

## Equine Dentistry: It's Not Just Floating Anymore

When horses were the main source of farm power and transportation, dentistry played a prominent role in the routine veterinary care of a horse. Horses were an integral part of the work force and people depended on their performance and longevity. Consequently, every aspect of a horse's overall health was important, including its teeth and mouth. However, as horses came to be replaced by the automobile, their role as a worker gradually evolved into that of pet, hobby and recreational outlet. This had a negative impact on the quality of dental care they received. It also markedly slowed the advancement of equine dental science, especially when compared with the rest of veterinary medicine.

Until fairly recently, this neglect of oral health in horses and other animals has gone unnoticed. However, we know that poor dental health can cause colic, weight loss and a host of other health problems and can interfere with performance. Most importantly, it can be painful for the horse to live with. As a result, equine dental care has recently experienced a resurgence of interest and is rapidly becoming emphasized as an integral part of veterinary college curricula.

In the history of human dentistry, there was a time when people consulted a dentist only when a toothache or gum problems became unbearable. Dentists contended that routine examinations and professional teeth



Image courtesy [www.javajane.co.uk](http://www.javajane.co.uk)

cleaning would prevent minor complaints from becoming serious health problems, but convincing the general public that such preventive measures would be effective was not easy. Perhaps the most convincing argument has been that **prevention is far preferable to the inevitable suffering that follows the neglect of teeth**. The same argument applies to horses.

Because of advances in other areas of equine health, horses today live well into their twenties and thirties. Consequently, it is vitally important to provide their teeth with regular preventive care starting at birth. Small problems that are recognized and corrected at an early age seldom become the large problems seen in many of

today's older horses. A veterinarian well-trained in equine dentistry has the skills to prevent most, if not all, major dental problems that have

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## DIRECTOR'S MESSAGE



Dr. Gregory L. Ferraro

**W**hy is it that we so often fail to properly maintain our horse's dental health? Why, when we see half-eaten food scattered around the stall or large quantities of hay in our horse's water do we think of it as a bad habit? When a horse resists accepting the bit, why do we put it off to bad behavior? Or when a well-schooled horse suddenly stops changing leads or running into their bridle do we call the trainer instead of the dentist? Is it a case of out of sight, out of mind or do we have some deep-seated psychological aversion to dentistry based on our past experience at the hands of some "Dickensian" driller?

Horse owners who are meticulous in their deworming and vaccination regimes, who insist on regular and careful hoof care, and who spend thousands of dollars a year on feedstuffs and dietary supplements will often totally overlook their horse's dental needs. For that matter, many dog owners never think about dentistry until their cherished Jack Russell terrier's breath becomes unbearable.

There is a line from a novella written by Jane Smiley called *The Age of Grief* where the main character, a dentist, describes

## Looking A Gift Horse in the Mouth

how his profession is so often unrewarding. He relates that no matter how technically good or beautiful his work might be, as soon as the patient closes their mouth and leaves his chair, it's over. Nobody besides the dentist himself will ever appreciate the value of what has just taken place. I think Jane got it right.

So why am I surprised about horses not getting proper dental care? Perhaps, if we could teach them to smile like Miss America or speak like a political candidate their owners would be more apt to notice what lousy shape their teeth were in. More likely, it's probably the horse's stoic, uncomplaining attitude that's really to blame for the state of their oral degeneracy. We couldn't possibly be neglecting their dental health on purpose, could we?

Seriously, it isn't easy to properly examine a horse's mouth. Only the experienced veterinarian or dental technician has the ability to fully examine and diagnose abnormalities of the equine teeth and gums. It takes many years to develop the dexterity and skills necessary to properly care for the dental needs of horses. So it is no wonder that the average horse owner tends to not think about what they cannot see or understand.

