fact sheet

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Worm Testing

Effective parasite control is best achieved where control programmes are designed around known parasite challenges, so monitoring of parasite burdens should be included as a part of all animal health programmes. Although it can be difficult to assess the types and numbers of internal parasites within livestock, the information is essential for making optimal decisions about when animals should be treated (if at all), what products should be used and how well control programmes are performing. There are a number of different methods that can be used to generate useful information, but care should be taken in how those methods are applied and how results are interpreted.

Faecal Egg Count (FEC)

Worm burdens can be estimated from the number of worm eggs that are being passed in the faeces of animals. A standard FEC test, which is usually conducted on samples from 10 animals, will determine the number of roundworm eggs present in the samples (expressed as eggs per gram of faeces – epg) and provides information about the presence of other parasites such as tapeworms and coccidia. It does not distinguish between the different species of closely related roundworms and will not give any indication of the number of immature worms present (since they are not yet producing eggs).

A different type of test can be used to count the number of fluke eggs in the faeces. Eggs from both stomach fluke and liver fluke are detected, but the two types can be differentiated easily. Fluke egg counts are normally performed on a bulk sample obtained by pooling subsamples from the 10 individual samples.

Larval Differentiation

By hatching the worm eggs and allowing the larvae to develop to the infective stage, the different species of roundworms can be distinguished and proportions calculated. This then allows producers to design control programmes or use treatments that will target the particular parasites that are present in significant numbers. Larval differentiation is normally performed on a bulk sample obtained by pooling the 10 individual samples. It is usually not performed where egg counts are low (threshold is often 100 or 200 epg). Results take around 10 days to be finalised because of the time required for the larvae to grow, but interim FEC results are normally provided so that treatments can be done immediately where high worm burdens are detected.

Total Worm Count

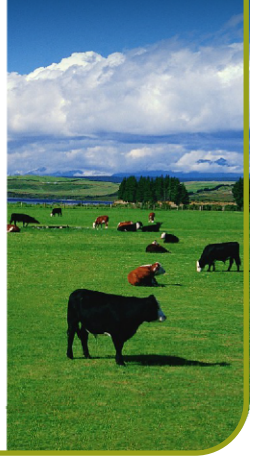
Where the gut of an animal can be examined, the parasite species present and their actual numbers, including immatures, can be determined. Clearly this cannot be used for routine monitoring, but it provides extremely valuable information where clinical outbreaks are causing the death of animals. Post-mortem examination of animals to determine cause of death is always good practice.

Liver Fluke Antibody Test

Egg counts reliably detect liver fluke infections in sheep, but are less reliable for cattle. An alternative (ELISA) test detects antibodies to the fluke in both blood and milk samples. This is particularly useful for dairy herds where bulk milk samples can be used to estimate the level of infection across the herd. Where samples from individual animals are analysed, the test will indicate which animals are infected. The test does not give any indication of the number of flukes infecting the animals. Care should be taken when retesting following treatment because the antibodies take some time (about three months) to decay after the flukes have been removed.

Worm Antibody (ELISA) Test

Worm egg counts can reliably detect adult worm burdens in sheep and young cattle, but are nearly always low or even zero in adult cattle, as their immune system is preventing worm egg production. An ELISA test is available to detect antibodies to gastrointestinal worms in cows' milk samples. Bulk milk samples from dairy herds can be used to



estimate the level of worm burden impact across the herd. Similarly to the liver fluke ELISA test, care should be taken when retesting following treatment because the antibodies take some time (about three months) to decay after the worms have been removed.

Haemonchus Dipstick Test

The Haemonchus Dipstick Test detects blood in sheep faeces to identify whether Barber's Pole Worm is present, and to help determine the level of infection and the damage being caused. The test is particularly useful where there are severe, rapid infections developing, as it can detect blood loss caused by the immature worms one week before they start to lay eggs. Care must be taken that results are interpreted in light of other indicators of Barber's Pole Worm infections, as other causes of blood in sheep faeces can cause positive reactions on the test strip. The Dipstick Test does not detect other worm species, so monitoring for other worm species and Liver Fluke infections should be undertaken independently.

Diagnosis of Disease

Worm burdens should be investigated whenever animals show signs of protein deficiency (e.g. bottle jaw, pot belly), anaemia, scouring or general ill-thrift and wasting. An FEC and fluke egg count (if appropriate) will give a relatively quick result which will indicate whether the worm burden is likely to be having a clinical impact and whether immediate treatment is required. A larval differentiation will then provide information to assist in the ongoing management of any roundworm problems. Where all of the animals appear ill, test the animals in worst condition. Where some animals are clearly worse than most others in the same group, test some animals in poor condition and some in good condition, ensuring that the samples are labelled appropriately.

Health Monitoring

Optimal parasite control is achieved through strategic parasite control programmes where chemical treatments are used to suppress parasite populations before they become a problem rather than to treat parasite burdens that are sufficiently high to cause economic or, even worse, clinical impacts. The accurate assessment of parasite species and numbers is therefore essential to design strategic programmes, to optimise timing of treatments and selection of products, and to assess the effectiveness of programmes. FECs (including fluke egg counts where appropriate) and larval differentiation are cost-effective methods for obtaining this essential information.

