



Sheep Attacks and Harassment Research



AGRICULTURE, ENVIRONMENT AND MARINE

Sheep Attacks and Harassment Research, 2019

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1. Executive summary

Background

Dog attacks and predation by wildlife on sheep are issues of concern in several respects. Not only do such incidents cause obvious suffering to sheep, they have a financial, emotional and time impact on farmers.

There is a suggestion that attacks may be increasing and there is heightened publicity around the issue – particularly in relation to dog attacks. There has been a multi-agency campaign¹ to reduce dog attacks by the Scottish Partnership Against Rural Crime (SPARC) and Emma Harper, MSP, has proposed a bill² to increase penalties and to provide additional powers to investigate cases of livestock worrying. However, the existing evidence does not provide an adequate basis for assessing the true scale of the issues in Scotland. Nor does it adequately show the potential contributing factors or impacts, that can effectively inform the development of appropriate responses.

The Scottish Government therefore commissioned a large-scale, representative survey of sheep farmers and follow-up qualitative research to provide up-to-date and robust data on the problems.

Methodology

The research comprised an initial desk review; a large mixed-method online and telephone survey of sheep farmers; and follow up qualitative research with sheep farmers.

Desk review

The main purpose of the desk review was to provide an overview of the findings of previous related studies, to inform the focus and design of the main stage of fieldwork, including identifying any gaps in the existing literature.

Survey

The purpose of the survey was to provide robust data on: the prevalence of attacks on sheep by dogs and wildlife; the impact of attacks on sheep; the impact of attacks on farmers in terms of the financial impact, the time impact and the emotional impact; the perceived effectiveness of any preventative techniques; and views on potential policy interventions.

9,148 sheep farmers were selected to take part, identified through a combination of the Scottish Government's Agricultural Census data and other RPID administrative data. Measures were taken to maximise the representativeness of the sample, with

¹ <https://www.scotland.police.uk/whats-happening/news/2019/january/sparc-launches-extended-livestock-worrying-campaign>

² <https://www.parliament.scot/parliamentarybusiness/Bills/111027.aspx>

farmers selected to reflect the profile of the sheep farming population in terms of regional distribution and the distribution of flock sizes.

A “push to web” approach was employed, with letters sent out to farmers inviting them to take part online, combined with a telephone survey targeting those who had not responded online. A total of 1,931 sheep farmers took part and the overall response rate was 21% – which is high for a survey of this nature.

Qualitative research

Follow up qualitative research was conducted with survey respondents that had recent experience of attacks. The purpose was to explore some of the topics covered in the survey in greater depth, including the impact of sheep attacks on farmers and in particular the emotional impact of attacks and views on potential mitigation measures and policy interventions.

A total of 23 sheep farmers took part, across five small discussion groups which were held face-to-face in Inverurie, Moffat and Stirling and by telephone conference with farmers based in Argyll & Bute and the North Western Highlands & Islands.

Prevalence of dog attacks and the impact on sheep

14% of sheep farmers said that dogs had attacked or chased their sheep in the previous 12 months. These farmers indicated that they had experienced an average of 3.5 separate incidents over that period. Details they provided of their most recent incident suggests that, on average, each incident results in 1.58 sheep being killed, a further 0.51 having to be destroyed, a further 1.72 being injured, 0.34 ewes aborting, 1.02 instances of mis-mothering, and 28.04 sheep being stressed but physically uninjured.

Factors associated with a greater likelihood of experiencing a dog attack were:

- **Larger flocks** (7% of those with fewer than 20 sheep had experienced a dog attack in the previous 12 months, compared with 17% of those with 20-149 sheep, 14% of those with 150-749 sheep and 20% of those with more than 750 sheep)
- **Sheep on fully open land (with no inbye) or open land with all/some lambing in bye** (20% and 18% prevalence respectively compared with 12% where land is fully enclosed)
- **Having a track or road which is regularly used by dog walkers close to any of the sheep** (19% prevalence among those with such a track or road compared with 5% of those without).
- **Being located in Lothian or East Central Scotland** (28% prevalence in each case). There were fewer attacks in North East Scotland (8% prevalence) than elsewhere³.

³ See Appendix E for a map of the regions

Prevalence of wildlife attacks and the impact on sheep

37% of sheep farmers said that their sheep had been attacked, chased or preyed on by wildlife in the previous 12 months. These farmers indicated that they had experienced an average of 9.4 separate incidents over that period. The impact on sheep and the nature of injuries clearly varies depending on the species of wildlife involved but details farmers provided of their most recent incident suggests that, on average, each incident results in 2.94 sheep being killed, a further 0.9 having to be destroyed, a further 1.3 being injured, 0.15 ewes aborting, 0.35 instances of mis-mothering, and 6.3 sheep being stressed but physically uninjured.

Respondents were asked not to include the scavenging of dead sheep when reporting the numbers affected. However, it is not always easy to tell whether a sheep was already dead/dying so it may be that some of those reported as having been killed had already died from some other cause. Similarly, some of the sheep preyed on (particularly young lambs) may have been relatively weak and may not have survived anyway.

Factors associated with a greater likelihood of experiencing a wildlife attack were:

- **Larger flocks** (10% of those with fewer than 20 sheep had experienced a wildlife attack in the previous 12 months, compared with 46% of those with 20-149 sheep, 26% of those with 150-749 sheep and 70% of those with more than 750 sheep)
- **Sheep on open land with all/some lambing in by** (51% of those with sheep on this type of land had experienced a wildlife attack in the previous 12 months, compared with 31% of those with sheep on fully open land (with no inbye) and 33% of those where land is fully enclosed)
- **Being located in East Central Scotland** (64% prevalence), **Argyll & Bute** (57%), **Ayrshire** (53%) or **Dumfries & Galloway** (48%). There were fewer attacks in North East Scotland and Eileanan an Iar (26%) than elsewhere.
- **Being located in a remote rural area (44% prevalence)** rather than an accessible rural area (36%) or a very remote rural area (37%).

Are attacks increasing?

This is the first time that the prevalence of attacks has been measured on a Scotland-wide basis so it is not possible to say whether the number of attacks is increasing or not. However, the study provides a baseline against which trends over time – and the impact of interventions – could potentially be measured. What the research shows is that there is certainly a perception amongst some sheep farmers that attacks – particularly wildlife attacks – are increasing: 47% thought wildlife attacks were increasing in their area compared with 35% who thought there was no change. Attacks by crows, ravens and foxes were the species most commonly thought to be increasing although there was considerable variation by area, reflecting the different distribution of species.

Thirty-eight per cent of farmers thought dog attacks in their area were increasing compared with 41% who thought there was no change. Increases were attributed to a higher number of irresponsible dog owners using the countryside.

The impact on farmers

While dog attacks have a significant impact on those who experience them, overall, sheep farmers perceive wildlife attacks as a bigger problem: 48% said wildlife attacks were a big/moderate problem for them personally compared with 25% for dog attacks. This, at least in part, reflects the greater prevalence of wildlife attacks.

Attacks by dogs and wildlife clearly cause considerable suffering to sheep and are therefore a concern from an animal welfare perspective. This is highlighted by the figures above on the number of sheep killed, injured and stressed by attacks. This study also provides data on the time, financial and emotional impact on farmers.

Farmers typically spent around 5 and a half hours dealing with each incident (for both dog attacks and wildlife attacks). The most time consuming aspects were treating injured sheep and investigating the attack. Using agricultural wages to provide a notional cost of this time, the average time cost of each dog incident is £50.33, while the average time cost of each wildlife incident is £51.08.

In addition, and excluding time costs, the average financial cost of each dog attack to farmers was £697.33, while the average cost of each wildlife attack was £391.82. The biggest costs were the value of the lost sheep and (for dog attacks) the value of aborted lambs.

This study also shows the considerable emotional impact of some attacks on farmers – an aspect on which there has been very little previous research. Eighty per cent of farmers said the most recent dog attack had upset them a great deal or quite a lot and 70% said the most recent wildlife attack had upset them a great deal or quite a lot. Participants in the qualitative research emphasised the fact that they were, and *had* to be, resilient to dealing with traumatic incidents and shocking sights in their daily work, nonetheless the distress that attacks caused sheep farmers and their families was tangible. Beyond the immediate distress at seeing and dealing with their sheep's injuries, farmers described the loss of their livestock as "soul-destroying", explaining this with reference to the hard labour that goes into nurturing their sheep, and the pride they take in this.

Generally speaking, attacks by dogs tended to incite a stronger emotional response among farmers than those by wildlife. They felt a greater sense of anger and frustration because such attacks were not inevitable and were attributable to the irresponsibility of the humans involved. However, participants were also keen to differentiate between the effects of wildlife species such as foxes which they could control, and protected wildlife species such as eagles and badgers which they could not control. While the former were most common, it was the latter which bothered farmers the most. Participants conveyed a sense of great frustration and helplessness where they were affected by wildlife species which they had no legal

right to control. They were also frustrated at public agencies such as Scottish Natural Heritage which they felt did not appreciate their problems or care about their interests.

Preventing dog attacks

There are two main types of dog incident: those involving dogs belonging to visitors to the area who are with their dogs at the time, and those involving dogs owned by local residents which are allowed to roam freely and are unaccompanied at the time. Somewhat different approaches may be needed to tackle each type of incident.

There is a need for more public education campaigns which inform dog owners about the risks that all dogs can pose to sheep, about sheep behaviour and reactions, and the impact on sheep (particularly pregnant ewes) of what might seem relatively minor incidents. Related to this, the qualitative research revealed a considerable amount of confusion among farmers about whether, and what signage was permissible in light of the Land Reform (Scotland) Act 2003 (which farmers tended to refer to as the 'right to roam'). Clarity and advice on this issue would be beneficial.

There was strong support among farmers for increasing the penalties for failing to have a dog under control; for requirements to keep dogs on leads within defined areas; and for greater powers to remove dogs from those who fail to control them.

The findings indicate that only around a third of dog attacks are currently reported to the police. The qualitative research revealed very mixed experiences of the police and courts' response to attacks and, consequently, mixed views about whether it was worth reporting an incident. There was a perception that the level of understanding of the problem, and the extent to which it was prioritised, varied by area and by individual officer. This suggests a need to encourage farmers to report incidents, to raise awareness of the issue among police officers and to improve the consistency of the police response.

Preventing wildlife attacks

Farmers suggestions for preventing, or at least reducing, wildlife attacks were very much focused on controlling numbers of the predatory species that were problematic in their area. They were keen to point out that they did not wish to eliminate species that were causing problems – but to achieve what they would judge to be a better balance.

There was a perception that the Scottish Government and other relevant agencies (Scottish Natural Heritage, in particular) either did not understand the scale and impact of the problems, or prioritised other interests. This led to a considerable amount of frustration and cynicism.

There is clearly a potential tension here between the interests of sheep and sheep farmers and the desire to protect and enhance the diversity of wildlife species. The insights from this study on the impact of wildlife attacks can help inform what must be an ongoing dialogue.

2. Introduction and background

Introduction

Dog attacks and predation by wildlife on sheep are issues of concern in several respects. Not only do such incidents cause obvious suffering to sheep, they have a financial, emotional and time impact on farmers. There are also wider implications for industry groups (such as the National Farmers Union Scotland and the National Sheep Association) and public agencies (such as Police Scotland and Scottish Natural Heritage) who expend time and resources on the issue.

There is a suggestion that attacks may be increasing and there is heightened publicity around the issues – particularly in relation to dog attacks. There has been a multi-agency campaign⁴ to reduce dog attacks by the Scottish Partnership Against Rural Crime (SPARC) and Emma Harper, MSP, has proposed a bill⁵ to increase penalties and to provide additional powers to investigate cases of livestock worrying.

However, the existing evidence does not provide an adequate basis for assessing the true scale of the issues in Scotland. Nor does it adequately show the potential contributing factors or impacts, that can effectively inform the development of appropriate responses. This is because much of the evidence is either indirect or incomplete (such as insurance claims data or incidents reported to the police), based on small-scale surveys, or simply anecdotal. The considerable impact of sheep attacks on farmers is widely recognised, but little research has thus far explored its scope and nature. The impact has also predominantly been explored from an exclusively financial perspective, rather than the potential time and emotional impacts on affected farmers. Further, very little of the existing evidence focuses on Scotland specifically.

The Scottish Government therefore commissioned research – involving a large-scale, representative survey of sheep farmers and follow-up qualitative research – to provide up-to-date and robust data on the scale of the problems, the impact and views on potential mitigation measures.

This report presents the findings from that research. The remainder of this chapter provides some further background information based on previous research and other existing data. Chapter 2 describes the methods used in the current research and the remaining chapters set out the key findings.

⁴ <https://www.scotland.police.uk/whats-happening/news/2019/january/sparc-launches-extended-livestock-worrying-campaign>

⁵ <https://www.parliament.scot/parliamentarybusiness/Bills/111027.aspx>

Existing evidence on dog attacks

On the basis of insurance claims in 2015, NFU mutual estimated that 18,500 livestock (in the UK) had been killed by dogs, costing £1.1m (up 35% on the previous year).⁶ This had risen further to £1.6m by 2017. Their claims figures indicate that dog attacks on sheep and cattle in Scotland quadrupled in the last two years and are running at an all-time high (over £300,000 a year).⁷ Again, however, this data does not provide the full picture: our survey found that the vast majority (96%) of farmers do not make insurance claims when they experience losses as a result of dog attacks (see section 7).

SheepWatch UK, a voluntary body that is encouraging farmers to report all cases of dogs worrying sheep, have estimated that, UK-wide, 15,000 sheep are killed annually, at a total cost of more than £2M. The National Sheep Association also believes dog attacks on sheep are becoming more frequent. It estimates that 20 to 25 per cent of its members have experienced dog attacks on flocks.⁸

Impact on sheep

When the Farm Animal Welfare Council's five freedoms were considered by a consensus of expert opinion, dog-worrying or the use of aggressive farm dogs was considered as a breach of 'freedom from fear and distress'.⁹

Loose dogs may chase sheep, separating the flock and lambs from mothers; they may cause traumatic wounds that can lead to death, or they may induce stress related issues, such as abortion.

Dog bite wounds can result in severe lacerations, open wounds with ripped skin, soft tissue bruising and crushing injuries as well as extensive damage to internal organs and bacterial contamination. Though there is limited detailed UK data on individual case outcomes, out of 28 pet sheep admitted to two US veterinary hospitals following dog attacks over a ten-year period, 50% either died or were euthanised. In the whole study there were 62 animals (sheep, goats and camelids) presented: injuries were recorded in the head in 50% of cases, the neck in 66%, perineal area in 21%, thorax in 19%, abdomen in 18% and extremities in 44%. Complications developed in 82% of animals.¹⁰

In pregnant sheep, parturition (labour) is initiated by an increase in the concentrations of foetal cortisol. Via the transfer of cortisol across the placenta,

⁶ Waters, A. (2017) Helping prevent sheep attacks Veterinary Record 180, 314

⁷ Tim Price, NFU Mutual quoted here: <https://www.scotland.police.uk/whats-happening/news/2019/january/sparc-launches-extended-livestock-worrying-campaign>

⁸ Waters, A. (2017) Helping prevent sheep attacks Veterinary Record 180, 314

⁹ Phythian, C. J. *et al.* Validating indicators of sheep welfare through a consensus of expert opinion. 943–952 (2011). doi:10.1017/S1751731110002594

¹⁰ Dukti, S. A., Southwood, L. L. & Van Metre, D. C. Survival and factors affecting survival in small ruminants and camelids attacked by dogs : 62 cases (1994 ^ 2004). **17**, 257–261 (2007).

high levels of maternal cortisol irreversibly initiates parturition and terminates the pregnancy¹¹. Exposure to humans and dogs has been shown to significantly increase heart rate and decrease vocalisation, both indicators of stress^{12,13}. There is also an increase in cortisol in sheep in response to short term stressors that include exposure to novel situations, management and handling procedures or restraint^{14,15} as well significant increases in response to barking dogs¹⁶.

Behavioural responses of sheep to the threat of predation include increased vigilance (with a characteristic posture of head up, neck rigid, ears alert and forward, frozen still and staring in the direction of the threat), flocking tightly together, flight to cover and the inhibition of usual behaviours once refuge has been reached. These anti-predator responses are a combination of both innate and learned behaviour with the different level of reaction for different breeds, age and category of sheep^{17,18}. The varied response by different sheep breeds appears to be on a continuum related to domestication. The more lowland or intensively reared breeds (e.g. Suffolk, Texel) respond less dramatically to the risk from predators due in part to their larger natural social group sizes and shorter periods of isolation at parturition compared to hill breeds (e.g. Scottish Black face, Cheviot) which are themselves less responsive than primitive breeds (e.g. Soay) or indeed wild sheep. In turn, the lowland breeds have the shortest flight distance when disturbed compared with the more primitive breeds, and are more likely to undertake behaviour such as vocalisation that would pose a high risk in the presence of a predator¹⁹.

The probability of sheep-chasing differs between dog breeds, with studies suggesting a higher likelihood in typical 'hunting' breeds, and age of dog, with a higher likelihood in younger dogs. Dogs lacking previous opportunity to chase

¹¹ Keller-Wood, M., Cudd, T. A., Norman, W., Caldwell, S. M. & Wood, C. E. Sheep Model for Study of Maternal Adrenal Gland Function During Pregnancy. *Lab. Anim. Sci.* **48**, 507–512 (1998).

¹² Cockram, M. S. A review of behavioural and physiological responses of sheep to stressors to identify potential behavioural signs of distress. *Anim. Welf.* **13**, 283–291 (2004).

¹³ Baldock, N. M. & Sibly, R. M. Effects of handling and transportation on the heart rate and behaviour of sheep. *Appl. Anim. Behav. Sci.* **28**, 15–39 (1990)

¹⁴ Barrnett, J I and Hemsworth, P. H. The Validity of Physiological and Behavioural Measures of Animal Welfare. *Appl. Anim. Behav. Sci.* **25**, 177–187 (1990).

¹⁵ Cockram, M. S. A review of behavioural and physiological responses of sheep to stressors to identify potential behavioural signs of distress. *Anim. Welf.* **13**, 283–291 (2004).

¹⁶ Ralph, C.R. & Tilbrook, A.J. The hypothalamo-pituitary-adrenal (HPA) axis in sheep is attenuated during lactation in response to psychosocial and predator stress. *Domestic Animal Endocrinology* 2016 Apr; 55: 66–73

¹⁷ Dwyer, C. M. How has the risk predation shaped the behavioural responses of sheep to fear and distress? *Anim. Welf.* **13**, 269–281 (2004).

¹⁸ Romeyer, A. & Bouissou, M. F. Assessment of fear reactions in domestic sheep, and influence of breed and rearing conditions. *Appl. Anim. Behav. Sci.* **34**, 93–119 (1992).

¹⁹ Dwyer, C. M. How has the risk predation shaped the behavioural responses of sheep to fear and distress? *Anim. Welf.* **13**, 269–281 (2004).

sheep showed a higher attack frequency, and dogs showing generally low levels of fearfulness (e.g. towards gunshots or unfamiliar people) and high levels of aggression were the most probable sheep chasers.²⁰

Prevention measures

In terms of measures to address attacks by dogs, advice issued to farmers by Police Scotland and farming bodies, has focused predominantly on encouraging them to secure their boundaries and put signs up on gateways and on key roads and paths alerting dog owners to the presence of sheep and lambs in their fields, and the danger posed by dogs.

The most recent SPARC campaign aimed to highlight the reality of livestock attacks and ensure dog owners understand the distressing nature of attacks, as well as the emotional and financial impacts such incidents can have, not just on farmers but on everyone having to deal with the aftermath.

Oxley et al (2017)²¹ note that, while current warning signs and other prevention materials tend to focus on the dangers of fines and prosecution and on sheep welfare, an increased focus on the dangers to dogs, in terms of being shot or having a destruction order placed on them, may help to increase owner concern (although this may not help foster better relationships between dog owners and farmers). Oxley *et al* also highlight the potential benefit of measures that encourage compliance with social norms, as used in prevention materials aimed at encouraging dog owners to clean up their dogs' faeces.

Waters (2017)²², meanwhile, has suggested there is scope for greater targeting of prevention materials at dog owners within veterinary surgeries and the use of electronic collars has been found to be useful in some dog breeds²³. Aversion techniques for dogs, such as the use of taste-aversion bait was not found to be helpful.²⁴

²⁰ Christiansen, F. O., Bakken, M. & Braastad, B. O. Behavioural differences between three breed groups of hunting dogs confronted with domestic sheep. **72**, 115–129 (2001).

²¹ Oxley, J.A, Evans, B. & Montrose, T. (2017) Prevention of Sheep Worrying in the UK: Rethinking the approach: *Journal of Veterinary Behaviour* 19 (2017), 61-63

²² Waters, A. (2017) Helping prevent sheep attacks *Veterinary Record* 180, 314

²³ Christiansen, F. O., Bakken, M. & Braastad, B. O. Behavioural changes and aversive conditioning in hunting dogs by the second-year confrontation with domestic sheep. *Appl. Anim. Behav. Sci.* **72**, 131–143 (2001).

²⁴ Hansen, I., Bakken, M. & Olai, B. Failure of LiCl-conditioned taste aversion to prevent dogs from attacking sheep. **1591**, (1997).

Existing evidence on wildlife attacks and predation

The scale of the problem and impact on sheep

Like attacks by dogs, sheep predation by wildlife – including foxes, predatory birds and badgers – is thought to be a growing problem in Scotland, reflecting the changing prevalence and geographical distribution of the predator populations concerned. The populations of both eagle species and ravens have expanded in recent years, with sea eagle numbers expected to grow exponentially in the short term, and conflict issues are only likely to increase over time^{25,26}.

There is also good evidence to support a substantial increase in the size of the badger population in Scotland since the 1992 Protection of Badgers Act²⁷. At the same time there has been an increase in claims that badgers predate lambs.

Predation particularly affects lambs, so has implications for the sustainability of flocks. However, there are limited recent empirical studies of the issue in Scotland; a situation that may in part reflect the difficulties involved in establishing causality in some sheep/lamb mortality.

Predators preferentially kill lambs, juveniles, females and individuals with reduced movement capabilities in both wild and domestic sheep populations²⁸. Sheep are at particular risk of predation at particular times of year (e.g. lambing) or following particular husbandry practices (e.g. gathering for shearing)²⁹.

