that COVID-19 had accelerated these. In response they have ‘upped their game’, or ‘pivoted’ very quickly.

CCRI_11 *“All of our events used to be physical events face-to-face. Since COVID, we've had to change that quite drastically. It was in our pipeline to try digital events. But that was more, you know, a long term as part of our long term strategy ... So it's been a steep learning curve for the whole team”*

CCRI_10 *“So in terms of kind of the infrastructure that was there and the capacities and the skills of the staff. It was it was latent”*

It has been demanding on skills and capacities but, on the whole, providers have been agile and adaptable and as one participant said they “deserve a ‘pat on the back’”. Most KE providers do not seem to have had training but have been learning on the job. Those people in organisations with skills in videos, editing and social media tactics have been in demand.

CCRI_10 *“I've managed to like, well started to learn how to facilitate online groups and do workshops, deal but online which has mixed results”*

Need to professionalise and upskill

There is acknowledgement that KE providers have had to (and will in the future) have to upskill and professionalise. For those putting content online, for example, this had meant purchasing new video making equipment and training in video making, as they recognise that their previous efforts were amateurish:

CCRI_10 *“We're going to need probably training up people to like, really continue doing so you can do more of the blended approaches and more digital expertise. I don't think we can, like I've accepted I'm going to need to get better at doing recording and digital media and like facilitating stuff”*

Different organisations will need to professionalise in different ways, for example, networking organisations realise they need to push the boundaries to gain an advantage when competing for an audience in the online world of intermediaries:

CCRI_11 *“We want to be able to provide that additional level of networking and engagement that, you know, people may not be necessarily finding elsewhere”.*

11. Future innovation/Implications for future delivery

Hybrid activities

All participants identified that the future of KE is likely to be more balanced between face-to-face and online KE provision. The adaptation and innovation reported by the interviewees in their response to COVID-19 could be viewed as an important process in this respect, as one said: “the key learnings are to be as inclusive, repetitive, get things out as far and wide as possible” (CCRI_13).

CCRI_11 *“Everybody seems to have come on board and embrace the opportunity. But people definitely miss this face-to-face events. And, you know, once we come out of all of this, we will, we'll definitely carry on doing digital. But, you know, managing this balance between digital and physical will be a conversation I think we'll be having in the summer”.*

How this balance is managed is a point of debate. Although digital delivery has been widely embraced and offers many learning opportunities, there are still challenges with engagement and internet provision, as captured in this remark:

ADAS_03 *“So the challenge now is about finding the right balance between physical and digital activity. with digital activity, we've found people engaged with us who have never been to events because they couldn't spare the time. And they didn't, they didn't want to, but they found the digital. So it's been a great learning. They will watch it a webinar in their own time, the legacy of the webinars is something that we're valuing, which, obviously, with the physical event, once it's over, it's over. And that's been really good. The challenge now is that we know that there have been a number of people who were used to the discussion group, the farm activity, and they liked that farm meetings, and they haven't interacted with digital and also in an agricultural community, not everybody has the kind of internet access that makes it easy. So, we know that there are still lots of farmers who have not been able to interact with what we've been doing”*

There was concern that running simultaneous events with both online and physical provision at the same time risks that neither is done very well, also it would be resource intensive.

Bigger questions are also being asked at the organisational level, as the opportunity to have greater reach and save cost and efficiencies has to be weighed up against the audiences' preferences and needs, and where those providing advice see the benefits:

CCRI_14 *“We have always struggled with funding, the way we did, we did delivery, it was on a regional basis with funding coordinators to run farm events. And actually, a lot of those I think, tended to just be for the farm adviser network and only a couple of farmers. So actually, by running more of an online event, anyone in the country can attend, we are probably going to stick with that way of delivery, because it does make more sense financially”*

CCRI_14. *“I think I mean, as a [farmer] membership organisation, I think the other thing we're weighing up is how that has impact on people who pay their subs. Some of them will still want that physical contact. So a lot of our staff on the ground still feel that there is benefit in actually going to meet members and talking to them. So some of that will probably still continue”*

It was noted that face-to-face connections are an important way to gauge the needs of the community. Where these are reduced, there is a need to ensure feedback from the farm continues, to make sure that, as one participant put it, “we're doing things that the membership wants us to do”.

