



Small-scale sheep keepers' biosecurity and quarantine practices: with reflections on potential response to disease outbreaks

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Claire Hardy, Carol Kyle and Lee-Ann Sutherland



The James
Hutton
Institute

Executive Summary

Small scale sheep keepers have a role to play in monitoring their livestock to prevent outbreaks of disease, not only on their own holdings but to contain potential outbreaks on a larger scale. Past studies have looked at commercial sheep production on farms of 100+ head of livestock but little is recorded on small sheep keepers where typically the numbers are below 100, often below 10.

Foot and mouth disease (FMD) is a notifiable disease in the UK and is caused by a highly infectious virus affecting sheep, cattle, pigs and goats. The last large-scale outbreak of FMD in the UK was in 2001, and it could cause devastating effects on livestock if another outbreak was to occur. It is therefore important that livestock holders are aware of potential practices that could leave them open to their stock catching the disease and of them spreading disease. Many people keeping livestock at the moment would not have been holding livestock during the previous outbreaks, and therefore will not have firsthand experience of the impact. The [FMD control strategy for Great Britain](#) outlines the protocol in place to minimize risk once the disease has been identified with the main objective to eradicate the disease and return to disease-free status. Preventive actions for the spread of FMD are centred around the need to maintain high biosecurity standards. This report presents research into how small-scale sheep producers respond to disease risks and identifies the current biosecurity measures routinely in place. It also highlights whether the keepers are in a good place to identify and contain any potential situations that might occur and their ability to respond to potential national outbreaks to prevent their livestock becoming the focal point for any outbreaks. To look at these issues 13 small scale sheep keepers across Scotland (Figure 1) with fewer than 100 head of head of sheep were interviewed. As few people had experienced the previous FMD outbreak, we also looked at response to sheep scab outbreaks, which is also a notifiable disease as an example of approach to an outbreak.

The uptake of biosecurity measures are low amongst the smallholder interviewed (few were able to describe their biosecurity measures employed on-farm). They live in remote locations with little contact with other sheep producers, rarely visiting potential contamination sources, for example the local mart, and rarely buying in additional animals. They have less opportunity to learn from their peers and are less likely to hear about standard practices in use and changes in practices that could be beneficial. Potential problems identified would be the borrowing of breeding males (tups) and a misunderstanding of the quarantine measures that should be in place. Small-scale sheep keepers develop their own networks, and some try to find a mentor. They indicated that they would find out about outbreaks on social media. The smallholders indicated that establishing a good veterinary relationship to provide the welfare support for their livestock was useful.

It should be noted that none of the sheep keepers interviewed had sheep during the 2001 FMD outbreak, although two study participants were working with livestock at the time and described their experiences. The smallholders had not encountered sheep scab with their own sheep. They had a clear consciousness of the risks that could be faced if there was a theoretical outbreak of disease and the resulting devastation that might impact on their own situations.

Animals held on crofts are in a unique situation. In some areas crofting townships are still operated. These are situated in remote areas and sheep keepers of a range of scales often work together. However, some crofts are not part of townships and operate independently, not relying on the community for joint activities. The animals in the crofting townships are held together accessing common grazing and together the livestock are looked after, sharing resources, including breeding males. Not bringing in animals from external sources is essential to the safe operating of the system. Their main strength, in terms of biosecurity, is in close cooperation and communication.

Several of the sheep keepers interviewed indicated they would like more information on biosecurity, disease and quarantine, relevant to keeping sheep in small numbers. They experienced difficulty in finding resources, although some had accessed both face to face and on-line training.

Text box 1 Recommendation from this report:

- Easily accessible courses on sheep handling, welfare and disease recognition
- Establishing formal networks for spreading disease news (potentially a Facebook group dedicated to smallholders)
- Providing biosecurity guidelines specific to smallholders and crofters
- Clear guidelines on how to notify a disease outbreak could be shared in an easily accessible format for sheep keepers on the edge of communities and not in current formal networks
- Providing clear quarantine guidelines that can be practically adhered to for small scale sheep holders
- High health for entire males available for hire for breeding purposes (tups), including records of preventive treatments, vaccination, or quarantine measures

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Research summary

This report presents the findings of interviews from 13 sheep keepers based in Scotland. The initial contacts used were drawn from a previous study looking at smallholders keeping pigs and poultry. Not all these participants kept sheep or wanted to be contacted in a further study. Subsequently a Facebook group and existing networks were contacted to obtain additional interviewees. The criteria used to select interviewees were: non-commercial sheep keepers living in Scotland prepared to give up time to engage with the study. Of the sheep keepers interviewed 11 were female and 2 were males. Their ages ranged from over 20 to under 65. Although this is a small sample, 'saturation' appeared to be reached i.e. no new information was emerging from the interviews after approximately 10 had been conducted. It is understood that although this is not a representative sample it is interesting when considering the perspectives of small-scale sheep keepers.

