How to Develop a Preventive Foot Care Program—A Model

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Developing a preventive foot care program provides a valuable service for clients and their horses. By raising awareness of existing problems, or the potential for certain problems to develop in a particular horse, steps can be taken to limit the impact of those problems and prolong the horse’s useful life. Author’s addresses: Central Carolina Equine Practice, 8809 Farrington Mill Road, Chapel Hill, NC, 27514 (Mansmann and Stewart); and Paper Horse, PO Box 1771, Cary, NC, 27512 (King). © 2000 AAEP.

Introduction
The two conventional preventive medicine programs in equine practice are deworming and vaccination. These programs are designed to prevent, or at least decrease the incidence and severity of, specific medical problems. As the fields of equine parasitology and immunology have advanced, so these preventive programs have been refined. Now, deworming and vaccination programs are tailored for particular types of horses, management situations, and geographic regions. These programs are now so widely accepted that, even if a horse owner or manager has limited knowledge of the specific parasites or diseases involved, most are convinced of the importance and value of these preventive medicine programs.

But preventive health care need not be restricted to deworming and vaccination. There are numerous performance-limiting problems in horses that can be prevented, or their incidence and severity reduced, simply by alerting the owner or manager to the potential for a particular horse to develop that problem and recommending appropriate management changes. This is the foundation of the preventive foot care program we describe in this paper.

Foot problems are among the most common causes of lameness in horses. Thus, the primary objective of this preventive foot care program is to avoid potentially serious foot problems and limit progression of existing problems, thereby maximizing performance and prolonging the useful life of the horse. This goal is achieved by making the owner aware of any potential or existing foot problems, providing the farrier with a lateral radiograph from which to make shoeing decisions, and encouraging positive interaction among the owner–farrier–veterinarian team (OFVT). This paper describes the preventive foot care program we have developed for
our practice, and presents the findings from the first 50 horses evaluated.

Materials and Methods

Examination Procedure

Fifty horses were evaluated between August 1998 and January 1999. To be eligible, the horse had to be sound for work, as determined by the owner. Horses that were lame were excluded from the study group, and their owners were encouraged to have a standard lameness examination performed.

The preventive foot care examination comprises five parts:

1. History. The owner or manager is asked to provide general information about the horse and its work schedule, any history of foot problems or lameness, and the shoeing schedule (Fig. 1).

2. General inspection. The horse's conformation is briefly evaluated and its body score is estimated. The potential for suspensory ligament problems (e.g., long pasterns and exagger-

Fig. 1. Sample evaluation form.
3. Assessment of the feet. Both forefeet are examined with the shoes on (if applicable). Foot conformation is evaluated, and the feet are inspected for any obvious external problems such as cracks, other hoof wall defects, and thrush. Two simple measurements are then made: (a) hoof wall angle (angle of the dorsal hoof wall relative to the bearing surface of the foot); and (b) hoof width, measured across the widest part of the foot.

4. Lateral radiographs. A lateral radiograph is taken of each forefoot, with the horizontal beam aimed at the bearing surface of the hoof wall and centered at the junction between the middle and palmar thirds of the shoe. Every effort is made to take a “true lateral” radiograph, in which both branches of the shoe are superimposed.

The lateral radiograph is primarily used to evaluate the position of the shoe in relation to the center of the coffin joint (i.e., heel support). Other evaluations include sole thickness, the position of the third phalanx (PIII) in relation to the hoof capsule, and the presence of any bony or soft tissue abnormalities visible on this view.

To evaluate heel support, a vertical line is extended down from the center of the coffin joint to intersect with the shoe (Fig 2). The center of the coffin joint is determined to be the point midway along the curvature of the distal interphalangeal joint, between the proximal extent of PIII’s extensor process and the proximal extent of the dorsal articular surface of the navicular bone. A calculation is then made of what proportion of the shoe is in front of this line (toward the toe) and what proportion is behind this line (toward the heel). Heel support is considered adequate when \( \geq 40\% \) of the shoe is behind this line.