Marquiss *et al* (2002)³⁰ explored the impact of white-tailed eagles on sheep farming in Mull. They identified good evidence that white-tailed eagles killed some live lambs (as opposed to simply scavenging on carcasses), including larger ‘viable’ lambs. Based on their findings, they calculated that the white-tailed eagle population on Mull killed between 33 and 37 lambs each year – a level that “could not have been damaging to sheep farming on a broad scale but [...] does not preclude damage on a small spatial scale.” The Scottish Agricultural Science Agency’s 2003 investigation into reported losses by golden eagles on Benbecula

²⁵ <https://www.nature.scot/sites/default/files/2018-02/Official%20Statistics%20-%20Terrestrial%20Breeding%20Birds%20-%20Index%20of%20abundance%201994-2016.pdf>

²⁶ <https://www.nature.scot/snh-commissioned-report-898-population-and-future-range-modelling-reintroduced-scottish-white>

²⁷ <https://www.nature.scot/sites/default/files/2017-07/C204587%20-%20Scottish%20Badger%20Distribution%20Survey%2006-09%20-%20Results%20-%2016%20November%202009.pdf>

²⁸ Dwyer, C. M. How has the risk predation shaped the behavioural responses of sheep to fear and distress? *Anim. Welf.* **13**, 269–281 (2004).

²⁹ Allen, L. R., Stewart-Moore, N., Byrne, D. & Allen, B. L. Guardian dogs protect sheep by guarding sheep, not by establishing territories and excluding predators. *Animal Production Science* **57**. 1118–1127 (2017).

³⁰ Marquiss, M., Madders, M., Irvine, J. and Carss, D. N. (2002) The Impact of White Tailed Eagles on Sheep Farming in Mull: <https://www.gov.scot/resource/doc/47060/0014566.pdf>

found that these did occur, but accounted for a relatively low proportion of losses compared to other causes (1-3%).³¹

In a study of fox management in three different areas of England in 1995, 24-60% of farmers reported predation by foxes during the previous year. As an average percentage loss of lambs, fox predation accounted for less than 1% (range 0-28.6%). Species accused of predation were corvid birds (49), badgers (24), buzzards (7), domestic dog (1) and mink (1) with the number in brackets indicating the number of farmers citing.³²

Predators in two small areas in the west of Scotland, Ardnish and Drimmin, in the late 1970s, were identified as fox (1-16), badger (0-7), eagle (0-1 pair), buzzard (1-2 pairs), raven (1-2 pairs) and crow (6-22 pairs).³³ Foxes killed up to 1.8% of lambs born. Both foxes and eagles were found mainly to kill lambs at 1-5 days old and there is some evidence that lambs born to younger mothers were more at risk. This study considered that lamb predation provided foxes with only a small proportion of their food and that it was very rare to see actual predation. They used the following as a guide to distinguish predation and scavenging:

1. Evidence of predation by fox	2. Evidence of scavenging by fox
Strong smell of fox urine or fresh fox scats near	Fox urine on the carcass may indicate little edible food left or territory marking
Wounds at throat & nape – puncture wounds on opposing surfaces and damage to bones, particularly the second and third cervical vertebrae, may be disarticulated in small lamb	Nose, ears or tail bitten off
Extensive haemorrhage at the neck, usually blood on the fleece	Head bitten off
	Large tears from the hind leg to or through the rib cage
	Limbs disarticulated and long bones bitten through: spine broken with some vertebrae missing or fully bitten in two in small lambs

This study considered that lamb-killing by eagles was rarely seen although, anecdotally, seen more often than killing by fox. Predation or scavenging by eagles was identified by: 1. Plucked wool scattered around the carcass for about a metre. 2. Talon or beak holes deeply penetrating the skull at mid-crown near the proximate

³¹ Campbell, S., and Hartley, G., (2004), Investigation into Golden Eagle Predation on Lambs on Benbecula. *Scottish Agricultural Science Agency*, <https://www.sasa.gov.uk/content/investigation-golden-eagle-predation-lambs-benbecula-2003>

³² Heydon, M. J. & Reynolds, J. C. Fox (*Vulpes vulpes*) management in three contrasting regions of Britain, in relation to agricultural and sporting interests. *J. Zool.* **251**, 237–252 (2000).

³³ R. Hewson. Scavenging and Predation Upon Sheep and Lambs in West Scotland. *J. Appl. Ecol.* **21**, 843–868 (1984).

end of the mandible and nape. 3. Tears along abdomen and thorax with ribs broken off. 4. Eagle feathers or pellets near the carcass.

In a separate study on two Scottish farms (1993-1996), confirmed losses due to foxes were 0.2% and 0.6% with maximum loss due to foxes up to 1.8%. There was an increased chance that a lamb that was killed by foxes was born into a litter rather than being a single. This study concluded that fox predation was a relatively unimportant cause of death of lambs and of low overall financial impact.³⁴

Prevention and mitigation measures

In terms of measures to address predation, existing statutory provision provides some scope for farmers to control and shoot predators. They can act directly (or indirectly through, for example, a Fox Control Club) to control foxes, and they can shoot and trap crows under a general licence. They must apply to Scottish Natural Heritage for an individual licence to control ravens.

Beyond this, a range of predator-specific measures have been suggested in the literature. In their study of white-tailed eagles on Mull, for example, Marquiss *et al* proposed measures ranging from removing factors predisposing lambs to predation by improving ewe nutrition and reducing tick infestation; to scaring devices and close-shepherding; and the use of feeding sites for white-tailed eagles in late winter to encourage them to nest as remotely as possible from lambing areas.

Farmers living in areas with established white-tailed eagle problems can participate in a management scheme that helps mitigate losses (<http://www.snh.gov.uk/docs/A1633348.pdf>), although no such equivalent scheme exists for golden eagles.

Overseas, protection by guardian dogs has been shown to be effective primarily due to their shepherding and boisterous vocalisations that encourage the sheep to flock together³⁵. Technological options have also been considered (e.g. global navigation satellite) to quantify the behavioural responses of sheep during simulated predation events³⁶ or an intelligent wireless sensor network which monitors the vital signs in the sheep and detects collective stress indicators³⁷.

³⁴ White, P. C. L., Groves, H. L., Savery J. R., Conington, J. & Hutchings, M. R. Fox predation as a cause of lamb mortality on hill farms. *Vet. Rec.* **147**, 33–37 (2000).

³⁵ Allen, L. R., Stewart-moore, N., Byrne, D. & Allen, B. L. Guardian dogs protect sheep by guarding sheep, not by establishing territories and excluding predators. *Animal Production Science* **57** 1118–1127 (2017).

³⁶ Manning, J. K. *et al.* A pilot study into the use of global navigation satellite system technology to quantify the behavioural responses of sheep during simulated dog predation events. *Animal Production Science*. **54** 1676–1681 (2014).

³⁷ Llario, F., Sendra, S., Parra, L. & Lloret, J. Detection and protection of the attacks to the sheep and goats using an intelligent wireless sensor network. in *2013 IEEE International Conference on Communications Workshops (ICC)* 1015–1019 (2013).

3. Methodology

Our research comprised three key components: an initial desk review; a large mixed-method online and telephone survey of sheep farmers; and follow up qualitative research with sheep farmers.

Desk review

The main purpose of the desk review was to provide an overview of the findings of previous related studies, to inform the focus and design of the main stage of fieldwork, including identifying any gaps in the existing literature. The review aimed to cover prior research on the prevalence of attacks on sheep by dogs and wildlife; the impact of attacks on both sheep and on farmers; and on prevention and mitigation measures.

The review was undertaken in a systematic way and followed PRISMA³⁸ (Preferred Reporting Items for Systematic Reviews and MetaAnalysis) criteria as far as was possible. However, one key criteria for a successful systematic review strategy is that it must be replicable, hence the requirement for the detailed and precise recording of database name, search terms and scope. By definition a 'systematic review' is not able to include the use of 'grey literature' or expert opinion and they typically take up to eighteen months to complete. Hence as a descriptive and evaluative review, this piece of work was strictly a 'literature review' and not a rigid 'systematic review' as would be appropriate for meta-analysis.³⁹

Primarily NUSEARCH was used; this University of Nottingham resource has access to over one million print books and journals, over 300,000 ebooks and 20,000 ejournals as well as all commonly used databases.

³⁸ Panic, N., Leoncini, E., Giulio de, B., Walter, R. & Boccia, S. Evaluation of the Endorsement of the Preferred Reporting Items for Systematic Reviews and MetaAnalysis (PRISMA) Statement on the Quality of Published Systematic Review and Meta-Analyses. *PLoS One* (2013). doi:10.1371/journal.pone.0083138

³⁹ Kysh, L. (University of S. C. What's in a name? The difference between a Systematic Review and a Literature Review and why it matters. doi:10.3906/sag-1704-10

Search Matrix

CONCEPTS -	SHEEP	WORRYING BY DOGS	PREDATION BY WILDLIFE	ANIMAL IMPACT	FARMER IMPACT
SYNONYMS	Flock, 'Ovis aries'	Dog worrying, dog attack 'dog chasing'	Hunting Predator-attack prey	Trauma Stress, wound, kill, distress, hurt, maul	Cost, 'financial impact', emotional, psychological, stress, worry, concern,
BROADER TERMS	livestock farm animals	attack, stress, chase, aggression	attack, predation, hunt	damage welfare	Farmer, prevention measures, time, labour, work
NARROWER TERMS	Lamb ewe	'dog-worry' 'dog attack' 'sheep worrying'	fox, 'white-tailed eagle', 'golden eagle', raven ³	Injury, fear, flight, chase, abortion	shepherd, flockmaster, crofter, mitigation,
WORD VARIATIONS	sheep* flock*	dog* attack* worry*	predat* wild*	wound* trauma*	

Searches in NUSEARCH

Search in 'All collections' for 'subject or title' contains **sheep AND (attack* OR worry* OR chas*)**

91 results of which 14 were considered relevant

Search in 'All collections' for 'subject or title' contains **sheep AND abort* AND stress***

5 results of which none were relevant

For the repeatability of a systematic review, some searches were limited to the individual database Web of Science

Search in TOPIC for 'All years (1900-2019)' for **dog* worry* OR dog* attack* AND sheep***

114 results of which 14 were considered relevant and read in detail.

Search in TOPIC for 'All years (1900-2019)' for **sheep* injur* AND (attack* OR worry* OR chas*)**

28 results of which 2 were considered relevant and fully accessible.

Search in TOPIC for 'All years (1900-2019)' for **sheep* abort* AND (attack* OR worry* OR chas*)**

7 results of which none were considered relevant

Search in TOPIC for 'All years (1900-2019)' for **sheep* abort* AND stress**

27 results of which none were considered relevant

Relevant and cited works are listed in Appendix D.

Quantitative research

Following the initial review of the literature, the main stage of the research involved a large-scale representative mixed-mode survey of sheep farmers. We employed a “push to web” approach, with letters sent out to respondents inviting them to take part online, combined with a telephone survey targeting those who had not responded online.

Sampling

9,148 sheep farmers (based on holdings with sheep) were selected to take part in the survey, identified through a combination of the Scottish Government’s Agricultural Census data and other RPID administrative data.

Measures were taken to maximise the representativeness of the sample, with farmers selected to reflect the profile of the Scottish sheep farming population both in terms of regional distribution and the distribution of flock sizes.

We decided against sampling on the basis of sheep distribution as this would have resulted in almost all the farms with large flocks being selected and almost none of those with smaller flocks being selected, which would have precluded analysis by size of flock. Instead, we designed the sample to be representative of sheep farms in Scotland. We banded flock size into four categories (less than 20, 20-149, 150-749 and 750+) and aimed for a roughly equal number of farmers within each band. We then used a stratified sampling approach where (within each band) we ordered the sample by Parish Code and selected 1 in N farmers.

All those selected were sent a letter by post containing a five-digit unique ID code, inviting them to take part online by entering their code at a specific web address. They were also provided with an alternative option, if they were unable to take part online, to opt into the telephone survey by completing and returning a short form provided on the letter to a freepost address.

Questionnaire Development

The survey covered a wide range of topics: the prevalence and time period of attacks on sheep by dogs and wildlife; the impact these attacks have on sheep; the impact of attacks on farmers in terms of the financial impact, the time impact and the emotional impact; the perceived effectiveness of any preventative techniques used by farmers; and farmers’ views on potential policy interventions.

In order to ensure that the findings were as current as possible, and that the survey took no longer than 20 minutes on average to complete, farmers were asked to provide details on the circumstances and impacts of incidents in the last year, and specifically of only their most recent attacks by dogs and wildlife.

The survey questions were tested through in-depth telephone interviews with a total of twenty sheep farmers recruited to encompass a mix of geographical areas, a

range of flock sizes and a mixture of LFA and Non-LFA land⁴⁰. Fifteen of the participants were recruited from the mainstage sample, while the remaining five were recruited through informal connections and networks. We split the draft questionnaire into sections, asked participants the questions, then asked how they found each section. We also probed on specific points.

The findings and recommendations for questionnaire changes from the cognitive testing are contained at Appendix F.

Fieldwork

Fieldwork took place between 7 May and 9 June 2019 with online fieldwork conducted throughout the whole period, and the telephone fieldwork taking place between 20 May and 5 June.

Overall, a total of 1931 sheep farmers took part in the survey, including 1346 respondents who took part online and 585 who took part in the telephone survey. The overall response rate was 21% which is high for a survey of this nature.

In addition to providing an opportunity for response amongst farmers unable to participate online, the telephone survey provided an opportunity to target groups underrepresented in the online fieldwork, and to ensure that the final composition of respondents aligned with the profile of the farming population in terms of regional distribution and flock sizes. The final profile of respondents closely matched the population profile in these respects as shown below in Figures 3.1 and 3.2.

⁴⁰ In recognition of the different physical and socio-economic characteristics across the regions, the European Union introduced the Less Favoured Area (LFA) designation to support farming where production conditions are difficult. The criteria for LFA designation were first established in European legislation in 1975 (Directive 75/268 EEC and accompanying measures). There are 3 types of LFA's; all in Scotland fall into the category of simple LFA's marked by poor soils and low agricultural income. Scotland's LFA's are defined by: (i) The presence of poor land of poor productivity, which is difficult to cultivate and with a limited potential which cannot be increased except at excessive cost, and which is mainly suitable for extensive livestock farming. (ii) lower than average production, compared to the main indices of economic performance in agriculture. (iii) a low or dwindling population predominantly dependent on agricultural activity, the accelerated decline of which could cause rural depopulation

Figure 3.1 Sample and respondent profile by flock size

	Flock size	
Base	Achieved 1930	Sample 9165
1 - 19	430 22%	2233 24%
20 - 149	400 21%	1239 14%
150 - 749	401 21%	2230 24%
750+	699 36%	3460 38%

Figure 3.2 Sample and respondent profile by region⁴¹

Region		
Base	Achieved	Sample
	1930	9165
Argyll & Bute	112 6%	521 6%
Ayrshire	90 5%	480 5%
Clyde Valley	93 5%	463 5%
Dumfries & Galloway	211 11%	979 11%
East Central	57 3%	250 3%
Eileanan an Iar	194 10%	960 10%
Fife	37 2%	170 2%
Highland	399 21%	1827 20%
Lothian	48 2%	204 2%
NE Scotland	222 12%	1140 12%
Orkney	58 3%	334 4%
	162	675

⁴¹ See Appendix E for a map of the regions.

Scottish Borders	8%	7%
Shetland	98 5%	581 6%
Tayside	149 8%	568 6%

For analysis, the data was weighted by region and flock size (according to agricultural census data). This offset the effects of the sampling approach (which over-represented those with smaller flocks) and the small differences in response rate by these variables.

Qualitative research

Following the survey fieldwork, follow up qualitative research was conducted between 18 June and 3 July among survey respondents who had agreed to be re-contacted for further research.

The purpose of the qualitative research was to explore some of the topics covered in the survey in greater depth, including the impact of sheep attacks on farmers and in particular the emotional impact of attacks and views on potential mitigation measures and policy interventions. The qualitative research also provided the opportunity to explore any wider impacts of attacks not covered in the survey, as well as attitudes towards reporting attacks to the police, and to insuring against attacks.

Participants were recruited through an invitation letter, inviting them to opt-in to take part in a focus group. In the event, around one third of participants opted into the research, while around two thirds were recruited through a follow up telephone call. A total of 23 sheep farmers took part in the qualitative research, across five small discussion groups. The research took the form of small focus groups which were held face-to-face in Inverurie, Moffat and Stirling; and by telephone conference with farmers based in Argyll & Bute and the North Western Highlands & Islands, where participants were provided with a free phone number to call. These areas were chosen to achieve a regional spread of participants, and to include areas such as East Central Scotland and Dumfries & Galloway where the reported incidence of attacks was higher than average. Those invited to take part had recent experience of attacks.

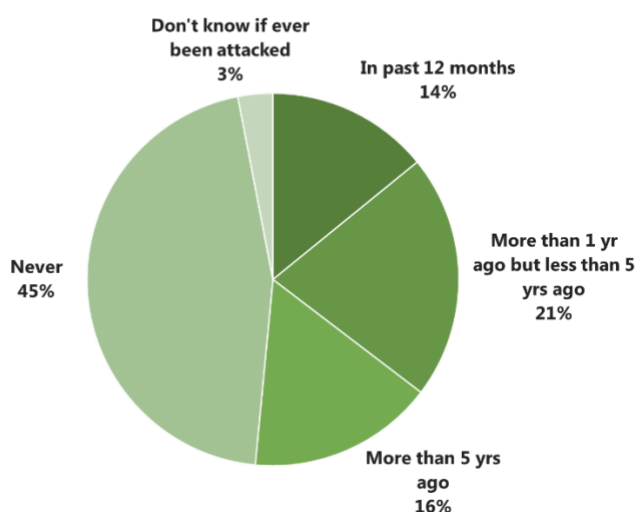
The groups lasted around 60-90 minutes and participants were given £30-£35 as a “thank you” for their participation, with a higher incentive offered to those who took part in the longer groups where they attended in person. With participants’ consent, the discussions were audio-recorded and transcribed for analysis purposes.

4. Prevalence of dog attacks and wildlife attacks

Prevalence of dog attacks

Overall, half (51%) of all sheep farmers in the survey indicated that, at some point, their sheep had been attacked or chased by dogs (Figure 4.1).

Figure 4.1 – Whether sheep have ever been attacked or chased by dogs and the last time this happened (% sheep farmers)



Base: All (n=1931)

Fourteen per cent of sheep farmers reported that their sheep had been attacked or chased by dogs in the previous 12 months.

Factors associated with a greater likelihood of experiencing a dog attack in the previous 12 months were:

Larger flocks (7% of those with fewer than 20 sheep had experienced a dog attack in the previous 12 months, compared with 17% of those with 20-149 sheep, 14% of those with 150-749 sheep and 20% of those with more than 750 sheep)

Sheep on fully open land (with no inbye) or open land with all/some lambing in bye (20% and 18% prevalence respectively compared with 12% where land is fully enclosed)

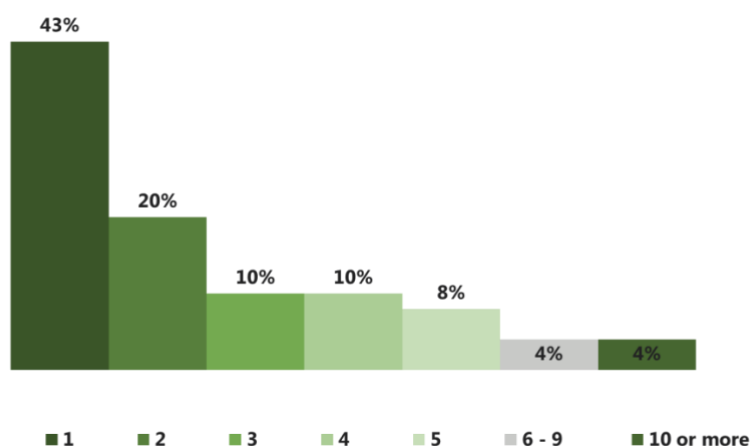
Having a track or road which is regularly used by dog walkers close to any of the sheep (19% prevalence among those with such a track or road compared with 5% of those without).

Being located in Lothian or East Central Scotland (28% prevalence in each case). There were fewer attacks in North East Scotland (8% prevalence) than elsewhere.⁴²

There was no difference in the 12 month prevalence of attacks between those located in accessible rural areas, remote rural areas or very remote rural areas.⁴³

Among those reporting any attacks in the past 12 months, 43% had experienced one attack and 57% had experienced more than one (see Figure 4.2 below). The mean number of attacks was 3.5, the median number of attacks was 1.2 and the maximum reported was 250. While this number of attacks was very unusual, and the result of multiple attacks over a sustained period, these situations have a huge impact on the businesses of the individual farmers concerned.

Figure 4.2 Number of separate dog attack incidents in past 12 months among those who had experienced any (% sheep farmers who experienced at least 1 attack in the past twelve months)



Base: All who had sheep chased or attacked by a dog in the past 12 months (n=293)

There were no significant differences in the types of farmers or farms who had had multiple attacks, compared to those who had had any attacks in the past 12 months.

Estimated total number of dog attacks

It is possible to extrapolate from the figures above to produce an estimate of the total number of incidents of dogs attacking or chasing sheep in Scotland within a 12 month period. While this estimate gives some indication of the potential scale of the problem, it should be treated with considerable caution as it is subject to wide confidence intervals and the limitations of any survey of this nature (e.g. the potential for non-response bias and recall inaccuracies). The estimated total number of incidents of dogs chasing or attacking sheep in Scotland in the period

⁴² See Appendix E for a map of the regions

⁴³ These are the three most rural categories in the Scottish Government 8 fold urban rural classification. There were insufficient farms in the five (more urban) categories to include in the analysis.

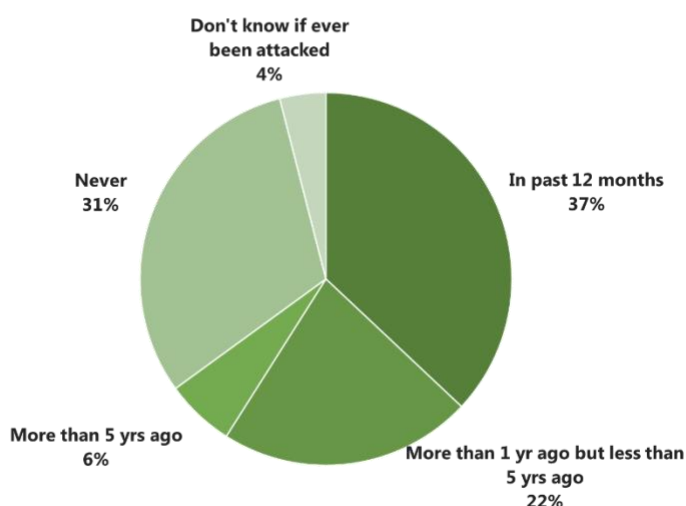
<https://www2.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification>

1 May 2018 to 30 April 2019 is around 7,000, with the true figure likely to be within the range of 4,500 to 10,000⁴⁴.

Prevalence of wildlife attacks

Overall, 64% of all sheep farmers in the survey indicated that, at some point, their sheep had been attacked, chased or preyed on by animals or birds other than dogs (Figure 4.3). They were asked only to include attacks on live sheep, not scavenging of dead sheep.