Interviewees who expressed an interest in being involved were initially contacted by email. Project details and a consent form were then sent. When these were returned, participants were offered the opportunity to select an on-line or face to face interview on a day and at a time convenient to them. All except one selected an on-line interview; it should be noted various areas had COVID-19 restrictions that were in place during this process and these restrictions were strictly adhered to, to protect both parties. The holdings were located from Caithness in the North of Scotland to Helensburgh in the West and Stonehaven in the East but concentrated in Aberdeenshire. (Figure 1). This could be explained by the higher concentration of smallholders in this area, as the initial studies (in poultry and pigs) also found a number of contacts in Aberdeenshire.



Figure 1: Locations of interviewees keeping small numbers of small sheep

Their education status ranged from Highers to Doctoral, although most were degree and above. When asked by what name they identified, the majority opted for 'smallholder', a few suggested 'hobbyists', two identified with the term 'pet' and two were definite in their identity as 'crofter'. As a number of interviewees did not have a strong opinion, for the ease of this report, they will be referred to as smallholders (Table 1).

Table 1: Age, education and owner self-designation

| Age | Gender | Education | Self-designation |
|---------------------------|--------|-----------|---------------------------|
| 60-64 | F | Degree | Pet owner |
| 20-25 (joint with parent) | F | Highers | |
| 45-50 | F | Post Grad | Smallholder with pets |
| 45-50 | M | Degree | Smallholder |
| 40-45 | F | Degree | Small farmer |
| 40-45 | F | Degree | Smallholder |
| 50-54 | F | Degree | Crofter |
| 45-50 | F | | Smallholder |
| 45-50 | F | Post Grad | Crofter |
| 35-40 | F | Degree | Smallholder |
| 60-65 | F | Degree | Hobby 'farmer' |
| 60-65 | F | Post grad | Hobbyist with aspirations |
| 55-60 | F | HND | Farmer (small mixed farm) |
| 60-65 | M | PhD | Smallholder |

Holding contexts

Although National networks were used, the majority of interviewees were based in Aberdeenshire. Holding size varied from 3 acres to 100 acres. The very small holdings sometimes had access to other land, whilst the large holdings kept several species and often grazing for horses. Not all the grazings were owned, some were rented. Not all the land was adjacent to their dwellings, meaning some people had to travel to look after their livestock and their livestock were on fragmented parcels of land. The sheep keepers all indicated that keeping sheep was not their main source of income.

Sheep breeds

No single sheep breed dominated the breeds being kept by smallholders; 18 different breeds were identified. Interviewees were asked about how they acquire their sheep, and their answers suggest that ease of availability has a lot to do with the breeds and distribution. Many smallholders buy their sheep privately, either hearing about locally available sheep, or sourcing those available on Facebook and on-line livestock adverts. Very few had bought from the local marts. Those buying pedigree sheep used breed societies to buy ewes and tups and were 'prepared to travel to buy the right animal'.

Motivation to keep sheep

Reasons for smallholders to keep sheep are varied and often multi-factored. Some of the smallholders start keeping sheep as a chance to have a new lifestyle and hope the 'good life' will work for them. The appeal of keeping sheep include meat for the freezer, milk to make cheese, fleeces for sell and wool for art and crafts. An additional appeal is low-cost maintenance of fields, and the attractiveness of sheep as pets (i.e. 'cute animals'). Smallholder priorities can however change over time; this is reflected in their decisions that can change over time. For example, some smallholders start out with an intention to grow their own meat, but then change their minds. The reality of raising something to then kill, add to the freezer and consume is challenging.

Martha: I originally bought them for meat, the first 3 that I bought I hand reared, and the plan was to cull one at 6 months, one at 12 months and then keep the ewe for breeding and that proved impossible and so that was the start of keeping sheep as pets.