Change in mind set/approach/reappraisal

There is a sense that with everything else going on, the pandemic has accelerated people's thinking about a number of things (digital, climate change) and that “we can't go back to the way things worked before”. For some this is seen to be a good thing “Crisis drives step change, and forces change upon

things. And I think in a good way". Certainly, with the digital world it has opened up opportunities and new ways of thinking according to this participant: "There's so much content available. Now, that was trickier to access beforehand. And yeah, it's just opened Pandora's box of thinking new approaches new practices" (CCRI_11).

The pandemic has also prompted a reappraisal of the challenges and the associated knowledge requirements:

CCRI_15 *"And I think, at this stage, the metrics we've used in the past around productivity and production, won't be the metrics we use in the future so that everybody will have to change how they're measured. So it's I do think accelerating the way people are starting to look at productivity to think about the climate and to be more environmentally sustainable"*

The need to understand how new digital sources influence farmers' decision making and behaviours also needs to be addressed: "It's something pre lockdown that we struggled with, like how do you measure whether someone coming to an event makes changes within their business?" (CCRI_14).

Managing information and integrating platforms

There was support for development of a one stop shop interactive platform online but there was also concern that if post-COVID there is a return to normal practice, then the capacity and funds to maintain any new platform might be lost, as seen with multiple similar initiatives.

12. Synthesis and future opportunities

There was strong overlap between the themes described above, as illustrated in the Figure 1. The same themes emerged from the analysis of the data from the survey, workshop and interviews, thus providing a level of consensus and validation. Although there was consensus, there was a different emphasis given to some themes, and specific issues raised, by the two key groups of respondents (farmer and other stakeholders). These are highlighted below.

Access and Engagement

Greater access and opening up knowledge

There was a strong level of consensus in the survey, interviews and the workshop analysis that increased online KE delivery following COVID restrictions has increased access for the majority of farmers. Farmers value the convenience and time saved with reduced need to travel. Overall stakeholders felt that the outcome was positive, both in terms of more numbers and greater diversity of people engaging. This has opened up access to knowledge for farmers (and other stakeholders) from multiple sources, including from experts across UK and internationally. The value of accessing information online was highlighted by farmers in the open comments in the survey.

This was further supported by survey data, with farmers (~80%) and stakeholders (~90%) agreeing that access to new sources of information, the flexibility to use them when convenient and savings on time and travel costs present opportunities, and ranking these in the top three opportunities offered by digital media and tools.

Survey data also confirm that use of online KE and digital methods and tools has increased both in terms of accessing and providing information and advice. The increases (approximate averages for farmers and stakeholders) were: video telecommunications (~60%), webinars and online conferences (~30%), online farmer forum (TFF) (10% farmers only), podcasts (~14%), video sharing (e.g. YouTube, Twitch) (~12%).

Increased reach but depth of engagement questioned

The benefits for stakeholders who provide information and advice, in terms of extending their reach beyond limited geographical areas (meetings and trials) were clearly articulated, and examples were given of large attendance numbers at online meetings compared to previous face-to-face events. However, there were questions raised about the nature of learning at events with such large numbers, since these can require passive engagement, again this is supported with survey open comments suggesting that farmer experiences were mixed. Furthermore, digital fatigue was ranked as one of the top three challenges to digital tools and media by both farmers (57%) and stakeholders (65%) in the survey. However, some stakeholders appeared to think that farmers had not yet reached 'peak' online delivery.

Who engages digitally? Inclusion and exclusion

The numbers and diversity of people engaging has increased with more online provision attracting people who would/could not attend meetings previously. The anonymity of online meetings was also thought to encourage engagement for some reluctant farmers. However, equally, digital delivery is seen to represent a barrier for many farmers due to poor broadband connectivity, lack of confidence or unwillingness to engage, and concerns were raised about the exclusion of these farmers. In the workshop, the risks and long-term impact of losing touch with these disengaged farmers was seen to be problematic (as noted below). Most concern was voiced by the farmer survey respondents who highlighted some farmers' disengagement and stressed the need to consider all audiences in the

future. The impact of farmer isolation on mental health for these farmers was also a point that came out strongly from farmers in their comments in the survey.

