Exploring farmers views on the uptake of cattle traceability technology

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Executive Summary

This report assesses issues relating to the up-take of electronic identification (EID) for cattle in Scotland. Following the mandatory introduction of sheep EID, the European Union is widely predicted to introduce an EID traceability capability for cattle in the near future. By taking account of farmers' views and needs the information gathered during this study may help underpin Scottish Government's involvement in developing European legislation or a post Brexit alternative, to ensure an effective adoption of cattle EID. Furthermore this report hopes assist in the facilitation of efficiencies in livestock management practices by promoting other capabilities of this technology. In addition, Scottish Government advisors had particular questions regarding implementation options for cattle EID which the research team explored with stakeholders.

Through qualitative interviews with farmers and crofters in three discreet areas of Scotland (Skye, Orkney and Aberdeenshire) the research team was able to collect opinions, ideas and concerns regarding livestock EID from a diverse population and can report how this technology is perceived and what barriers there may be to its further adoption. Farmers have been complying with legislation and implementing EID with varying degrees of integration in their management practices. While some do no more than mandatory tagging others have fully embraced the associated technology using EID readers in conjunction with computerized systems. This latter group includes many farmers in the dairy industry and a smaller number of beef farmers, for whom EID has been an integral part of daily management practices for some time.

Opinions about EID ranged from "it's great" to "why do we need it?" Views were not strictly age or location specific although contextual factors did emerge. For example, some crofters on Skye were sceptical of the value of EID technology in limiting culling of diseased animals from their communal sheep grazing system. They told researchers that any local outbreak would be likely to result in a cull of the whole island regardless of recorded movements which are minimal in their closed herd systems. For others, although they understood the requirement for traceability, they did not immediately associate EID with disease control, many citing food chain traceability instead. Another cohort associated both EID and Cattle Traceability System (CTS) with a general, increasing administrative burden. Where disease was cited as the key driver, past experiences with both Bovine Spongiform Encephalitis (BSE) and Foot and Mouth Disease (FMD) with their different epidemiological profiles, seemed to have created very different understandings of what EID was designed to achieve. The researchers also noted that suckler herd keepers faced a different set of livestock keeping challenges to finisher and dairy keepers and that these different farming configurations gave different perspectives on cattle EID. These perspectives covered a broad spectrum from those envisaging practical difficulties with no notable benefit, to those anticipating little difficulty adopting cattle EID and significant efficiencies to management practices. The more positive practitioners demonstrated that there is considerable potential to increase farmer up-take by promoting the direct benefits to herd management, beyond strategic disease control considerations, namely:

- Improved efficiency of data management over the existing passport system
- Reduction in manual handling leading to health and safety improvements
- Efficient integration with other computerized systems for trading, feeding or breeding etc.

Overall the heterogeneity of livestock systems in the sample pointed to the need for a nuanced and tailored approach to farmer engagement in order to ensure an effective transition to cattle EID. The different circumstances across Scotland exemplified by our three locations reveal both challenges and opportunities for policy makers to introduce enhanced controls while promoting on farm benefits to improve livestock systems more generally. While 'one size fits all' will inevitably be a technical characteristic of any Europe-wide EID traceability, the details of a new system may be developed and promoted in a way that takes into account the diverse practices and contexts of Scottish livestock.

Contents

Introduction

The aim of the study is to contribute to better livestock disease control outcomes in Scotland as part of the wider EPIC Centre of Expertise for Animal Disease. Specifically, this work will help to underpin Scottish Government's (SG) involvement in contributing to a European cattle electronic identification traceability capability that takes account of the views and needs of the nation's farmers. We are particularly interested in the farm-level practice of using EID; how it can help farmers rather than be burdensome. For this reason we enquired about various aspects of livestock EID over and above disease control issues. Our assumption has been that taking farmers' practices into account will promote uptake of cattle EID.

Following the mandatory introduction of sheep EID across Europe in 2010, farmers and crofters in our sample reported that they have been complying with the legislation with varying degrees of enthusiasm and have now generally accepted it as standard practice. Most of our sample who kept sheep achieve the minimum required to comply with legislation. A small number have integrated EID and the associated technology into their management practices, using EID readers in conjunction with on-farm computer systems, for example inventory recording.