Others pursue small-scale meat production and expand to produce not just for themselves but for family and friends by growing the flock over time. Once a small holding has been purchased managing the land becomes a reality. Keeping the grass down can be a problem and sheep are seen as an easy option to manage the land as it is quick to build numbers .



Figure 2: a Zwartble ewe with lambs

Although the majority of people have looked extensively into their options of what breed of sheep, initial numbers, what to do with additional numbers (if breeding) (Figure 2), others get into sheep keeping with little prior planning,

Daisy: The first one was an orphan lamb that we were given so he was a few hours old when we got him, but his mother had gone off down to the bottom of the field to give birth to a twin and stayed down at the bottom of the field and didn't come back for him. He was delivered to us in a cardboard box.

Prior knowledge of sheep keeping

Commercial sheep keepers typically have a tradition of livestock husbandry (i.e. coming from a farming family) or have been to college or university to learn about general animal husbandry and welfare. Biosecurity awareness and knowledge are thus well established. This is less so the case for smallholders. However, some smallholders have had sheep as youngsters or family and friends are farmers providing a solid network of experience to draw upon.

June: we sort of say it's a small holding on my husband's farm, we've got pigs, chickens, a small flock of sheep,it's my husband's family's farm so it's been in their...all their lives.

However, in some circumstances the farming family is not always considered to be helpful. Especially if the traditions are embedded and new techniques and technology have not been embraced. The new sheep keepers recognize that the older members can have a reluctance to move on, relying on tradition rather than embracing change.

Sue:I still have him and my dad on the end of the telephone as well but to be honest I generally go to the vet because at the end of the day they all tend to do what's been done before and that's not necessarily the right thing. I was going to say technology, it's not really technology but things change.

Whereas many of the keepers of small numbers of sheep have little prior knowledge of sheep keeping, they draw on general animal welfare and often use their ability to find and research

knowledge bases to source information on sheep and their welfare. As noted earlier many of the people interviewed are degree educated and therefore have experience researching areas of interest, finding resources, learning and adapting information. Some have academic knowledge of animal welfare and behaviour but without the practical hands-on experience that comes with routinely looking after animals.

Martin: the broad concept of animal welfare yes I did. In terms of the actual practicalities no I didn't

Smallholders appear to be resourceful and if they need additional knowledge they look to sourcing courses, for example the local machinery ring (in the Caithness area) has provided the opportunity to top up knowledge with face-to-face courses. However, the COVID-19 epidemic has impacted on availability and many of the courses have gone on-line. On-line courses have the advantage of being available nationally with the larger vet groups and SRUC offering lambing courses to boost knowledge in the virtual environment. A way to disseminate highly relevant material on biosecurity, disease would be useful to further their understanding. Some people indicated that it would be useful to be able to easily find resources applicable to smallholders, in several formats, including both simple guidelines and more in-depth training sessions.

John: I have been to a lot of seminars; I went to things like Oatridge for lambing courses.the new vets in turn were running courses on everything between lambing courses and...yeah...picked up a lot from that.

A few highlighted that when the older generations are no longer at the end of the phone, or their current networks are unavailable other methods prevail. Only one person we spoke to mentioned checking book references. However most people did describe using 'google,' this was found to be really useful if people have small amount of knowledge and know where to start searching. Others, typically with more than basic understanding of sheep health, are members of forums and are able to pose questions.

Bill: I would say Facebook is a very important part of keeping livestock as a smallholder and as somebody that's got a small number of animals it's a big source of information'

This quick fix approach gives answers immediately but relies on the information that is provided being accurate. On social media questions and images, showing problems, can elicit several conflicting answers that can lead to confusion. Fiona was a member of Facebook groups but did not find their responses reliable.

Fiona:I am part of them butthey talk so much crap..... Sometimes I read some of the responses and I think oh my god just go and get a vet!

Vet Relationship

The majority of smallholders in the study have good working relationships with their vets and expressed their praises of their vets and the practices in general. Interviewees relied on contacting their networks, their learned knowledge and the internet before contacting their vet. There was an indication that people were more reluctant to reach for the phone to speak to the vet, with price being the most common factor that prevented the vet being contacted.

George: most of the stuff I tend to deal with myself because my vet bills are big enough! But aye if it's something I don't know I'll look into it, I'll research it and if I'm still no' happy with it I'll go to the vets.

Grace: I have a very good working relationship...I have a far too good working relationship with my vet, and they have far too much of my money.