Views about access to broadband in rural areas preventing farmers from engaging in online KE delivery were strongly expressed by the farmers in the survey, ten comments were made on this topic. The survey analysis shows that 35% farmers and 18% stakeholders agreed with the statement 'I do not have reliable /adequate access to the internet' which is notable given that they represent a cohort of people who were able to respond to the survey online. Farmer membership organisation stakeholders agreed that broadband represent a major barrier for many farmers.

Although not considered in the interviews and workshops, the survey comments about the inaccessibility of some online sites due to subscription costs was highlighted as another reason why some farmers might be excluded. This was supported in the survey data showing that 46% of both farmers and stakeholders agreed that a challenge for digital tools and media was that it is expensive to sign up to different providers.

Adaptability, digital literacy and confidence

Digital re-set but not for everyone

The general sentiment from all respondents was that farmers had been adaptable and were positively engaging with new KE provision. The interview and workshop respondents agreed that there is willingness to try out digital tools to gain access to events across a range of farmers and sectors including the small-scale farms and the livestock sector, which has traditionally been seen to be more reluctant to engage online. There was agreement that COVID-19 has certainly 'focused people's minds' on the digital technology availability and the ability to use it, which would not have happened otherwise.

In support of this both groups of survey respondents (~ 70%) agreed that the industry has been adaptive and they have not had any problems. Also, some 57% of both farmers and 82% stakeholders agreed that they had prior experience and felt confident using digital tools and media. Stakeholders providing KE on the whole appeared more positive than farmers about online delivery. This was supported in the survey with many more in the stakeholder group agreeing that that COVID-19 created opportunities (40%), compared to farmers (17%). Overall stakeholder opinions were more polarised than farmers with farmers being more indifferent ('neither/neutral responses') (42%).

Farmers' comments from the survey suggested that the process of adapting to new technologies was unavoidable, and an inevitability that has been accelerated by COVID-19. Some farmers said that they were using online KE because they had to but were looking forward to returning to face to face events.

However, all respondents also said that there are evidently some farmers who lack confidence and digital skills. A number of respondents cautioned that those who were less IT capable or engaged could be left behind and this would have wider implications for the industry. This reinforces points made in the theme above. The workshop discussions noted that skills in some farming communities were low and training was not widely available. In the survey 36% of farmers and 21% of stakeholders agreed that a challenge to digital tools and media was not enough time to access them or support to learn how to use and access them, suggesting that this is not an insignificant issue for some farmers. Considering that all survey respondents were already able to some extent to respond digitally to the survey, this suggest that there are different levels of digital literacy.

Social Interaction

Loss of social interaction and shared learning

It is clear from the survey data that face-to-face activities have reduced significantly since COVID-19 restrictions started. The decrease for respondents both providing and accessing information and advice respectively is: group events (e.g. discussion forums) 65% and 52%; face-to-face communication with other farmers 60% and 65%; and via individual, face-to-face communication (e.g. from advisers or others) 63% and 60%. Interestingly this latter figure contradicts to some extent views expressed in the workshop by stakeholders that advisers visits on-farm were continuing.

The consequences of this for reduced social interaction were widely discussed by all respondents. There was a strong consensus from all the analysis that online delivery cannot replicate the peer to peer learning that happens in face to face events, nor provide social benefits for isolated farmers. The value of face-to-face activities in the collective field activities in particular was noted, although interestingly more by stakeholders providing advice than farmers.

The survey analysis supports this with both farmers (59%) and stakeholders (57%) agreeing that digital tools and media presents a challenge because they are too solitary allowing only limited interaction with others. This was identified as one of the_top three challenges for both survey groups. The value of social interaction was also emphasised in survey responses about future developments (see below).

Limitations of online meetings for social interaction

There was shared perception that online events have limitations with respect to fostering engagement and social interaction characterised by face-to-face activities, as they can be passive in nature. This was noted in all the analysis. Those delivering advice agreed that it is more difficult to build a rapport with farmers online particularly for those who do not have a prior relationship with the group or the audience they are intending to engage. Farmers themselves concurred in the survey. This is compounded by the sense of digital fatigue which was strongly expressed in the survey.