While there is no regulatory requirement to electronically tag cattle, some dairy farmers are already integrating EID with other computer systems as a way of recording milk yields and feed intake. A number of larger units also incorporate electronic technology into daily management such as monitoring the health of individuals and the detection of oestrus. Some enthusiasts have fully embraced technology and introduced robotic milking with EID as a key component.

The beef farmers sampled were more reticent about early adoption of the available technology. There appeared to be no single driver for early adoption while the existing paper based Cattle Tracing Service (CTS) remains compulsory; however some of the larger units, pedigree breeders and more progressive enterprises are already employing EID and associated components for routine herd management.

Key aims

We believe that lessons learned from the implementation and experiences of existing livestock EID can help promote the uptake of EID technology and improve livestock disease outcomes.

We seek to ensure, by engaging directly with farmers, that the anticipated switch from the current CTS to EID enabled systems takes account of farmer views and is as usable and beneficial at the farm-level as it can be given the constraints of wider governance.

Methods

This qualitative study took the form of semi- structured face to face interviews with farmers in Aberdeenshire (13) and Orkney (8), crofters on Skye (7) and key informants from ScotEID involved with the operation or development of livestock EID. Locations were selected to align with prior studies and existing data sets (EPIC[1] and PRO AKIS[2]). For ease of reporting the term 'farmers' is used

[1] EPIC is The Scottish Government's Centre of Expertise on Animal Disease Outbreaks – website

http://www.epicscotland.org

generically, incorporating both farmers and crofters. Interviews lasted approximately 1 hour and were recorded and transcribed in accordance with strict ethical procedures. Data was then indexed and sorted into an analytical framework using computer assisted packages (NVivo10 and Excel).

This type of qualitative study employs a small sample size in order to explore behaviours and perceptions in great detail, to capture nuances and to allow respondents to explain their thinking in conversation. This is typically achieved by listening and probing as new information emerges during the interview. The findings from the small samples studied in this way are typically indicative of more general patterns. Qualitative methods of this type are particularly effective at extracting real-world complex attitudes and mixed feelings that other survey methods fail to uncover. Statistically significant representativeness cannot be claimed due to the small sample size.

Geographic location

Orkney and Skye participants' generally farm closed beef/sheep suckler systems, breeding their own replacement animals. As this system requires little in the way of external input, few animals (usually only breeding males) are brought onto the islands. Livestock is typically sent to the mainland at weaning as island conditions are generally not conducive to producing the feedstuffs required to grow (finish) animals to slaughter weight and the cost of importing concentrate from the mainland is generally prohibitive. However some island farmers do finish and export stock to mainland abattoirs for slaughter.

Aberdeenshire farms (cattle and sheep) are predominantly either closed suckler holdings that breed and finish their own animals or finisher ('feeder') units buying stock from multiple sources at weaning and fattening them to slaughter weight on the better quality grazing and more economic concentrate feed available on the mainland.

Participant Recruitment

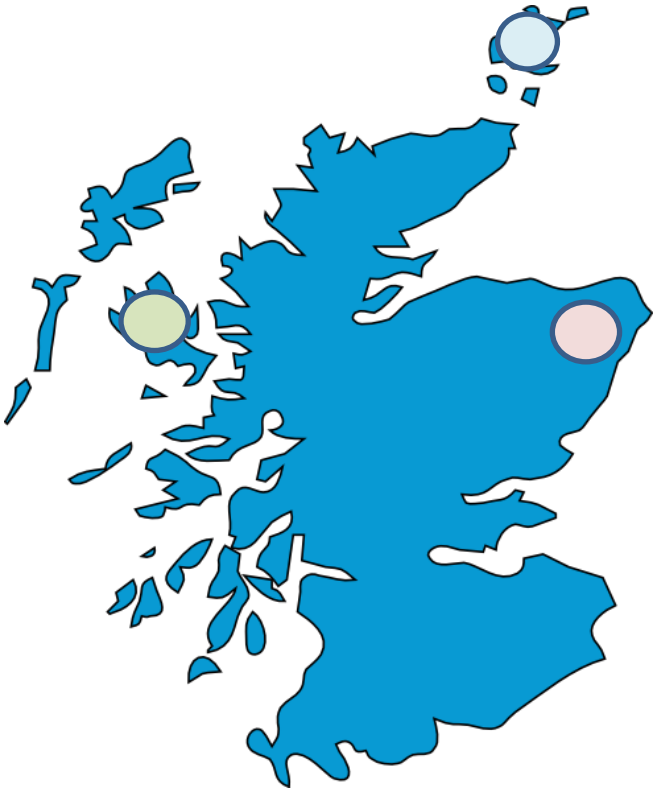
In order to capture informed views about the opportunities and challenges of livestock EID we concentrated recruitment on livestock keepers who kept sheep or both sheep and cattle and who have practical exposure to sheep EID following its introduction in 2010 as we were particularly interested in farmers who were already using EID systems. Furthermore we prioritized farmers who were actively using EID as a livestock management tool rather than simply complying with legislative requirements. Our assumption was that farmers deriving direct benefits from EID in terms of improved livestock management at the farm level are more likely to be knowledgeable about livestock and the practical benefits of EID. Following the same logic we recruited a number of beef and dairy cattle farmers who were voluntarily deploying cattle EID. In order to understand barriers to more integrated practices we also spoke to livestock keepers who were simply complying with legislation by tagging sheep with EID tags and not using an electronic reader.