Networks

It is important for the sheep keepers to be able to identify potential disease symptoms to treat disease and maintain the welfare of their small flocks. Disease symptoms that go untreated can cause larger problems both to themselves and potentially for others. Knowledge networks are very important for the small sheep keepers that have little previous experience. They build a network of knowledge around themselves and if possible, find a mentor that can be called if problems arise, ensuring there is practical advice on hand if required. Peer-to-peer learning is beneficial for all parties involved.

Sue: Our childminder at the time had contacts, she's into horses and the stables where she kept her horses had got some cade lambs that they were looking for homes for, so we got 2 pet cade lambs from them and kind of built knowledge as we went on. We were fortunate that we'd got an experienced farming family in my daughter's class at school.

A few sheep keepers bring in professional shepherds or shearers to provide the general routine maintenance. Although this still requires the owner to carry out the daily checks to spot problems that might occur at other times.

April: she sprays them with that antimaggot spray, and she worms them as well and does their feet too. A one stop shop!

Management

Livestock keepers, in general, practice good management by using a daily routine to check their animals. Smallholders, regularly check their sheep to spot anything that could be considered out of the normal including: unusual movements and uncharacteristic changes in behaviour.

Fiona: I guess our biggest sort of sign of them not being well is if you've got one left on its own. It highlights the problems.

Commercial sheep farmers who are dealing with several hundred head of sheep potentially spread over upwards of 200 acres, often treat their sheep as a whole flock; if a number show symptoms then the whole group are brought in, removing any one animal can be a difficult time-consuming task. Smallholders, who are observing small numbers in a small area, use this to their advantage, enabling them to know all their livestock individually and treat them on this basis

April: Daily management, well I go and have a chat with them every day,

Mary: I can basically look out windows and go...and see everybody and they're very friendly so they come to you

Interviewees also described walking around their sheep, taking the quad and occasionally taking a trek pass on horseback, to check their sheep without disturbing them and thus reducing stress.

Buying and Selling

Visiting the Mart sales both locally and for specialised sales, further a field, is a risk that could potentially open up the sheep keeper to bringing in diseased livestock. Or coming themselves into direct contact with diseased animals. Visiting the Mart to buy or sell livestock appears to not be the normal approach for small sheep keepers, one owner explains her thoughts

Liz: I've never been to a livestock mart for the purpose of buying sheep. It's always private sales. I have considered it but I'm a little bit concerned about buying from that sort of environment from a disease perspective

Those that have pedigree sheep use their breed society sales to get a fair price and network with other breeders.

Biosecurity measures

Most smallholders live remotely and don't expect to have visitors. They use their remote location and lifestyle to protect themselves and their livestock. Some were not able to describe any biosecurity measures they employ. General biosecurity measures however are adhered to for those regularly visiting the mart and when visiting other sheep breeders or hosting their visit. Here George describes his routine

George: I use different boots, different boots and waterproofs for going to the market, my trailer I wash 'oot at the market and then I come home and then it gets Virkon so its spotless before it comes home but then I'll Virkon inside it and in the tyres and basically my boots kept in a different room so they get kept in here and other than that...that's all there is. So...anytime the trailer goes 'oot it gets steam cleaned and disinfected.

In general visitors use disinfectant footbaths provided for boots, but most visitors that regularly visit on farm, NFUS, AHDB, QMS or the Vets, come prepared for a visit and it is expected they would attend to their own biosecurity.

Grazing with horses is common and in some cases general grazing due to the small amount of land is practiced. When the land is limited then smallholders find managing to keep animals separate a challenge. Smallholders reported paying good attention to their boundary fences to ensure nothing escapes and they do not get any unwanted visitors. However inside their boundary fences the livestock appear to have free rein to graze where they please

April: they all graze together. My pig Poppy pleases herself actually who she grazes with. She runs loose, she has the run of the place so sometimes she's in with the horses, sometimes she's in with the sheep.

In Scotland the crofts are arranged into townships that act together for common activities. There are roughly 6000 crofts arranged into 280 townships. The crofts have a small amount of in by land and some have access to common grazing. Crofters generally graze all the livestock together due to the small amount of in-by land available.

Morag: we're a croft so we have a field of sheep, we've also got pigs, we've got poultry and I've got horses as well so everything is really sort of intermixed but we are only a 3 hectare holding so everything is in very very close proximity to each other.