Adapting to digital – using digital tools effectively

Engaging groups digitally – enabling social interaction

Interviewees and workshop participants agreed that KE delivery needs to be suited to the aims of the meeting, the form of knowledge being communicated, the context and the audience. It was emphasised that physical events cannot just be replicated online, different approaches are needed that create a good social experience. There was some discussion amongst workshop participants about the opportunities to enhance social interaction and networking in larger online meetings using interactive online platforms. In smaller groups, stakeholders agreed that social interaction is easier to manage and that these can be more effective in terms of knowledge exchange, although it was stressed that facilitation needs to be adapted to online delivery.

Adapting with hybrid/blended approaches

Stakeholders providing KE have adapted their approaches extensively over the last year drawing on their own learning experiences and feedback from audiences. Several examples of creative hybrid activities (non-simultaneous) where face-to-face and online are combined to complement each other were described as effective by participants. These demonstrate the adaptability of the stakeholders and the considerable thought and planning that they have undertaken to ensure that KE activities

continued during COVID-19. The participants highlighted the effectiveness of a series of little and often online events, in some cases supported with digital tools such as Whatsapp in-between to maintain group connectivity and ensure continuity. Videos and podcasts were described as popular, but it was pointed out that these need to be targeted and produced to a high quality. This is supported by the survey data which showed an increase of podcast and video sharing as reported above.

Robust and trusted information

Trust and credibility

The importance of credible and trusted information in online delivery was raised a number of times as an issue in the survey open comments. Farmers' see the proliferation of social media was a concern, as well as the risk of bias from commercial information sources. This was reinforced in the analysis, with 'a trusted, credible source of advice' ranked in the top three of what both respondent groups (50% farmers and 60% advisers) would like to see in the development of digital media and tools for both accessing and providing information and advice in the future. However, somewhat contradictorily, a proportion in the survey agreed that digital tools and media produces more reliable, robust data than other sources and are more transparent (farmers 31%, stakeholders 41%) and 25% farmers and 8% stakeholders agreeing that they don't trust advice from this source.

Interviewees did not express strong opinions about this and felt that farmers could be discerning between social media and more authoritative sources, often maintaining their own trusted sources but through a different communication channel. However, the workshop participants did note the spheres of influence of social media which could be persuasive.

Some level of concern about data security was expressed in the survey with 45% farmers and 21% stakeholders agreeing with the statement 'I feel that my data is not secure' and ranking this as a top five challenge with digital tools and media.

Connectedness and fragmentation

More connections

Overall there is a sense of stakeholders being better connected by online KE delivery which allows opportunities for networking and linking up with each other. This was particularly highlighted by the workshop and interview stakeholders suggesting this was potentially of more benefit to them than farmers (it was not mentioned in the survey open comments). However, this connectedness does not appear to translate into greater integration.

Still fragmented

Despite this connectedness, increased online provision is seen by all respondents to create additional complications to the existing fragmentation in the AKIS as there are now multiple platforms as well as providers.

This was raised as a particular concern in the survey open comments with frequent mention by farmers of being overwhelmed by too much disconnected information. This view is supported in the survey analysis which found that fragmentation of tools/media, was one of the top challenges for digital tools and media for both groups (59% farmers and 69% stakeholders agreeing). Several comments suggested more coordinated delivery amongst organisations. The survey data supported this with some 30% of both farmers and stakeholders agreeing that 'a one stop shop where I can

access all the information I need’; and 20% farmers and 30% stakeholders agreeing that ‘somewhere that collates new knowledge’ are what they would most like to see in the development of digital tools and media.

The fact that some information is privatised and inaccessible is also an issue for integration in the AKIS. This was noted in the comments and supported in the survey data showing that 40% of both farmers and stakeholders agreed that a challenge for digital tools and media was that it is expensive to sign up to different providers.

Providers: impacts, responses and implications

This theme captures a number of issues in relation to stakeholders who provide KE, mainly revealed in the interview analysis which focused more on aspects of organisational resources and capacities and capabilities.

The implications for business were reportedly positive for some, particularly for those dealing in data management, providing marketing or advertising services online.

More efficient use of resources and flexible planning was highlighted as a benefit for a number of organisations. The opportunity for a wider reach for less cost and less pressure on staff was mentioned and compared to previously inefficient systems of extensive travel to meetings, where often there was poor attendance. This is supported by new analytical tools which allows those delivering KE to evaluate interest and engagement and can help target meetings. A focus on being responsive to target audiences’ needs on a more flexible basis was discussed.

