Horserace Betting Levy Board
Parnell House
25 Wilton Road
London, SW1V 1LW

Tel: 020 7333 0043
Fax: 020 7333 0041
Web: www.hblb.org.uk
Email: equine.grants@hblb.org.uk

Development of a diagnostic immunoassay for larval cyathostominosis

PI: Professor Jacqueline Matthews
Moredun Research Institute/University of Edinburgh
Co-Applicant: Dr Jane Hodgkinson, University of Liverpool
Researchers: Hamish McWilliam, Mairi Mitchell, Samantha Dowdall

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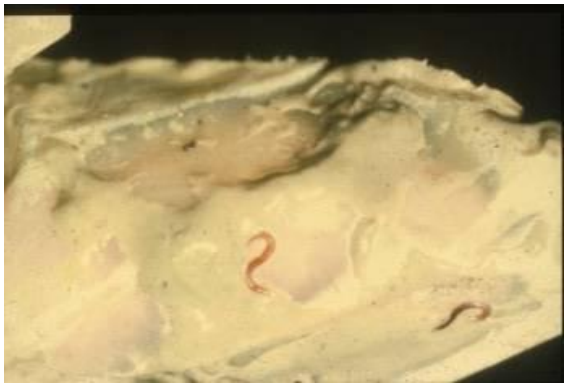
Why do we need better tests to detect horse worms?

- The cyathostomins are common parasites of horses. These parasites spend a large proportion of their lifecycle in the gut wall, where they can cause severe disease, but cannot be detected.

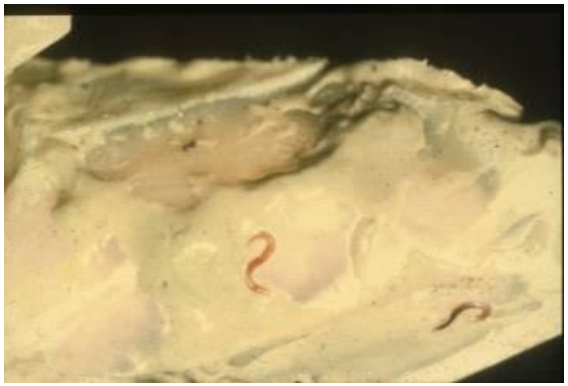
- By identifying proteins that can be used in a diagnostic blood test, this project has made considerable steps towards the development of the assay, the function of which will be to estimate the burden of encysted larvae in a horse's gut wall.

- Availability of this test would be of tremendous value in enabling identification of horses at risk of severe parasitic disease and will direct administration of appropriate drug treatments.



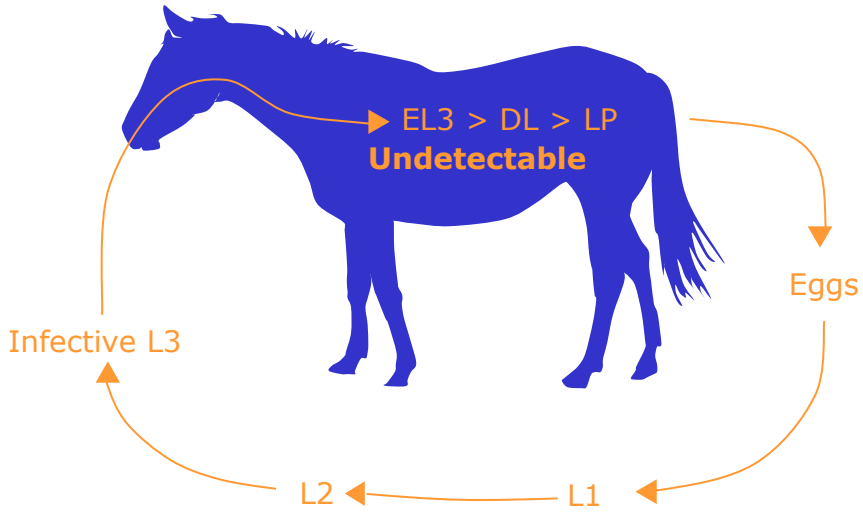
More reasons why we need a new test

- Results of the test will inform strategic drug treatments for only those horses with moderate-large worm burdens and hence reduce selection pressure for resistance to wormers. This will help prolong the effective lifespan of these drugs.
- The test will inform trainers, breeders and horse owners of an individual animal's worm status and thus its general wellbeing.
- When used with larger groups, it will provide specific information on the worm burden of animals and inform on the success or otherwise of the overall parasite control programme.



Cyathostomins: the threat

- Most important equine parasite.
- Virtually 100% horses are infected.
- Complex infections.
- Multiple species.
- Some animals develop severe colitis due to larvae emerging from the gut wall leading to life-threatening weight loss and diarrhoea.
- Gut wall larvae (EL3& DL) are undetectable in the live animal.
- These parasites are becoming increasingly resistant to all 3 classes for drugs that are used to control them.
- It is essential that new strategies for managing these parasites are developed.