The crofting township act together to get activities for livestock achieved, they have a combined shearing, dipping and the tups are shared. The equipment is communal, and smallholders collaborate to ensure all the animals are looked after

Grace: as a township we do everything together. So they'll do gatherings together, they'll do clipping together, they'll do dipping together, so we work together as a community, as a township.

The crofting township cooperate to achieve group trust in their combined biosecurity measures, including joining the same health schemes. They believe that by acting together, they are able to contain any biosecurity issues at source.

Foot and Mouth Disease

None of the smallholders we interviewed for this study were keeping sheep at the time of the 2001 outbreak of Foot and Mouth Disease (FMD). However, they were aware of this outbreak, and were very conscious of the implication of further outbreaks. Mary recalls the reaction of the agriculture community she saw working as a vet nurse in England at the time of the 2001 outbreak and her worries for her small flock now if another outbreak were to occur.

Mary: I saw the impact that it had and I remember the coverage around it and I remember the impact that it had on...not just on standard farmers but also people that kept sheep as pets and were trying to hide them in their houses and that is my...I guess would be my biggest worry is that foot and mouth would come in because I don't think of my sheep really as livestock. They're much more my pets and so an outbreak of foot and mouth and an order to cull because I'm sat within a 3-mile inclusion zone or whatever it is would be devastating

Andrew worked in research and equally wouldn't want a repeat experience

Andrew: it was scary stuff, really scary stuff but we escaped it unscathedthe pressure inside the shed was higher than the pressure outside so nothing could get in. Oh...it was absolutely amazing but not good, we don't want to go there again.

He shared his thoughts on his concerns for his own flock

Andrew: I mean blood, sweat and tears, I take a great pride in my flock..... Just a disaster. All the years of breeding and you get used to them, you get attached to them,..... we trained a couple of sheep to walk with head collars on beside wheelchairs so that the kids could take them a walk with the wheelchairs and stuff. So you lose them its...it's no' just a sheep you're losing. Aye, no you shudder to think losing sheep like that. It would just be a disaster.

Although none had firsthand experience of FMD we asked them to reflect on their biggest risks of another outbreak of disease, particularly affecting sheep. Most thought outside livestock and people coming onto their land were the biggest risks. Some had taken extreme measures of padlocking gates to keep everyone out.

Amy: Absolutely! Yes and my gate is locked at all times. So people can't even just wander onto my land. I am really....I'd probably say protective

Sheep Scab

None of the study participants have had a case of sheep scab; two had neighbours that had cases but the one reaction that was voiced by Elsa is, it's not really discussed. Prevention of sheep scab has practical difficulties as it involves either dipping or the more expensive method of using an injectable drug. Respondents who show livestock typically treat, with the injectable drug, against scab for the specific sheep that will be shown in a season. Most contractors with a mobile dipper are reluctant to set up for a small number of sheep due to the cost, making it not feasible for single smallholders. Instead cooperation within the community can result in getting enough numbers to warrant a visit for the mobile dipper. This relies on one member of the community to organise the visit and ensure everyone is ready, sheep gathered and enough people available to manage the different flocks needing to be dipped. Group dipping in addition raises biosecurity concerns. However another person saw that to keep on top of disease in his region would help everyone

Gordon: If anybody in the area has got scab or anything like that I'll be the first to give them a phone and say right what are you doing about it?

If a disease outbreak did occur most respondents suggested good community networks would work to spread the word 'within 5 minutes'. Crofting townships rely on communication to spread the word on disease, and all livestock problems (escapees, people needing help). Some networks and communication channels that could spread news of disease outbreaks exist already but interviewees mentioned the lack of formal networks, that they were of aware of, was disappointing. Many smallholders said they would rely on the internet and social media to find out about new disease outbreaks. Local networks often report national information and people hope the word would be quickly spread from a national down to a regional and then community level to ensure swift response to any movement restrictions for livestock.

Quarantine

The majority of the smallholders are only occasionally buying in additional sheep to add to the flock. Their awareness of quarantine measures and their ability to put them into practice are limited. Those that do buy in sheep regularly tend to have more stringent measures, as described by Mark.

Mark: I've got segregation pens for the sheep andthey go into there for 20 days so when a ewe...whenever I buy a ewe in or a tup in or something they'll go into the segregation pen. They'll get their feet trimmed, they'll get Terramycin spray on their feet. They'll get Ivermectin so I do Ivermectin and then they get I think 7 days and then they'll get another Ivermectin which covers scab and all the worms. Any worm burden or anything like that, resistance or anything like that, all the dung is going into the isolation pens and basically you just keep them in there for the 20 days and keep an eye on them. Watch 'oot for any nasal discharge, all that kind of stuff before they go anywhere near anything else. Usually I'll bring in a lamb just to keep them company.

