Focus Article: Serological ELISA test for *Streptococcus equi* (Strangles)

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The disease

Strangles is caused by infection with *Streptococcus equi* (S. equi). Clinical signs include pyrexia, mucopurulent nasal discharge and abscess formation in the retropharyngeal and submandibular lymph nodes. Diagnosis is usually based on the characteristic clinical signs and culture (and/or PCR) of nasopharyngeal swabs or pus (reviewed by Sweeney and others (2005)). Many, perhaps even the majority of, cases in the UK do not show classical clinical signs. Instead they show milder atypical signs or may have subclinical infections (Slater 2010).

Two factors underlie strangles importance as a disease. Firstly, around 10% of cases develop more severe clinical signs which occasionally prove fatal. Secondly S. equi has evolved to persist in the equine population. After normal infection, a proportion of cases, known as carriers, remain persistently but asymptomatically infected. Carriers appear outwardly normal but infection usually persists in the guttural pouches; in-contact horses can become infected through intermittent shedding of S. equi. Together with the unrecognised and thus untreated atypical cases, carriers are likely to contribute significantly to the disease persistence. Identification of both carriers and atypical cases is difficult by conventional means.

The test

In 2008 the Strangles ELISA blood test was launched by the Animal Health Trust. The test detects IgG, to two *S. equi* specific antigens (A and C), identified through sequence analysis of *S. equi* and numerous strains of *S. zooepidemicus*. Exposure to *S. equi* within the last 6 months can be detected with a sensitivity of 93.3%, and a specificity of 88.0% (Waller, A.S. personal communication). The test has proved popular and 5129 samples were submitted in 2010 (DEFRA/AHT/BEVA 2010).
**Test use and interpretation**

The test has 3 main uses:

- Screening horses of unknown history prior to movement onto disease free premises to allow carriers to be identified and treated before movement.
- Follow up testing after an outbreak e.g. at a livery yard. In many cases it can be unclear which horses have been exposed to *S. equi* and thus may be carriers.
- Confirmation of infection in atypical cases or those in which conventional testing has failed to demonstrate the presence of *S. equi*.

A positive ELISA result indicates a serological response to exposure but not necessarily current infection or carrier status. Only a small minority of seropositive horses are likely to be carriers. Whilst a negative result makes carrier status highly unlikely, a positive result is an indication for additional testing (guttural pouch endoscopy or repeated nasopharyngeal swabbing) to confirm or refute carrier status.

Positive results can occur in vaccinated horses. The Equilis Strep E vaccine has only recently been reintroduced and the persistence and magnitude of IgG titres to these antibodies in vaccinated horses has not been well characterised. False positive results due to the assay not being 100% specific can occur in clinically normal horses.

Samples taken early in the course of the disease (within 2 weeks) may give negative results if insufficient time has elapsed for a serological response to exposure. False negative results may also occur in a small minority of cases (around 6.7%) that do not develop a typical immune response to *S. equi* exposure.

Active infection can be demonstrated by a rising IgG titre on paired serum samples taken 10-14 days apart.

**Future directions**

In some cases the delay in receiving test results can hamper diagnosis or delay the movement of horses. Supported by a grant from Land Rover Burghley Horse Trials, work is currently underway at the Animal Health Trust to develop a patient side ELISA capable of producing a result in 10 minutes.

**References**