Yet, the unseen is not like dust under the rug. It is extremely important to the health, performance and longevity of every horse, particularly in this day and age where advances in veterinary medicine, nutrition and husbandry techniques have made it possible for horses to live longer than ever. Throughout their lives, horses wear away their teeth, which have only a limited capacity to continue to respond through eruption. It's a shame to find 20- to 30-year-old horses that may be healthy

in all other respects succumb to infirmities such as colic and poor nutrition simply due to the lack of any viable teeth. It is even worse to see the premature loss of young and productive animals from terminal diseases secondary to dental abnormalities that should have been recognized and treated through regular dental care.

In the pages that follow, we will familiarize you with equine teeth, some commonly seen dental conditions and abnormalities, and proper examination and veterinary care options currently utilized for health maintenance. We hope that you will find this information enlightening enough to forget the old proverb, *Never look a gift horse in the mouth*. Please DO look that gift horse—and every other one you own—in the mouth.

**"Bitzer," said Thomas Gradgrind. "Your definition of a horse."**

**"Quadruped. Graminivorous. Forty teeth, namely twenty-four grinders, four eye-teeth, and twelve incisive. Sheds coat in the spring; in marshy countries, sheds hoofs, too. Hoofs hard, but requiring to be shod with iron. Age known by marks in mouth."**

**"Now girl number twenty," said Mr. Gradgrind. "You know what a horse is."**

**— Charles Dickens,  
*Hard Times***

**Equine Dentistry**  
 — Continued from page 1

previously been accepted as an inevitable part of equine aging.

Good dental health is critical to the proper function of a horse's digestive system, since digestion is a complex process that begins with chewing and mixing of food with saliva. If the food is not properly chewed, it will not digest properly and could cause chronic colic, choke and general unthriftiness (a husbandry term used to indicate an unkempt appearance or a failure to thrive). Reluctance to drink cold water may also result from dental pain. Healthy teeth and gums will also prevent other problems such as infections in the teeth roots and performance problems because of pain or discomfort with the bit.

Not all dental problems in the horse are revealed by obvious clinical signs, any more than underlying diseases in humans always reveal themselves in symptoms right away. This underscores the importance of having regular, comprehensive dental examinations. According to Dr. Mary DeLorey, a veterinarian dedicated exclusively to equine dentistry at Northwest Equine Dentistry in the state of Washington, "One of the most important concepts that horse owners can embrace is that prevention is the absolute key to good equine dental health. The idea that a horse doesn't need dental attention until he is in his or her middle age must disappear. . . . Once your horse has reached the age of 6 years, all his permanent teeth are in position and in [full] use. If your horse has had periodic, comprehensive dental care up to this time and has no severe malocclusions or dental disease, he's well-poised for lifelong dental health. He should receive maintenance care every 8-12 months. Horses that are in demanding competition, have heightened sensitivity or pre-existing

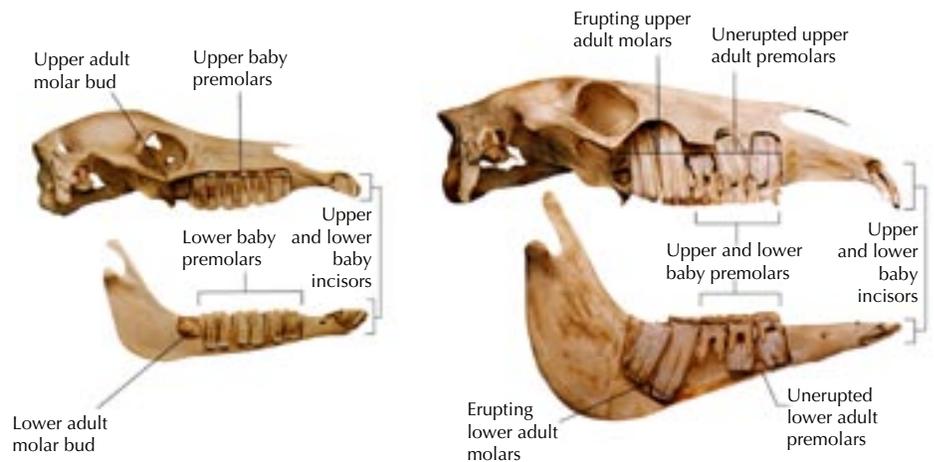
dental abnormalities may need routine attention more frequently, perhaps every six months, to maintain dental health and comfort. Each horse is an individual with unique needs. A veterinarian skilled in equine dentistry can work with you to determine a schedule most appropriate for your horse."