Figure 4.3– Whether sheep have ever been attacked, chased or preyed on by any other animals or birds other than dogs and the last time this happened (% sheep farmers)



Base: All (n=1931)

Thirty-seven per cent of sheep farmers reported that their sheep had been attacked or chased by wildlife in the previous 12 months.

Factors associated with a greater likelihood of experiencing a wildlife attack in the previous 12 months were:

Larger flocks (10% of those with fewer than 20 sheep had experienced a wildlife attack in the previous 12 months, compared with 46% of those with 20-149 sheep, 26% of those with 150-749 sheep and 70% of those with more than 750 sheep)

Sheep on open land with all/some lambing in bye (51% of those with sheep on this type of land had experienced a wildlife attack in the previous 12 months, compared with 31% of those with sheep on fully open land (with no inbye) and 33% of those where land is fully enclosed)

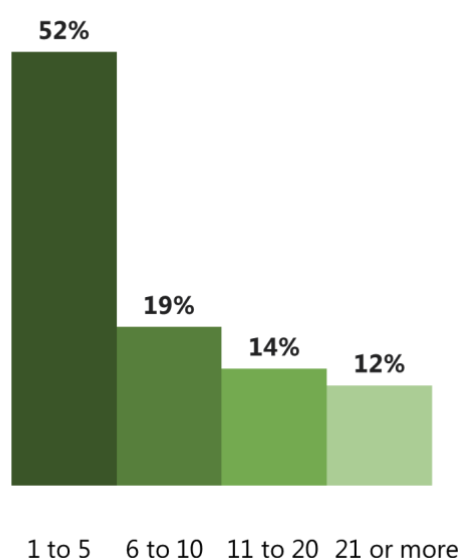
⁴⁴ The precise estimate is 7,257 with a lower estimate of 4,421 and an upper estimate of 10,093.

Being located in East Central Scotland (64% prevalence), **Argyll & Bute** (57%), **Ayrshire** (53%) or **Dumfries & Galloway** (48%). There were fewer attacks in North East Scotland and Eileanan an Iar (26%) than elsewhere.

Being located in a remote rural area (44% prevalence) rather than an accessible rural area (36%) or a very remote rural area (37%).

Among those reporting any attacks in the past 12 months, more than half (54%) had experienced five or more separate incidents (see Figure 4.4 below). The mean number of attacks was 9.4, the median number of attacks was 4.1 and the maximum reported was 400. While this maximum figure is an outlier, and very rare, such extreme cases could have potentially huge impacts on individual businesses.

Figure 4.4 Number of separate wildlife attack incidents in past 12 months among those who had experienced any (% sheep farmers)



Base: All who had sheep chased or attacked by wildlife in the past 12 months (n=840)

The different species of wildlife involved in these attacks is discussed in Section 5 below.

Estimated total number of wildlife attacks

It is possible to extrapolate from the figures above to produce an estimate of the total number of incidents of wildlife predation on sheep in Scotland over a 12 month period. Again, however, these estimates are subject to wide confidence intervals and the limitations of any survey of this nature (not least because most wildlife incidents are unobserved and farmers are generally only aware of incidents where the aftermath, such as the disappearance of a lamb or an injured sheep, is obvious). They should therefore be treated with extreme caution. Bearing those caveats in mind, but to give some indication of the potential scale of the problem, the estimated total number of incidents of wildlife attacking, chasing or preying on sheep in Scotland in the period 1 May 2018 to 30 April 2019 is around 50,000, with the true figure likely to be in the range of around 45,000 to 55,000⁴⁵.

⁴⁵ The precise estimate is 50,243 with a lower estimate of 44,525 and an upper estimate of 55,962.

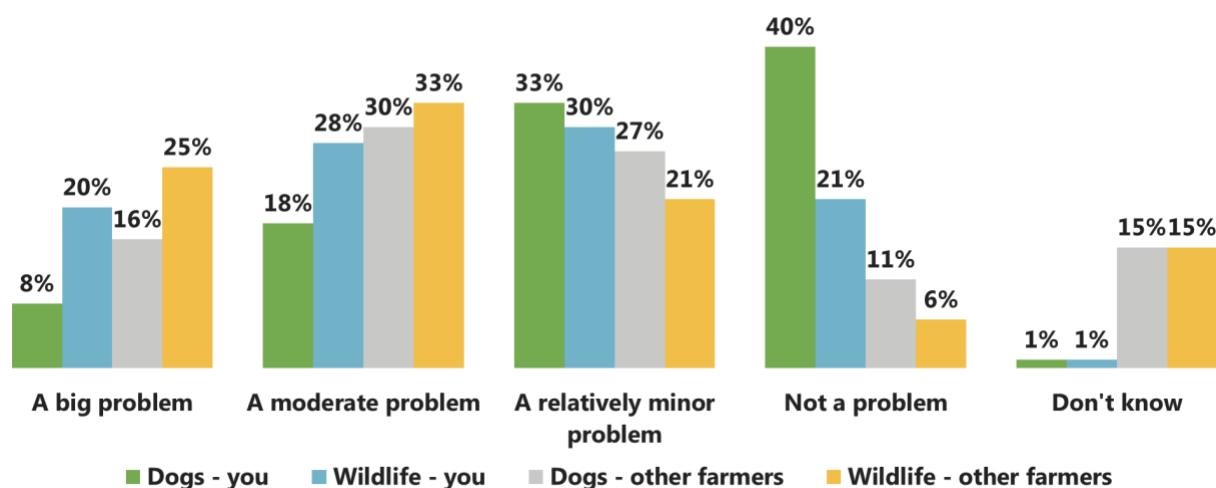
Views on the severity of the issues

Farmers were asked how much of a problem they thought dog attacks and wildlife attacks were – both for them, personally, and for other farmers in their area (Figure 4.5).

Overall, wildlife attacks were perceived as a bigger problem than dog attacks: 48% said wildlife attacks were a big/moderate problem for them personally compared with 25% for dog attacks. This, at least in part, reflects the greater prevalence of wildlife attacks.

Respondents indicated that both kinds of attack were more a problem for *other* farmers in their area than for them personally: 46% said dog attacks were a big/moderate problem for other farmers compared with 25% for them personally, and 58% said wildlife attacks were a big/moderate problem for other farmers compared with 48% for them personally. Interviews with farmers suggested that this might stem from a reluctance to say that something is *not* a problem for someone else as that might seem dismissive or unsympathetic. It may also reflect publicity around the issues and hearing about the same local incidents from several sources – which gives the impression that problems are more common than they actually are. It is notable that there was more of a gap in relation to dog attacks than wildlife attacks and the former tend to garner more publicity.

Figure 4.5 Perceptions of how much of a problem dog attacks and wildlife attacks are for a) respondents and b) for other farmers in their area (% respondents)



Base: All (n=1931)

Perceptions about whether attacks are increasing

There were mixed views on whether dog attacks were increasing: 38% of respondents thought they were increasing in their area while 41% thought there was no change. Very few (5%) thought they were decreasing. (Figure 4.6).

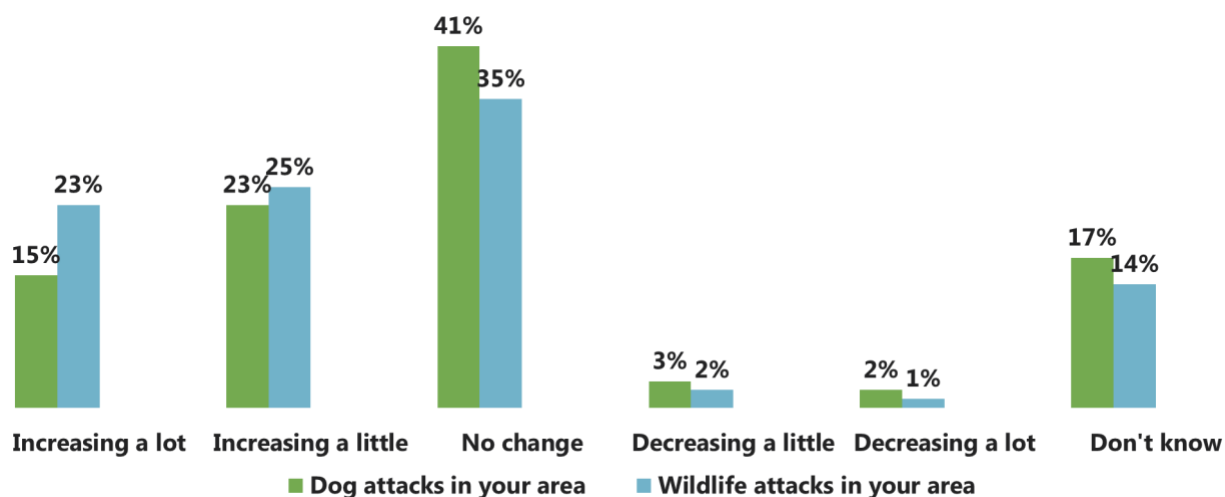
Those who had experienced more attacks and more recent attacks, and those with a track or road regularly used by dog walkers, were more likely to think they were

increasing. Perceptions of an increase were also higher in Lothian (69%), Fife (65%), Argyll & Bute (54%) Tayside (52%) and Clyde Valley (50%). Those in accessible rural (46%) and rural areas (40%) were more likely to think they were increasing than those in very remote rural areas (31%).

A somewhat higher proportion of sheep farmers thought wildlife attacks were increasing: 47% thought they were increasing in their area compared with 35% who thought there was no change. As with dog attacks, very few (3%) thought they were decreasing. (Figure 4.6)

Those who had experienced more wildlife attacks and more recent attacks were more likely think they were increasing and perceptions of an increase were higher in Argyll & Bute (69%) and Eileanan an Iar (56%).

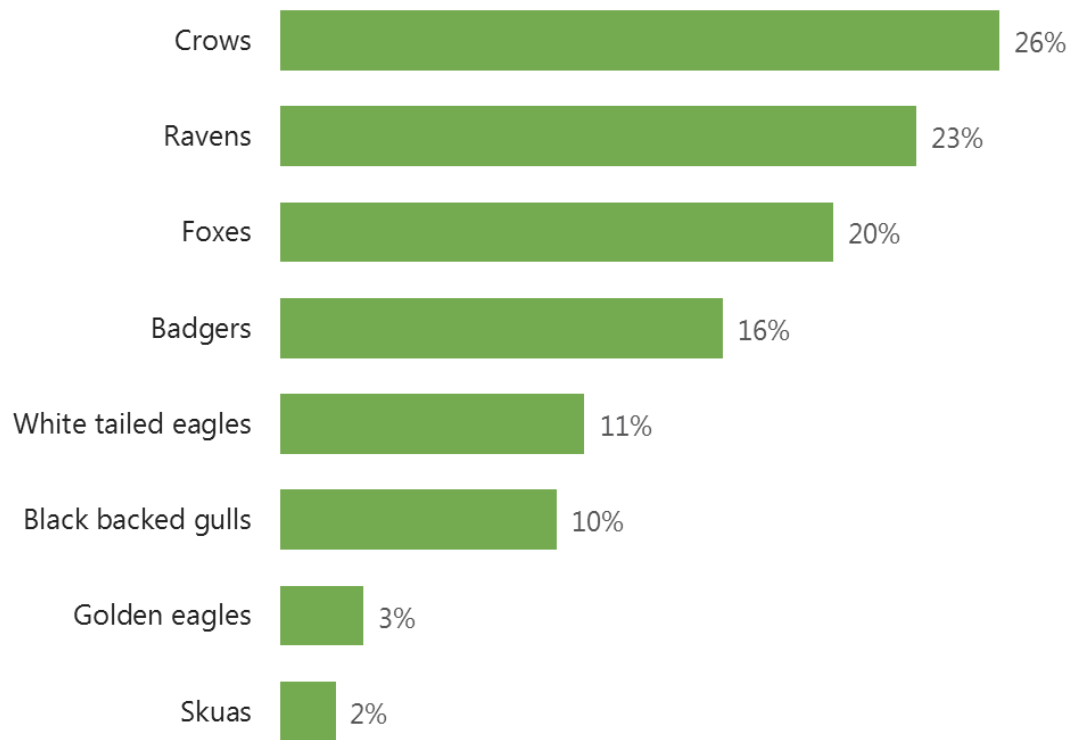
Figure 4.6 Perceptions of whether dog attacks and wildlife attacks are increasing or decreasing in respondent's area (% respondents)



Base: All (n=1931)

Those who thought wildlife attacks were increasing were asked which species they thought were involved. Crows, ravens and foxes were the species most commonly cited (Figure 4.7). (See Section 5 for discussion of actual numbers of attacks by different species). There was considerable variation by area, reflecting the different distribution of species (see Appendix B for more detail).

Figure 4.7 Wildlife species believed to be responsible for increasing numbers of attacks (% respondents)



Base: All respondents (n=1931)

5. Circumstances of attacks

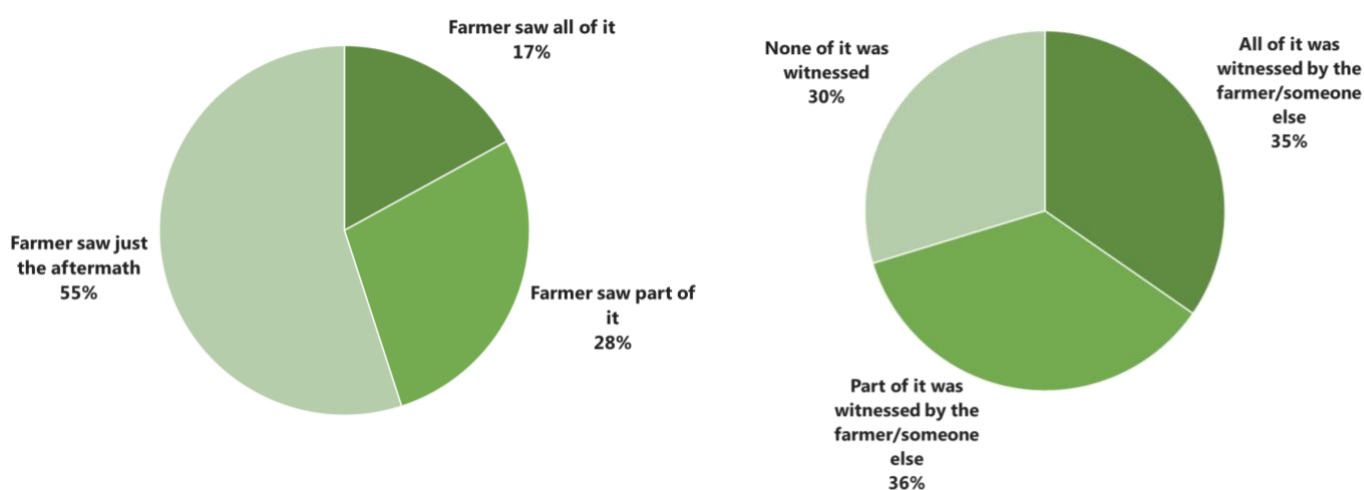
Sheep farmers who had experienced at least one attack on their sheep in the last twelve months were asked a range of questions relating to the circumstances of the most recent incident.

Dog attacks

Half of those who had experienced a dog attack within the last twelve months reported that the most recent incident involved physical contact with the sheep (49%), while the other half (51%) reported that their sheep were chased by the dog but there was no physical contact.

45% of respondents had personally witnessed the incident and 17% had witnessed it in full.

Figure 5.1 Whether farmers personally witnessed the most recent dog incident and whether it was witnessed by anybody (% respondents)

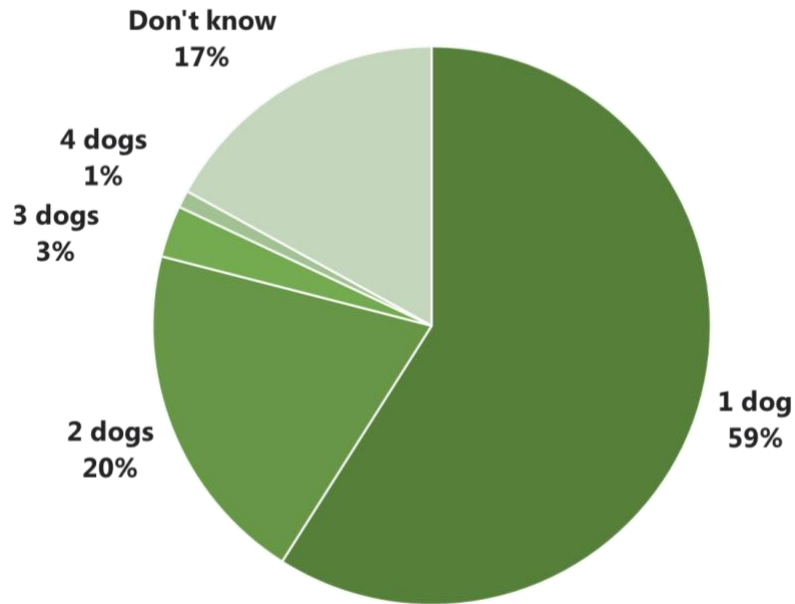


Base: All those whose sheep had been chased or attacked by dogs in the last 12 months (293)

In most of the cases where sheep farmers had not personally witnessed the incident in full, they reported that somebody else had witnessed the incident. Overall, as shown in the chart on the right above, around 71% of incidents were witnessed either by the farmer or by someone else. In around a third of cases of dog attacks, however, (30%) the incident had neither been witnessed by the sheep owner nor anybody else that they were aware of.

More than half of the dog attacks involved just one dog (60%), while a fifth of attacks (19%) involved two dogs. The average (mean) number of dogs reported to have been involved in an incident was 1.4. Incidents involving more than two dogs were much rarer, with just 3% of affected farmers reporting the involvement of three dogs and just 2% reporting an attack with four dogs. There was one report of an incident involving five dogs.

Figure 5.2 Q How many dogs were involved?



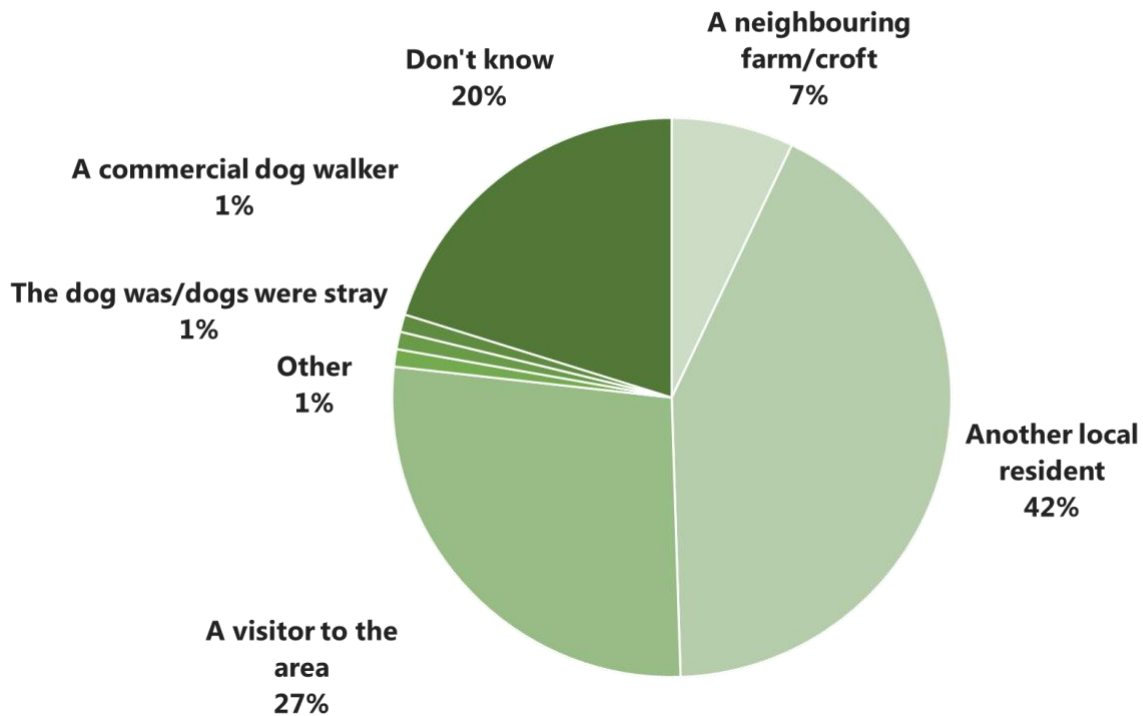
Base: All those whose sheep had been chased or attacked by dogs in the last 12 months (293)

In half of the dog attacks reported (49%), farmers believed the dogs were accompanied at the time of the attack, while in 38% of cases the dogs were believed to be unaccompanied and in 13% of cases the respondent did not know.

Most commonly, respondents were under the impression that the dog(s) belonged to another non-farming local resident (42%), with 27% reporting that the dog(s) belonged to a visitor to the area and 7% reporting that the dog(s) belonged to a neighbouring farm/croft. Very few were stray or the responsibility of a commercial dog walker at the time (1% in each case).

Most of the visitors' dogs were accompanied at the time of the incident (80%) while most of the dogs from neighbouring farms/crofts were not (only 26% were accompanied). There was no clear trend among the dogs belonging to non-farming local residents with similar numbers believed to be accompanied and unaccompanied.

Figure 5.3 Q Who did the dog belong to?