Several people mentioned if buying in single animals keeping an animal in isolation can be a problem for the welfare of the animal and often they will bring in a sacrificial animal to keep the isolated animal company. Larger commercial keepers would be buying substantial number which they can isolate together.

The majority of smallholders, although they mention the need to quarantine, the actual details of how they carry out the quarantine in practice are vague. Somewhere between seven and 14 days appears to be the normal, in a separate field and 'similar to bringing a new horse' was used as an indicator of correct regulations. A separate issue is the need to isolate animals attending shows.

Interviewees that do show (this has obviously been impacted by COVID-19 restrictions at the time of the interviews) indicated that they have isolation fields, adhere to medication guidelines, keep show animals separate and have experienced few logistic problems.

Tup hiring

Due to the smallholders having limited land, keeping entire male sheep (Tup, Figure 3) can be a challenge, particularly trying to keep them separate from the ewes out of the breeding season. This has led to many smallholders borrowing or hiring tups when required.

Liz: Then the lady that shears had put us in contact with someone that had a tup that we could hire to breed with



Figure 3: Blackface tup

If these are from commercial sheep keepers, the smallholders have a limited window when the Tups will be available and the ewes ready. This limited time constrained window in combination with the lack of land, makes the 28-day quarantine period difficult to manage and would rely on the owner isolating the tup, rather than the hirer. Consequently this part of the quarantine procedure is often neglected. It would be interesting to gather more reflections on this area of sheep husbandry.

Recommendations

Sheep keepers on small holdings were resourceful in finding training courses and information relating to disease and welfare. However they expressed a desire to be able to find material specific to smallholders and keepers of small numbers of sheep. Courses that specifically addressed issues they find challenging would enable them to keep their flocks safe from disease.

- **Offering courses on sheep handling, welfare, and disease recognition**

Most of the people interviewed recognised the need for knowledgeable peers to ask for advice. They had established a network of people to call upon to gather advice from. It was however expressed,

on numerous occasions, that a formalised network for smallholders might be interesting that could offer: mentors; help; advice and resources.

- **Establishing a known formal network for spreading disease news (potentially a Facebook group dedicated to smallholders) and updated guidelines**

People we talked to identified biosecurity measures were important to keep their flocks safe but commented that they were challenging to achieve for the smallholders and crofters. It was suggested that guidelines, specifically with smallholders and crofters in mind, relating to sheep, would be useful.

- **Providing biosecurity guidelines specific to the smallholders and crofters**

None of the smallholders in the study had kept sheep during the last FMD outbreak or had experienced sheep scab. They were therefore not able to identify procedures to deal with occurrence of either on their own holdings. Clarification on sheep disease notification, specific for smallholders, would be a helpful addition to advice given on the relevant websites.

- **Recommendation on how to notify disease in a format for sheep keepers on the edge of communities and not in formal networks**

Smallholders recognised the need for quarantine measures and realised they needed to comply. They were unsure about the exact details, mainly the length of time required. In part the lack of knowledge could be due to rarely buying in animals and therefore were not familiar with the guidelines. However they also said that it was difficult for them to implement quarantine measures. They generally were buying in single animals and said that keeping a sheep isolated alone for 28 days was a challenge. Sheep are flock animals that suffer if kept in isolation.

- **Providing clear quarantine guidelines that can be practically adhered to for small scale sheep holders**

The lack of available land for smallholders makes keeping tups away from ewes during the non-breeding season difficult. Hiring in a tup for breeding helps not having to house the tup year-round, however involves trying to find time and land to provide quarantine for the tup coming onto the holding. Providing guidelines for high health tups for hiring would help.

- **High health for hiring out entire males for breeding purposes (tups), including medicine records and quarantine protocols**

Acknowledgements

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Claire Hardy Claire.hardy@hutton.ac.uk 01224 395396
Carol Kyle carol.kyle@hutton.ac.uk 01224 395206
Lee-Ann Sutherland lee-ann.sutherland@hutton.ac.uk 01224 395285

The James Hutton Institute
Craigiebuckler, Aberdeen
Scotland
UK
AB15 8QH

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