**Equine Teeth**

Like humans, horses develop two sets of teeth in their lifetime: the deciduous (baby) teeth and the permanent teeth. The deciduous teeth or caps are comprised of milk (or baby) incisors and premolars. The last of the deciduous teeth erupt at around 8 months of age and begin to be replaced by adult teeth (incisors, premolars and molars) around age 2-1/2. By age 5, most horses have their full complement of permanent teeth. An adult male horse has 40 permanent teeth including the canines, while a mare may have between 36-40 because mares do not usually have canines.

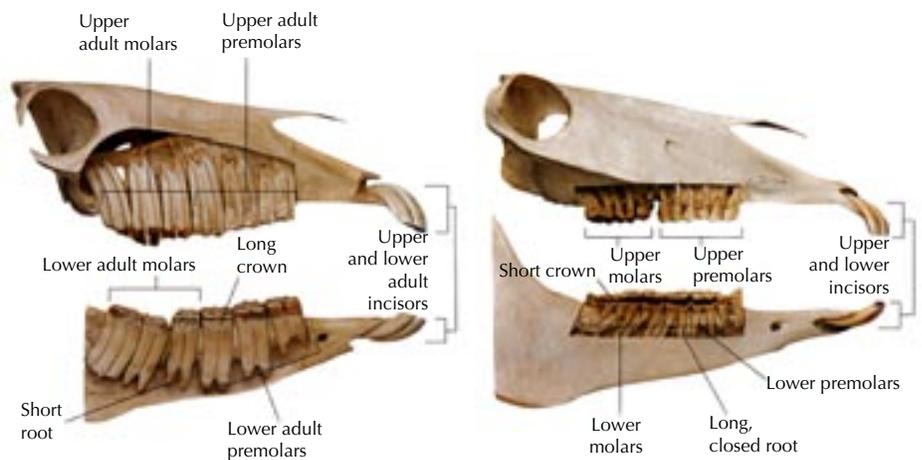
The following illustrations show the development of teeth in horses at birth, at 2 years, 6 years and approximately 20 years.

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**TEETH AT BIRTH**

**TEETH AT 2 YEARS**



**TEETH AT 6 YEARS**

**TEETH AT 20 YEARS**

## Equine Dentistry

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The initial length of the permanent equine teeth (crown and root combined) is about four inches. The roots are deeply embedded in the jawbone, as shown in the photo below. Teeth continue to erupt throughout a horse's lifetime and are worn down primarily by chewing. As seen in the next photo, the length of tooth diminishes significantly as the horse ages.



### The Dental Exam

At the UC Davis Veterinary Medical Teaching Hospital, a proper equine dental examination consists of the following:

- Sedation to keep the horse quiet and still.
- Appropriate head support system (suspension, head stand, head ring).
- An initial visual examination and palpation of the oral cavity.
- Full-mouth speculum to enable a clear view and ability to work deep into the mouth.
- Proper set of instruments that are complete and clean.
- Radiology when indicated by a potential problem or before and after dental extraction.
- In addition, pharmacological agents such as phenylbutazone (bute) or banamine and antibiotics may be needed as adjuncts to treatment.

The exam begins by rinsing the horse's mouth and evaluating the volume, consistency and odor of the flushed material. Using a full-mouth speculum, the horse's mouth is examined digitally and visually using adequate light and reflecting instruments. Further,

- The incisors are evaluated from the front and sides to check for evenness of wear and occlusion.
- Interdental spaces are observed and palpated for unerupted canine teeth and blind wolf teeth (small vestigial premolars; see note below).
- The tongue is examined for lesions such as ulcers, lacerations or scars.
- The upper front premolars are palpated and examined for hooks and sharp cusps that may cause ulcers on the inside of the cheeks.
- The cheeks are also examined for packing of feed or lacerations.
- The lower jaw is evaluated for adequate sideward movement (lateral excursion).
- The mouth is examined for evidence of any dental lesions or gum disease.
- The entire oral cavity is palpated (felt) manually for any abnormalities as a supplement to the visual inspection.