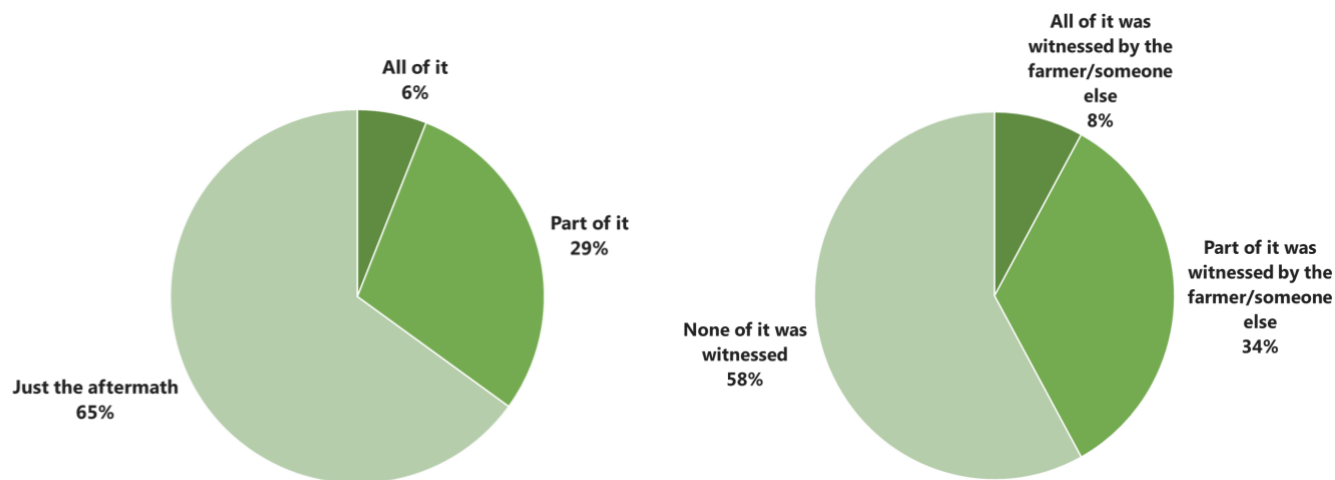


Base: All those whose sheep had been chased or attacked by dogs in the last 12 months (293)

Wildlife attacks

In contrast to the incidents with dogs, where the split was roughly even between dogs chasing and physically attacking sheep, more than nine in ten (94%) reported incidents with wildlife species involved physical contact with the sheep, while just 5% of respondents reported that their sheep were chased but not attacked in their most recent wildlife incident. This perhaps reflects the fact that farmers may be less aware of incidents where wildlife harassed their sheep but did not make physical contact. It may also reflect the fact that wildlife attacks, unlike dog attacks, are more likely to be driven by predation than a more 'playful' drive to chase. As shown in Figure 5. 4 below, respondents were much less likely to witness wildlife attacks than dog attacks: partly because foxes and badgers will tend to be active at night, and partly, perhaps, because dog incidents may create more of an obvious disturbance. Besides the nocturnality of many wildlife species, these species may also be more highly sensitive to the presence of humans nearby, and more likely to avoid activity in these circumstances, compared with dogs.

Figure 5.4 Whether farmers personally witnessed the most recent wildlife incident and whether it was witnessed by anybody (% respondents)

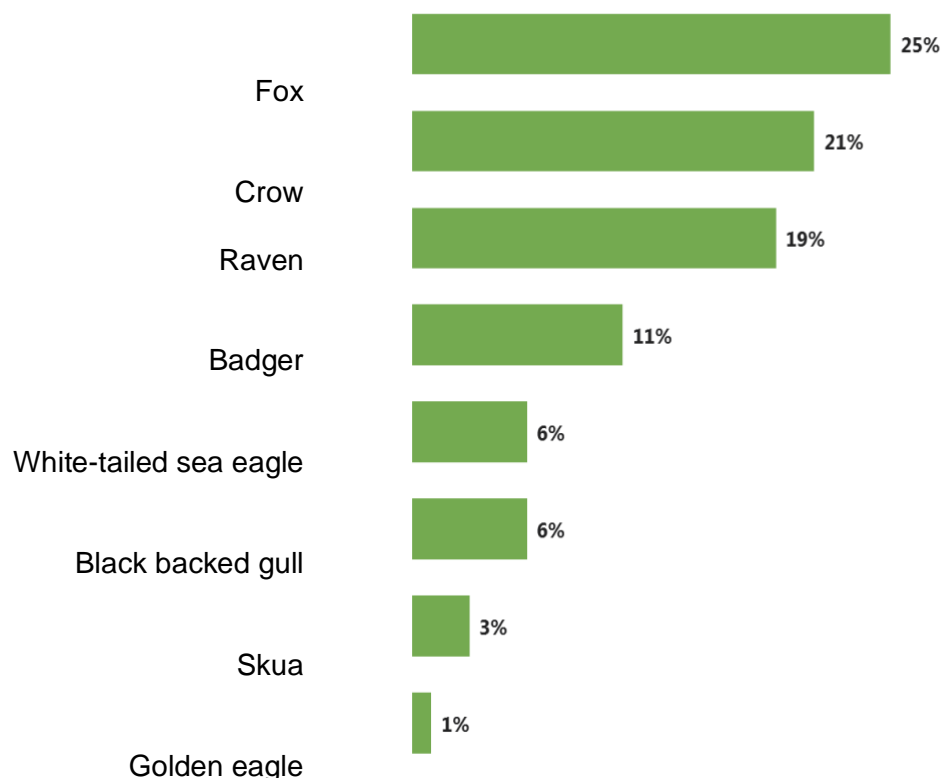


Base: All those whose sheep had been chased or attacked by a wildlife species in the last year (840)

Respondents who had experienced a wildlife attack in the last year were asked what species they thought was involved in the most recent incident. Foxes were thought to account for the highest number of wildlife attacks reported, comprising a quarter (25%) of attacks, while crows and ravens were thought to be responsible for a further two fifths of attacks (20% and 19% respectively). A further one in ten attacks were attributed to badgers (11%), while white-tailed sea eagles and black backed gulls⁴⁶ were each believed to be responsible for 6% of attacks and skuas and golden eagles for 3% and 1% each.

⁴⁶ The questionnaire response option was 'black backed gull' and did not therefore distinguish between the great black backed gull and the lesser black backed gull.

Figure 5.5 Q What species do you think was involved {in the most recent incident}?



Base: All those whose sheep had been chased or attacked by wildlife in the last twelve months (840)

There was considerable regional variation related to the species involved⁴⁷. In Tayside, foxes were believed to account for more than half of the most recent incidents reported (51%), followed by Clyde Valley where they were thought to account for just under half of the most recent incidents (46%).

Crows, meanwhile, were the most highly reported species in Dumfries and Galloway: respondents attributed more than one third (34%) of the most recent wildlife attacks to crows.

There were more reports of raven attacks than average in the western regions of Eileanan an Iar, Ayrshire and Argyll & Bute, in each of which they were the most reported species, believed to account for 42%, 33% and 35% of the most recent incidents respectively.

Badgers were the most reported species in NE Scotland and the Scottish Borders, where they were thought to account for around a third of the most recent attacks in the two regions (32% and 30%).

⁴⁷ Full details of this can be found in table Appendix C

White-tailed sea eagles were reported almost exclusively in Eileanan an Iar, Highlands and Argyll & Bute, where they were thought to account for 16%, 14% and 13% of attacks respectively, while Golden Eagles were almost exclusively reported in Eileanan an Iar (13%).

There were much higher than average reports of both black-backed gulls and skuas in Shetland, where each species were believed to account for 28% and 38% of reported attacks respectively.

6. Impact on sheep of attacks

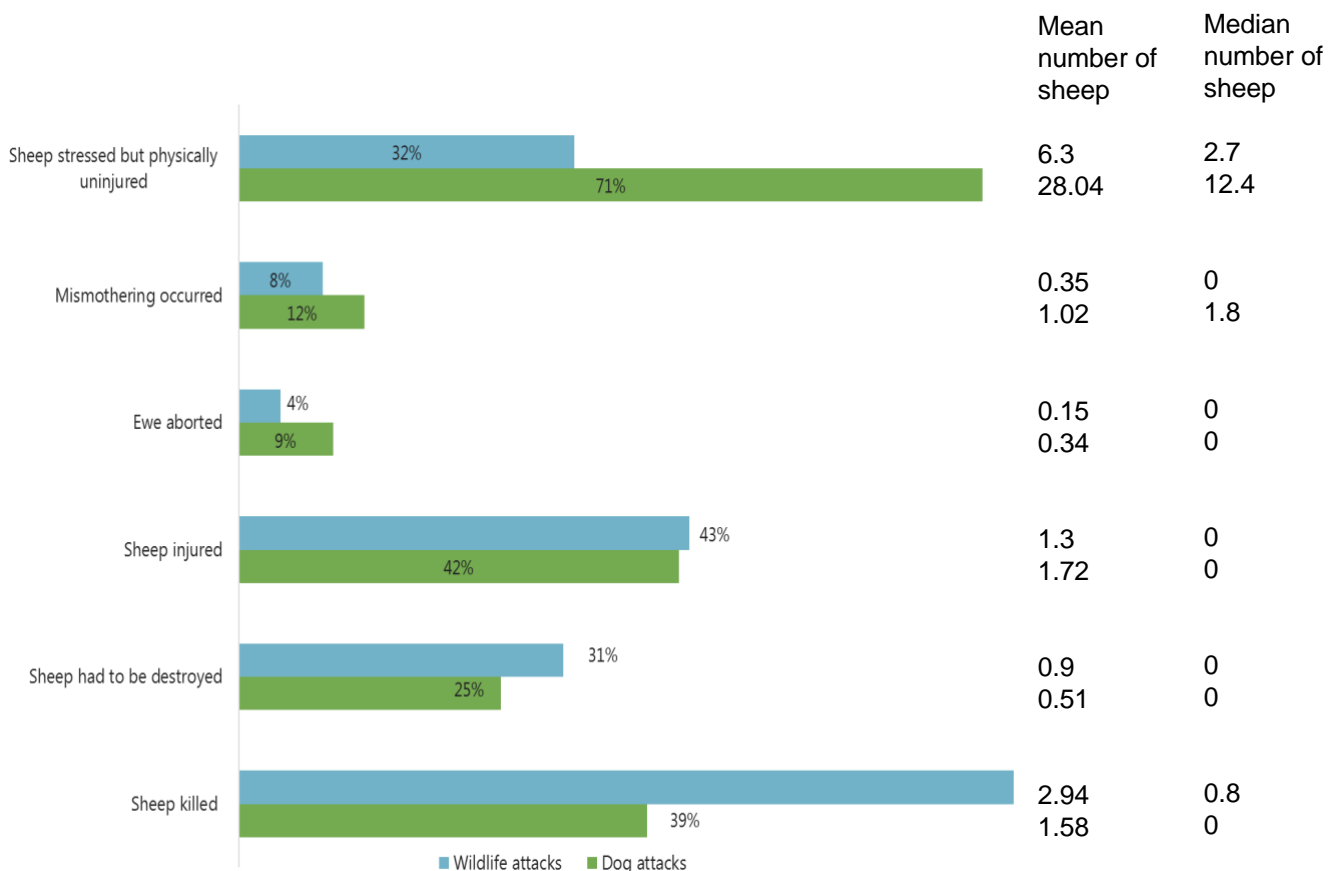
This chapter outlines the ways in which sheep have been affected by attacks.

Survey respondents who reported at least one attack on their sheep within the last twelve months were asked to describe the most recent attack. Questions explored the numbers of sheep affected in the most recent attack; the nature of the impacts on their sheep; and what type(s) of sheep were affected.

Impact of dog attacks compared with wildlife attacks

The figure below shows the proportion of wildlife and dog attacks that have affected at least one sheep in each of the ways listed, and the columns beside indicate the mean and median number of sheep affected in each way per attack. For example, in 71% of the most recent dog attacks reported, at least one sheep was stressed but physically uninjured, the mean number was 28.04 and the median number was 12.4. By comparison, in 32% of the most recent wildlife attacks at least one sheep was stressed but physically uninjured, the mean number affected in this way was 6.3 and the median was 2.7. As is evident, a relatively high proportion of attacks resulted in sheep being injured, destroyed or killed.

Figure 6.1 Proportions of wildlife and dog attacks which have affected at least one sheep in the ways outlined (% farmers reporting each in relation to the most recent attack)



Base: All those who had experienced a wildlife attack (840) or a dog attack (293) in the last year

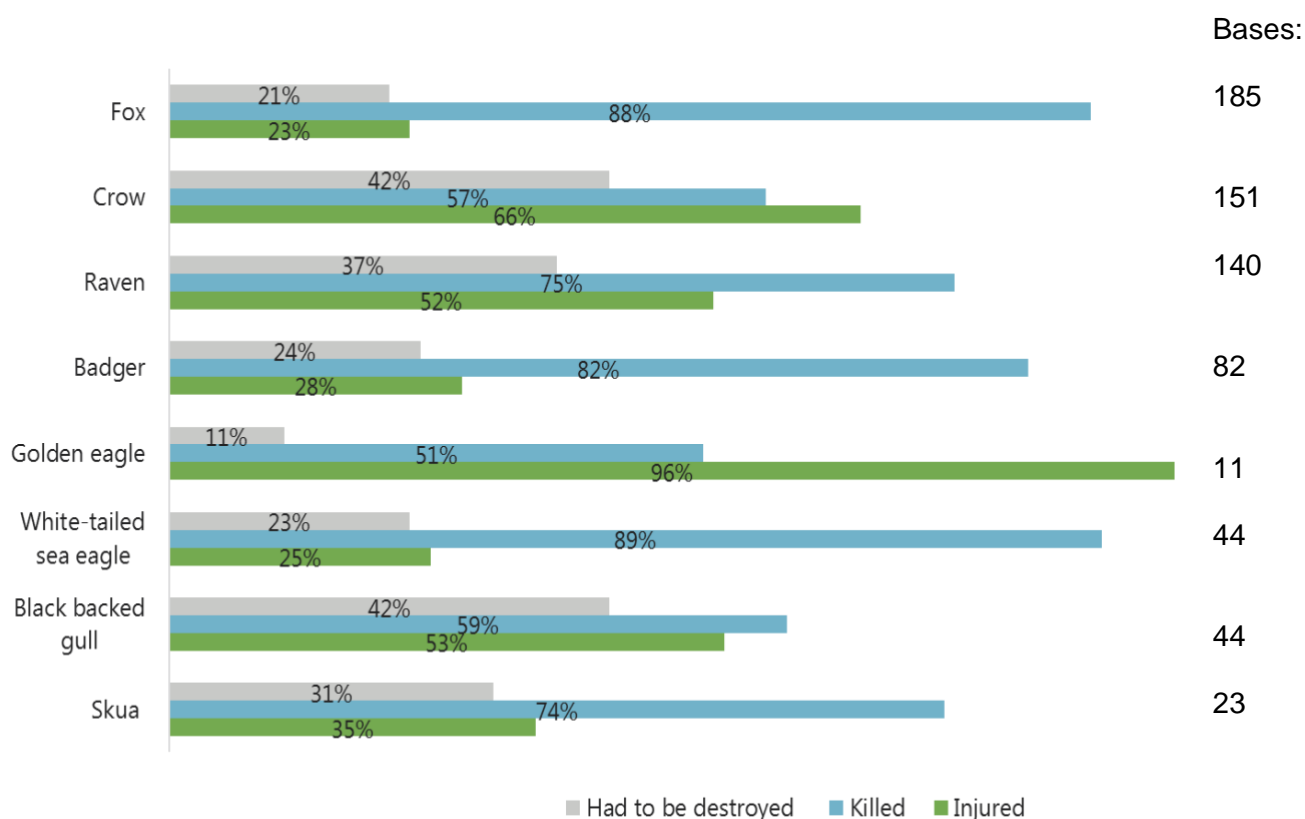
Farmers were more likely to report that pregnant or lactating ewes were affected by dog attacks than other types of sheep. Of the farmers reporting that their sheep had been killed in the most recent incident, forty-four per cent reported that at least one pregnant or lactating ewe had been killed. By comparison, 20% reported that at least one lamb had been killed, 18% that a dry ewe or gimmer had been killed, 23% that a hogget had been killed and 6% that a ram/tup had been killed⁴⁸.

Pregnant or lactating ewes were also the most likely to have had to be destroyed as a result of a dog attack with 44% of farmers who had had to destroy at least one sheep reporting that at least one pregnant or lactating ewe had had to be destroyed (compared to 11% reporting a lamb having to be destroyed, 20% reporting a dry ewe or gimmer, 19% reporting a hogget and 8% reporting a ram/tup).

Impact of wildlife attacks

The figure below shows the percentage of attacks attributed to each species that resulted in at least one sheep being injured, killed or having to be destroyed. Attacks by white-tailed sea eagles and foxes were most likely to be thought responsible for killing at least one sheep (in 89% and 88% of attacks attributed to these species respectively).

Figure 6.2 % of attacks attributed to each species in which at least one sheep was injured, killed or had to be destroyed



⁴⁸ To a large extent, the types of sheep affected reflect the overall numbers of each type (rather than vulnerability to attack)

Injury was the second most frequently reported impact on sheep from wildlife attacks, with 43% of farmers reporting that at least one sheep had been injured in an attack. The mean number of sheep injured in a single wildlife attack was lower than in a single dog attack (mean of 1.3 in wildlife attacks, compared to a mean of 1.78 in dog attacks). Attacks by golden eagles were most likely of all wildlife attacks to result in injury with 96% of incidents with this species resulting in at least one sheep being injured.

With regard to the types of sheep affected, in contrast to dog attacks where pregnant or lactating ewes tended to be more affected than other types of sheep, more lambs, defined as under 1 year old, were reported to have been killed, destroyed or injured by wildlife than any other types of sheep.

Eighty-one per cent of farmers reporting that at least one sheep had been killed in their most recent wildlife attack reported that at least one lamb had been killed (compared to 18% reporting that at least one pregnant or lactating ewe had been killed, 4% reporting that a dry ewe or gimmer had been killed, 4% reporting a hogget and <1% reporting a ram/tup). Similarly, 61% of farmers whose sheep had had to be destroyed reported that this included at least one lamb (compared to 36% who stated that it included at least one pregnant or lactating ewe, 4% at least one dry ewe or gimmer, 4% at least one hogget, and <1% a ram/tup). The rate of injuries (as opposed to deaths) from wildlife attacks were broadly similar among lambs and pregnant or lactating ewes however; while around half (54%) of farmers whose sheep had been injured by a wildlife attack reported at least one injured lamb, almost as many (41%) reported at least one injured ewe.

Respondents were asked not to include the scavenging of dead sheep when reporting the numbers affected. However, it is not always easy to tell whether a sheep was already dead/dying so it may be that some of those reported as having been killed had already died from some other cause. Similarly, some of the sheep preyed on (particularly young lambs) may have been relatively weak and may not have survived anyway. Though, on this last point, sheep farmers in the qualitative research were keen to dispel the notion only the weakest lambs were preyed on and cited examples where they had witnessed sea eagles (for example) taking strong, healthy lambs and, in one instance, a large hogget.

7. Time and financial impact on farmers of attacks

Time impacts of dog attacks

Survey respondents who had experienced an attack on their sheep in the last year were asked how much time they had spent dealing with the most recent incidents. Figure 7.1 shows the mean time in minutes spent on each task relating to their most recent dog incident. The mean total time spent dealing with a single incident was 5 hours and 19 minutes. The most time consuming of the specific tasks listed were personally treating injured sheep as a result of an attack, which farmers reported spending an average of one hour and 17 minutes doing, and investigating an attack, which took farmers an average of 67 minutes. Those who said they had spent 'other time' related to the incident were asked for more detail. The most common responses were: time spent rounding up scattered sheep, checking on sheep after the incident, re-mothering lambs with ewes and repairing fences.

Using agricultural wages to provide a notional cost of this time, the average time cost of each incident is £50.33 and the total estimated time cost to the sector per annum is around £350,000.⁴⁹

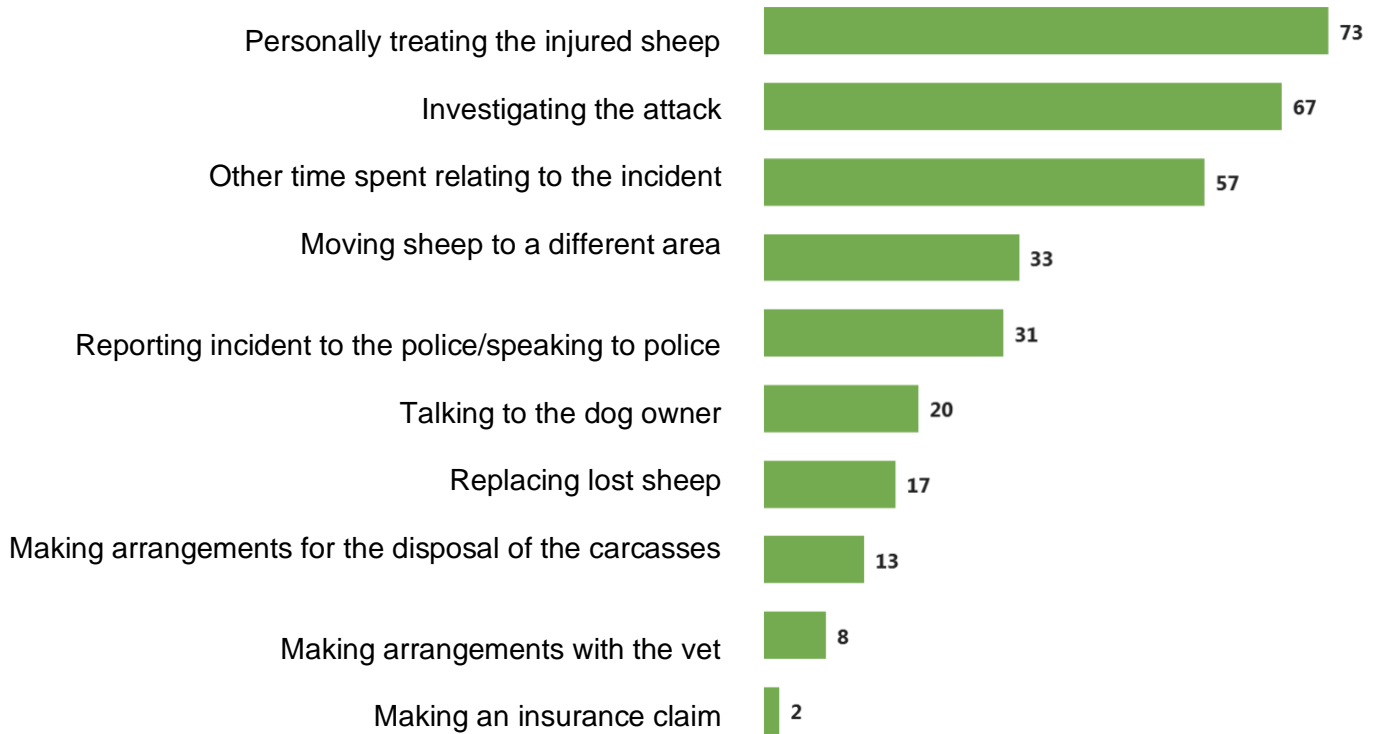
Our qualitative research revealed the considerable time spent by farmers dealing with the "collateral" damage of incidents, such as re-establishing the relationship between ewes and their lambs, following a disturbance by a dog, which might explain the large amount of time reported as "other time spent related to the incident":

"If you go back to the ewe that has twin lambs and one split off. Well, first of all you don't just go and pick it up and drop it beside and say "there is your lamb back missus". It doesn't work, you've got to put the [sheep] dog round the ewe with the other lamb and hold it there, because that lamb, if you put it down, will just follow you. If you move away it will follow your heel. That lamb will run after you, or it will run away that way or that way. If you're very, very, lucky it might run to the mother."