5. Report. Once the radiographs have been evaluated, a written report is sent to the owner and the farrier (and, when applicable, the primary or referring veterinarian). Included in the report are a summary of the general inspection and hoof measurements; details of any radiographic abnormalities found; a tracing of the lateral radiograph with the assessment of heel support; and any specific recommendations for shoeing, turnout, diet, and exercise. The owner is encouraged to have the evaluation repeated every 12 months.

**Evaluation of the Program**

In an effort to determine the practical value of such a program, a subjective score was given for each preventive foot care evaluation:

0 = feet appeared normal and no new information was gleaned

1 = foot/feet had some abnormality that was already being addressed by the OFVT

2 = one minor problem either unknown or not being addressed by the OFVT

3 = combination of minor problems either unknown or not addressed by the OFVT

4 = moderate problem unknown to the OFVT that may be asymptomatic but should be monitored

5 = serious problem of immediate concern, unknown to the OFVT

Specific abnormalities found during the evaluation that we considered to be, or have the potential to become, a problem were also compiled.

**Results**

In evaluating the program, the following results were obtained for each subjective score:

0—In 5 of the 50 horses (10%), the feet and radiographs were considered normal, and no member of the OFVT learned anything new about the horse.

1—In 12 horses (24%), the problem was known to the members of the OFVT, and no new problems were identified. The evaluation simply confirmed the presence and extent of the problem, which in most horses was mismatched feet.

2—In 20 horses (40%), a minor problem that was either unknown or not being addressed by the OFVT was identified. The most common problems in this category were inadequate...
The most common finding that we considered to be a potential problem was mismatched feet (Table 1). In most horses, the mismatching was mild to moderate. The next most common finding was excessive body weight (body score > 7 on a scale from 1–9), and a level or inversely angled coffin bone (loss of the normal tilt to the solar margin of PIII such that it is either level or lower at the wings than at the toe).

3—In 8 horses (16%) a combination of minor problems unknown or not being addressed by the OFVT were found. The types of problems identified were the same as those listed for horses with a score of 2; one horse in this group had mild coffin bone rotation.

4—In 4 horses (8%) a problem of moderate importance was found. Problems in this group included ringbone (currently asymptomatic), coffin bone rotation, and suspensory ligament pain.

5—One horse had an important problem of immediate concern. This horse was tripping and falling as a result of advanced carpal arthritis, of which the owner and farrier were unaware.

Table 1. Specific Findings of Preventive Foot Care Evaluations on 50 Horses

<table>
<thead>
<tr>
<th>Finding</th>
<th>Number of Horses</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mismatched feet</td>
<td>27</td>
<td>54%</td>
</tr>
<tr>
<td>Overweight/cresty neck</td>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td>Inadequate heel support†</td>
<td>18</td>
<td>36%</td>
</tr>
<tr>
<td>Propensity for hindlimb problems</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td>Thin soles (radiographic assessment)</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Ringbone</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td>Coffin bone rotation</td>
<td>2</td>
<td>4%</td>
</tr>
</tbody>
</table>

Note: the total number of horses exceeds 50 because some horses had more than one abnormality.

† <40% of the shoe behind the center of the coffin joint.

Discussion

In this small sample of 50 horses, 66% had potential problems that were not known or were not being addressed by the owner, farrier, or primary care veterinarian. In only 10% of horses were the feet and lateral radiographs considered normal. In our experience, the problems identified through this program have the potential to negatively impact performance and even cause lameness if not managed appropriately. Thus, we believe that a preventive foot care program such as this is a valuable service for clients and their horses.

Our preventive foot care program is still evolving, but it has been well received by owners and farriers in our area. The most common problems or misconceptions that we have encountered so far are that the program is 1) a critique of the farrier’s work, 2) a comprehensive physical and radiographic evaluation of the feet, or 3) a substitute for a lameness examination. But when the goals of the program are made clear to the owner and the farrier, in most cases all parties have been pleased with the results and convinced of its value. We feel that this program offers veterinarians a unique opportunity to positively interact with the farriers in their practice area, and work together to manage existing foot problems and prevent many others.