Participants were recruited via recommendations from Scottish Government (SG), the Orkney Livestock Association, key informants, personal contacts and National Farmers Union Scotland

[2] Refers to a European project: Prospects for Farmers' Support : Advisory Services in European AKIS (PRO AKIS) PRO AKIS is http://www.proakis.eu

(NFUS) officers. Additional names were sourced from Aberdeen and Northern Mart sales records, breed society journals and internet sources or generated from the snowball technique.

Figure 1 Breakdown of the participants interviewed



ORKNEY
Sheep numbers: 6-800
Cattle numbers: 60-250
Area farmed: 100-5000ha
Age of Farmers: 30-57

SKYE
Sheep numbers: 150-800
Cattle numbers: 20-60
Area farmed: <10-100ha
Age of Farmers: 30-70

ABERDEENSHIRE
Sheep numbers: 80-850
Cattle numbers: 5-1000
Area farmed: <100-5000ha
Age of Farmers: 20-70

Findings

Understanding of strategic benefits of EID

It quickly became apparent that very diverse views existed in our sample of farmers. From technophiles to technophobes very distinct attitudes regarding the purpose and utility of both the existing sheep EID and any future cattle EID proliferated. Just as the farmers exhibited different views, the farms they managed were heterogeneous in terms of location, size and type of operation. All of the comments reported below must be seen against this general heterogeneity.

Some respondents did not appreciate any requirement for new legislation for cattle traceability and saw the current Cattle Tracing System (CTS) as fit for purpose. There was concern that discarding the paper passport could lead to problems in proving ownership of stock, particularly for private sales. Others recognised the logistical benefit in replacing CTS and its associated paper passport. To a large extent, within our sample, we found that the CTS was identified with paper passports. Conversations about replacing physical paper records with electronic recording were eagerly entered into. Both supporters and critics of the paper passports appeared to view them as a significant part of their administration routine.

What was surprising was that while most respondents understood that EID is connected to traceability, many did not immediately associate EID legislation with disease control. Some connected EID rather generally with the food chain and food provenance while others saw it primarily as a matter of complying with regulations. When asked directly there was no single disease that farmers cited as the objective of EID control.

When prompted about EID and biosecurity most referred to either BSE (Bovine Spongiform Encephalitis) or Foot and Mouth Disease (FMD). This was interesting in terms of the contrasting epidemiology of these diseases. BSE represents a zoonotic disease with severe consequences in the food chain, however several farmers considered the disease to be eradicated and therefore not requiring even the current CTS controls let alone new EID adoption. However, this was by no means universal with several farmers suggesting that public trust in meat was fundamental and that passports had reassured consumers after the BSE crisis. Others associated EID measures with FMD which poses no significant human health risk through the food chain but is generally regarded as significant in terms of trade.

> *"As I understood it, it was for traceability...after the foot-and-mouth they wanted to track sheep movements better."(Orkney, sheep and cattle, age 20-40)*

In relation to the efficacy of EID as an FMD control several of the island livestock keepers believed that any outbreak would result in a complete cull on the island and that therefore farmers would derive little benefit from EID. Some of these island farmers also thought that their closed herds, particularly sheep, did not warrant EID level control. On many farms animals only ever left the holding and some of these farmers saw no value in the controls.