(Sheep farmer, East Central Scotland)

⁴⁹ Based on the minimum rate for agricultural workers with a qualification at SCQF Level 6/7 or above which was £9.46 per hour at April 2019. <https://www.gov.scot/publications/scottish-agricultural-wages-board/pages/4/> Total cost to the sector is based on the average cost per incident multiplied by the estimated total number of incidents of 7,257 (see page 22).

Figure 7.1 Mean time in minutes spent dealing with a dog incident

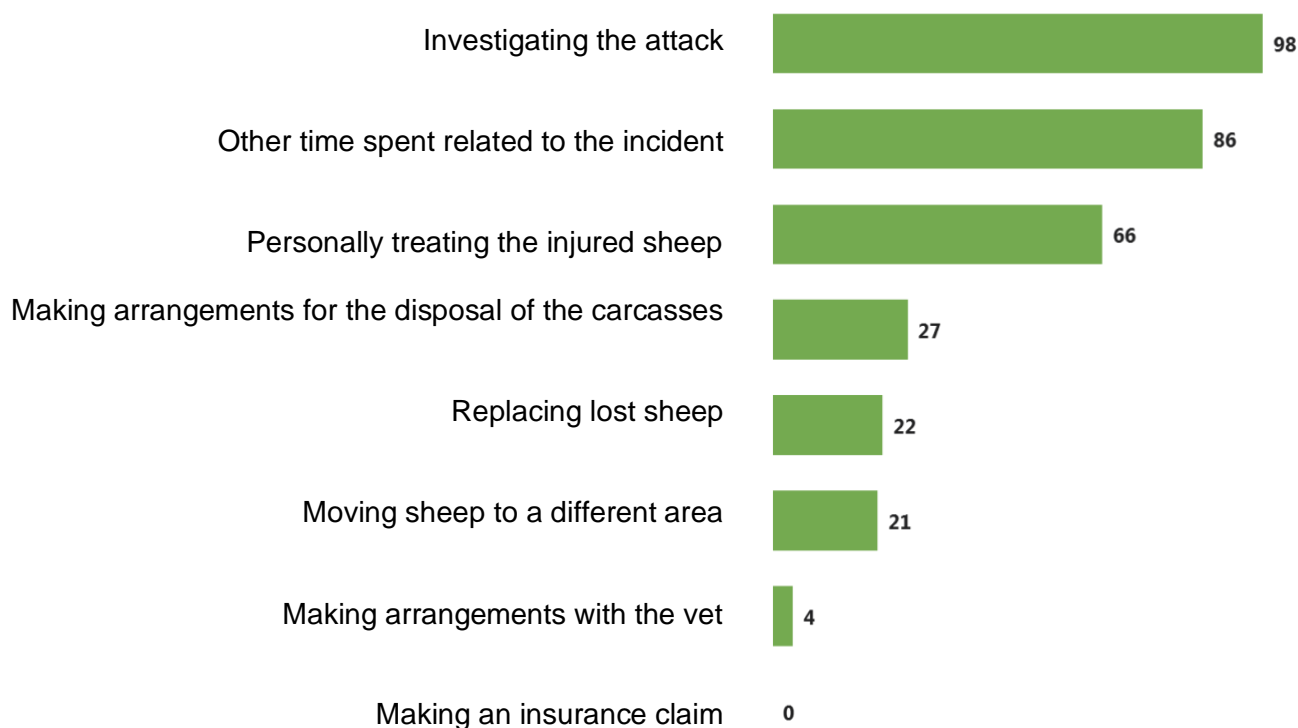


Base: All whose sheep have experienced a dog attack in the last year (293)

Time impact of wildlife attacks

Figure 7.2 shows the mean time farmers spent dealing with various tasks as a result of their most recent wildlife attack. The average total time spent dealing with an incident was 5 hours and 24 minutes, in line with the time spent dealing with dog attacks. As was the case with dog attacks, investigating the attack and personally treating injured sheep were amongst the most time-consuming of the listed tasks. Other time spent related to the incidents included increased monitoring of sheep; personally destroying injured sheep; and making arrangements with a gamekeeper.

Figure 7.2 Mean time in minutes spent dealing with a wildlife incident



Base: All whose sheep have experienced a wildlife attack in the last year (840)

Again, using agricultural wages to provide a notional cost of this time, the average time cost of each incident is £51.08 and the estimated total time cost to the sector per annum is around £2,500,000.⁵⁰

Financial impact on farmers of attacks

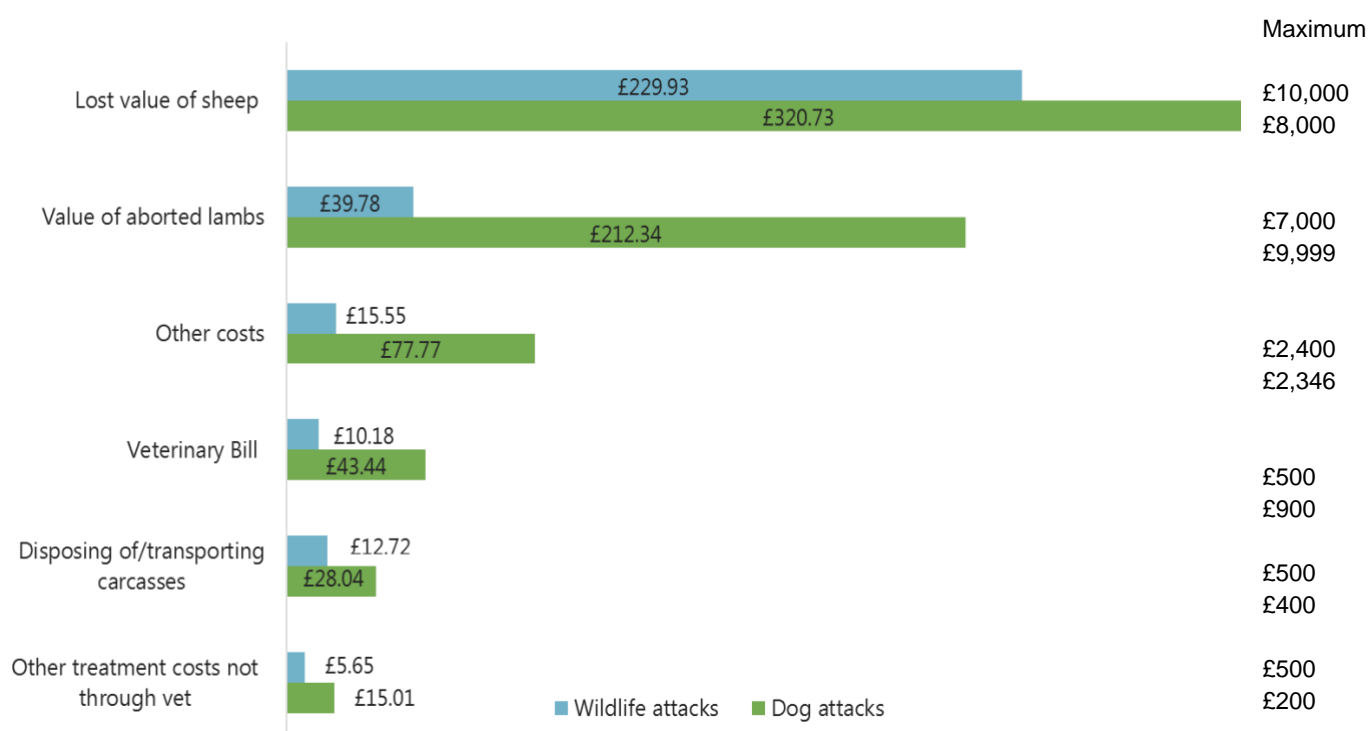
Figure 7.3 below shows the estimated mean costs incurred from farmers' most recent attacks by dogs and wildlife⁵¹.

⁵⁰ Total cost to the sector is based on the average cost per incident multiplied by the estimated total number of incidents of 50,243 (see page 23).

⁵¹ It should be borne in mind that these are based on estimates respondents gave when they responded to the survey and in some cases will be very rough. They were asked "approximately what was the financial cost, if any, of the incident to you? If you are not sure, please give your best estimate." They were then presented with the categories of costs shown in Figures 7.1 and 7.2 and asked to estimate the cost of each. Estimates of the lost value of sheep and aborted lambs could clearly be calculated in different ways depending on, for example, whether they are based on the saleable value at the time of the incident or the potential future value but, to avoid making provision of the estimate too complicated or time-consuming, respondents were not provided with instructions about how they should calculate these costs. It should also be noted that the costs discussed in this section reflect only the cost to the sheep farmers – other individuals or organisations may also incur costs as a result of attacks (e.g. the police, neighbouring farmers who also take action as a result).

The mean total financial cost of each dog incident to farmers was £697.33, while the mean cost of each wildlife attack was £391.82. Respondents consistently reported the value of lost sheep as the biggest financial cost of attacks, with the highest figures reported for a single incident being £10,000 for a wildlife attack and £8,000 for a dog attack. The value of aborted lambs was the second biggest financial impact on farmers, with the highest estimated cost incurred from a wildlife attack being £7,000, and the highest estimated cost of a dog attack £9,999. The other costs mentioned included the costs of additional labour involved in dealing with the incident; the costs of additional feed for nurturing injured sheep; and costs of hunting wildlife. Dog attacks tended to cost considerably more on average to farmers in the value of aborted lambs, in veterinary bills, in disposing of carcasses and in other costs.

Figure 7.3 Mean financial costs incurred by sheep farmers from most recent dog and wildlife attacks



Base: All who had experienced a wildlife attack (840) or a dog attack (293) in the last year

Insurance claims and other compensation

Just nine per cent of farmers who had experienced a dog attack on their sheep in the last year reported receiving money in connection with the incident, either from an insurance claim or some other source (this might be, for example, compensation from the dog owner or from the courts⁵²). The mean amount amongst those receiving money was £416.96, while the median amount was £185.10.

Not a single respondent reported receiving any money (whether insurance money or any other form of compensation) for their most recent wildlife attack, and 99%

⁵² Where respondents did receive money, we do not have details of the source

said they did not intend to make an insurance claim in the future relating to the most recent incident, with just 1% expressing uncertainty about whether they might do so.

Attitudes to insurance

The qualitative research indicated that the low number of claims could largely be explained by farmers' not insuring their sheep. Most farmers were skeptical that insuring their sheep against attacks (whether for dogs or wildlife) would be worthwhile. They typically made reference to the perceived high, and increasing, cost of insurance premiums, expressing a view that these would only increase further if they were ever to make a claim, offsetting any financial benefit they might receive in compensation.

“The cost of insurance (puts me off), and the fact they keep pushing up the prices.”

(Sheep farmer, East Central Scotland)

“It becomes very difficult, any number of claims, your insurance premium just goes up.”

(Sheep farmer, NE Scotland)

They also referred to the difficulty of providing sufficient evidence.

“Insurers are always wanting proof, and the proof is all gone in the blink of an eye.”

(Sheep farmer, Argyll and Bute)

8. Reporting dog attacks to the police

Overall, just a third of farmers (32%) said they had reported the most recent dog attack incident to the police. Where sheep were killed or had to be destroyed as a result of the attack, farmers were more likely to report the incident (52% reported incidents where sheep were killed and 62% where sheep had to be destroyed).

The qualitative research revealed very mixed experiences of the police and courts' response to attacks and, consequently, about whether it was worth reporting an incident.

Some farmers talked positively about the speed of the police response and the seriousness with which they took incidents. Others complained about the police taking days to come out and being "disinterested".

There was a perception that the level of understanding of the problem, and the extent to which it was prioritised, varied by area and by individual officer:

"We have a very enthusiastic police response in Argyll, as a result of, particularly as a result of some of the officers getting involved with what went on at Inveraray [...] a couple of years ago with the Huskies. I mean it was horrendous, but in the overall scheme of things, there have been worse sheep attacks, it was the way things came about. So, anyway the local police here are very lively to it". [...]

"Put it this way, police officers turned out from Tully⁵³ do absolutely nothing on the legislation controlling about dogs or sheep or livestock. They don't cover hardly any of the rural criminal law at all. So, it is only when the police officers do make the rural areas that they might get interested. Sometimes, you know, they come off a farm and they are interested, but generally speaking they're not".

(Sheep farmers, Argyll & Bute)

"Well, I said I wasn't sure [about whether he wanted to the dog owner to be charged], but the police insisted, they were pressing because they said it's getting too common and it's got to be [stopped]...the Huntly police, aye".

(Sheep farmer, NE Scotland)

One farmer explained that she had not reported the most recent dog attack on her sheep to the police because of her previous experience of a case going to court and receiving compensation for just one of the ten sheep that had been killed or

⁵³ The Scottish Police College at Tulliallan

injured. The most recent incident involved one sheep and she felt it would not be worth the time and effort involved for the likely level of compensation.

However, others thought that they would want to report attacks, even if just to raise awareness of the issue.

“Well, I would certainly report it, yes, I mean to try and get a bit publicity to make sure it's in the public eye, yes”.

“Maybe should be reporting at least every one now. Just make a big show of it”.

(Sheep farmers, Dumfries & Galloway)

Regardless of the effectiveness of the response, in some circumstances there was a concern regarding involving the police because of the potential impact on relationships with neighbours and within the wider community.

“I had the police taken out and said did I want to press charges? But, I had young bairns at the village school, and I thought, you know, they can be picked on, so I'm not sure”.

(Sheep farmer, NE Scotland)

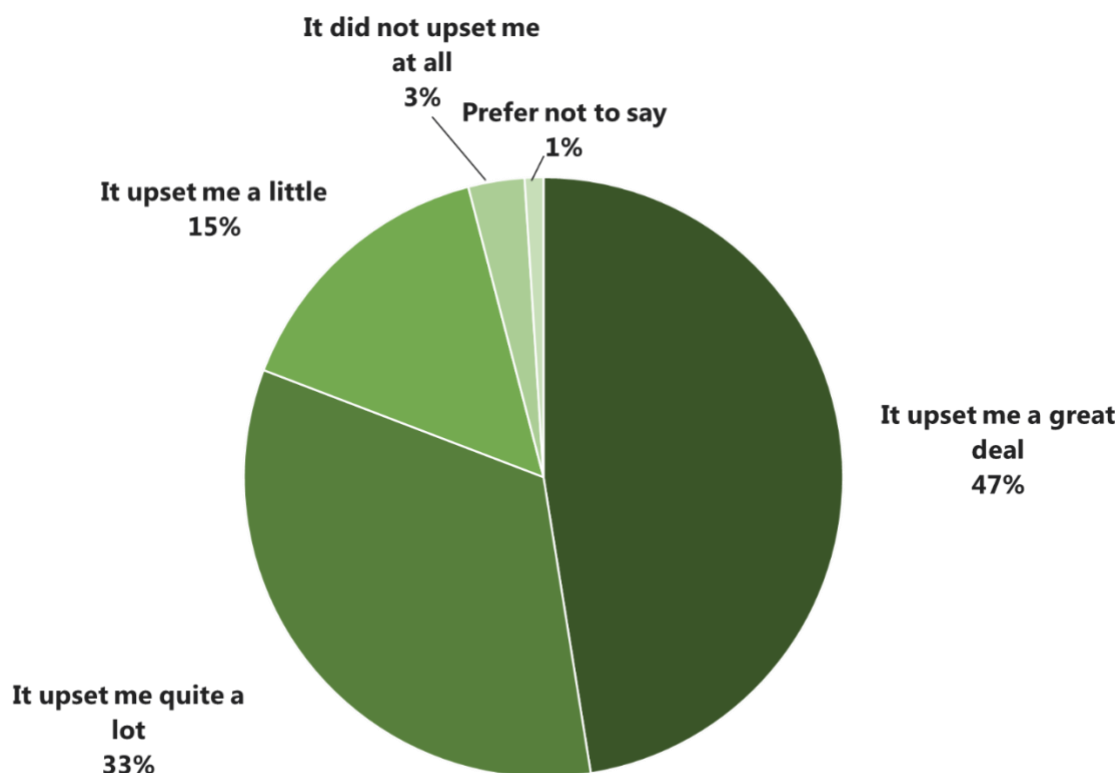
“You think twice about calling the Bobbies on your neighbour”.

(Sheep farmer, Highlands & Islands)

9. Emotional impact of attacks

In the survey, farmers were asked how much they were personally upset by the most recent attack on their sheep. The figure below shows respondents' responses in relation to their most recent dog incident. Eighty per cent of farmers indicated that the dog attack had upset them a great deal or quite a lot with almost half (47%) saying it had upset them a great deal.

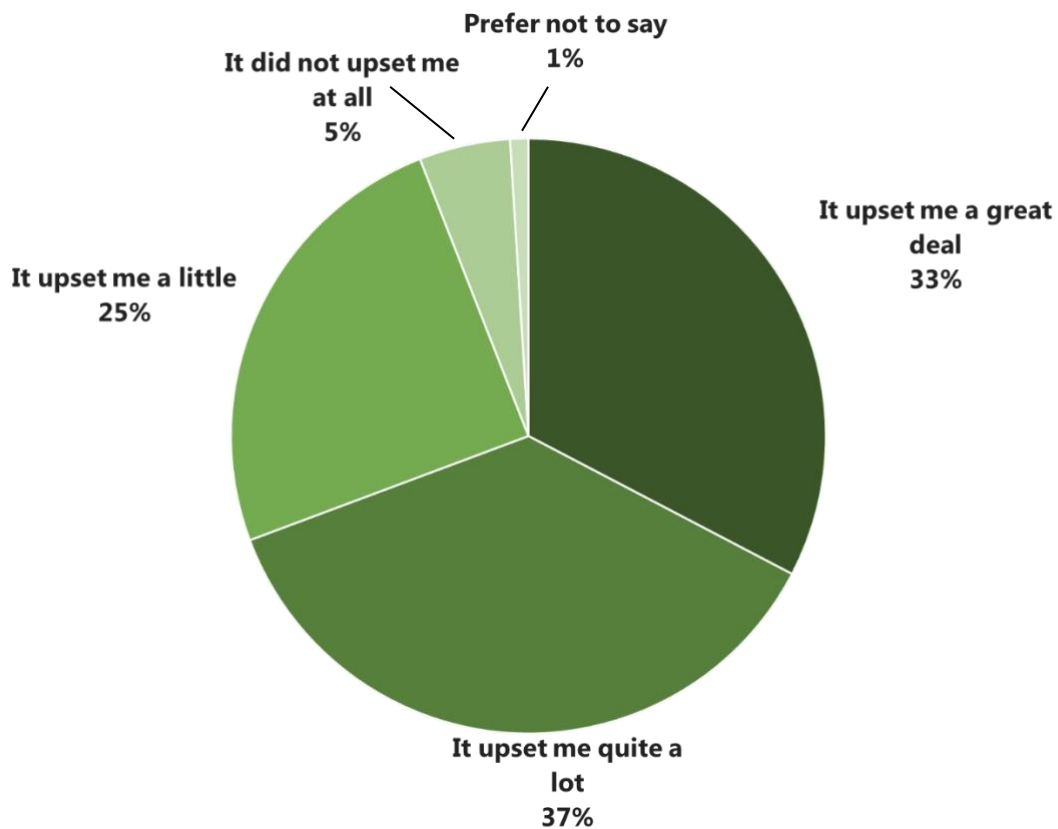
Figure 9.1 Emotional impact of dog attacks. Q How much did the incident personally upset you, if at all?



Base: All whose sheep were attacked by a dog in the last year (293)

The same question was asked of respondents whose sheep had experienced a wildlife attack in the last year. Figure 9.2 shows the extent to which farmers were personally upset by their most recent attack. Seventy per cent of farmers indicated that they were upset either a great deal or quite a lot by the wildlife attack and a third (33%) said it had upset them a great deal.

Figure 9.2 Emotional impact of wildlife attacks. Q How much did the incident personally upset you, if at all?



Base: All whose sheep were attacked by wildlife in the last year (840)

There was no difference in the level of upset experienced between farmers with different career lengths or different flock sizes.

Female respondents were more likely than male respondents to say they had been upset “a great deal” by both dog attacks and wildlife attacks. 43% of male respondents reported having been upset a great deal by their most recent dog attack, while 60% of female respondents reported having felt this way. Further, while 40% of female respondents reported to have been upset a great deal by their most recent wildlife attack, the figure was 30% among men. It should be acknowledged that expressions of emotion cannot be taken in isolation from the context of wider social norms, and this difference perhaps reflects the fact that it may be perceived as more acceptable for women to express a sense of deep upset than it is for men.

Our qualitative research explored the emotional impact of sheep attacks in more depth and greater detail, providing insight into the wide range of emotional responses that attacks on sheep may provoke among farmers and others in their household.

Although participants consistently emphasised the fact that they were, and *had* to be, resilient to dealing with traumatic incidents and shocking sights in their daily

work, nonetheless the distress that attacks caused sheep farmers and their families was tangible. Many shared stories and graphic photographs displaying the horrific injuries some sheep had sustained.

“You can’t compensate a sheep farmer financially for the distress, and it really is distress.”

(Sheep farmer, Argyll and Bute)

There was a clear sense that attacks were also deeply affecting farmers’ families, and often causing yet more distress among farmers’ partners and children. One participant commented that it was deeply upsetting for his wife, who assisted with the lambing process, and others commented that the worst affected were their partners and children.

“My wife does the lambing and it’s very upsetting for her to look after the sheep and then put them outside for them to be killed.”

(Sheep farmer, North East Scotland)

“I think partners and children are definitely worst [affected].”

(Sheep farmer, Dumfries and Galloway)

As well as witnessing the injuries and death of their sheep as a result of attacks, it was evident that having to personally destroy seriously injured sheep was a deeply upsetting experience for farmers. In one case, having to do this daily for sixteen consecutive days, as a result of raven attacks had led a farmer to giving up her large flock.

“I was just so disheartened, I mean the fact that I was literally going round every day on my quad with my .22, shooting lambs.”

(Sheep farmer, East Central Scotland)

Beyond the immediate distress at seeing and dealing with their sheep’s distressing injuries, farmers described the loss of their livestock as “soul-destroying”, explaining this with reference to the hard labour that goes into nurturing their sheep, and the pride they take in this. Emphasising the centrality of their livestock to their personal identity, farmers described the loss of sheep as deeply affecting their morale and motivation.

“It’s the amount of work ... and you see this being destroyed in front of you...it’s so absolutely soul destroying.”

(Sheep farmer, East Central Scotland)

“Lambing a ewe and keeping her a whole year and you find that the lamb has died, or won't survive, it's just a disaster. You've done everything right and just ready to lamb and you find something like that happening, it's horrendous.”

(Sheep farmer, North East Scotland)

It was not uncommon for participants to refer to instances in extreme cases where the rate and severity of attacks had been so demoralising that they had contributed to farmers they knew giving up their flocks altogether. Two participants cited it as a contributing factor in their personal decision to reduce the size of their flock.

