

Sheep scab management: a community-based regional approach in England

The use of improved management strategies, based on a better understanding of the transmission of sheep scab, is urgently needed to tackle the rising incidence of the disease. The objective of this RDPE funded programme, was to use a community-based approach to control scab in three high-risk areas of England. The aim was to test 100 flocks in clusters of contiguous farms within each of these regions (300 farms in total) using the sheep scab blood-test. Based on the results, treatments would be coordinated on farms with flocks that were positive for scab, and 'in-contact' farms as appropriate. This was followed up the next year with a second blood test to assess the reduction in the prevalence of sheep scab.

The three high-risk areas where a high level of sheep scab was known were: the North (Cumbria, Lancashire, North Yorkshire, and Northumberland), the Midlands (Shropshire and Herefordshire) and the Southwest (Cornwall and Devon). Within each region, farms were selected in clusters. These were defined as groups of farms that were contiguous with each other, or with a maximum of 0.5km between boundaries, and/or shared common grazing. A key principle of the programme was that farmers who participated agreed to share the results of their blood test with other farmers and coordinate treatments within their cluster.

Within each region, farm recruitment and day-to-day management was undertaken by regional co-ordinators: the NSA in the Southwest, ADAS in the Midlands and the Farmer Network in the North. Regional co-ordinators had a pivotal role in communicating with farmers, the local veterinarians and, as appropriate, with mobile dippers brought in for scab treatment.

Regional co-ordinators arranged a series of local farm meetings in the spring/early summer of 2021 to recruit farmers. The involvement of the farm's own veterinary surgeon was also considered pivotal in the project. Initially, participating farmers completed an extensive retrospective questionnaire detailing their previous experience of scab outbreaks and this was followed by the first blood testing in June/July 2021. In accordance with the standard testing procedure, blood samples were taken from a single management group of 12 animals from each farm. The blood test result was evaluated by members of the project steering group. This took into account the scab history, on-farm risk factors (e.g. common grazing) and the date of the last treatment for scab. Advice was then provided on the most suitable management approach for that flock.

In total, 254 farms (North = 83, Midlands = 80, Southwest = 91) had performed at least one blood test by the first cut-off date in 2021 and had completed the initial questionnaire to allow for inclusion in the data analysis. The second round of blood tests took place from late summer 2022* ending at the end of the year. By this time, 66 (North), 76 (Midlands), and 56 farms (Southwest) had tested and were included in the analysis.

**Some farms used their 'second blood test' earlier in season to confirm successful treatment of a positive scab case so these were not classified as 'second blood tests' in the analysis. There were also a small number of drop outs due to unforeseen circumstances such as retirement, tenancy changes etc.*

Results:

Prior to the start of the project in 2020, and based on the presence of clinical signs of scab, 17.4% ($\pm 4.6\%$, $n=48$) of the farmers self-reported scab (Fig 1). In contrast, the first round of blood testing showed that 25.6% ($\pm 5.5\%$, $n=65$) farms were positive for scab in 2021/22 (Fig. 1), illustrating that scab was present in some flocks without any clinical signs. In the second round of blood testing the following year, only 9% ($\pm 3.94\%$) of the flocks were positive, (Fig 1). which represents a significant reduction in the number of farms testing positive between the first and second tests ($\chi^2 = 17.7$, $df = 5$, $P < 0.001$). This overall result was strongly driven by the substantive decline in positive flocks in the North.

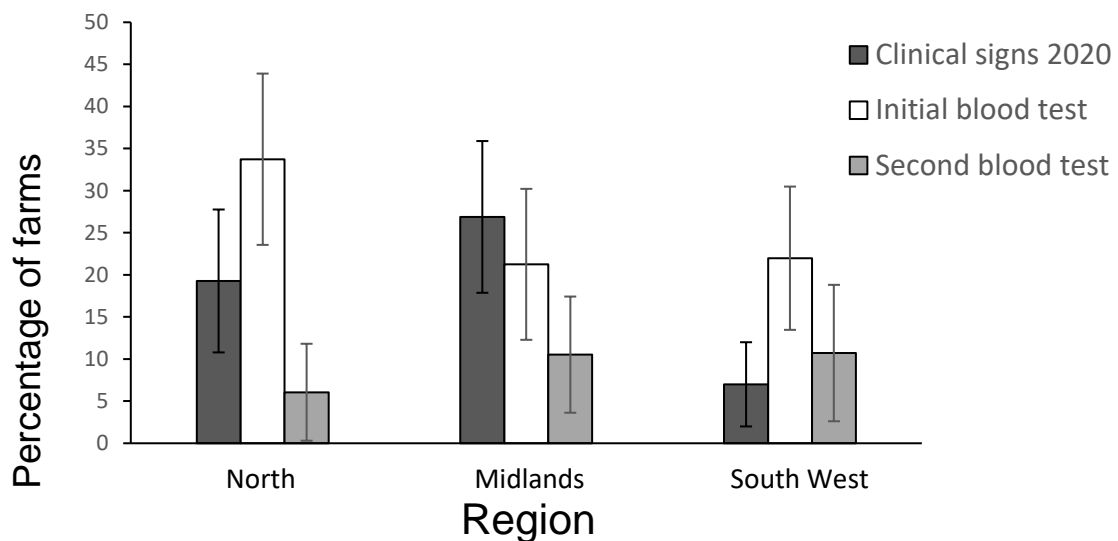


Fig 1. The percentage of farms that reported scab in 2020 based on clinical signs and the percentage that tested positive for scab ($\pm 95\%$ binomial confidence interval), as determined by the blood test in three regions of England, at the start and end of a two-year scab management programme.

Conclusions for the future management of sheep scab

The programme has provided invaluable insight into future approaches to sheep scab control that are likely to be both effective and sustainable in the UK. Conclusions are:

- Sub-clinical scab, as detected by the blood test but in the absence of clinical signs, can persist in many flocks without being obvious to flock owner or veterinarian. The implication is that management programmes that rely on farmer self-diagnosis are unlikely to be effective, since sub-clinical cases will be missed, allowing scab to persist and spread unnoticed and unchecked.
- Both veterinarians and farmers need to have confidence in the blood test outputs. Lack of confidence undermines willingness to accept that a flock might be infested, in the absence of clinical signs, and therefore reluctance to take the expensive step of treating.

- Generating confidence in the blood test should be achieved by clear explanations of how it works. In particular, it is a flock-level test and should not be used, nor the results interpreted, for individual animals. The test also has defined sensitivity and specificity, which means that the outputs must be carefully considered and explained.
- Any future programmes using this approach, should aim to employ testing on all management groups on a farm, coupled with follow-up testing for flocks where a positive blood test was not associated with clinical signs of scab. While testing of multiple management groups would add to costs, this is far more cost effective than routine untargeted prophylactic treatments.
- Synchronisation of testing and treatment within clusters was not easy to achieve, but it was a vital component of this project because if there was too great an asynchrony, it would allow infestation to persist and reinfect in an area. In practical terms this was easier to achieve in smaller clusters than large ones. Strategies to engage the occasional uncooperative farmer who de-motivated neighbours must be refined, though some did respond positively to peer pressure given time.
- Overall, the programme demonstrated that a community-based approach could be used to reduce the prevalence of scab significantly in high-risk areas of England and that collective sharing of results and responsibility can begin to break down the stigma previously associated with sheep scab infestation.

We would like to take this opportunity to thank all the participating farmers, their veterinary surgeons and coordinators, without whose hard work and determination this project would not have been possible.

Stewart Burgess

Richard Wall

Lesley Stubbings