**NOTE:** Because the eruption time for wolf teeth is highly variable, veterinarians routinely examine the mouth for their presence and may remove them as they appear, anytime during the first five years of life.

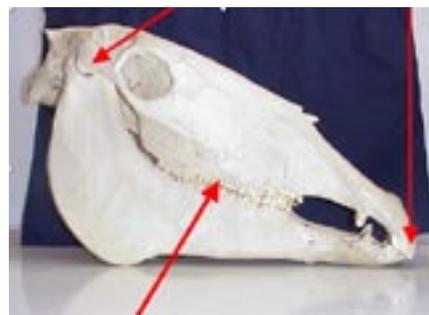
### Who Should Care for Your Horse's Teeth?

Dental health should be addressed by a licensed veterinarian. In many states it is illegal for nonveterinarians to perform equine dental procedures. In states that do permit trained dental technicians to perform dental procedures, such individuals must work alongside a licensed veterinarian. The American Association of Equine Practitioners also supports this but cautions that "the practice of equine dentistry is an integral branch of equine veterinary medicine. . . . Any surgical procedure of the head or oral cavity; the administration or prescription of sedatives, tranquilizers, analgesics or anesthetics; procedures which are invasive of the tissues to the oral cavity including, but not limited to, removal of sharp enamel projections, treatment of malocclusions of premolars, molars, and incisors, reshaping of canine teeth, the extraction of the first premolars and deciduous premolars and incisors; treatment, extraction or repair of damaged or diseased teeth; periodont treatment; and dental radiography are veterinary medical procedures and should be performed by a licensed veterinarian."

Dental technicians can be certified through different organizations. Two well-recognized ones are the **American Veterinary Dental Society** and the **International Association of Equine Dentists**. Bear in mind that a legitimate equine dental technician should be willing to work with your veterinarian, who is the best advisor for your horse's overall health care.

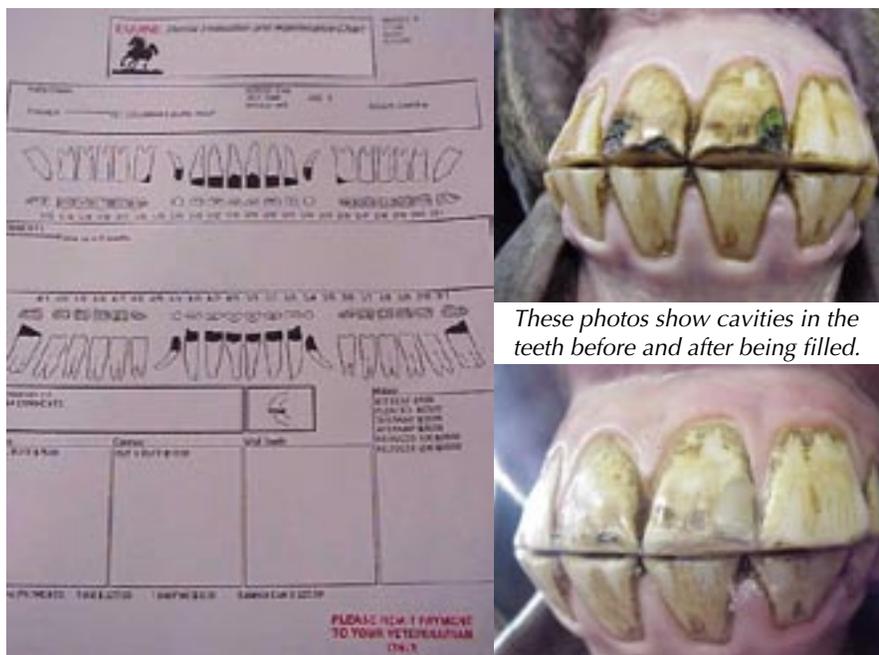


Initial visual examination and palpation of the oral cavity.