Whatever the system, participants felt that it needed to be simple and that ideally it would work with existing sheep technology.

> *"I suppose I think it's to try and keep the thing as simple as possible...You know, without trying to go over the top with anything too fancy..." (Skye, sheep and cattle, age 60-80)*

Understanding of on-farm/direct benefits

As stated earlier, we were very much interested in farm level benefits following the assumption that operational benefits to farmers are complementary to strategic benefits for the national herd and, if addressed effectively, will help make EID successful for disease control.

> *"It's no use doing EID unless you can get the management benefits back to the farmers... No use doing EID for the benefit of the government, it must be benefits back to the farm…" (Orkney, cattle and sheep, age 40-60)*

Some respondents could see farm-level benefits in terms of improved record keeping for breeding and production purposes so embraced the technology, highlighting the time saved and accuracy of the system. However, in practice few of our sample farmers were either using EID in conjunction with their current management systems or had any clear idea about how an integrated system would be of benefit to them. Some cited technological barriers including the fear of adopting a technology that they believed would become obsolete (the 'Betamax' effect) or may be the 'wrong' one, or perceived a lack of co-operation between tag and equipment manufactures that could make the choice of equipment problematic.

"…the tag companies and weigh head [manufacturers]... they work different systems, and they don't want to cooperate and have things interchangeable" (Aberdeenshire, sheep, age 20-40)

Some were enthusiastic about "the dream" of a fully integrated system but in many cases the cost of investment was prohibitive. Affordability of a reader appeared to be related to farm size with large establishments clearly having bigger administrative overheads if only in terms of time.

Keepers using an electronic reader and software

We spoke to a number of farmers that owned an EID tag reader. Some were using a reader at gathering time or when recording lamb movements and either printing a list of numbers to manually enter into a database, or if the reader was more advanced, linking it to software and downloading data automatically. Others had never used their reader and it was still in the box.

Farmers with more complex systems recorded pedigrees, performance and routine management procedures. Regardless of the extent of application, users agreed that readers increased the efficiency and accuracy of recording. Some were highly enthusiastic. This was not entirely related to age with several older farmers amongst the technophiles.

Another finding relates to the reduction in the requirement for physically handling animals which could result in improved animal welfare and personal safety. This was particularly important for cattle handling where the animal is more dangerous by virtue of its size and weight but putting sheep through races is also an arduous, physically demanding operation. Evidence from the dairy industry suggests that cows' welfare is also improved by reduced manual handling and robotic milking parlours endorse this principle (Holloway, 2007)[3]. Our encounters with farmers generally confirmed this. There were sceptics however. Several farmers complained that in practice there wasn't any great advantage because the read range is so short that the animal must be handled to read the ear tag anyway. There was considerable interest in handling systems utilising fixed readers in pens or races, but cost was seen as a barrier.

Specific questions from the Scottish Government's (SG) EID Team

In addition to compiling data for our research project we anticipated that our interaction with farmers could offer additional insight to the SG EID team tasked with exploring options for cattle EID. Therefore we invited them to discuss questions of interest to them which we incorporated into our interviews. The SG team were particularly interested in farmers' views on how best to introduce new practices (roll out), the guidance farmers had previously received or sought and their tag preferences in terms of materials, design and configuration.

Roll-out

It seems likely that EU regulations enforcing cattle EID will come into force in the near future. SG are interested in farmers views regarding the method of introduction or 'roll –out'. Two possible options are 'Big Bang' where all cattle have to have an EID tag by a certain date, or 'phased' which would

[3] Holloway, L. (2007). "Subjecting cows to robots: farming technologies and the making of animal subjects." Environment and Planning D: Society and Space **25**(6): 1041-1060.

mean tagging new calves initially followed by the subsequent tagging of older animals over a longer time period.

'Big Bang'

There were concerns about a 'Big-Bang' introduction of cattle EID which some understood to either require the replacement of existing tags or necessitate additional tags to those already required for BVD (bovine viral diarrhoea) testing and the Beef Efficiency Scheme. The degree of opposition to re-tagging appeared to be related to the presence of on farm facilities, the accessibility of stock, or the number of cattle (and therefore the expense of tags and effort of handling), with beef and dairy herds conceivably requiring wholesale re-tagging.

