How to Control Strangles Infections on the Endemic Farm

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1. Introduction

*Streptococcus equi* infection, or strangles, continues to be a devastating, highly infectious disease that is endemic in the horse population. Clinical signs include high fever, mucopurulent nasal discharge, abscesses of the submandibular lymph nodes, leucocytosis, elevated fibrinogen, and local edema. Acute strangles causes considerable pain and loss of condition, and it can be fatal in advanced cases. In susceptible horses, morbidity may be >90% and mortality as high as 10% of horses with clinical signs of the disease. The Animal Health Trust in Newmarket, England ranks strangles among the three most significant equine respiratory diseases.

Strangles is transmitted either from infected horses with clinical signs or from environmental *S. equi* that persists after an outbreak. Significantly, a recent study using polymerase chain reaction (PCR) diagnosis of nasal swabs showed that asymptomatic *S. equi* carriers were positive for an average of 4.5 mo after the initial infection. One reported asymptomatic carrier was still able to infect other horses almost 5 yr (56 mo) after initial infection. Not surprisingly, strangles is often regarded as pernicious and almost impossible to cure on some endemic farms.

This report describes how PCR can be used as a tool to help control the spread of strangles by diagnosing infected animals, including asymptomatic carriers that standard culture methods may fail to identify. The use of PCR to evaluate nasal-swab samples for *S. equi* has been previously described by investigators in Europe and by clinicians at the Gluck Equine Research Center at the University of Kentucky. Also discussed in this report is a treatment protocol that has been proven effective in controlling the spread of disease, limiting the duration of outbreaks, and eradicating strangles on endemic farms.

*S. equi* Diagnostic Study of Kentucky Herds

PCR was used to determine the incidence of *S. equi* infection in clinically affected and asymptomatic horses on six Kentucky farms (Table 1). Farm A is a breeding facility with a 3-yr history of endemic *S. equi* infection. On this farm, diagnostic sensitivity of PCR was compared with standard bacterial culture methods in a cohort of 77 mares.

Sample Collection

Clinical personnel wore single-use rubber gloves and coveralls to obtain diagnostic samples.
tain biosecurity, boots were disinfected before entering and when leaving a pasture or paddock.

Either nasal swabs or nasopharyngeal washes were obtained as diagnostic samples. Nasopharyngeal washes were concentrated by centrifugation at 3000 g; then, the pellets were cultured on blood-agar plates and tested by PCR, a procedure that is much more sensitive than bacterial culturing of nasal swabs in detecting small numbers of the S. equi organisms. The PCR test uses primers that are looking for DNA for M-protein of S. equi. The test cannot distinguish between live or dead organisms.

Nasal swabs were obtained by inserting a 16-in cotton-tipped swab through the ventral meatus to the level of the nasopharynx and then gently rotating the swab to collect the sample. After it was removed from the horse, the swab was placed in Ames culture media on ice and submitted for diagnostic testing.

Nasopharyngeal washes were performed by inserting a 20-cm, #10 polypropylene catheter in the nostril through the ventral meatus to the level of the nasopharynx. The distance that the catheter was advanced averaged 10 cm. A 60-ml syringe was used to gently spray warm sterile saline into the nasopharynx. The horse’s head was lowered while the saline was administered. Saline solution from both nostrils was collected in a plastic cup or palpation sleeve. The sample was transferred into a 50-ml centrifuge tube, labeled, and placed in a cooler for diagnostic testing.

2. Results

Use of PCR diagnosis showed that in a population of 597 horses on six farms with endemic S. equi, 25.5% (152 horses) were positive for S. equi. There were at least 1–2 horses on all of these farms that showed clinical signs of active S. equi at the time of PCR testing. Of these, only 12.6% (17 horses) showed clinical signs of strangles. In the cohort of 77 resident mares on Farm A, standard bacterial-culture methods yielded a positive diagnosis for only 12 infected horses, which was less than one-fourth of the total identified by PCR (52 horses). Of the 79 horses brought onto Farm A for breeding or other purposes, PCR or bacterial-culture testing showed that 7 (8.9%) were positive for S. equi. All horses where tested after treatment until two negative PCR results were obtained.

3. Conclusions

The diagnostic survey revealed that S. equi-endemic farms typically have a substantial pool of infected animals, and only a small percentage of these horses show clinical signs of strangles. One-fourth of the total population in this study was S. equi-infected, a prevalence that ensures maintenance of an S. equi reservoir in the equine population unless an effective screening and control program is implemented. The small percentage of horses with clinical strangles masks the true extent of S. equi infection on endemic farms. Presence of multiple cases of strangles should be properly viewed as an indication of much wider infection within the herd. The 8.9% rate of unapparent S. equi infection in horses introduced into Farm A illustrates how the disease is inadvertently but easily spread.

PCR was shown to be a much more sensitive diagnostic method than standard bacterial culturing. Other investigators have found that culturing from nasal swabs is an imprecise method of diagnosing S. equi infection. In one study, positive tests often occurred only intermittently in chronic cases lasting between 7 and 39 mo.3 Thus, PCR is a far superior tool for screening a herd for S. equi to identify individual horses for treatment and control as outlined in the following section.