The red arrows show the three points of alignment: the temporomandibular joint at the top, the cheek teeth (molars and premolars) in the middle, and the incisors at the front.

A thorough dental examination should include keeping dental records—similar to those used for people. Knowing a horse's dental history can be important if you move or change veterinarians or if you decide to sell your horse. This example of a dental chart shows what procedures were indicated by the exam and what was actually done:



These photos show cavities in the teeth before and after being filled.

animal, teeth can rapidly become uneven and alter the alignment of the mouth. A critical part of regular dental care is to keep all the teeth relatively even in length and prevent minor problems from becoming major problems.

Maintaining an even bite plane during a horse's middle teens is especially important to ensure a level grinding surface when the horse is in its twenties. If an even bite plane is neglected, it may be impossible to achieve alignment when the horse is older, since the teeth will wear unevenly and eventually stop erupting. Again, the goal of regular, consistent dental care is to prevent minor problems from becoming major ones that can impact the quality of an animal's life, particularly in its later years.

Some common problems that may be addressed during the course of regular maintenance include:

- Sharp enamel points forming on cheek teeth, causing lacerations or ulcers on the cheeks or tongue.
- Retained caps (deciduous teeth that are not shed).
- Discomfort caused by bit contact with the wolf teeth (small vestigial premolars).
- Hooks forming on the first upper and last lower cheek teeth.
- Long and/or sharp canine (bridle) teeth interfering with insertion or removal of the bit.
- Lost and/or broken teeth.

### Common Dental Problems

Horses grind their food using a side-to-side movement of the lower arcade of teeth against the upper arcade, known as *lateral excursion*. Consequently, an important part of equine dental care is to maintain good alignment at the three critical points shown in the following photograph so that the horse can chew its food properly. Since equine teeth grow throughout a horse's lifetime and wear down in many different ways depending on the individual

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## Equine Dentistry

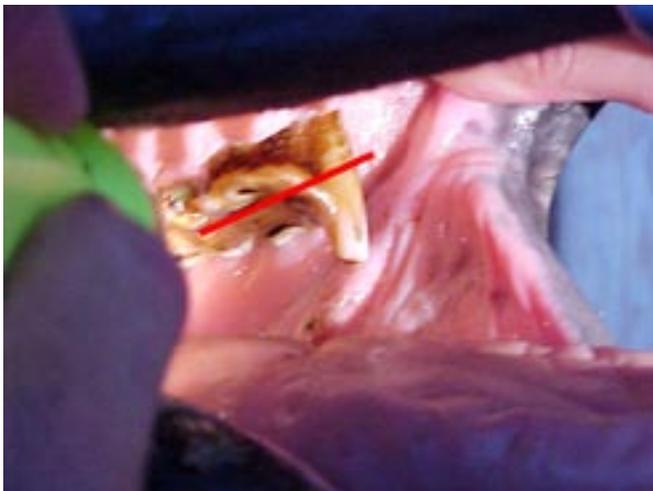
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- Abnormally long teeth.
- Infected teeth and/or gums.
- Misalignment of the mouth/poor apposition (can be due to congenital defects or injury).
- Periodontal pocketing of feed and other evidence of periodontal (gum) disease.

The following photographs illustrate some of the problems listed above:



This photo shows an excessively long crown, which can become quite sharp. Red line indicates the point to which tooth should be reduced.



This photo shows a hook that has formed on the front portion of the first upper cheek tooth. Hooks can also become sharp and cause lacerations to the cheek and tongue. Similar hooks can form on the back portion of the last lower cheek teeth, causing severe discomfort to the horse. Red line indicates the point to which the tooth should be reduced.



The arrow on the right shows a deciduous tooth that has not yet been shed, making it difficult for the permanent incisor (left arrow) to erupt properly.



The **above photo** shows incisors that are excessively long and interfering with the proper alignment of this horse's mouth. The **photo below** demonstrates a better alignment after the teeth have been reduced.