> *"Trouble is, you know ...if everything needed doing in one go it would be a bit of a shocker wouldn't it? And just getting them done I mean don't forget, I mean we get our cows in every winter but some people don't... So, they'd have to get them in to retag them wouldn't they? (Aberdeenshire, sheep and cattle, age 40-60)*

Farmers were also concerned that cattle EID would be subjected to a number of iterations similar to those that occurred following the implementation of sheep EID. Others questioned the capability of the central data collection points e.g. the British Cattle Movement Service (BCMS) or ScotEID to cope with an influx of number modifications (assuming the present numbering system is changed).

> "*…how can they do that with two/three hundred thousand cattle…changing from one number to another, that's all gonna have to be recorded on a database...?" (Orkney, sheep and cattle, age unassigned)*

In addition participants expressed concern about health and safety implications of re-tagging older cattle. Retagging was anticipated to incur risk to farmers and stress to animals.

Cost was also a concern with a 'big bang' approach. Some farmers feared having to bear the full cost of replacing existing tags which could be considerable depending on the size of the unit. Some calls for incentives were recorded.

'Phased' roll out

Several participants preferred a statutory phased roll out, perhaps tied in with removing and/or introducing a cost for the passport, while others proposed the compulsorily electronic tagging of calves born on or after a specified date. Some (particularly on the islands) questioned the need to EID tag older animals in closed herds, suggesting that they only be tagged if necessary e.g. when leaving the holding.

> *"I think the most sensible way to do it is just go and say 'From the 1st of January everything born, when you tag it, has to have an electronic tag'. I think to go retagging older animals would be...well it would be a nuisance!" (Orkney, cattle, age 20-40)*

In contrast several farmers pointed out the relative longevity of cattle compared to sheep and the implication that the existing CTS arrangements might run in parallel with EID for decades.

Given the existing systems of double tagging and recording cattle movements and the compliance with sheep EID, there was a general feeling that cattle EID would probably be more readily accepted

than the sheep legislation had been. Participants who were already using or had used EID for herd or flock management advocated investment in monitor farms to promote the positive attributes of electronic systems.

> *"I think you should actually start with a few lead farms, and say 'Right, this system actually works... Right, it'll make your life easier". (Aberdeenshire, cattle, age 40-60)*

Guidance and Information

Participants who kept sheep were asked about the guidance and information they received prior to the introduction of sheep EID. They all remembered receiving literature and/or having the opportunity to attend talks or courses and visit monitor farms. In general people felt that enough information had been made available, that it was useful at the time and was 'somewhere in the office' should it be required. There were some complaints about the cost of the training provided by SAC Consulting (now SRUC, Scotland's Rural College), however most cattle farmers thought that due to their experience with existing cattle tagging systems training would not be required.

When asked about their knowledge regarding penalties for non-compliance participants said that they simply got the gist of the rules and made sure they complied. None of the farmers we spoke knew specific details about the penalties though reference was made to non-compliance affecting their single farm payment. It seemed apparent that although our sample farmers were wary of penalties none had been penalised and their information was anecdotal.

> *"…yeah the penalty stuff. You know, they've got a grid and a matrix and it's quite complicated…" (Aberdeenshire, cattle, age 40-60)*

Tag Preferences

All the participants we interviewed regarded the tag companies as a useful source of information. Farmers on the islands made extensive use of consultancy services offered by the Orkney Livestock Association and SRUC, in some cases relying quite heavily on advisors for assistance.

In Aberdeenshire the farmers we spoke to didn't rely on advisors but would contact software manufactures, BCMS or NFUS for assistance if required;

WYSIWYG ('What you see is what you get')

During discussions with sheep farmers and cattle farmers who were early adopters of voluntary EID systems it became apparent that one of the main issues with the early systems was having to manually match electronic tag numbers to animal management numbers i.e. the external management number seen by the farmer didn't match the pre-programmed number on the electronic chip. This meant farmers "wasted" a lot of time cross matching tags to animal numbers on their management systems. In recent years EID technology has improved so this is no longer an issue.

However, although feasible from a technical perspective, representation of the current UK cattle ID system is not compliant with the international standard ISO11784. The result is that cattle farmers still have to cross match EID tags to their management number systems. Whilst this may be little more than an inconvenience for smaller holdings, those larger units already using EID found it frustrating and sometimes confusing. People were very much in favour of electronic and management tag numbers matching.