“We're thinking we're not going to replace our sheep - we're going to let the flock diminish to nothing, that's what we're doing. [The attacks] are not the prime reason, but that's one of the reasons.”

(Sheep farmer, North East Scotland)

The emotional effect of incidents clearly varied to some extent by the species involved. Generally speaking, attacks by dogs tended to incite a stronger emotional response among farmers than those by wildlife species. In addition to the distress and sense of loss caused by seeing the effect of attacks on sheep common among all types of attacks, farmers commented that they felt a greater sense of anger, frustration and disappointment as a result of attacks by dogs. They explained this with reference to the fact that such attacks were not inevitable and were attributable to the irresponsibility of the humans involved.

“I think I'm more annoyed about the dog simply because ravens, foxes, eagles, they're doing what they do...But the dog, that is just people being irresponsible, so I find that more annoying.”

(Sheep farmer, East Central Scotland)

“It's the worst...Your animal has suffered because of somebody else's fault basically.”

(Sheep farmer, Dumfries and Galloway)

Further, farmers described a need to repress the anger they experienced in the case of some dog attacks, which they felt had longer term impacts on them. They described how their ownership of a gun put them in a position of perceived vulnerability: they feared that any expression of anger about a dog attack could be used against them by the police who might revoke their licence. Participants also alluded to the mental and emotional energy required to stay calm in the

aftermath of an attack when dealing with the dog owner, and felt it had contributed to problems with their health.

“[You feel] very vulnerable, you must keep your mouth shut and you must have at least one witness [when talking to the dog owner]... You [must] never lose your cool.”

(Sheep farmer, East Central Scotland)

“It's bad ... actually damaging famers' health, because for the very reasons I've spoken about, you have that supressed rage.”

(Sheep farmer, East Central Scotland)

While there was a consensus that attacks by dogs had the greatest emotional impact on farmers, participants were keen to differentiate between the effects of wildlife species such as foxes which they could control, and protected wildlife species such as eagles and badgers which they could not control. While the former were most common, it was the latter which bothered farmers the most. Participants conveyed a sense of great frustration and utter helplessness where they were affected by wildlife species which they had no legal right to control. They were also frustrated at public agencies such as SNH which they felt did not appreciate their problems or care about their interests. This was exacerbated where they had experienced repeated attacks over a period of time and by the generally positive public perception of these species.

“It's the ones you can't control, [which are] the most upsetting... The badgers and the gulls they are annoying to me.”

(Sheep farmer, North East Scotland)

“With the protected species you feel helpless that you can't do anything about it and that's not a good feeling.”

(Sheep farmer, North East Scotland)

10. Prevention and mitigation measures

This chapter describes the different measures farmers have employed on their land to try and prevent attacks and how effective they perceive them to have been. It then explores priorities for wider initiatives to prevent attacks or mitigate their impact, including potential regulatory and legislative changes.

Measures employed to prevent dog attacks

The most commonly employed approach was talking to dog owners: 52% had done this to try to prevent attacks. Interviews with farmers indicated that this might include explaining the risks to sheep to owners who had let dogs off the lead in areas close to sheep, or alerting people to the fact it was the lambing period. Less commonly, farmers had used signage or moved sheep to a different area (Table 10.1).

The perceived effectiveness of measures was mixed.⁵⁴ Those who felt the measures were effective tended to say they had been ‘fairly’ rather than ‘very’ effective and, for most measures, considerable minorities felt they had been ineffective.

Moving sheep to a different area was perceived to be most effective (72% of those who had done this thought it had been effective) but this is clearly time consuming and often may not be feasible.

Table 10.1 Measures employed to prevent dog attacks and perceived effectiveness

	% putting this in place	% thinking it has been effective	% thinking it has been ineffective
Talking to dog owners	52	61	32
Signs for dog owners/walkers to encourage responsible management of dogs	27	42	47
Moving sheep to a different area	22	72	19
Notices highlighting the lambing period	17	50	39

Bases: % putting place, all (n=1931); % thinking it has been effective, all who had put the measure in place: talking to dog owners, n=1028; signs for dog owners, n=550; moving sheep, n=451; notices highlighting lambing, n=348

The qualitative research revealed a considerable amount of confusion among farmers about what signage was permissible in light of the Land Reform (Scotland) Act 2003 (which farmers tended to refer to as the ‘right to roam’), including confusion about whether they were allowed to put up signs and/or what they were allowed to say on those signs.

⁵⁴ There was a correlation between putting the measures in place and having experienced more attacks and more recent attacks. It is therefore not possible to gauge the effectiveness of different measures from rates of attack.

Measures employed to prevent wildlife attacks

Overall, shooting predators (used by 36% of farmers), working with local gamekeepers (34%) and moving sheep to different areas (28%) were the most commonly used measures to try to prevent wildlife attacks (Table 10.2).

Shooting foxes was seen as effective (91% thought it was effective), as was working with a local gamekeeper to control them (90%) and working with a fox control club (82%) – the last two will generally also involve shooting them.

However, as with the measures to prevent dog attacks, perceptions of the effectiveness of other measures was very mixed⁵⁵. Measures perceived as most effective against crows were working with a local gamekeeper (73%), shooting (64%) and traps (61%). For ravens, the most effective measures were thought to be shooting (60%), working with a local gamekeeper (56%) and moving sheep (50%). For badgers, it was moving sheep (54%), working with a local gamekeeper (46%)⁵⁶ and additional fencing/barriers (31%).

⁵⁵ Again, as with dog attacks, there was a correlation between putting the measures in place and having experienced more attacks and more recent attacks. It is therefore not possible to gauge the effectiveness of different measures from rates of attack.

⁵⁶ Though this should be treated with caution as working with a local gamekeeper to control badgers was only reported by 11 respondents.

Table 10.2 Measures employed to prevent wildlife attacks and perceived effectiveness

		% putting this in place/ % targeted at each species	% thinking it has been effective	% thinking it has been ineffective	Bases
Shooting predators		36			1931
<i>To prevent attacks by...</i>	foxes	73	91	6	596
	crows	48	64	33	367
	ravens	14	60	38	104
Working with a local gamekeeper		34			1931
<i>To prevent attacks by...</i>	foxes	83	90	7	667
	crows	30	73	23	237
	ravens	13	56	37	90
Moving sheep		28			1931
<i>To prevent attacks by...</i>	foxes	52	56	35	278
	crows	34	50	45	164
	ravens	32	50	44	159
	badgers	25	54	40	134
Devices to scare/deter predators		19			1931
<i>To prevent attacks by...</i>	crows	51	33	60	186
	ravens	47	24	71	161
	foxes	37	49	43	150
Additional fencing/barriers to protect sheep		14			1931
<i>To prevent attacks by...</i>	foxes	62	52	37	177
	badgers	32	31	48	88
Wildlife traps		9			1931
<i>To prevent attacks by...</i>	crows	71	61	35	163
	foxes	37	44	47	80
Working with a fox control club		9			1931
<i>To prevent attacks by...</i>	foxes	9657	82	16	221

⁵⁷ A small number of respondents indicated that they were using a fox control club to help prevent attacks by other species (crows, ravens, badgers and black backed gulls).

Priorities for change

Mitigating dog attacks

Farmers were presented with a list of potential regulatory and legislative changes, and other initiatives, which have been suggested as ways to prevent attacks or mitigate their effects. For each, they were asked whether or not they thought it should be a priority (Figure 10.3). Almost all agreed that increasing public awareness/campaigns should be a priority (93%), that there should be greater penalties for failing to have a dog under control (92%) and there should be a requirement to keep dogs on leads within defined areas (90%). Seventy-three per cent would prioritise a requirement for dogs that have attacked or chased livestock and their owners to attend dog training classes. There was somewhat less support for greater provision of suitable spaces for off-lead exercise (49% thought this should be a priority).

Those with bigger flocks, those who had been sheep farming for a longer time, and those whose sheep had been attacked by dogs tended to be a little more likely to think these potential changes should be priorities.

Figure 10.1 % sheep farmers thinking each measure should be a priority to prevent dog attacks



Base: All (n=1931)

The first four of these measures were raised spontaneously by farmers in the qualitative research and there was strong support for all of them.

A dominant theme was the ignorance of some members of the public about the risk their dogs posed to sheep and how sheep can be affected by the presence of a strange dog. Farmers frequently referred to encounters with dog owners who assured them that their dog would never chase sheep or – when in the act of chasing them – that they were simply “playing”. One recounted several instances of sheep on open land being driven for miles in front of walkers with dogs because the

walkers did not understand that the sheep would keep moving as long as the dog was behind them.

A participant in the qualitative research suggested that all dog owners should be required to have insurance against any losses that their dog was responsible for.

There was a common view that the element of behaving responsibly in return for access rights had been forgotten and that those encouraging greater use of the countryside should have more concern for the potential impact.

“The people who are pushing the pathways, whether it's local council or local Heritage, Scottish National Heritage or Forestry or whoever is promoting access, I think have to take a bit more responsibility of what happens for the people they are putting up there”.

(Sheep farmer, NE Scotland)

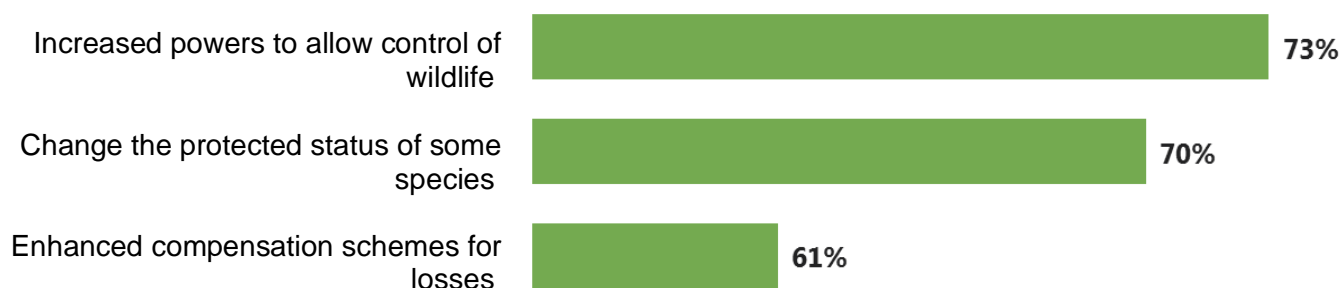
In addition to helping educate the public, there were specific suggestions that agencies should provide appropriate fencing and signage on popular routes and be responsible for their upkeep.

Preventing wildlife attacks

Farmers were also asked their views on potential measures for reducing wildlife attacks or mitigating their effects. There was generally a little less support for prioritising these measures than for the suggested ways of preventing dog attacks (Figure 10.4).

Again, those with bigger flocks, those who had been sheep farming for a longer time, and those whose sheep had been attacked by wildlife tended to be more likely to think these potential changes should be priorities. Farmers in Argyll & Bute were more likely than average to want increased powers to allow control of wildlife (82% compared with 73% overall). They, and those in Eileanan an Iar, were also more likely to prioritise enhanced compensation schemes for losses (71% compared with 61% overall), as were those who attributed their most recent attack to a white-tailed sea eagle (80% compared with 61% overall).

Figure 10.2 % of sheep farmers thinking each measure should be a priority to prevent or mitigate wildlife attacks



Increased powers to control the numbers of predatory species (the particular species varied depending on the area) was a major theme in the qualitative discussions. Farmers were keen to point out that they did not wish to eliminate species that were causing problems but to achieve what they would judge to be a better balance.

“Nobody wants to see badgers wiped off the face of the earth.

“No, no.”

“Just too many of them, yes”.

“A way of controlling them. All species, there needs to be a control, there needs to be a balance”.

(Sheep farmers, Dumfries & Galloway)

There was a perception that the Scottish Government and other relevant agencies (Scottish Natural Heritage, in particular) either did not understand the scale and impact of the problems, or prioritised other interests. This led to a considerable amount of both frustration and cynicism.

“But, I feel we're up against it, I think that sea eagle gets through, the beaver has now got a protective status, we can't touch a badger, people, the general public like these things, and ... [the] farming population is such a small vote winner, you know, there are only a few thousand of us, if we are all fed up and sick of it, well so what, we've gained a million votes by getting a sea eagle or a beaver. I think that's generally it.

(Sheep farmer, NE Scotland)

“The tourist pound is king”.

(Sheep farmer, Highlands & Islands)

One participant suggested a government backed insurance scheme for farmers, to protect against both types of attacks, in which an individual’s premium would not increase as a result of a claim.

11. Conclusions

This first nationally-representative study in Scotland into the prevalence of attacks on sheep by dogs and wildlife has found:

- **14% of sheep farmers said that dogs had attacked or chased their sheep in the previous 12 months.** These farmers indicated that they had experienced an average of 3.5 separate incidents over that period. Details they provided of their most recent incident suggests that, on average, each incident results in 1.58 sheep being killed, a further 0.51 having to be destroyed, a further 1.72 being injured, 0.34 ewes aborting, 1.02 instances of mis-mothering, and 28.04 sheep being stressed but physically uninjured. (It is worth noting that attacks by a group of (more than two) dogs were extremely rare).
- It is possible to extrapolate from these figures to produce an estimate of the total number of incidents. While this estimate gives some indication of the potential scale of the problem, it should be treated with considerable caution as it is subject to wide confidence intervals and the limitations of any survey of this nature (e.g. the potential for non-response bias and recall inaccuracies). Bearing those caveats in mind, the estimated total number of incidents of dogs chasing or attacking sheep in Scotland in the period 1 May 2018 to 30 April 2019 is around 7,000, with the true figure likely to be within the range of around 4,500 to 10,000.⁵⁸
- **37% of sheep farmers said that their sheep had been attacked, chased or preyed on by wildlife** in the previous 12 months. These farmers indicated that they had experienced an average of 9.4 separate incidents over that period. The impact on sheep and the nature of injuries clearly varies depending on the species of wildlife involved but details farmers provided of their most recent incident suggests that, on average, each incident results in 2.94 sheep being killed, a further 0.9 having to be destroyed, a further 1.3 being injured, 0.15 ewes aborting, 0.35 instances of mis-mothering, and 6.3 sheep being stressed but physically uninjured. Respondents were asked not to include the scavenging of dead sheep when reporting the numbers affected. However, it is not always easy to tell whether a sheep was already dead/dying so it may be that some of those reported as having been killed had already died from some other cause. Similarly, some of the sheep preyed on (particularly young lambs) may have been relatively weak and may not have survived anyway.
- It is possible to extrapolate from these figures to produce an estimate of the total number of incidents. Again, however, this estimate is subject to wide confidence intervals and the limitations of any survey of this nature (e.g. the potential for non-response bias and recall inaccuracies). Moreover, most

⁵⁸ The precise estimate is 7,257 with a lower estimate of 4,421 and an upper estimate of 10,093.

wildlife incidents are unobserved and farmers are generally only aware of incidents where the aftermath (e.g. the disappearance of a lamb or an injured sheep) is obvious. Bearing those caveats in mind, but to give some indication of the potential scale of the problem, the estimated total number of incidents of wildlife attacking, chasing or preying on sheep in Scotland in the period 1 May 2018 to 30 April 2019 is around 50,000, with the true figure likely to be in the range of around 45,000 to 55,000⁵⁹. While dog attacks have a significant impact on those who experience them, overall, sheep farmers perceive wildlife attacks as a bigger problem: 48% said wildlife attacks were a big/moderate problem for them personally compared with 25% for dog attacks. This, at least in part, reflects the greater prevalence of wildlife attacks.

Are attacks increasing?

This is the first time that the prevalence of attacks has been measured on a Scotland-wide basis so it is not possible to say whether the number of attacks is increasing or not. However, the study provides a baseline against which trends over time – and the impact of interventions – could potentially be measured. What the research shows is that there is certainly a perception amongst some sheep farmers that attacks – particularly wildlife attacks – are increasing: 47% thought wildlife attacks were increasing in their area compared with 35% who thought there was no change. Attacks by crows, ravens and foxes were the species most commonly thought to be increasing although there was considerable variation by area, reflecting the different distribution of species.

Thirty-eight per cent of farmers thought dog attacks in their area were increasing compared with 41% who thought there was no change. Increases were attributed to a higher number of irresponsible dog owners using the countryside.

The impact of attacks

Attacks by dogs and wildlife clearly cause considerable suffering to sheep and are therefore a concern from an animal welfare perspective. This is highlighted by the figures above on the number of sheep killed, injured and stressed by attacks.

This study also provides data on the time, financial and emotional impact on farmers.

Farmers typically spent around 5 and a half hours dealing with each incident (for both dog attacks and wildlife attacks). The most time consuming aspects were treating injured sheep and investigating the attack. Using agricultural wages to

⁵⁹The precise estimate is 50,243 with a lower estimate of 44,525 and an upper estimate of 55,962.

provide a notional cost of this time, the average time cost of each dog incident is £50.33, while the average time cost of each wildlife incident is £51.08.⁶⁰

In addition, and excluding time costs, the average financial cost of each dog attack to farmers was £697.33, while the average cost of each wildlife attack was £391.82. The biggest costs were the value of the lost sheep and (for dog attacks) the value of aborted lambs.

The estimated total cost to sheep farmers across Scotland each year is therefore around £5,500,000 for dog attacks and £22,500,000 for wildlife attacks.⁶¹ Again, these estimates should be treated with considerable caution as they are subject to wide confidence intervals and the limitations of any survey of this nature. It should also be noted that these are the estimated costs for sheep farmers only – they do not include the costs incurred by other agencies, for example, the police, courts or Scottish Natural Heritage.

This study also shows the considerable emotional impact of some attacks on farmers – an aspect on which there has been very little previous research. Eighty per cent farmers said the most recent dog attack had upset them a great deal or quite a lot and 70% percent said the most recent wildlife attack had upset them a great deal or quite a lot. Participants in the qualitative research emphasised the fact that they were, and *had* to be, resilient to dealing with traumatic incidents and shocking sights in their daily work, nonetheless the distress that attacks caused sheep farmers and their families was tangible. Indeed, the survey results showed that more experienced farmers and those with more sheep were just as upset by incidents. Beyond the immediate distress at seeing and dealing with their sheep's distressing injuries, farmers described the loss of their livestock as "soul-destroying", explaining this with reference to the hard labour that goes into nurturing their sheep, and the pride they take in this.

Generally speaking, attacks by dogs tended to incite a stronger emotional response among farmers than those by wildlife. They felt a greater sense of anger and frustration because such attacks were not inevitable and were attributable to the irresponsibility of the humans involved. However, participants were also keen to differentiate between the effects of wildlife species such as foxes which they could control, and protected wildlife species such as eagles and badgers which they could not control. While the former were most common, it was the latter which bothered farmers the most. Participants conveyed a sense of great frustration and

⁶⁰ Total cost to the sector is based on the average cost per incident multiplied by the estimated total number of incidents of 45,000 (see page 23).

⁶¹ The estimated total cost to sheep farmers is based on the average time cost of each attack plus the average financial cost of each attack multiplied by the estimated total number of attacks. The precise estimate for dog attacks £5,425,769 with a lower estimate of £3,305,405 and an upper estimate of £7,546,132. The precise estimate for wildlife attacks £22,252,625 with a lower estimate of £19,720,123 and an upper estimate of £24,785,570

helplessness where they were affected by wildlife species which they had no legal right to control. They were also frustrated at public agencies such as Scottish Natural Heritage which they felt did not appreciate their problems or care about their interests.

Preventing dog attacks

There are two main types of dog incident: those involving dogs belonging to visitors to the area who are with their dogs at the time, and those involving dogs owned by local residents which are allowed to roam freely and are unaccompanied at the time. Somewhat different approaches may be needed to tackle each type of incident.

There was anecdotal evidence that farmers and dog owners tend to have very different ideas about what dog behaviour constitutes a risk to sheep. There is thus a need for more public education campaigns which inform dog owners about the risks that all dogs can pose to sheep, about sheep behaviour and reactions, and the impact on sheep (particularly pregnant ewes) of what might seem relatively minor incidents. Related to this, the qualitative research revealed a considerable amount of confusion among farmers about what, if any, signage was permissible in light of the Land Reform (Scotland) Act 2003 (which farmers tended to refer to as the 'right to roam'). Clarity and advice on this issue would be beneficial, perhaps from SPARC or other organisations.

There was strong support among farmers for increasing the penalties for failing to have a dog under control; for requirements to keep dogs on leads within defined areas; and for greater powers to remove dogs from those who fail to control them.

The findings indicate that only around a third of dog attacks are currently reported to the police. The qualitative research revealed very mixed experiences of the police and courts' response to attacks and, consequently, about whether it was worth reporting an incident. There was a perception that the level of understanding of the problem, and the extent to which it was prioritised, varied by area and by individual officer. This suggests a need to encourage farmers to report incidents, to raise awareness of the issue among police officers and to improve the consistency of the police response.

Preventing wildlife attacks

Farmers' suggestions for preventing, or at least reducing, wildlife attacks were very much focused on controlling numbers of the predatory species that were problematic in their area. They were keen to point out that they did not wish to eliminate species that were causing problems – but to achieve what they would judge to be a better balance.

There was a perception that the Scottish Government and other relevant agencies (Scottish Natural Heritage, in particular) either did not understand the scale and impact of the problems, or prioritised other interests. This led to a considerable amount of both frustration and cynicism.

There is clearly a potential tension here between the interests of sheep and sheep farmers and the desire to protect and enhance the diversity of wildlife species. The insights from this study on the impact of wildlife attacks can help inform what must be an ongoing dialogue.

Appendix A: Questionnaire and Focus Group Schedule

Survey Questionnaire

Intro

All information that you give us will be treated in the strictest confidence and your identity will not be passed on to any third parties or connected to your answers in any way without your consent.

Taking part is completely voluntary – you are free to stop the survey at any time and to skip any questions you do not wish to answer. Your answers will be kept for up to one year, will be only accessible to the research team, and will be securely deleted once the research is finished.

ASK ALL

SINGLE CODE

Q1 Have any of your sheep ever been attacked or chased by dogs?

Yes	1
No	2
Don't know	3

ASK IF Q1=Yes (code 1)

SINGLE CODE

Q2 When was the last time this happened?

It has happened since 1 May last year (2018)	1
Longer ago than 1 May 2018 but less than 5 years ago	2
More than 5 years ago	3
Don't know	4

ASK IF Q2= Since 1 May last year (code 1)

SINGLE CODE

NUMERIC

Q3 On how many separate occasions have your sheep been chased or attacked by dogs since 1 May last year (2018)? If several sheep were affected on the same occasion, please treat this as one occasion. A later question will ask about the number of sheep affected.

If you're not sure, please give your best estimate.

Enter value: _____

[VALIDATION: IF Q3 > 30] Just to double check, you said this happened on <number> separate occasions since 1st May 2018. Is that correct?