Horses with dental problems may show signs of pain or irritation, or they may show no signs at all. If a horse starts behaving abnormally, dental problems should be considered as a potential cause. The following signs, though not always indicative of dental problems, can alert you to a potential problem:

- Loss of feed from mouth while eating (quidding), difficulty chewing or excessive salivation.
- Loss of body condition, weight loss.
- Large or undigested feed particles (long stems or whole grain) in manure.
- Head tilting or tossing, bit chewing, tongue lolling, fighting the bit or resisting bridling.
- Poor performance such as lugging on the bridle, failing to turn or stop, even bucking.
- Refusing to take a lead.
- Foul odor from mouth or nostrils or traces of blood from the mouth.
- Nasal discharge or swelling of the face, jaw or mouth tissues.

If you are diligent about caring for your horse's teeth, chances are you will not be surprised by a sudden problem. Oral exams should be an essential part of an annual physical examination by a veterinarian. The end result is a healthier, more comfortable horse and teeth that may sustain the horse well into old age.

#### Dental Problems in Older Horses

Older horses can be more susceptible to infections, gum problems and broken or lost teeth. Horses that are 20 years old and older should have their teeth examined at least once a year (and preferably twice a year) to prevent any serious problems. An aging horse that can chew its food properly will be more inclined to have good nutrition, be less susceptible to colic or choke, and maintain good body condition.



*These incisors belong to a 25-year-old horse and are in very good condition due to long-term regular dental care. The instrument is pointing to a chip in one tooth, which in this case was left alone.*

#### Approximate Cost of Dentistry

At the UC Davis Veterinary Medical Teaching Hospital, the cost of a complete initial dental exam starts at around \$50 to \$75, including sedation. Additional expenses would depend on the treatment indicated by the exam. A follow-up exam is recommended after 6 months. Once a horse's teeth have been balanced, many horses can go from 8 to 12 months until the next exam.

And as the adage goes, an ounce of prevention is worth a pound of cure. ✨

## Dentistry Services at the UC Davis Veterinary Medical Teaching Hospital

Equine dentistry services at UC Davis are offered at the hospital through the Equine Medicine Service and in the field through the mobile Equine Field Service, which serves the needs of horse owners in a defined practice area. Dental services in the field are provided by Drs. Sharon Spier and Joie Watson, as well as by members of our team of resident veterinarians. Appointments can be made by calling (530)752-0292.

Appointments for dentistry services at the hospital can be made by calling (530)752-0290 and are typically scheduled on Wednesdays. Dental services are provided by Drs. David Wilson and Monica Aleman and resident veterinarians who work closely with Mr. Tony Basile, an equine dental technician. In addition, consultations with veterinary specialists in the Equine Surgery and Small Animal Dentistry services are provided as necessary.



*Tony Basile (left) and Dr. David Wilson with "Cat on Guard".*

## Timetable and Checklist for Routine Dental Examinations

### Immediate postnatal period

Check for congenital defects of lips or palate.  
Check for tongue motion and strength.  
Check for dental malocclusions.  
Evaluate all body systems.

### 6 to 8 months

Check that all incisors are erupted.  
Check incisor and premolar occlusion.  
Check for sharp enamel points or hooks.  
Examine tongue and inner lining of the cheeks and lips (buccal mucosa) for ulcers.  
Float (file) teeth if necessary.

### 16 to 24 months

Check for expanded lower wolf teeth eruption.  
Check for points and hooks on premolars.  
Check for bit lesions.  
Float teeth and round off front corner of premolar 2.  
Extract wolf teeth if present (see note below).

Note: Because the eruption time for wolf teeth is highly variable, veterinarians routinely examine the mouth for their presence and remove them as they appear, anytime during the first five years of life.

### 2 to 3 years

Check for upper and lower wolf teeth.  
Check corners of mouth and interdental space for bite injuries.  
Check central incisors and remove if needed.  
Evaluate molars and premolars for points and retained caps (first cheek tooth).  
Float (file) outside of upper and inside of lower cheek teeth.  
Remove caps if present and ready and extract wolf teeth.  
Balance mouth to align dental occlusion.