A monitoring programme should be designed around season changes and key animal management events (such as joining, lambing/calving and weaning). Spring is particularly important because it is then that many parasite populations begin to rise and timing of treatments is crucial. Autumn is also important because parasite burdens should be assessed and controlled (if necessary) before animals face the nutritional and environmental stresses of winter. Parasite populations should be monitored regularly at other times to assess whether additional treatments are required, especially where animals are vulnerable to parasitic infection (e.g. lambing ewes, weaners) or need to be at peak performance (e.g. prejoining, entry to feedlot). Monitoring times should be flexible so that tests can be done in response to unseasonal weather conditions or when animals are showing signs of ill-thrift or poor performance.

Animal selection is the key to the level of information that these tests provide. All classes of sheep, but particularly lambs, weaners and pregnant ewes, should be monitored regularly. Young cattle (up to 18 months old) should also be monitored regularly. Results from testing older cattle are less reliable because the egg output is not always indicative of the worm burden, but can nevertheless be informative in many instances. Regardless of which classes are tested, the animals that are sampled should be representative of the group. Do not select only those that are doing particularly poorly or those that are doing particularly well. Where different groups of animals are managed independently, it is best to monitor all of the groups because one group is not always representative of the others.

Determination of Pasture Contamination and Reinfection Rates

Animals returned to pastures that are contaminated with worm larvae can quickly reacquire infections that will impact on their health and performance. The rate of reinfection can be estimated by conducting an FEC about six weeks after treatment. The eggs being released at that stage will give some indication of the number of worms picked up in the three weeks following treatment. Timing can be adjusted if pasture contamination is thought to be high or low. Care must be taken to ensure that the worms have, in fact, been acquired from the pasture and are not resistant worms that have survived the treatment.

Assessment of Chemical Resistance

The efficacy of chemical products can be assessed by conducting an FEC about 10 days after treatment. Any eggs being passed at this stage can only have come from worms that were within the animals at the time of treatment since no larvae that were picked up after treatment would have had sufficient time to mature and start laying eggs. Results from a test of this type are indicative only; if resistance is suspected, a Faecal Egg Count Reduction Test (FECRT) should be performed. An FECRT simply consists of a comparison of the egg output from animals treated with a particular product with that from other animals from the same mob that received no treatment (not a comparison of egg counts from the same animals before and after treatment). Resistance is considered present when the reduction in egg output resulting from treatment is less than 95%.

Worm Testing

(continued)

Interpretation of FEC Results

The many variables associated with egg outputs (species composition, proportion of immatures/adults, effect of host immunity, consistency of faeces, etc) do not allow the setting of definitive numbers that are indicative of economic or clinical impacts. It is possible, however, to set some broad guidelines. In general, roundworm counts of 500 epg and fluke counts of 50 epg in both sheep and cattle are cause for concern and treatment should occur in the short term, if not immediately. The threshold for economic impacts is much lower, with 100 epg often given as the approximate stage at which production losses outweigh treatment costs. There is some evidence that egg counts of 40 epg or even lower can indicate a significant impact on high production animals such as dairy cows, particularly where the immune response of older animals suppresses the parasite egg output even though large numbers of worms are present. Decisions about whether egg counts are economically significant must be made on an individual basis and should take into account the future consequences of not treating as well as immediate production benefits to be gained.

It is important to consider the consistency of the 10 individual egg counts when interpreting test results. One animal that has a very high or very low egg count can skew the results so that the mean is not indicative of the worm burden in most animals.

Test	Specimen tested	Method	Parasite(s) detected	Quantit - ative	General interpretation of results	
Faecal Egg Count (FEC) Worm Egg Count (WEC)	Dung (from any species)	Saturated salt flotation	Strongyle and *Nematodirus* eggs	Yes (epg)	>500	Cause for concern
					>100-200	Economic impacts expected
			Tapeworm eggs	No	Any result significant	
			Coccidial oocysts	Yes	See Coccidiosis Fact Sheet. Seek professional advice	
Fluke Egg Count	Dung (from any species)	Sedimentation	Fluke eggs	Yes (epg)	>50	Cause for concern. Any result significant
Larval Differentiation	Dung (from any species)	Incubation of sample submitted for FEC	Strongyle larvae	Yes (%)	% of *Haemonchus, Trichostrongylus, Cooperia, Ostertagia* etc. present	
Total Worm Count	Post mortem (abomasum and intestine)	Intestines washed and worms collected, speciated and counted	All gastrointestinal worms	Yes	Seek professional advice	
Liver Fluke ELISA	Blood or milk (bovine)	Antibodies to liver fluke detected and measured (indirect test)	Liver fluke	Yes (OD)	<0.1	Very low
					0.1-0.3	Low (monitor)
					0.3-0.7	Moderate (<20% infection expected in herd)
					0.7-1.1	Moderately high (20-50% infection in herd)
					>1.1	Very high (>50% infection)
Worm ELISA (WET)	Milk (bovine)	Antibodies to worms detected and measured (indirect test)	Gastrointestinal worms *(Cooperia, Ostertagia)*	Yes (ODR)	<0.5	Low (monitor)
					0.5-0.8	Moderate (treatment may be required)
					>0.8	High (treatment recommended)
Haemonchus Dipstick Test	Dung (sheep)	Blood in dung measured (indirect test)	Barber's Pole Worm *(Haemonchus contortus)*	Yes (Score)	1	Low (continue to monitor)
					2-2.5	Moderate (retest in one week)
					3-3.5	High (treatment recommended)
					>4	Severe (immediate treatment required)