Prevalence of shelly hoof and other ovine hoof lesions in the Wairarapa

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Introduction

Ovine lameness is a significant animal welfare issue, as lameness is a sign of pain. Diseases of the ovine hoof that cause lameness include footrot, scald, shelly hoof, and hoof abscesses (Winter 2011). Ovine lameness also incurs a financial cost to the sheep farmer, as lame ewes have lower body condition and lower milk production, they also have poorer growth rates, lower conception rates and sustain a treatment cost (Hickford *et al.* 2005; Lovatt 2015).

Shelly hoof, also known as White Line Disease, is a disorder of the ovine hoof characterised by a weakness between the wall and the sole leading to separation of the hoof wall from the underlying tissues (Winter and Arsenos, 2009). The prevalence of shelly hoof in New Zealand is unknown, however, studies in the United Kingdom (UK) have found a high prevalence and a moderate heritability for this condition (Connington *et al.* 2010a). Sheep breeds and environmental conditions in the UK are vastly different to New Zealand, therefore additional studies on the prevalence of shelly hoof here are required.

The objective of this study is to record the prevalence of shelly hoof and other hoof lesions in a sample of healthy ewes from farms in the Wairarapa.

Methods

Farms were approached to be part of the study based on convenience and interest in sheep lameness. All farms were commercial sheep and beef farms in the Wairarapa and Tararua districts. The goal is to include 70 farms, as of 1 April 2025 a total of 61 farms have been surveyed. These are therefore preliminary results and should be interpreted as such.

On each farm, 50 ewes were sampled using systematic randomisation, whereby if, for example, 200 ewes were in the mob then every 4th ewe was selected. Each selected ewe was tipped up, and each claw on each hoof examined. Lesions were recorded using the video function of a normal handheld cell phone. The results were then transcribed to a spread sheet at the claw level. If shelly hoof was present the separation (in mm) and location of separation (axial, toe, or lateral) was described. If there was no shelly hoof but other abnormalities such as footrot or scald, foot abscess, hoof overgrowth, or any other lesions were present, these were also described. The same experienced veterinarian carried out all hoof examinations.

The case definition for shelly hoof was a separation between the wall and the sole. Overgrown hooves were defined as abnormal or excessive hoof growth severe enough to affect normal weight bearing or gait and did not include hooves with active footrot (so that lesions were not counted twice). Footrot was classified using a scoring system of 1 to 4, based on the degree of underrunning (Australian scoring system). Score 1 was scald or interdigital dermatitis, score 2 was necrosis in the part of the hoof adjacent to the interdigital space, score 3 was necrosis invading the hoof but not up to the hoof wall, and score 4 was necrosis up to or involving the hoof wall.

A short questionnaire was also discussed verbally with each farmer, to establish some farm parameters.

Animal Ethics approval was granted through Massey University AEC23/15.

Results

The median farm size was 2450 ewes and 650 effective ha (approximately). A total of 3050 ewes on 61 properties were individually examined

All 61/61 (100%) farms had evidence of shelly hoof, 54/61 (88.5%) farms had one or more sheep with overgrown hooves, and 51/61 (84%) farms had one or more ewes with footrot or scald.

Overall, 13% of ewes had no lesions on any claw. The prevalence of any lesion on any claw was 37% of claws, or 87% of ewes. This included shelly hoof including minor separation (<10mm) and axial separation, footrot, overgrown hooves, and other less common conditions.

There were on average 40% of ewes with severe lesions (including shelly hoof >15mm not including axial separation, overgrown hooves, footrot, and foot abscesses) in one or more claws. At the claw level, 12% of claws were affected with severe lesions.

The overall prevalence of shelly hoof at the sheep level was 78% (78% of ewes had shelly hoof of 10mm or greater, including axial separation, in one or more claws). If we disregard axial separation, 56% of ewes had shelly hoof >10mm in one or more claw, and 14% of all claws had shelly hoof. In the hind feet, the prevalence was lower in the lateral claws (8% of lateral hind claws vs 14% of medial hind claws).

Prevalence of severe shelly hoof, defined as only including separation >15mm and not including axial separation, was 5% of claws, and 40% of ewes were affected in one or more claw. Again, in the hind feet the prevalence was lower in the lateral claws (2.5% of lateral hind claws vs 6% of medial hind claws).

Of the separation noted, 19% of claws had axial separation, 11% had separation at the toe, and 6% of claws had lateral separation. Axial separation accounted for 52% of the shelly hoof at the claw level, toe 31% and lateral 17%.

Footrot was present in 6% of ewes. 40% of footrot was grade 1 (scald), and 45% was grade 4. 82% of farms had one or more ewe with footrot or scald.

Overgrown claws were found in 4% of claws, in 12% of ewes. 88.5% of farms had one or more ewes with overgrown claws.

Farmer estimates of number of overgrown hooves varied widely. On 37 farms, the farmer had overestimated the proportion of ewes with overgrown hooves, and 18 farmers had underestimated the proportion of ewes with overgrown hooves. The average prevalence of overgrown hooves at the sheep level was 12% of ewes; the average of farmer estimates was 5%.

Discussion

A study on only four farms in the United Kingdom reported that half of all hooves had shelly hoof lesions, and 80% of sheep had one or more claws affected (Best *et al.* 2021). Another UK study found that on 27 farms in the UK, 47% of sheep had shelly hoof in one or more hoof, and on 12 farms in Ireland 48% of ewes had shelly hoof in one or more hoof (Conington *et al.* 2010b). In this study, 87% of ewes had hoof lesions. This higher rate in New Zealand could be because sheep farmers do not recognize shelly hoof, so do not actively manage it or cull for it. Differing environmental factors between the two countries could also account for the difference.

There are no current estimates of the prevalence of footrot in New Zealand, even among Merino (Mulvaney 2013), and historical and overseas estimates rely on anecdotal reporting, which is likely to be flawed (Kaler and

Green 2008). This study showed a small proportion of apparently healthy ewes harboured footrot in >80% of the flocks. These ewes with chronic footrot will maintain the infection in the flock and spread it from year to year.

Overgrown hooves can be a consequence of previous footrot infection (Kaler *et al.* 2010) or be a result of poor limb conformation (Bokko *et al.* 2015). In this study, both were probably involved, as many of the overgrown hooves did not show evidence of separation or previous footrot. Overgrown hooves are the greatest concern to the farmer, as they can be identified visually without tipping the sheep up. This study showed that many farmers underestimate the prevalence of overgrown hooves. This has implications for the validity of studies which rely on farmer estimates of foot lesions.

Where to next?

Findings from the current study indicate the need to repeat this study at a national level since there are likely to be regional differences in the prevalence of shelly hoof and other hoof lesions. Further studies are also required to examine the impact of shelly hoof on production and ill thrift, whether there is a genetic basis for shelly hoof, and what management factors are associated with less shelly hoof. It would also be beneficial to investigate the low level of footrot seen in this study, how much impact that has, and what can be done to manage it on commercial crossbred farms. Overgrown hooves are also of concern to farmers, and further research into the aetiology and prevention of these would be worthwhile.

Conclusion

Shelly hoof is common on commercial crossbred farms in the Wairarapa. Older animals are more likely to be affected. Most farms have a small number of animals with chronic, grade 4, footrot. Overgrown hooves are also commonly present on farms.

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