On the other hand, one participant who was already using cattle EID, said they would prefer to re-tag an animal when the missing tag was noticed (e.g. during routine management) and manually cross match the numbers than have to order a specific number, wait a week then potentially handle the herd to retag one animal.

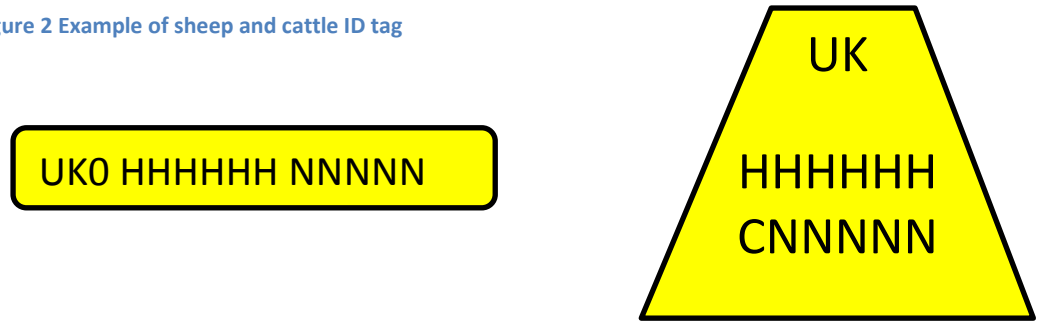
The check digit

The check digit, found on the cattle numbering system, is designed to highlight errors made in reading or recording the tag number. This enables farm management software packages and the BCMS system to reject invalid ear tags thus ensuring accurate recording of animals and animal movements. Some participants found the check digit useful and understood its function while others had no idea of its purpose. No one we spoke to expressed concern about losing it.

Unique identifier

At present sheep and cattle identification numbers are easily distinguishable by species. Although both start with the UK country code and each has a 6 digit herd / flock number (H) and a five digit animal identification number (N), the sheep flock number is preceded by 0 and the cattle ID number is preceded by the check digit (C).

Figure 2 Example of sheep and cattle ID tag



The SG team was interested in farmer's views regarding the loss of a species identifier and their opinion of introducing a single run of numbers for each holding that would encompass sheep and cattle. (E.g. numbers 1-100 of which cattle 1-10, sheep 11-80, cattle 81-100 etc.)

Farmers expressed a preference for maintaining their existing numbering system and for some sort of unique species identifier to be prominent on the number. They believed a continuous run of numbers across species would be confusing.

> *"No I think it would...it would get quite complicated I would say to run it as one numerical batch for sheep or cattle…"(Orkney, cattle and sheep, age 20-40)*

Metal tags

EU legislation requires cattle to have 2 tags in-situ at all times. Farmers have a number of options when considering a secondary tag, one of which is a small metal tag that offers good retention and was the preferred choice for a few keepers. However in general the farmers we spoke to had abandoned the metal tags in favour of plastic citing reduced quality and difficulty of reading as reasons.

LF (low frequency) v UHF (Ultra-high frequency) tags

There was considerable confusion surrounding the capabilities of LF and UHF tags with many participants being uncertain of the differences between them and unsure of the capabilities of UHF. Farmers thought that having the capability to read tags at a distance would be a real breakthrough believing that there would be safety and time saving advantages particularly at mating and calving time.

> *"Now... if this would read at...ten metres, it would be fantastic, you know, 'cause I would be able to just do all of that [record cow numbers in the field] – a lot less hassle, a lot less disturbance to the cattle... That would great!" (Aberdeenshire, cattle, age 60-80)*

Opinions were divided over the benefits of storing management data on the tag so that it stayed with the animal throughout its life. Those in favour thought it could lead to a saving in management costs (wormer, routine vaccinations etc.) when buying animals, assuming the seller was honest with their recording, but there was concern regarding the time required for additional interaction with tag manufacturers and increased animal handling.

