



A comparison of the efficacy of three intervention trial types: postal, group, and one-to-one facilitation, prior management and the impact of message framing and repeat messages on the flock prevalence of lameness in sheep



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ARTICLE INFO

Keywords:

Sheep
Footrot
Intervention study types
Message framing
Farmer behaviour

ABSTRACT

The aim of this study was to evaluate the effectiveness of three knowledge-transfer intervention trial types (postal, group, one-to-one) to promote best practice to treat sheep with footrot. Further aims were to investigate whether farmer behaviour (i.e. management of lameness) before the trial was associated with uptake of best practice and whether the benefits of best practice framed positively or negatively influenced change in behaviour. The intervention was a message developed from evidence and expert opinion. It was entitled “Six steps to sound sheep” and promoted (1) catch sheep within three days of becoming lame, (2) inspect feet without foot trimming, (3) correctly diagnose the cause, (4) treat sheep lame with footrot or interdigital dermatitis with antibiotic injection and spray without foot trimming, (5) record the identity of treated sheep, (6) cull repeatedly lame sheep. In 2013, 4000 randomly-selected English sheep farmers were sent a questionnaire, those who responded were recruited to the postal (1081 farmers) or one-to-one intervention (32 farmers) trials. A random sample of 400 farmers were invited to join the group trial; 78 farmers participated. A follow-up questionnaire was sent to all participants in summer 2014. There were 72%, 65% and 91% useable responses for the postal, group and one-to-one trials respectively. In both 2013 and 2014, the prevalence of lameness was lower in flocks managed by LC1 farmers than LC2 and LC3 farmers. Between 2013 and 2014, the reduction in geometric mean (95% CI) period prevalence of lameness, proportional between flock reduction in lameness and within flock reduction in lameness was greatest in the one-to-one (7.6% (7.1–8.2%) to 4.3% (3.6–5.0%), 35%, 72%) followed by the group (4.5% (3.9–5.0%) to 3.1% (2.4–3.7%), 27%, 55%) and then the postal trial (from 3.5% (3.3–3.7%) to 3.2% (3.1–3.4%), 21%, 43%). There was a marginally greater reduction in lameness in farmers using most of Six steps but slow to treat lame sheep pre-trial than those not using Six steps at all. There was no significant effect of message framing. The greatest behavioural change was a reduction in therapeutic and routine foot trimming and the greatest attitude change was an increase in negative attitudes towards foot trimming. We conclude that all three intervention trial approaches were effective to promote best practice to treat sheep with footrot with one-to-one facilitation more effective than group and postal intervention trials. Results suggest that farmers’ behaviour change was greater among those practising aspects of the intervention message before the trial began than those not practising any aspect.

1. Introduction

Sheep farmers consider lameness an important welfare problem (Goddard et al., 2006). Footrot causes the majority of lameness in sheep in England (Kaler and Green 2008; Winter et al., 2015). Treating sheep lame with footrot (both interdigital dermatitis (ID) and under-running severe footrot (SFR)) within 3 days of onset of lameness (Kaler and Green 2008) with antibacterials by injection and topical treatment and

without trimming hoof horn, leads to recovery of > 95% sheep within 2–10 days (Kaler et al., 2010). In a recent study, Winter et al. (2015) concluded that routine foot trimming was unnecessary. Avoiding trimming and rapid appropriate treatment can reduce the flock prevalence of lameness to < 2% (Wassink et al., 2010a) and is current “best practice” for management of footrot.

In 2013, a postal questionnaire was sent to a random sample of 4000 sheep farmers in England in 2013. Farmers reported on management of

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footrot, the prevalence of lameness in their flock and their opinions, knowledge and attitudes towards footrot. There were three classes of farmer management of lameness identified by latent class (LC) analysis: 11% (LC1) used best practice, 57% (LC2) followed best practice but treated sheep within a week rather than 3 days and 32% (LC3) of farmers were more likely to use traditional managements. O’Kane et al. (2017) hypothesised that farmers in LC2 and LC3 might respond differently to intervention messages promoting best practice.

Traditionally, intervention messages have consisted of generic, mass-produced printed material distributed to the population by mail (Kreuter et al., 1999). These reach many people at little expense but might not be effective (McCaul and Wold, 2002). One method of improving the persuasiveness of an intervention message is through message framing (Kahneman and Tversky, 1979), in the current example of footrot, focusing on losses incurred by not adopting best practice (e.g. 10% of sheep will be lame) or the gains that would be received by doing so (e.g. 98% of sheep will be sound). In human health, loss framed messages are more effective at promoting increased levels of detection behaviours especially when the procedural risk and uncertainty about the outcome of the behaviour is high (e.g. screening for HIV: Apanovitch et al., 2003). Conversely, gain framed messages encourage increased levels of prevention behaviour (e.g. sunscreen use: Detweiler et al., 1999) and are more effective when the procedural risk and uncertainty about the outcome is low. For footrot, farmers open to new ideas or already using some or all of best practice to treat sheep lame with footrot (i.e. LC2) might consider the risk and uncertainty about the outcome of adopting best practice as low and thus respond to gain framed messages whilst farmers resistant to change, using traditional techniques to manage lameness (i.e. LC3) might consider the risk and uncertainty high and thus respond better to loss framed messages (Ferguson et al., 2005; Ferguson and Gallagher, 2007; Rothman and Salovey, 1997; Rothman et al., 1999).

