ASSESSING THE RESISTANCE OF THREE BRITISH SHEEP BREEDS TO PARASITIC INFECTION

PARASITE RESISTANCE TO CHEMICAL CONTROL

Sheep carrying excessive parasite burdens exhibit poor weight gains. They may become dehydrated, anaemic, scour and die from parasitic gastroenteritis. The level of infection can be estimated by counting the number of worm eggs present in a faecal sample (faecal egg count or FEC). However there is not a linear relationship between FECs and worm burden.

Anthelminthics have been used to successfully treat worm burdens but parasite resistance to the treatments is increasing. Resistance is believed to be present on almost all sheep farms in the UK.

As the current chemical anthelminthics are increasingly ineffective in managing parasitic infections further solutions to control parasites are required.

SHEEP RESISTANCE TO PARASITES

One option to help control parasitic infection is to select for sheep that are naturally resistant.

Sheep produce antibodies in response to worm infection. Higher levels of IgA (an antibody involved in the immune function of mucous membranes) are found in sheep with a better resistance to parasite infections. Once an animal is infected it produces an antibody response to the parasitic larvae in the gut. The anti larval IgA levels can be accurately measured in the saliva, which can be sampled by simply taking a swab.

Animals with high anti parasitic IgA responses have lower parasite burdens. The IgA response is heritable and measurements have been used to calculate an Estimated Breeding Value (EBV) which can be used for selection.

Assessing resistance of three sheep breeds to parasites

THE CASE STUDY

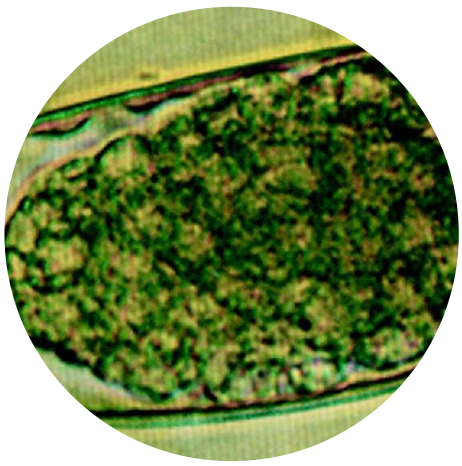
Salivary IgA has been shown to be a reliable biomarker for *Telodorsagia circumcincta* (a strongyle parasite) infection.

Data was collected for Romney, Lleyn and Exlana Signet recorded flocks to establish benchmarks of performance and investigate the level of variance within and between breeds.

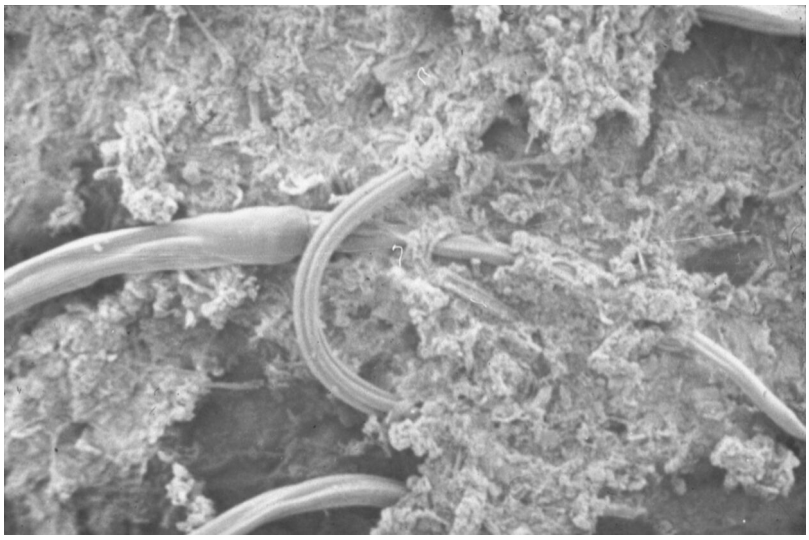
Salivary IgA EBVs have only been calculated for Lleyn sheep. In this study salivary IgA samples were taken from Romneys to assess the response in another breed.

FEC samples were collected from Exlana sheep to contribute towards a FEC EBV for that breed.

It is assumed that mounting an immune response will 'cost' the host and there is likely to be a trade off between growth and response. Lambs in the study were scanned for muscle and fat depth.



Strongyle egg from a FEC sample as seen under the microscope



Telodorsagia circumcincta

Wormer resistance costs the UK sheep industry £84m each year. Almost all farms (94%) are thought to have resistance to white wormers, 68% to yellow wormers and more than 50% to ivermectin-type drenches.

We need alternative methods of managing parasites, selecting for resistant sheep is one of them.

PERFORMANCE AND RESISTANCE TO INFECTION

Salivary IgA samples collected in the Romney reflected levels of infection estimated by FECS. As would be expected animals with a high salivary IgA had lower FECs. With more data IgA EBVs could be calculated and included in a selection programme.

There were a range of FEC values in the Exlana sheep indicating a level of variation of response. Further work is required to calculate FEC EBVs for Exlana.

Performance data was collected for all three breeds. From Lleyn data it could be ascertained that IgA responses were not associated with decreased growth. In further trials IgA responses have been associated with increased growth.

Benefits of assessing the resistance of the three breeds

BENEFITS TO THE SHEEP INDUSTRY

- Parasites are increasingly resistant to available wormers
- Selecting for sheep that are resistant to infection i.e. they mount an effective immune response has the potential to reduce parasite numbers
- The IgA response does not negatively impact lamb growth, in contrast to reports of IgE (antibiodies produced by the immune system) responses and poorer growth rates
- Animals that produce a good IgA response shed fewer parasite eggs and continue to grow
- If fewer eggs are shed, pasture contamination is lower reducing the parasite population available to reinfect grazing sheep

Anthelminthic resistance is a global problem.

Drenching animals is no longer the solution to parasite burdens and new methods of reducing infection by parasites and their impact need to be found.

POTENTIAL

Anthelminthic resistance affects sheep production worldwide. Selecting animals that have a good immune response to parasitic infection is one method of reducing parasite numbers and their impact on infected animals. The salivary IgA test is simple to conduct and will give a farmer an indication of the level of immune response. The salivary IgA response has a heritability of 0.16 so by developing EBVs that can be used in the selection of breeding stock progress can be made in developing a flock that has a higher resistance to parasitic infection.

WRITING: ORC & AHDB

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