### 3 to 4 years

Check corners of mouth and interdental space for bit injuries.  
Evaluate incisors for retained deciduous teeth or extra teeth.  
Evaluate molars and premolars for points and retained caps (second cheek tooth).  
Evaluate size and shape of lower jaw and percuss (tapping to evaluate the sound obtained) sinuses.  
Check for blind wolf teeth (wolf teeth may be palpable through the gum although they have not erupted).  
Remove caps and wolf teeth if present.  
Float teeth and balance mouth.

### 4 to 5 years

Check all incisors for eruption.  
Check canine teeth for sharp edges or eruption delays.  
Check corner incisors and remove if ready.  
Evaluate entire molar arcade for proper eruption and alignment.  
Visually check upper front and lower back cheek teeth for hooks from malocclusion.

**4 to 5 years (continued)**

Digitally check for points on sharp edges of cheek teeth.

Percuss sinuses.

Remove deciduous teeth if ready.

Reduce hooks if present.

Remove mucosa over canines if gingival cysts are present.

Float teeth and balance mouth.

**5 years**

Float teeth and balance mouth.

**6 years and at least once a year thereafter**

Examine mouth visually and digitally, especially noting hooks and uneven wear.

Evaluate canines for sharp edges and tartar.

Percuss sinuses.

Use olfactory senses to detect evidence of oral decay or gingivitis.

Observe incisors for even wear.

Evaluate sideways movement of lower jaw across upper jaw (lateral excursion).

Float teeth; remove hooks and level or shorten incisors if indicated.

## A dental exam should include the following:

1. Rinse mouth, noting volume, consistency and odor of flushed material.
2. Use full-mouth speculum and examine mouth digitally and visually using adequate light source and reflecting instruments.
3. Evaluate incisors from front and side for evenness of wear.
4. Observe and palpate (feel) interdental space for canine teeth, blind wolf teeth and unerupted canines.
5. Observe tongue for lesions.
6. Palpate upper front premolars for detection of hooks and sharp cusps on the inside of the cheeks.
7. Evaluate back and forth sideways movement of the lower jaw (mandible) across the upper jaw (lateral excursion).
8. Check for any dental lesions such as broken teeth or cavities
9. Manually palpate oral cavity.



## DONOR SUPPORT

The Center for Equine Health at UC Davis has successfully established several awards in support of its research, educational and service activities. These endowments are essential to stimulating collaborative efforts toward the current and long-term success of the CEH. We are proud to announce the following award recipients for 2006:

### ***Dr. Susanne Dykgraaf - Dan Evans Memorial Endowment***

### ***Dr. William Symm and Dr. Aaron Hodder - John P. Hughes Memorial Endowment***

### ***Dr. Amy Poulin - Peray Memorial Endowment***

A description of the research made possible by these endowments follows. Congratulations to Drs. Dykgraaf, Symm, Hodder and Poulin!

### **Dan Evans Memorial Endowment**

Dr. Susanne Dykgraaf is the recipient of this year's Dan Evans Memorial Endowment. Her research will examine the hypothesis that sampling of fluid from the equine digital tendon sheath and injection of a commonly used antibiotic (amikacin) can cause elevations in synovial fluid parameters that may resemble values currently used to indicate sepsis. Because the sampling plays a crucial role in deciding on the course of treatment, it is important to understand the effect of the antibiotic on the fluid. To this end, Dr. Dykgraaf will determine the effect of repeated sampling and injection of amikacin on the fluid of the digital flexor tendon sheath in healthy horses.

Injuries to the digital flexor tendon sheath are common in horses and



*Dr. Susanne Dykgraaf*

can lead to life-threatening infection of the sheath. The decision to proceed with surgery is often made based on characteristics of the fluid sample from the sheath. It is common practice at the time of sampling to inject antibiotics into the sheath. However, we do not know how this affects fluid parameters that are used to make treatment decisions. To our knowledge, there are no published ranges of values for fluid from the tendon sheath and the response to injection of antibiotic, or how these differ from values that suggest infection. The results of this study should provide new information on which to base treatment decisions. In some cases, a horse may avoid the risks of surgery, general anesthesia and recovery.