Cyathostomin lifecycle

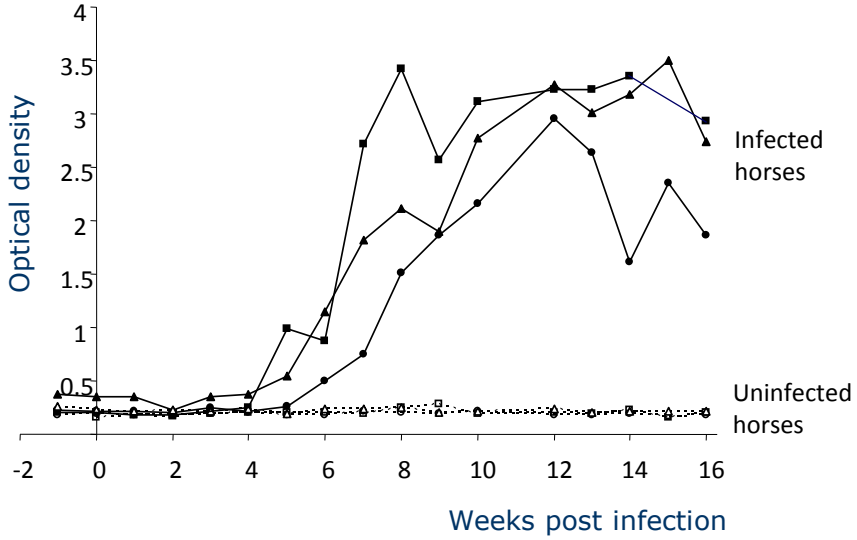
Aims of this project

- To develop a blood test that will enable estimation of the level of gut wall larvae.

- Test results will be used to inform on:
  - Horses at high risk of severe disease
  - Which horses require drug treatment to eliminate gut wall larvae
  - Targeted treatment of horses so that dewormer efficacy can be maintained

Identification of a single worm-derived protein which is a candidate for use in a novel test:

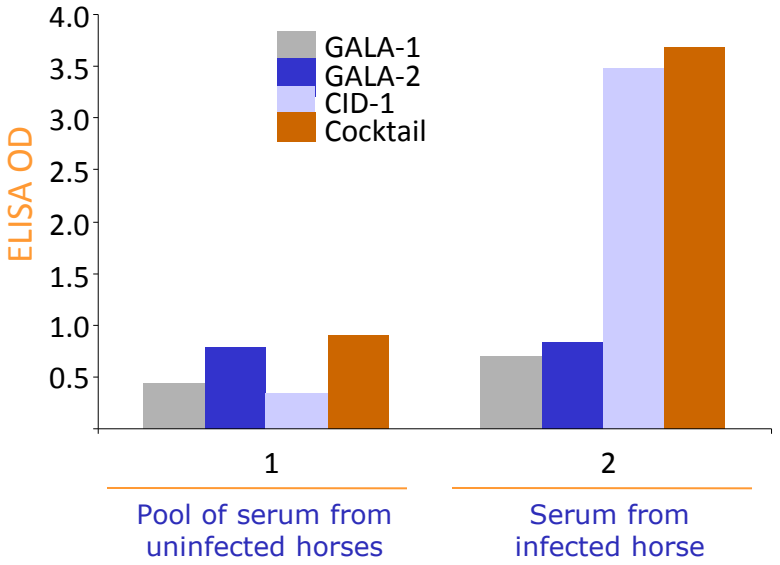
- GALA
  - A protein with potential for estimating numbers of larvae.
  - The host horse can produce antibody responses to GALA that increase soon after infection.
  - Host antibody responses to GALA correlate with levels of larvae in infected horses.
  - GALA detected in all common parasite species tested.



Blood antibody responses to GALA protein in infected *vs.* uninfected horses: Note there is a marked difference between infected and uninfected horses

A cocktail of parasite proteins are even more promising:

- Protein cocktails give improved indications of infection levels.
- A number of proteins now available;
  - 1 CID & 2 GALA proteins from different cyathostomin species.
- These are being tested for diagnostic value as protein cocktails.



Implications of findings

- By identifying parasite-derived proteins that can be used in a diagnostic blood test, this project has made considerable steps towards development of an assay that can be used to estimate the burden of encysted cyathostomin larvae in a horse's gut wall.

- This test will be of great value in enabling identification of horses at risk of severe parasitic disease and will direct administration of appropriate drug treatments.

- Results of the test will inform strategic drug treatments for those horses with moderate-large worm burdens and hence reduce selection pressure for resistance to wormers. This will help prolong the effective lifespan of these drugs.

Find more information on parasites that affect Thoroughbreds:

- Facing the threat of equine parasitic disease: JB Matthews:

  http://onlinelibrary.wiley.com/doi/10.1111/j.2042-3306.2010.00356.x/full

Scientist's summary

- The cyathostomins are common parasites of horses. These parasites spend a large proportion of their lifecycle in the gut wall, where they can cause severe disease, but cannot be detected.

- By identifying proteins that can be used in a diagnostic blood test, this project has made considerable steps towards the development of the assay, the function of which will be to estimate the burden of encysted larvae in a horse's gut wall.

- Availability of this test will be of tremendous value in enabling identification of horses at risk of severe parasitic disease and will direct administration of appropriate drug treatments.

Scientist's summary

- Furthermore, results of the test will inform strategic drug treatments for those horses with moderate-large worm burdens and hence reduce selection pressure for resistance to wormers. This will help prolong the effective lifespan of these drugs.

- The test will tell trainers, breeders and horse owners of an individual animal's worm status and hence provide information on its general wellbeing.

- When used with larger groups, it will provide specific information on the worm burden of animals and provide a means to monitor the success or otherwise of the overall parasite control programme.