This preventive foot care program is presented simply as a model. We anticipate that equine practitioners who adopt this program will modify the evaluation to fit the types of horses and most prevalent foot problems seen in their practices. For example, the examination may need to be modified for gaited horses shod with elevated pads, and for growing horses; and in young horses, a practitioner may recommend re-evaluation every 6 months instead of every 12 months. Some veterinarians may choose to include a dorsopalmar projection or a ‘skyline’ navicular view in the radiographic examination, although the program is designed to be a screening tool that is as economical and as simple to conduct as possible. Various methods of evaluating the foot are described elsewhere.

As our sample size is small and limited to functionally sound horses, our data do not accurately reflect the incidence of various foot problems in horses. We did not find any major foot problems in this population of horses, which is probably to be expected. However, the main impetus for the principal author (RAM) to develop this program was the number of cases in which a program of this type could have prevented a serious problem, or at least alerted the owner, farrier, or veterinarian to its presence early enough for simple management changes to have limited its impact. A fairly common example is a horse with white line disease in which a lateral radiograph reveals the presence of coffin bone rotation. Whether the rotation was primary or secondary is open to speculation. The fact remains that, had a lateral radiograph not been
taken, the farrier and veterinarian would have been unaware of the extent of the problem.

Another example that illustrates the value of this program is the older horse with pituitary pars intermedia dysfunction (equine Cushing’s disease), in which chronic laminitis and recurrent foot abscesses are common and frustrating problems. There are many owners and farriers who are unaware of this medical condition and equally unaware that it can be managed, and the foot problems substantially improved, with medication.

We now provide brief discussions of the potential problems we did identify in the first 50 horses evaluated.

Mismatched Feet
Mismatching of the feet was the most common finding. We quantitatively defined mismatching as a difference in hoof angle and/or width between the left and right feet of ≥ 2 degrees and/or ≥ 2 millimeters, respectively. Many of the owners and all of the farriers were aware of the mismatching in these horses. However, the preventive foot care evaluation allowed such issues as the importance of an appropriate shoeing interval to be addressed by a third party, thus reinforcing the farrier’s recommendations to the owner.

A small amount of inequity between the left and right feet is probably normal. However, in our experience obvious mismatching is suggestive of a previous, current, or developing problem that could affect performance or lead to lameness if not addressed. The horses we evaluated were all functionally sound in the opinion of the owner, but few were performing at an advanced level in a strenuous sport or activity. We recommend monitoring mismatched feet for widening of the difference between the two feet in successive shoeings. If there is no significant change between shoeings (i.e., the situation is static) and the horse is performing satisfactorily, then monitoring the situation may be all that is needed. But if there is a widening of the difference between the two feet in successive shoeings, it could indicate a progressive problem which needs further evaluation.

Overweight Horses
Almost 40% of the horses evaluated were considered to be overweight (body score of > 7). This fact should have been apparent to the owner, farrier, and veterinarian, but no one was addressing this problem. Most equine practitioners would agree that overweight horses and those with cresty necks are at increased risk for laminitis, and that excessive body weight can complicate various other orthopedic problems, particularly joint disease. Awareness of the potential risk factors is essential in the prevention of laminitis, so this preventive foot care program offers farriers and veterinarians an opportunity to educate their clients and work at eliminating one of the risk factors for this devastating disease.

Inadequate Heel Support
Over one-third of the horses had inadequate heel support in one or both feet. In our collective experience, which spans two continents and several regions within the United States, we believe that this problem is quite prevalent in various types of horses. Inadequate heel support may be responsible for many cases of palmar foot pain (heel pain), whether originating from the navicular area or elsewhere in the palmar aspect of the foot. It may also contribute to quarter cracks.