> *"…with the high frequency they want to put everything onto the tag, so that anybody could come in about to the farm and just go up to an animal and there's all the details of that animal. -But if it lost that electronic tag, then you have to get a new tag ordered – so you've to let her out that day, you've to get your new tag ordered but you have to send all the information that you'd also have a copy of on the computer for what vaccines/treatments she's had to whoever you get the tag from, they would have to put all that information onto the tag then send you a tag back" (Aberdeenshire, cattle age 20-40)*

ScotEID - findings from a focus group with ScotEID

In order to gain additional insight into the operation of EID in Scotland, we carried out a focus group with the staff at the ScotEID office in Aberdeenshire. Participants at ScotEID felt that their primary responsibility is to act as a go between for farmers and critical control points (abattoirs and marts-CCPs). EID tags are read at CCPs and the 'reads' are sent to ScotEID where they are collated. Farmers can access the website to see their data. If there is a discrepancy with reads e.g. a farmer disagrees with CCP information, ScotEID can assist in resolving the issue by investigating further. In addition ScotEID staff can manually record private moves, i.e. those animals not going through CCP

> *"And if there's any problems, if people have sold through...what is called a CCP – a mart or an abattoir with a reader – if they can't see their reads or there's reads missing or whatever, then they would phone us and try and find out why and we can help coordinate...speak to marts and stuff..."*

Although few of the farmers we spoke to cited ScotEID as a direct source of information, staff at the office said they spent some time giving information about tagging legislation and believed that farmers prefer talking to them because they aren't "the department" (Directorate for Agriculture

and the Rural Economy- DARE). In addition farmers or crofters with small numbers of animals and/or limited internet access are more inclined to contact the office directly. Members of the focus group believed that some farmers see ScotEID' s function as a policing or record keeping body and don't understand the importance of the ScotEID role regarding disease traceability.

ScotEID - the farmers' perception

When farmers were asked about the function of ScotEID their understanding was varied. Some participants had little or no interest or understanding of its role while others referred to the ScotEID website on a regular basis or had interaction with the ScotEID team.

> *"Tremendously helpful, really nice folk – they've always been really helpful" (Aberdeenshire, sheep, age 40-60)*

Conclusion

Farmers have mixed views about the potential of EID technology at the farm level. Although the idea of a fully integrated weighing and shedding system appealed to all in principle, many said that finances were a sticking point. While not anti-EID or anti-technology per-se; many of the farmers in our sample felt that they could not justify the expense of the latest technology or failed to see the benefit in their particular situation.

> *"I would say money is the initial driver and then when having spent the money and you realise the convenience and the ease and the benefits, you're glad you did it; but the difficult bit is getting people to make the first step" (Aberdeenshire, cattle, age 40-60)*

What may be of greater concern is the apparent lack of understanding regarding the rationale behind the requirement for EID. Our evidence suggests that the link between cattle EID and benefits for the national herd could be better communicated. Farmers in our sample exhibited mixed understandings of the purpose of livestock EID. Some thought it to be a general governance tool, others that it was about food provenance (often in connection with BSE where some believe control is no longer necessary) and others identified it as part of FMD control. Livestock EID can in fact play a role in all these areas. Therefore communicating clear objectives through multiple initiatives including information and guidance could reinforce the underlying strategy of EID to enhance traceability for effective disease control and eradication strategies.

Additional initiatives might further be used to raise awareness of on-farm benefits quite independent of national biosecurity. Livestock keepers can and do achieve productivity benefits and efficiency savings by integrating management tasks using EID readers. Having examples of good practice at different scales and for different configurations reflecting the diversity of cattle and sheep farming nationally would provide encouragement for greater innovation and adoption.

In terms of any future implementation of cattle EID, the take home message from this study is that cattle farming is a heterogeneous activity across Scotland and that different configurations face different barriers and opportunities. Messages could to be tailored to address different audiences. Local circumstances for island and mainland keepers make them sensitive to different aspects of any new arrangements. Keepers of closed herds see biosecurity differently to finishers and small farmers view implementation costs differently to their larger neighbours.

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The views and recommendations expressed in this report are drawn from the participants interviewed and are not necessarily representative of wider farming or other professional opinion. Furthermore, this report does not represent Scottish Government policy

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EPIC

EPIC (Epidemiology, Population health and Infectious disease Control) is an ambitious animal heath consortium project.

EPIC is the Centre of Expertise on Animal Disease Outbreaks, bringing together Scottish-based expertise under one umbrella to best prepare Scotland's livestock industry and stakeholders for disease outbreaks. Funded by Scottish Government,

http://www.epicscotland.org