4. Protocol for Controlling Strangles on an Infected Farm

The following protocol has proven to be consistently effective for stopping active outbreaks and eliminating endemic S. equi infection. The protocol is based on accurate (PCR) diagnosis of subclinical cases, prompt isolation of infected horses, immediate treatment with local and systemic antibiotics, and careful environmental sanitation. The protocol has been used on each of the farms listed in Table 1, and no new cases of strangles have been reported since implementation.

<table>
<thead>
<tr>
<th>Farm</th>
<th>No. Animals Tested (Group)</th>
<th>No. S. equi–Positive Horses and Test Method</th>
<th>Strangles Clinical Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>77 (mares)</td>
<td>52 (PCR) 12 (Culture)</td>
<td>Asymptomatic 48 3</td>
</tr>
<tr>
<td>A</td>
<td>223 (weanlings and yearlings)</td>
<td>38 (PCR) 3 (Culture)</td>
<td>Asymptomatic 33 5</td>
</tr>
<tr>
<td>B</td>
<td>41 (mares)</td>
<td>3 (PCR)</td>
<td>Asymptomatic 3 0</td>
</tr>
<tr>
<td>C</td>
<td>51</td>
<td>13 (PCR)</td>
<td>Asymptomatic 10 3</td>
</tr>
<tr>
<td>D</td>
<td>45</td>
<td>5 (PCR)</td>
<td>Asymptomatic 5 0</td>
</tr>
<tr>
<td>E</td>
<td>81</td>
<td>22 (PCR)</td>
<td>Asymptomatic 19 3</td>
</tr>
<tr>
<td>F</td>
<td>79</td>
<td>19 (PCR)</td>
<td>Asymptomatic 17 2</td>
</tr>
<tr>
<td>Total</td>
<td>597</td>
<td>152 (PCR)</td>
<td>Asymptomatic 135 17</td>
</tr>
</tbody>
</table>

NA, not attempted.
Endoscopic Examination and Treatment

Horses that test positive by culture or PCR are sedated with 20 μg/kg detomidine* administered intravenously. The upper respiratory tract and each guttural pouch are examined with a 9-mm pediatric endoscope. To aid entry to the guttural pouch, a guide wire is placed down the biopsy channel port. A sterile, single-use, 2.4-mm endoscopic delivery catheter is placed into the biopsy channel port, and the guttural pouch is flushed with 50–60 ml of warm sterile saline. Sodium penicillin is then administered locally into the guttural pouches. After guttural-pouch treatment, horses are given systemic procaine penicillin G (20 ml every 12 h; 300,000 units/ml) for 7 days followed by oral trimethoprim-sulfa (15 mg/kg) oral treatment every 12 h for 2 wk.

Quarantine

A strict quarantine to isolate S. equi positive horses is necessary to limit the spread of this easily transmitted disease. Isolation measures include avoiding shared water and feed sources, working with S. equi-positive horses at the end of the day after all the other horses have been handled, disinfecting stabling areas used by infected horses, and not using tack from infected animals to become fomites of infection for other horses.

Post-Treatment Sanitation

Because S. equi has been proven to live up to 30 days in watering equipment, all waterers should be emptied, scrubbed, and disinfected with disinfectant solution.b,c After disinfection, waterers should be rinsed well to remove any cleaning residue. All stalls, surrounding housing areas, and any equipment or objects that infected horses may have touched should be thoroughly cleaned and disinfected. Floors and walls should be first rinsed and then brush-scrubbed with disinfectant solution to ensure complete coverage. This should be followed by a second rinse and rewashing with a solution of laundry detergent. Finally, the floors and walls should be rinsed for a third time. The detergent wash is useful, because the bubbling action makes it possible to visually see the surfaces that have been cleaned. After the cleaning procedure, the housing area should remain unoccupied for at least 7 days, which is the longest period that S. equi has been shown to remain viable on inanimate objects. To avoid contaminating other sites on the premises, residue from stalls or the cleaning operation should be discarded, and it should not be spread with manure or otherwise placed in locations where it could come in contact with horses.

Any equipment that has been exposed to an infected horse should be replaced or disinfected as noted above. Examples include buckets, twitches, pitchforks, muck tubs, lead shanks, lead ropes, and wheelbarrows.

The top rail of fences may be cleaned by spray-bottle application of a disinfectant solution. Fences should be rinsed with water afterward to avoid exposing horses to toxic disinfectant. Pastures should be mowed to aid the bacterial-killing effect of sun exposure. Access to contaminated pastures should be restricted for 7 days after mowing and premise sanitation.

5. Discussion

Data from other studies have shown that PCR is at least three times more sensitive than bacterial culturing for detection of S. equi in samples obtained from nasal swabs and nasopharyngeal washes.4,5 PCR testing was the key to identifying the asymptomatic carriers of S. equi in the study described here. Screening of newly arrived horses with PCR or a combination of the two testing methods, isolation and treatment of positive horses using the protocol described, and use of multiple post-treatment diagnostic tests were the keys to rapidly limiting the spread of strangles on the experimental farms.6

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References and Footnotes


*Dormosedan, Pfizer, New York, NY 10017.
TekTrol, Bio-Tek, Winooksi, Vermont 05404.
One-Stroke Environ, Pro-Ag, Winnipeg, MB R2J 0LI, Canada.