With respect to capacities and capabilities, online delivery was also noted as demanding on staff digital skills and time and the need to professionalise and upskill was noted in both the workshop and interviewees.

Future innovation/Implications for future delivery

Hybrid activities

Although digital delivery has been widely embraced and offers many learning opportunities, there are still a number of challenges. Nevertheless, there was universal agreement amongst all respondents that the future of KE will be balanced between face to face and online provision. These views were supported by those of farmers and stakeholders in the survey with >90% of both agreeing with the statement ‘I hope to use a mix of in person and digital media and tools in the future’.

However, how the balance between the two is managed is a point of debate. Flexible delivery is required to suit the audience and context. There are a number of creative hybrid adaptations already in operation which can service as good examples for the future delivery. Participants stressed that any hybrid delivery has to be done well and there were many concerns about simultaneous hybrid delivery raised by stakeholders, both in terms of the quality and effectiveness and the additional workload and resources required.

Stakeholders agreed that the advisers and agronomists ‘coming out the farm driveway’ are still going to be a vital component of support, although 21% of farmers agreed with the statement ‘I do not have to employ an adviser anymore’ as an opportunity that digital tools offered. Although stakeholders agreed that that advisers would remain a key element of future delivery, this figure indicates that potentially some farmers might be relying on digital tools instead.

Evidence of learning is needed

A number of stakeholders highlighted the fact that currently there is limited evidence of learning from online activities, although there is a lot of information circulating, it is not known how much of it is being translated into knowledge. This point also strongly expressed in the workshop and identified in the survey open comments, and the need for studies to assess the extent of learning is clear. This would allow a more nuanced evaluation of the high figures recorded of online participation in some meetings.

Managing information and integrating platforms

Aligned to the theme about connectedness and fragmentation, there was consensus that the proliferation of platforms and information since COVID started has compounded problems in an already fragmented AKIS. The need for a more coordinated and joined up approach to delivery was advocated although some challenges with reconciling different organisation's objectives was also identified. Overall the sense was that digital delivery required strong knowledge management and curation with signposting, making all information (including legacy recordings) easy to find and accessible.

Reappraisal

A common theme across all the analysis was that the pandemic has prompted a reappraisal of the challenges and the associated knowledge requirement amongst farmers and those providing KE. For some, COVID has prompted a long overdue 'digital re-set', with many stakeholder and farmers adapting and learning, arguably upskilling a cohort of practitioners for the future. This was supported by the survey data; both groups in the survey (67% farmers and 77% stakeholders) strongly agreed with the statement that that the disruption has presented an opportunity to rethink how they access or provide advice. Although more stakeholders were more likely to agree (44%) that they would not go back to the way they used to provide advice compared to farmers (34%) (accessing advice) suggesting that advisers have adapted to the changes to greater extent overall.

Future opportunities

There have been high levels of adaptability and positive engagement with online KE delivery since COVID-10 restrictions started, and an appreciation of the many benefits it provides. This presents a number of opportunities for the future. However, there is a strong feeling that this is at the expense of the social interaction, shared learning and social support that farmers gain from face to face activities. Furthermore, there was concerns about those who have been excluded from online delivery, for whatever reason, and the implications this has for their future. When planning KE delivery in the future, it is important that the needs of some farmers and sectors are not compromised as organisations look for resource efficiencies. The figure below captures the key opportunities, building the lesson and adaptations outlined in this study:

- Build on the digital re-set and the upskilled cohort of practitioners
- Make digital more effective using the many lessons and experiences gathered over the last year, creating social interaction online with new interactive platforms
- Knowledge needs to be managed given the proliferation of sources and platforms. Easy access, signposting and a high level of credibility are seen as priorities, as is the need for coordinated delivery through shared platforms or a one stop shop
- Optimise on people's new outlooks and re appraisal of their KE methods
- Invest in organisation and individual capacities and capabilities to ensure professionalisation and skills to support new forms of delivery
- For future KE hybrid delivery, it is important that this is developed to ensure well balanced and appropriate delivery

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- Endeavour to be inclusive in delivery, consider how to support the disengaged
- Assess the extent of engagement and learning achieved through online delivery to ensure that digital tools are optimised and used in the appropriate context



Figure 3 Opportunities for future KE delivery