We chose to evaluate heel support radiographically, based on the method outlined by Chris Colles. However, we modified Colles’ approach slightly. Colles describes drawing a circle over the distal interphalangeal joint and dropping a vertical line from the center of the circle to the bearing surface of the foot. Using this method, the line should bisect the bearing surface if the foot is correctly balanced. But rather than drawing a circle over the coffin joint to determine its center, we simply select a point along the curvature of the coffin joint that is equidistant between the most proximal aspects of the extensor process and the dorsal articular surface of the navicular bone. We then drop a vertical line from that point to the ground surface (Fig. 2). Using this method, we consider heel support to be adequate in most horses when no more than 60% of the shoe is in front of this line and no less than 40% of the shoe is behind this line (i.e., 60:40). A common concern among owners and some farriers is that the horse is more likely to loosen or pull off a shoe if the shoe extends back too far. But we have found that horses shod to provide adequate heel support based on our criterion of 60:40 are no more likely to lose shoes, provided attention is paid to breakover and to the environment in which the horse is kept.

Throughout the program, most farriers have appreciated having a lateral radiograph (or a tracing) from which to work. It graphically depicts the problem in a way that most owners can readily understand, and it helps the farrier determine the most appropriate shoeing method and shoeing interval. It also encourages dialogue between the farrier and the veterinarian.

Propensity for Suspensory Problems
Horses with long pasterns tend to have exaggerated hyperextension of the fetlocks during motion. In some horses, the pasterns are merely “functionally” long, meaning that while the pasterns may be of average length, there is still exaggerated fetlock hyperextension. Typically, horses with long or functionally long pasterns are considered “good movers,” having a more elastic gait than horses with shorter or more upright pasterns. However, this conformation may place undue stress on the suspensory ligaments, as the loading and length of the suspensory ligament increase with extension of the fetlock joint.
Horses with long or functionally long pasterns and exaggerated fetlock hyperextension may, therefore, be at increased risk for degenerative suspensory ligament disease (chronic stretching and fiber damage). In the first 50 horses we evaluated, 14% had what we considered to be a propensity for suspensory ligament problems, based on their conformation. All cases involved the hindlimbs, and all tended to have straighter hocks in the stance phase of the stride than horses considered not to be at increased risk for suspensory problems. Three of the seven horses had some pain on palpation of the affected suspensory ligament(s), either in the body or the branches.

As with excessive body weight, making the owner aware that such a horse may be at increased risk is an important step in preventing or limiting this serious condition. In horses with this propensity, we discuss modifications to the exercise program with the owner and discuss increasing the heel support with the farrier.

Radiographic Findings

Two horses in the group had mild coffin bone rotation. Both horses were asymptomatic at the time of the evaluation, and in each case the farrier was unaware of the problem. Four horses in the group had thin soles. Currently, our radiographic assessment of sole thickness is subjective; we do not routinely measure sole depth. But in general, we consider a horse to have thin soles if the distance between the tip of PIII and the surface of the sole is less than 0.75 cm. In each of the four horses with thin soles, the farrier was aware of the fact, but in most cases the farrier found it useful to have the extent documented on radiographs.

A small proportion of horses had level or inversely angled coffin bones, in which the normal 4–5 degrees tilt of the coffin bone in relation to the ground surface of the hoof was lost. None of these horses was lame, but we believe that this radiographic finding is not normal and signals a potential problem in the palmar half of the foot. Colles remarked that this abnormality may be found in horses with very badly balanced feet. In some horses with level or inversely angled coffin bones, we have observed some improvement in angulation once adequate heel support is provided.

Degenerative joint disease involving the proximal interphalangeal joint was identified in three horses. In each case the condition was clinically silent and unknown to the members of the OFVT. Although the significance of this finding is open to debate, we feel that emphasizing the importance of consistency in the shoeing interval and footing (both exercise and turnout surfaces) is beneficial in these horses.

In conclusion, we believe that developing a preventive foot care program, tailored to the types of horses and foot problems commonly encountered in the practice, provides a valuable service for clients and their horses. By raising awareness of existing problems, or the potential for certain problems to develop in a particular horse, steps can be taken to limit the impact of those problems and thus prolong the horse’s useful life. This program also provides a novel way of enhancing the owner–farrier–veterinarian relationship, to the ultimate benefit of the horse.

References