

## Barber's Pole (*Haemonchus* spp.) DNA Testing Info Sheet

Barber's Pole (BP) worm (*Haemonchus contortus*) is considered the worst of all the roundworms to infect ruminants, such as goats, sheep and alpacas. The reason BP is notorious is that it is one of the only worm species that directly sucks blood. Adult worms live in the abomasum (stomach) and a single worm may take up to 0.05mL of blood per day. With a burden of 5000 worms, an animal may lose 250mL of blood per day. In severe (acute) cases, animals can die from anaemia and protein loss. In chronic cases, the continued loss of blood will result in animals that lose weight and show weakness and inappetence rather than classic anaemia symptoms (e.g. pale membranes, bottle jaw).

Monitoring the presence of BP in your livestock can allow you to make more informed decisions about treatment. Being able to determine what type of strongyles are infecting livestock is important for appropriate management: BP worm may require more aggressive management than less problematic strongyles, such as nodule worm (*Oesophagostom* spp) or scour worms (*Trichostrongylus* spp).

### Diagnosing BP infection:

- BP is part of the strongyle worm family. There are many types of strongyle worm that infects livestock, BP is considered the most harmful to small ruminants.
- Faecal egg counts can diagnose strongyle worm infection; but all strongyle eggs are similar in appearance and cannot be accurately differentiated.
- Traditional parasitology methods use larval culture to hatch and ID strongyles – this is time consuming (~ 3 weeks) and prone to error and bias.

### How does this test work?

- This diagnostic test uses a PCR reaction to detect the presence of BP DNA in faecal samples.
- Worm eggs are isolated from faecal samples, then DNA is extracted for testing.



### **What will the results tell me:**

- This test gives a yes/no answer to the presence of BP
- A faecal egg count (FEC) will also be performed on each sample
- The DNA test is not quantitative but when used with FEC results, problematic BP infections can be diagnosed.
- This test does not rule out the presence of other worms in the strongyle family (e.g. scour worm, stomach worm). Contact WormCheck for other available tests to diagnose these.

### **Can I pool samples?**

- Yes: a pooled faecal sample is a good way to determine if BP is present on your property. Up to 10 samples can be grouped and tested together
- A FEC will be performed on the pooled sample, if you would like samples individually FEC-ed and then pooled for DNA testing, note this on the submission form, and pay \$10 each per extra FEC

### **What is the turn-around time?**

- Traditional larval culture can take up to 3 weeks. This DNA-based test will take anywhere between 1-4 days once the samples arrive at the WormCheck Lab. The test itself only takes one day to complete; due to reagent costs, it may only be run twice a week with bulk samples.

### **What animals can be tested?**

- BP is problematic in goats, sheep, alpaca, and deer. Cattle may also be infected however this is not as common.

### **How much does it cost?**

- Each BP test costs \$60
- Any additional FECs are \$10 each

### **How are the results sent?**

- Results will be emailed. See below for an example result report and analysis.

## EXAMPLE RESULTS

- This submission consisted of five individual FEC samples and then all five samples were pooled together for DNA testing for BP.
- From the FEC results, it shows that two of the sheep require deworming due to high EPG values.
- The pooled sample DNA test indicates that some, or all, of the sheep have an infection of BP worms.
- For treatment/future management, the owner should deworm the two sheep with high EPG values, and monitor all other sheep for any symptoms of BP infection.
  - BP infection can lead to anaemia, any animals showing symptoms (pale membranes, bottle jaw, weight loss) should be treated for BP and given supportive care.
  - In sheep and goats, the EPG values correlate very closely to worm burden. BP is generally considered to be low risk when EPG is below 500. Therefore, an animal with a low EPG, even if positive for BP, is not likely to be at risk of disease. Over worming is leading to drug resistance, and so avoiding deworming as much as possible is necessary.
- Follow up testing may be requested, where each sheep sample is tested for BP individually.

## Example WormCheck DNA Results

Sample	FEC Results	Barber's Pole DNA	De worming recommendation
Sheep 1	130 EPG strongyles	-	≤200 EPG, deworming not required
Sheep 4	0 EPG	-	
Sheep 3	50 EPG strongyles	-	
Sheep 2	400 EPG strongyles	-	>200EPG, deworming recommended.
Sheep 5	1250 EPG strongyles	-	
Pooled Sample	-	POSITIVE	-

EPG = worm eggs per gram of manure.

>200EPG, deworming is recommended

>500EPG may indicate a worm burden high enough to cause disease.

**For more information on the methodology of this test, see the following publications, on which it is based:**

- Melville, L., Kenyon, F., Javed, S., McElarney, I., Demeler, J., & Skuce, P. (2014). Development of a loop-mediated isothermal amplification (LAMP) assay for the sensitive detection of *Haemonchus contortus* eggs in ovine faecal samples. *Veterinary Parasitology*, 206(3-4), 308-312.
- Panozzo, J. (2018). *Wild deer as potential reservoirs of economically important gastrointestinal parasites in South Eastern Australia* (Doctoral dissertation, Federation University Australia).
- Harmon, A. F., Zarlenga, D. S., & Hildreth, M. B. (2006). Improved methods for isolating DNA from *Ostertagia ostertagi* eggs in cattle feces. *Veterinary parasitology*, 135(3-4), 297-302.