- | | |
|--------------------------|---|
| Yes | 1 |
| No – please say how many | 2 |
| Don't know | 3 |

ASK IF Q2=SINCE 1 MAY 2018 (code 1)

MULTICODE OK [IF MORE THAN ONE AT Q3, IF ONE AT Q3 THEN SINGLE CODE]

NUMERIC

Q4 [IF ONE AT Q3] In which month did this incident occur? If you can't remember exactly, please give your best guess.

[IF MORE THAN ONE AT Q3] Please insert number of incidents in each month. If you can't remember exactly, please give your best guess.

May 2018

June 2018

July 2018

August 2018

September 2018

October 2018

November 2018

December 2018

January 2019

February 2019

March 2019

April 2019

May 2019

June 2019 [if survey date 1 June 2019 or later]

[VALIDATION: IF TOTAL NUMBER OF INCIDENTS NOT EQUAL TO RESPONSE AT Q3] You said you had had <number> incidents since 1 May 2018. Do you want to amend the number of incidents each month above, or amend the total number since 1 May 2018?

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

[IF Q3 > 1: We'd like to ask you about the most recent incident. (Asking everyone about their most recent incident will give us the most accurate overall picture. But if you have other incidents you wish to tell us about, or any other comments, there will be an opportunity later on in the survey.) Please just tell us about the most recent incident in [Insert most recent month with an incident].

SINGLE CODE

Q5 Were your sheep...?

- Chased but no physical contact 1
- Attacked 2

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

Q6 Do you have sheep on more than one holding?

- Yes 1
- No 2

ASK IF Q6= YES (code 1)

Q7 On which holding did this incident happen?

Please input the Parish and holding number (this should be a seven digit number – include leading 0s e.g.012/0004 if your parish number is 12 and your holding number is 4)

___ / _____

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

Q8 Did you personally witness the incident?

- Yes – all of it 1
- Yes – part of it 2 ASK
- No – just the aftermath 3 IF

Q8= Code 2 or Code 3

SINGLE CODE

Q9 Did anybody else witness the attack?

- Yes – someone else saw all of it 1
- Yes – someone else saw part of it 2

Don't know/Not that I am aware of 3

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

NUMERIC

Q10 How many dogs were involved?

Enter value 1

Don't know 2

[VALIDATION: IF Q10= >4 AT CODE 1] You said <number> of dogs were involved in this particular incident. Is that correct?

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

Q11 As far as you are aware, [IF Q10 = 1 AT CODE 1 OR DON'T KNOW, was the dog]/[IF Q10 >1 AT CODE 1, were the dogs] accompanied by anyone at the time?

Yes 1

No 2

Don't know 3

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

Q12 Who did the dog [IF Q10 >1 AT CODE 1, dogs] belong to?

A neighbouring farm/croft	1
Another local resident	2
A visitor to the area	3
The [dog was] [IF Q10 >1 AT CODE 1, dogs were] the responsibility of a commercial dog walker	4
The [dog was]/[IF Q10 >1 AT CODE 1, dogs were] stray	5
Other	6
I don't know	7

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

MULTICODE OK

ASK AS LOOP

Q13 How were your sheep affected?

	None affected this way	Insert number affected [VALIDATION: IF > 99] Just to double check, you said <number> sheep were affected in this way on this particular incident. Is that correct?
Sheep killed		
Sheep had to be destroyed/ euthanised		
Sheep injured		
Sheep aborted		
Mis-mothering occurred		
Sheep stressed but physically uninjured		

FOR EACH ROW ABOVE (APART FROM SHEEP ABORTED), WHERE NUMBER AFFECTED IS ONE ASK:

What kind of sheep was this?

Ewe (pregnant or lactating/with lamb at foot)

Non-pregnant dry ewe or gimmer

Lamb (under 1 year old)

Hogget

Ram / tup

FOR EACH ROW ABOVE (APART FROM SHEEP ABORTED), WHERE NUMBER AFFECTED IS TWO OR MORE ASK:

What kind of sheep were they? Please insert number of each.

[VALIDATION: IF > 99] Just to double check, you said <number> sheep were affected in this way on this particular incident. Is that correct?

Ewes (pregnant or lactating/with lambs at foot)

Non-pregnant dry ewes or gimmers

Lambs (under 1 year old)

Hoggets

Rams / tups

Please insert the total number of different sheep affected by this incident

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

SINGLE CODE

Q14 How many sheep were in the group, including any not affected, at the time? If you are not sure, please give your best guess.

- Enter value **1**
- Soft check on >200 **2**
- Don't know/Can't remember **3**

ASK IF Q2= SINCE 1 MAY 2018 (code 1)

MULTICODE OK

Q15 Thinking specifically about this incident, approximately how long did you spend dealing with it in hours and minutes? If you are not sure, please give your best estimate.

Activity	Estimated time (hours)	(minutes)
Investigating the attack		
Talking to the dog owner		
Reporting the incident to police/speaking to police		
Making arrangements with the vet		
Making arrangements for the disposal of the carcasses		

Can't remember 3

Q20 How much did this incident personally upset you, if at all?

SINGLE CODE

It upset me a great deal	1
It upset me quite a lot	2
It upset me a little	3
It did not upset me at all	4

These next questions are about predation and attacks on your sheep by wildlife.

ASK ALL

SINGLE CODE

Q23 Have any of your sheep ever been attacked, chased or preyed on by any other animals or birds, other than dogs? Please just include attacks on live sheep, not scavenging of dead sheep.

Yes	1
No	2
Don't know	3

ASK IF Q27 = YES (CODE 1)

SINGLE CODE

Q24 When was the last time this happened?

It has happened since 1 May last year (2018)	1
Longer ago than 1 May 2018 but less than 5 years ago	2
More than 5 years ago	3
Don't know	4

ASK IF Q24= CODE 1

SINGLE CODE

Q25 On how many separate occasions were your sheep attacked, chased or preyed on by other animals or birds, since 1 May last year (2018)? If several sheep were affected on the same occasion, please treat this as one occasion. A later question will ask about the number of sheep affected.

If you're not sure, please give your best estimate.

Enter value

[VALIDATION: IF Q25 >30] Just to double check, you said this happened on <number> separate occasions since 1st May 2018. Is that correct?

Yes	1
No – please state the correct number of occasions	2

Q26 MULTICODE OK [IF MORE THAN ONE AT Q25, IF ONE AT Q25 THEN SINGLE CODE]

NUMERIC

Q26 [IF ONE AT Q25] In which month did this incident occur? If you can't remember exactly, please give your best guess.

[IF MORE THAN ONE AT Q25] Please insert number of incidents in each month. If you can't remember exactly, please give your best guess.

May 2018

June 2018

July 2018

August 2018

September 2018

October 2018

November 2018

December 2018

January 2019

February 2019

March 2019

April 2019

May 2019

June 2019 [if survey date 1 June 2019 or later]

VALIDATION IF IT DOESN'T ADD UP TO TOTAL NUMBER OF INCIDENTS REPORTED AT Q25: You said you had had <number> incidents since 1 May 2018. Do you want to amend the number of incidents each month above, or amend the total number since 1 May 2018?

ASK IF Q24= CODE 1

[IF MORE THAN 1]: We'd like to ask you about the most recent incident. (Asking everyone about their most recent incident will give us the most accurate overall picture. But if you have other

incidents you wish to tell us about, or any other comments, there will be an opportunity later on in the survey.) Please just tell us about the most recent incident in [Insert most recent month with an incident].

Q27 Were your sheep...?

SINGLE CODE

- Chased but not attacked 1
- Attacked 2

ASK IF Q24= CODE 1

Q28 What species do you think was involved? Please select one answer.

SINGLE CODE ONLY

Unsure/I don't know	
Fox	
Crow	
Raven	
Badger	
Golden eagle	
White-tailed sea eagle	
Black backed gull	
Skua	
Other species (please say which)	

ASK IF Q24= CODE 1 AND DO NOT ASK IF Q6= NO (CODE 2)

SINGLE CODE

Q29 Do you have sheep on more than one holding?

- Yes 1
- No 2

ASK IF Q29= Yes (code 1)

NUMERIC

Q30 On which holding did this incident happen?

Please input the Parish and holding number

(This should be a seven digit number – include leading 0s e.g.012/0004 if your parish number is 12 and your holding number is 4)

___ / _____

ASK IF Q24= CODE 1

MULTICODE OK

ASK AS LOOP

Q31 Just thinking about the incident with the [insert species at Q28 unless unsure/don't know], how were your sheep affected?

On each row, please tell us the number affected.

	None affected this way	Insert number affected [VALIDATION: IF > 99] Just to double check, you said <number> sheep were affected in this way in this particular incident. Is that correct?
Sheep killed		
Sheep had to be destroyed/ euthanised		
Sheep injured		
Sheep aborted		
Mis-mothering occurred		
Sheep stressed but physically uninjured		

FOR EACH ROW ABOVE (APART FROM SHEEP ABORTED), WHERE NUMBER AFFECTED IS ONE ASK:

What kind of sheep was this? Was it a....?

SINGLE CODE

Ewe (pregnant or lactating/with lamb at foot)	1
Non-pregnant dry ewe or gimmer	2
Lamb (under 1 year old)	3
Hogget	4
Ram / tup	5

NUMERIC

FOR EACH ROW ABOVE (APART FROM SHEEP ABORTED), WHERE NUMBER AFFECTED IS TWO OR MORE ASK:

What kind of sheep were they? Please insert number of each.

Ewe (pregnant or lactating/with lamb at foot)	Enter value
Non-pregnant dry ewe or gimmer	Enter value
Lamb (under 1 year old)	Enter value
Hogget	Enter value
Ram / tup	Enter value

Please insert the total number of different sheep affected by the incident

ASK IF Q24= CODE 1

SINGLE CODE

Q32 Did you personally witness the incident?

Yes – all of it	1
Yes –part of it	2
No – just the aftermath	3

ASK IF Q32= code 2 or 3

SINGLE CODE

Q33 Did anybody else witness the attack?

Yes – somebody else saw all of it	1
Yes – somebody else saw part of it	2
Don't know/not that I am aware of	3

ASK IF Q24= CODE 1

MULTICODE OK

NUMERIC

Q34 Thinking specifically about this incident, approximately how long did you spend dealing with it in hours and minutes? If you are not sure, please give your best estimate.

Activity	Estimated time (hours)	(minutes)
Investigating the attack		
Making arrangements with the vet		
Making arrangements for the disposal of the carcasses		
Personally treating injured sheep		
Moving sheep to/from a different area		
Replacing the lost sheep		
Making an insurance claim		
Other time spent related to the incident (please say what)		
I did not spend any time on it		

ASK IF Q24= CODE 1

MULTICODE OK

NUMERIC

Q35 Thinking specifically about this incident, approximately what was the financial cost, if any, of the incident to you? If you are not sure, please give your best estimate.

Type of cost	Estimated cost (£)
Veterinary bill	
Other treatment costs (e.g. medicines/dressings) not through vet	
Disposing of/transporting carcasses	
Lost value of sheep	
Value of aborted lambs	
Other costs (please specify)	
There was no financial cost	
I don't know/can't remember and I really can't give an estimate	

ASK IF Q24= CODE 1

SINGLE CODE/NUMERIC

Q36 If you received any money from an insurance claim or any other compensation in connection with the incident, please say how much.

INSERT AMOUNT

1

I did not receive any money 2

ASK IF Q24= CODE 1

SINGLE CODE

Q37 Did you/do you intend to make an insurance claim?

- Yes 1
- No 2
- Don't know 3

ASK IF Q24= CODE 1

SINGLE CODE

Q38 How much did this incident personally upset you, if at all?

SINGLE CODE

- It upset me a great deal 1
- It upset me quite a lot 2
- It upset me a little 3
- It did not upset me at all 4

ASK ALL

Q43

SINGLE CODE FOR EACH STATEMENT

Have you put any of the following measures in place to try to prevent attacks by dogs?

	Yes (1)	No (2)
Signs for dog owners/walkers to encourage responsible management of dogs		
Notices highlighting the lambing period		
Moving sheep to a different area		
Talking to dog owners		
Other (please say what)		

ASK AS LOOP For each measure coded "Yes" (CODE 1 AT Q43):

And overall how effective do you think this has been?

- Very Effective 1
- Fairly Effective 2
- Not very Effective 3
- Not at all Effective 4
- Too early to tell 5
- Don't know 6

ASK
ALL

SINGLE CODE FOR EACH MEASURE

ASK Q44-Q46 AS A LOOP FOR EACH MEASURE

Q44 Have you put any of the following measures in place to try to prevent attacks by wildlife?

	Yes	No
Additional fencing/barriers to protect sheep		
Moving sheep to a different area		
Devices to scare/deter predators		
Shooting predators		
Wildlife traps		
Working with a "fox control club"		
Working with local gamekeeper		
Other (please say what)		

ASK FOR EACH MEASURE CODED YES AT Q44

Q45 Which species was this to prevent attacks by?

MULTICODE

- Fox 1
- Crow 2
- Raven 3
- Badger 4
- Golden eagle 5
- White-tailed sea eagle 6
- Black backed gull 7
- Skua 8
- Other species (please say which) 9
- I don't know 10

FOR EACH SPECIES CODED AT Q45

Q46 And how effective do you think the measure[s] you have put in place [have]/[has] been

- Very Effective **1**
- Fairly Effective **2**
- Not very Effective **3**
- Not at all Effective **4**
- Too early to tell **5**
- Don't know **6**

ASK ALL

Q47 Overall, how much of a problem do you think dog attacks are for....

	A big problem	A moderate problem	A relatively minor problem	Not a problem	Don't know
You, personally?					
Other sheep farmers in your area?					

ASK ALL

SINGLE CODE FOR EACH ROW

Q48 Overall, how much of a problem do you think wildlife predations and attacks are for....

	A big problem	A moderate problem	A relatively minor problem	Not a problem	Don't know
You, personally?					
Other sheep farmers in your area?					

ASK ALL

SINGLE CODE FOR EACH ROW

Q49 Do you think the following are increasing or decreasing....

	Increasing a lot (1)	Increasing a little (2)	No change (3)	Decreasing a little (4)	Decreasing a lot (5)	Don't know (6)	Not applicable/species not present in the area (7)
a) Dog attacks in your area?							
b) Wildlife attacks in your area?							

ASK IF Q49 b =Code 1 or Code 2

ASK Q50a-Q50b AS A LOOP

MULTICODE OK

Q50a Attacks by which species of wildlife are increasing?

- Foxes 1
- Crows 2
- Badgers 3
- Ravens 4
- Golden eagles 5
- White tailed eagles 6
- Black backed gulls 7
- Skuas 8
- Another species (please say what) 9

For each species mentioned:

Q50b And are they increasing a lot or a little?

- A Little 1
- A lot 2

Focus Group Schedule

1. INTRODUCTION (5 MINS)

- Introduce self and Ipsos MORI
- Introduce the research: Thank participants for completing the survey and for giving up their time this evening to take part in the group.

This research has been commissioned by the Scottish Government following the survey, to explore your views and experiences of sheep attacks in a little more depth.

The Scottish Government are keen to get a better understanding of the issue and of the impact of sheep attacks on sheep farmers so this can inform policies and initiatives in this area.

- Practicalities:
 - Explain that the group will last around 90 minutes
 - Provide reassurances of anonymity and confidentiality. Explain that no information about individuals will be passed on to anyone outside the research team.
 - You will get £35 as a “thank you” for your time
 - No right or wrong answers. Give everyone a chance to speak.
 - Request permission to record interview.
- Any questions you’d like to ask before we start?

2. BACKGROUND INFORMATION ON PARTICIPANTS (5 MINS)

Perhaps before we begin you could each just introduce yourself....

So, could you each tell me your name, where you live, how long you’ve kept sheep, and how many sheep you currently have. [Reassure participants that we are equally interested in all flock sizes if big differences]

3. IMPACT OF ATTACKS/ DOG VS WILDLIFE ATTACKS (20 MINS)

Firstly, if we could just begin by very briefly saying how much experience you’ve had of dog and wildlife attacks.

PROBE: Were they one-off or repeated attacks? Which wildlife species? .

EMOTIONAL IMPACT OF ATTACKS BY DOGS

For those of you who’ve experienced an attack **by a dog** on your sheep could you describe what happened?

How did it made you feel?

PROBE IF NECESSARY:

Did you feel upset or distressed?

Did you feel shocked, or were you unsurprised?

Did you feel frustrated or helpless?

Did you feel angry? Who/what did you feel angry about?

Did you feel anxious? What were you anxious about?

Or did you feel accepting of it?

PROBE ON EACH: Which aspect most [upset/angered/shocked etc.] you?

Was anybody else affected? Family members? Anyone else?

IF HAD MORE THAN ONE ATTACK: Have your feelings changed after subsequent attacks compared to after the first attack?

And *since* the incident, could you describe how you have felt/what impact if any the incident has had on you?

PROBE IF NECESSARY: Whether felt anxious, stressed, worried about sheep, worried about finances, concerned about future of business, frustrated/angry towards dog owners/about the law.

Has it affected your attitude to sheep farming?

EMOTIONAL IMPACT OF ATTACKS BY WILDLIFE

For those of you who've experienced an attack by a wildlife species on your sheep could you describe what happened, most recently, and how it made you feel...

...at the time or shortly after the incident? PROBE IF NECESSARY

Did you feel upset or distressed?

Did you feel shocked, or were you unsurprised?

Did you feel frustrated or helpless?

Did you feel angry? Who/what did you feel angry about?

Did you feel it could have been avoided/ it was anybody's fault?

Did you feel anxious? What were you anxious about?

Or did you feel accepting of it?

PROBE ON EACH: Which aspect most [upset/angered/shocked etc.] you?

Was anybody else affected? Family members? Anyone else?

IF HAD MORE THAN ONE ATTACK: Have your feelings changed compared to after the first attack?

And *since* the incident, could you describe how you have felt/what impact if any the incident has had on you?

PROBE IF NECESSARY: Whether felt anxious, stressed, worried about sheep, worried about finances, concerned about future of business, frustrated/angry towards /about the law.

Has it affected your attitude to sheep farming?

DIFFERENCES BETWEEN DOG AND WILDLIFE ATTACKS:

Do you feel the same way about an attack by a dog as an attack by a wildlife species or would you see them differently?

IF DIFFERENT Why is this? What makes the dog attack different?

PROBE: The involvement of the dog owner?

Do you feel differently about wildlife attacks depending on which species it is?
Or depending on whether it's a repeated attack?

4. SUPPORT (10 MINS)

Did you talk to anybody at the time about the attack? Who did you speak to?

Did you receive any kind of emotional support? (for want of a better word) Who from?

PROBE IF NECESSARY:

Family

Friends/neighbours

Local community

Other local farmers

Online

Sheep/farming association

NFUS

SNH

Young Farmers

What other emotional support would be helpful to you in dealing/coping with the effects of attacks?

Who would you like to provide this? Why?

And are there any other forms of practical support that would be helpful to you in dealing with effects of an attack?

PROBE: Support with specific tasks? Swift veterinary attention?

Help dealing with carcasses/clean-up? Help with labour to cover other tasks?

5. REPORTING TO POLICE (10 MINS)

Have any of you ever reported a dog incident to the police?

IF YES: Could you tell me a bit about what happened. Why did you make this decision?

IF NO BUT HAD AN INCIDENT: Why not?

What do you think would happen if you reported it to the police?

PROBE: Do you have any concerns about the implications of a report?

IF THINK NOTHING WOULD HAPPEN: Why do you have that impression? What would encourage you to report an incident to the police?

Do you know of anybody else who has reported an attack to the police?

Our survey found that only about a third of dog attacks are reported to the police. Why do you think that is?

6. MAKING AN INSURANCE CLAIM (10 MINS)

Has anyone here tried to make an insurance claim in relation to a dog or a wildlife attack?

IF YES: Could you tell me a bit about the incident or incidents? Why did you make this decision?

How did you find the process?

What was the outcome of the claim? Were you happy with the amount you received?

Those who have not (but have had an incident): Why haven't you made an insurance claim?

IF THOUGHT IT WOULDN'T BE WORTH IT: Why did you have this impression?

7. ANY OTHER IMPACTS (5 mins)

The survey covered the impact of attacks in terms of time and cost, and we've talked about the emotional impact, but are there any other ways you feel attacks by dogs or wildlife have affected you, your business, and/or your family?

PROBE: How have these impacts changed as a result of multiple attacks among those of you who've had repeated attacks?

8. ATTITUDES TO PREVENTION AND MITIGATION MEASURES (10 MINS)

DISTRIBUTE RESULTS OF THE SURVEY ON SUPPORT FOR MEASURES FOR DOG AND WILDLIFE ATTACKS.

E.g. Just 50% thought greater public provision of suitable spaces for dog owners to allow dogs off-lead exercise should be a priority.

61% think enhanced compensation schemes for losses should be a priority

72% thought changing the protected status of some species should be a priority

In the survey, there was more support for some measures than others. Do these results surprise you?

Have you had personal experience of any of these measures?

Do you agree or disagree with the choice of priorities?

Why do you think some received less support?

Are there any measures that you think should be on the list but are not?

9. AWARENESS OF PREVENTION GUIDANCE WOULD FIND HELPFUL (10 MINS)

How do you find out about ways to prevent attacks? Do you talk to other people about it?

PROBE IF NECESSARY:

Family

Friends/neighbours
Local community
Other local farmers
Online
 Farming press
Other literature
Sheep/farming association
NFUS
SNH
Young Farmers

Are you aware of any other places you could turn to for support or advice?

Would you ever consider using any of these?

Have you any suggestions for ways to improve access to help and advice? Or the quality of help and advice?

10. CLOSE

Thank participants for their time.

Any final comments they would like to add before we finish up?

Distribute incentives.

Appendix B: Attacks by which wildlife species are thought to be increasing by region (Base: All those who think wildlife attacks are increasing in their area).