Group meetings, where farmers are addressed by a credible and trustworthy (Blackstock et al., 2010; Henriksen et al., 2015) “expert”, are often used in agricultural knowledge exchange. They are considered to be more effective than mass produced literature. The ultimate tailoring of messages is one-to-one communication because it is personal and interactive, but due to cost and time constraints its use is limited (Kreuter et al., 1999).

In the current study, we tested the efficacy of three intervention trial types (postal, group and one-to-one) on farmer uptake of an intervention message for best practice to treat lame sheep. It was predicted that the one-to-one trial would be more effective than the group trial (Figueiras et al., 2001), with the postal trial the least effective (Hawkins et al., 2008; Noar et al., 2007). In the postal intervention trial we also investigated the impact of message framing and the number of repeat or seasonally framed messages by farmer LC.

2. Materials and methods

Consent for the study was obtained from University of Warwick ethical committees for studies on humans and animals and Defra survey control liaison unit. All trials assessed change in the flock prevalence of lameness between 2013 and 2014. The intervention trials were three within flock trials comparing one-to-one, group and postal routes to provide a message on best practice to manage lameness in sheep. In addition, the postal trial was used as a between flock trial to compare framing the intervention message as a gain or a loss and to compare repeated and seasonally targeted messages and farmer management of lame sheep before the start of the trial.

2.1. Development and testing of the intervention message and documents

The intervention was a message to encourage farmers to adopt best practice to minimise lameness in sheep. In 2012, data from one-to-one interviews with 15 experts, 7 focus groups with 46 English and Welsh

Table 1

Summary of the intervention message “Six steps to sound sheep” developed using current best practice for treatment of sheep lame with footrot.

Step	Instruction
1	CATCH sheep within three days of becoming lame
2	INSPECT the feet clean away dirt do not trim hoof horn
3	DIAGNOSE the cause of lameness
4	TREAT all sheep with footrot or scald with antibiotic injection and spray do not trim the foot (spray alone is sufficient for lambs with scald)
5	MARK and RECORD all sheep with footrot or scald
6	CULL sheep that are repeatedly lame

sheep farmers and a telephone survey of 46 randomly selected English sheep farmers were used to identify barriers and motivators to treat lame sheep. The research team facilitated by two clinical psychologists created the intervention message ‘Six steps to sound sheep’, which was summarised in six key words: catch; inspect; diagnose; treat; mark and cull (Table 1). Leaflets and posters were developed. One version emphasised the gains of adopting best practice; while the other emphasised the losses of not adopting best practice. There was a frequently asked questions section and an email address for farmer queries. Quotes, with a photograph, from a specialist sheep veterinarian and a sheep farmer were included in the leaflet (Supplementary material). Two seasonally focused leaflets were also written for weaning – mating and pregnancy – lambing (Supplementary material). Design options were discussed with 38 farmers at Welsh Sheep 2013 and then with 30 farmers at North Sheep 2013. The finalised documents were pilot tested on 20 farmers involved in previous stages of the study; and were received positively.

2.2. Roll-out of intervention messages

2.2.1. One-to-one intervention trial

Sample size calculations indicated that a 3% change in within flock mean prevalence of lameness could be detected in 18 flocks with a variance of 10 with 80% power and 95% confidence and a two-tailed test. Thirty-two farmers (Table 2) were convenience selected into the one-to-one intervention trial from respondents to the 2013 postal questionnaire. The criteria for selection were willingness to participate, flocks with > 300 sheep, with $\geq 5\%$ flock lameness, with < 3% lameness due to contagious ovine digital dermatitis (CODD), and farmers who either did not treat individual sheep within three days of becoming lame or did not treat individual sheep until > 5 were lame in a group. Two – four farmers were visited per day between June and September 2013. Laura Green (LG) interviewed all 32 farmers, Jasmeet Kaler was present at the first 18 visits to ensure between observer agreement on the causes of lameness. At the visit, the farmer discussed their current management of footrot. Following this, the researcher(s) and farmer examined some lame sheep that the farmer had gathered. Throughout, LG and the farmer discussed best practice and whether a strategy could be identified so that the farmer could adopt the Six steps. The visits lasted 1–2.5 h. The farmer was sent a letter summarising the discussion and detailing flock specific advice within two weeks of the visit. All farmers in the one-to-one trial received the gain framed intervention message. In 2014, follow-up visits were used to discuss changes in the management of footrot on these farms. Holly O’Kane, who was blind to the discussions at the first visits, conducted follow-up visits following a semi structured interview script.

2.2.2. Group intervention trial

Sample size calculations indicated that a 2% change in within flock mean prevalence of lameness could be detected in 40 flocks with a variance of 10 with 80% power and 95% confidence and a two-tailed test. A population of 400 members of the National Sheep Association in Wales, South-West England and the English Marches regions were

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