*small base

**very small base, not eligible for significance testing

In red – statistically significantly higher than the mean for Scotland

	Scotland	Argyll and Bute	Ayrshire	Clyde Valley	Dumfries and Galloway	East Central	Eileanan an Iar	Fife	Highland	Lothian	NE Scotland	Orkney	Scottish Borders	Shetland	Tayside
Base	913	79*	47*	44*	116*	34**	105*	10**	193	16**	99*	22**	83*	25**	65*
Foxes	41%	47%	45%	66%	53%	56%	-	63%	53%	64%	58%	-	50%	-	62%
Crows	53%	50%	65%	50%	62%	54%	45%	80%	49%	68%	51%	54%	61%	56%	68%
Badgers	33%	18%	24%	53%	61%	36%	-	46%	24%	41%	78%	-	83%	-	30%
Ravens	48%	68%	65%	32%	39%	33%	64%	17%	59%	23%	15%	72%	21%	48%	44%
Golden eagles	7%	3%	-	-	-	-	31%	-	5%	-	-	-	-	-	4%
White tailed eagles	23%	49%	-	-	1%	5%	59%	9%	38%	-	-	-	2%	-	3%
Black backed gulls	20%	20%	30%	6%	9%	7%	17%	29%	22%	12%	13%	55%	5%	80%	9%
Skuas	5%	-	-	-	-	-	-	-	2%	0%	0%	11%			
Another species	9%	9%	8%	14%	6%	10%	14%	-	10%	-	8%	7%	5%	3%	9%

Appendix C. Species thought to be responsible for most recent attack by region

*small base

**very small base, not eligible for significance testing

In red – statistically significantly higher than the mean for Scotland

Unweighted total	Scotland	Argyll and Bute	Ayrshire	Clyde Valley	Dumfries and Galloway	East Central	Eileanan an Iar	Fife	Highland	Lothian	NE Scotland	Orkney	Scottish Borders	Shetland	Tayside
Base	840	68*	52*	40*	117*	36**	49*	11**	176	16**	71*	19**	86*	36*	63
Unsure/don't know	3%	-	2%	9%	1%		2%	-	3%	-	9%	5%	1%	-	5%
Fox	25%	31%	24%	46%	24%	41%	-	20%	34%	38%	23%	-	27%	-	51%
Crow	20%	9%	27%	29%	34%	38%	15%	39%	11%	38%	21%	36%	26%	9%	15%
Raven	19%	35%	33%	3%	15%	9%	42%	5%	21%	4%	5%	19%	6%	10%	5%
Badger	11%	4%	6%	9%	21%	8%	-	20%	6%	8%	32%	-	30%	-	12%
Golden eagle	1%	-	-	-	-	-	13%	-	-	-	-	-	-	-	1%
White tailed sea eagle	6%	13%	-	-	-	-	16%	-	14%	-	-	-	-	-	1%
Black backed gull	6%	2%	3%	-	1%	2%	7%	-	5%	4%	3%	28%	3%	28%	1%
Skua	3%	-	-	-	-	-	-	-	-	-	-	3%	-	38%	-
Another species	7%	8%	5%	3%	3%	2%	5%	15%	7%	8%	7%	9%	6%	14%	8%

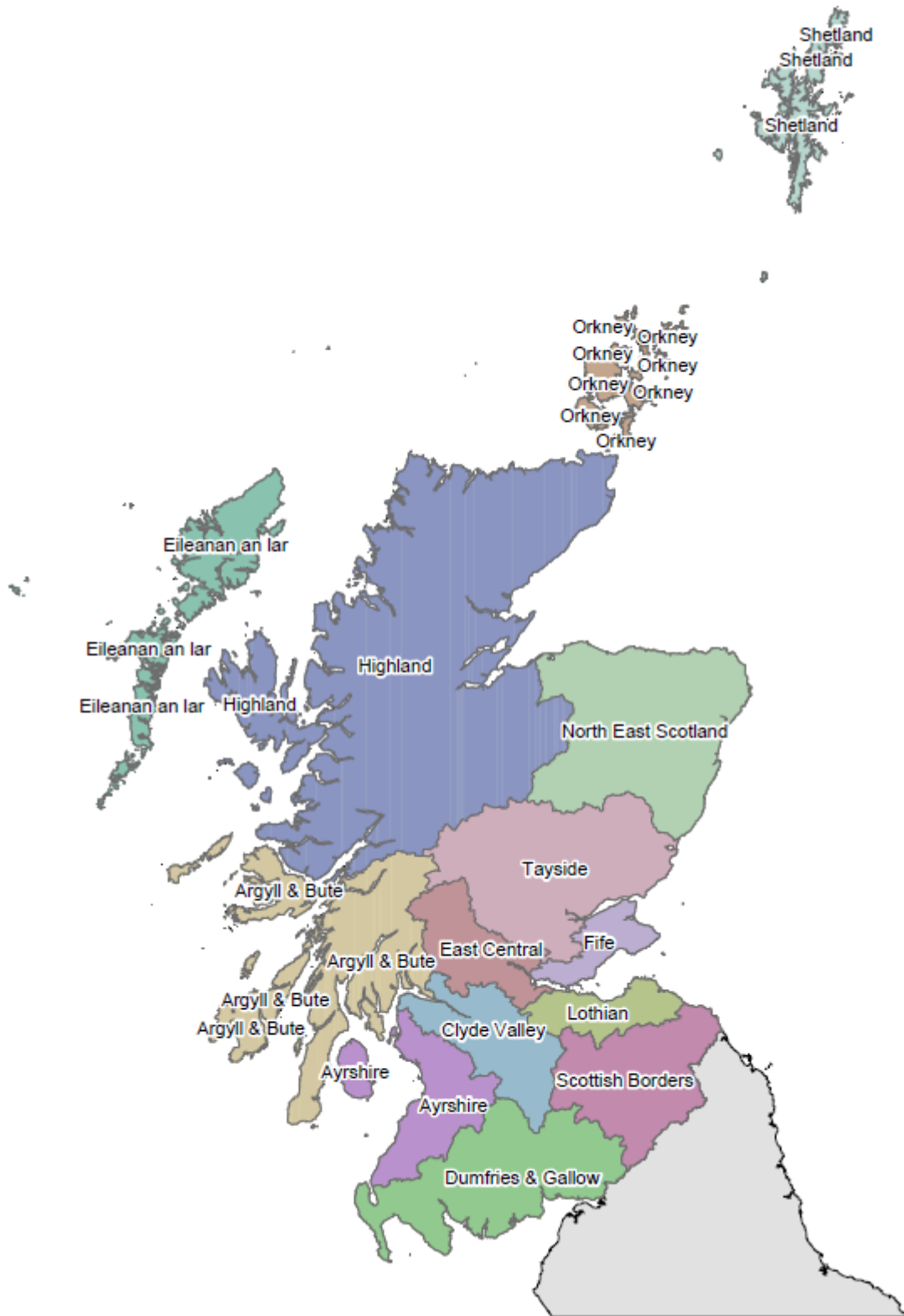
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Appendix E: Map of regions



Appendix F: Cognitive Testing Findings

The cognitive testing of the survey took place between 4th and 27th March 2019. The survey questions were tested through in-depth telephone interviews with a total of twenty sheep farmers recruited to encompass a mix of regions across Scotland, a range of farm sizes (from those with 1-20 sheep up to those with 750+ sheep) and a mixture of LFA and Non-LFA land. Fifteen of the participants were recruited from the mainstage sample, while the remaining five were recruited through informal connections and networks. We split the survey into sections, asked participants the questions, then asked how they found each section. We also probed on specific points. We achieved a good mix of farm sizes, and spoke to farmers in all regions of Scotland, as outlined below.

Farm size (number	1-20	21-150	151-750	750+
	3	6	6	5

Region	NE Scotland	Eastern	South Western	Highlands and
	4	6	2	8

This document summarises the main findings relating to the questions. The findings – and suggested amendments and potential solutions to problems identified – should be considered in the context of the questionnaire currently being too long.

Most of the participants had experienced one incident (either a dog attack or a wildlife attack) in the past year and so were asked the detailed questions about that incident. The survey was initially taking 25-30 minutes with those participants and then 20-25 minutes when we skipped some of the questions or some of the response options. It was taking around 12-15 minutes with those who had not experienced any incidents. This is considerably longer than the average of 10 minutes which we had anticipated. It was partly because the participants were keen to talk about the incidents and the topic in general, so gave additional details and comments (which was interesting and useful – and bodes well for the response rate) and partly because they took some time to consider their responses to some questions. However, we clearly need to cut the length. We have made a number of suggestions below about what could be cut: whole questions in some cases and reducing the response options in other cases.

Question	Issues identified	Proposed change
<p>Q1 On what type of land are your sheep?</p> <ul style="list-style-type: none"> • Fully Open land or common grazing (no inbye) • Open hill or common grazing with all/some of lambing inbye/partly enclosed land • Fully enclosed 	<p>Participants found it quite difficult to choose from the answer options on this question. In particular, some commented that they found it difficult to recall the second answer option “Open hill or common grazing with all/some of lambing inbye/partly enclosed land” and asked for it to be repeated. Further, some participants commented that they thought common grazing was extremely rare, and indeed nobody described their land as “common grazing”.</p>	<p>We propose changing the answer options to:</p> <ul style="list-style-type: none"> • Fully open land (no inbye) • Open land with all/some lambing inbye • Fully enclosed <p>We tested these shortened answer options with some of the participants and they worked much better.</p> <p>We also propose moving the position of this question from the beginning to the end of the survey, to follow the question “Do you have any other suggestions for measures to prevent dog and/or wildlife attacks?” as one participant said she had not experienced any attacks when what she meant was that she had not experienced any attacks <i>on her current farm</i>. She was thinking about her current farm because we had just asked about the type of land. Moving the question to the end avoids this issue.</p>
<p>Q3 Is there a track or path which is regularly used by dog walkers close to any of your sheep?</p>	<p>Although this question generally worked well, a few respondents asked for clarification on whether they should include roads in their answer.</p>	<p>We propose amending the wording of the question to “Is there a track or road which is regularly used by dog walkers close to any of your sheep?”</p>

	<p>However, it is worth noting that respondents said ‘yes’ even if there were very few dog walkers (e.g. two a day). One option might be to ask a follow up question about how many there are, but this would add to the length.</p>	<p>We tested this new version of the question with some participants and it worked well.</p> <p>We also propose moving this question to the final section of the survey, before the above question about type of land.</p>
<p>Intro to questions on dog/wildlife attack incidents: “We’d like to ask you about the most recent incident, but we’ll give you the opportunity to tell us about other incidents later on if you would like to. Please tell us about the most recent incident in [insert most recent month with an incident].”</p>	<p>Some participants talked about or make reference to incidents in addition to their most recent incident in this section.</p>	<p>We propose amending this instruction to emphasise that participants should <i>only</i> discuss their most recent incident in this part of the survey. We suggest rewording to “Please just tell us about the most recent incident”</p>
<p>Q12/Q32 Where did it happen?</p>	<p>When asked to input their holding number some respondents found it difficult to recall the number in full.</p> <p>Amongst those who could recall their holding numbers, some gave numbers shorter than seven digits long, as they did not include the full number of 0s in their answer.</p>	<p>Since we hold information on one (main) holding connected with each respondent, and most will not have more than one holding in total, it should generally not be necessary to ask respondents to provide their holding number; and the issues identified in cognitive testing can thus be avoided.</p> <p>We therefore propose amending this question to “Do you have sheep on more than one holding?” and only if they answer “Yes” to this question, to ask them the follow</p>

		<p>up question: “On which holding did this incident happen?” with the instruction “Please input Parish and holding number (this should be a seven digit number – include leading 0s e.g. 012/0004 if your parish number is 12 and your holding number is 4.”</p> <p>In the online version we would provide a box with three followed by four spaces for respondents to input their holding number where necessary, to ensure respondents input the right number of digits.</p> <p>: ___/_____</p>
<p>Q21/Q37 How were your sheep affected? On each row, please tell us the number affected</p> <ul style="list-style-type: none"> • Sheep killed • Sheep had to be destroyed/euthanised • Sheep injured • Sheep aborted • Mis-mothering occurred • Hefted sheep displaced • Sheep stressed but physically uninjured 	<p>In this question, “Hefted sheep displaced” caused some confusion amongst respondents. Several asked for clarification as to what was meant by this, and one commented that it would be impossible for farmers with larger numbers of sheep to know when the sheep had moved and to link it to an attack as sheep are only counted every few weeks.</p> <p>Another issue with this question was that some respondents made reference to effects on their sheep from incidents other than the most recent incident</p>	<p>Part way through the cognitive testing, we amended “Hefted sheep displaced” to “Sheep displaced and did not return themselves”, but some respondents continued to query this. Nobody cited this as an effect of a dog or wildlife attacks and we feel that where it did happen, it would be captured in the later question about time spent dealing with the incident. So we propose removing this effect from the list of answer options.</p> <p>To emphasise that we want to hear just about the most recent incident in this part of the survey we propose amending the question to read “Again, just thinking about</p>

	when asked about their most recent incident.	this last incident with the [input species], how were your sheep affected?]? “
<p>Q21/Q37 What kind of sheep was this?</p> <ul style="list-style-type: none"> • Ewe (pregnant or lactating/with lamb at foot) • Non-pregnant dry ewe • Lamb (under 1 year old) • Ram/tup 	<p>Most participants commented that these terms did not encompass all those they would use to describe their sheep. They suggested the addition of “gimmers” and “hoggets”.</p>	<p>We propose updating the list to:</p> <ul style="list-style-type: none"> • Ewes (pregnant or lactating/with lambs at foot) • Non-pregnant dry ewes or gimmers • Lambs (under 1 year old) • Hoggets • Rams/tups <p>We tested this in some interviews and it seemed to work well.</p>
<p>Q22/Q42 Thinking specifically about this incident, approximately how long did you spend dealing with it? If you are not sure please give your best estimate</p>	<p>A few participants referred to treating their sheep themselves (as opposed to solely having it treated by a Vet) in this question.</p>	<p>We propose adding an answer option “Personally treating the injured sheep”</p>
<p>Q23/Q41 Thinking specifically about this incident, approximately what was the financial cost, if any of the incident to you?</p>	<p>A few participants indicated that in some instances farmers may treat sheep or administer medicine themselves and this may be a cost not accounted for on the existing list of potential costs.</p> <p>“Value of lost sheep” does not cover a reduction in value of a sheep which has</p>	<p>We propose adding “Other treatment costs (e.g. medicines/dressings) not through vet”</p> <p>We propose changing “Value of lost sheep” to “Lost value of sheep”.</p> <p>We tested these amendments with some participants and they worked.</p>

	<p>been injured (e.g. lost an eye) but not lost.</p> <p>One farmer said he had received £300 compensation from the dog owner.</p>	<p>Adding “If you received any money from an insurance claim and/or any other compensation, please say how much you received”.</p>
<p>Q38 What species do you think was involved?</p> <ul style="list-style-type: none"> • Unsure • Fox • Crow • Raven • Badger • Golden eagle • White-tailed sea eagle • Other species (please say which) • I don’t know 	<p>A couple of participants talked about attacks by “bonxies”. (i.e. skua) and black backed gulls.</p>	<p>We propose adding “skua” and “black backed gull”.</p>
<p>Q46 Have you put any of the following measures in place to try to prevent attacks by dogs?</p> <ul style="list-style-type: none"> • Signs for dog walkers to encourage responsible management of dogs • Signs to highlight where it is NOT suitable to allow dogs off lead/out of heel • Signs where it is suitable to allow dogs off lead/out of heel 	<p>We found this list of measures took a very long time to read out over the telephone and a large number of the measures had not been taken by any participants.</p> <p>One measure not included however, came up spontaneously numerous times – talking to dog owners/walkers.</p>	<p>To shorten the survey, and to ensure the question is relevant to respondents, we propose shortening the answer options list to:</p> <ul style="list-style-type: none"> • Signs for dog owners/walkers to encourage responsible management of dogs • Notices highlighting the lambing period • Additional fencing/barriers to protect sheep

<ul style="list-style-type: none"> • Notices highlighting the lambing period • Signs to redirect the public along alternative routes • Redirecting the public along alternative routes through the use of fences/stiles • Cameras to monitor the area • Additional fencing/barriers to protect sheep • Moving sheep to a different area • Other (please say what) 		<ul style="list-style-type: none"> • Talking to dog owners/walkers • Other (please say what) <p>We tested this in the latter stage of cognitive testing and it seemed to work well. The “other” answer option ensures that the results should still reflect the full range of measures taken.</p>
<p>Have you put any of the following measures in place to try to prevent attacks by wildlife?</p> <ul style="list-style-type: none"> • Cameras to monitor the area • Additional fencing/barriers to protect sheep • Moving sheep to a different area • Devices to scare/deter predators • Shooting predators • Wildlife traps • Taste aversion bait • Scottish National Heritage (SNH) licensed control 	<p>A couple of the measures in this question caused confusion amongst participants. Many respondents expressed uncertainty about what “Taste aversion bait” was and none of the 20 farmers interviewed had used it.</p> <p>There was also considerable confusion around the “Scottish National Heritage (SNH) licensed control” with a majority of participants asking for clarification of what this was and nobody having used it.</p> <p>Further, only one participant had used cameras to monitor the area.</p>	<p>We propose removing “Taste aversion bate”, “SNH Licensed Control” and “Cameras to monitor the area” from the list of answer options. We tested this in the latter phase of the cognitive testing and the shortened list appeared to work well. As with the previous question, the “Other” answer option will give respondents the possibility to mention any measures not listed.</p>

<ul style="list-style-type: none"> • Working with a “fox control club” • Working with a local gamekeeper • Other (please say what) 		
<p>Q51 Do you think the following are increasing or decreasing...</p> <ul style="list-style-type: none"> • Dog attacks in your area • Attacks by foxes • Attacks by crows • Attacks by badgers • Attacks by ravens • Attacks by golden eagles • Attacks by white tailed eagles • Are attacks by any other species increasing? Please state which <p>(Increasing a lot, increasing a little, no change, decreasing a little, decreasing a lot, don't know)</p>	<p>This question was very long to read out and many respondents answered “Not applicable” to most of the wildlife species cited as the species were not present in their area.</p>	<p>We propose amending this question to “Do you think the following are increasing or decreasing...</p> <ul style="list-style-type: none"> • Dog attacks in your area • Wildlife attacks [If yes, which species?]” <p>We tested this new version of the question with a few participants and it worked well.</p>
<p>Q53 How effective do you think the following measures would be at reducing attacks by dogs?</p> <ul style="list-style-type: none"> • Requirement to keep dogs (other than working dogs) on leads at all times within 	<p>In the cognitive testing, a large number of respondents wanted to give answers which differed from the “Effective/ineffective” scale, such as they variably thought the measures were unrealistic, impractical, or</p>	<p>We propose amending the question to: “From the list below of potential measures for reducing attacks by dogs, please indicate whether you think each should be a priority or not a priority” and amending the answer options to “Should be a priority”, “Not a priority” and “Don't know”. We tested</p>

<p>defined areas of the countryside</p> <ul style="list-style-type: none"> • Increase public awareness/campaigns • Greater public provision of suitable spaces for dog owners to allow dogs off-lead exercise • Requirement for dogs that have attacked or chased livestock and their owners to attend dog training classes • Greater penalties for any person who fails to have a dog they are responsible for under control • Greater powers to remove dogs from those who fail to control them <p>(Ineffective, somewhat effective, very effective, don't know)</p>	<p>insufficient as the dog should in question should be put down.</p> <p>We also felt that the first measure was quite long to read out and a few participants asked for it to be repeated.</p>	<p>these new answer options in the latter part of the cognitive testing and they worked much better. Although there may have been a risk that participants would say all of the measures should be a priority, this did not happen.</p> <p>We also propose slightly shortening the first measure to “Requirement to keep dogs (other than working dogs) on leads within defined areas of the countryside”.</p>
<p>Q54 How effective or ineffective do you think the following measures would be at reducing attacks by wildlife or reducing the effects?</p> <ul style="list-style-type: none"> • Enhanced compensation schemes for losses • Increased powers to allow control of wildlife 	<p>As with the equivalent question on dog attacks, a large number of cognitive testing participants wanted to give answers which did not fit into the “Effective/ineffective” scale.</p> <p>Most participants also made negative comments about the last three</p>	<p>We propose amending the wording of the question to read “From the list below of potential measures for reducing attacks by wildlife or reducing the effects, please indicate which you think should be priorities” and amending the answer options accordingly to “Should be a priority”, “Not a priority” and “Don't know”.</p>

<ul style="list-style-type: none"> • Change the protected status of some species • Stopping re-introductions/rewilding efforts • Provision of alternative food sources for predators • Measures to increase the viability of lambs. 	<p>measures: “Stopping reintroductions/rewilding efforts”, “Provision of alternative food sources for predators” and “Measures to increase the viability of lambs”. These measures presented different problems. Almost all participants found it hard to answer “Stopping reintroductions/rewilding efforts” because it depended on the species (i.e. they would support some rewilding efforts and not others). Many commented that “Provision of alternative food sources for predators” was an odd suggestion, was likely to be ineffective and potentially counterproductive.</p> <p>Almost all supported “Measures to increase the viability of lambs” but found it an odd suggestion because it was so obviously a good thing and something everyone would be trying to do anyway. Asking about it is therefore unlikely to provide useful data.</p>	<p>We tested this changed wording in the latter half of the cognitive testing and it worked well.</p> <p>We also propose reducing the number of measures to just the first three: “Enhanced compensation schemes for losses”; “Increased powers to allow control of wildlife” and “Change the protected status of some species”.</p>
<p>Are you aware of the Taking the Lead guidance published by Scottish Natural Heritage?</p>	<p>This question worked, but we feel it could be taken out given the length of the questionnaire.</p>	<p>We propose removing this question to reduce the overall length of the survey.</p>

<p>Do you have any other suggestions for measures to prevent dog and/or wildlife attacks</p>	<p>In the cognitive testing respondents often used this question to reiterate points they had already made earlier and this question added to the length of the questionnaire</p>	<p>We propose removing this question for the telephone version of the survey (we would keep it in for the online version).</p>
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How to access background or source data

The data collected for this social research publication:

- are available in more detail through Scottish Neighbourhood Statistics
- are available via an alternative route
- may be made available on request, subject to consideration of legal and ethical factors. Please contact RuralStatistics@gov.scot for further information.
- cannot be made available by Scottish Government for further analysis as Scottish Government is not the data controller.



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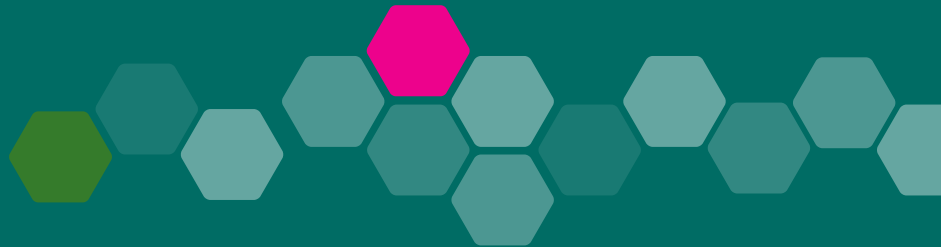
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This document is also available from our website at www.gov.scot.
ISBN: 978-1-83960-368-6

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Produced for
the Scottish Government
by APS Group Scotland
PPDAS667302 (12/19)
Published by
the Scottish Government,
December 2019



Social Research series
ISSN 2045-6964
ISBN 978-1-83960-368-6

Web and Print Publication
www.gov.scot/socialresearch

PPDAS667302 (12/19)