### **John P. Hughes Memorial Endowment**

This year's John P. Hughes Memorial Endowment was again awarded to two researchers conducting two very different studies: Dr. Aaron Hodder and Dr. William Symm.

Dr. Hodder's research will focus on examining equine semen for the presence, incidence and level of activity of equine herpes virus 1 using real-time Taqman PCR assay. Detection of EHV-1 DNA is indicative of viral presence, but it does not indicate whether the virus is dead or actively replicating. By testing

samples for the presence of mRNA coding for an important structural element, glycoprotein- $\beta$ , it is possible to determine the percentage of virus present that is actively replicating.

Another aim of this project is to correlate the presence and level of activity of virus with sperm morphology and other somatic cells present in semen.

Equine herpes virus 1 is of considerable economic importance to the equine breeding industry as a leading cause of infectious abortion in mares. The virus has been shown to be present and active in the genital organs of stallions under both experimental and natural conditions. Little attention has been given to the possible role of virally infected semen to equine infertility and transmission of the virus. In other species, herpes viruses are known to be present and transmitted via semen and to cause abnormalities in the ejaculate. Taqman PCR assay systems have been shown to be a faster, more sensitive and efficient method for detecting the presence of viruses in semen than previously used techniques.



*Dr. Aaron Hodder*

The information gained from this study will provide new knowledge important to semen preservation and transport.

Dr. Symm's research will investigate three different methods of hand-

washing in preparing for equine surgery based on the hypothesis that combined use of traditional hand-scrubbing and alcohol-based hand rubs will be superior to traditional scrubbing techniques alone.

Optimal surgical hand preparation should substantially reduce bacterial counts for the duration of surgery. Despite extensive research in the human surgical field and the currently accepted use of alcohol-based antiseptic hand-rubs in clinical veterinary practice, no studies have been performed to evaluate the use of these products in the equine surgical setting.



*Dr. William Symm*

Recent research in the human medical literature provides conflicting data regarding the effectiveness of scrubless alcohol-based hand rubs, and we are not aware of any published research to support the exclusive use of these products in the veterinary surgical environment. Since horses are highly susceptible to surgical infections, this study will provide valuable information on optimum methods for hand preparation before surgery.

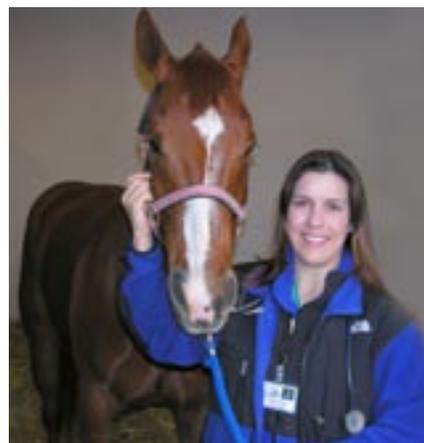
### Peray Memorial Endowment

Dr. Amy Poulin is the recipient of this year's Peray Memorial Endowment. She will be conducting a preliminary evaluation of a new clinical method to screen for endotoxemia in equine colic patients. This new

method uses a commercially available equine enzyme-linked immunosorbent assay (ELISA), which is thought to provide a sensitive and specific test for Tumor Necrosis Factor- $\alpha$  (TNF- $\alpha$ ), an indicator of endotoxemia.

Horses are extremely sensitive to endotoxin, a bacterial cell wall component. In fact, the high morbidity and mortality rates detected with colic have been attributed to endotoxin exposure and subsequent elevation of systemic TNF- $\alpha$  levels.

Previous equine clinical studies have relied on the traditional bioassay for TNF- $\alpha$  determinations, which requires 24 hours to complete. This new assay method would provide the needed information much more rapidly, thereby improving the timely identification of patients with elevated endotoxin and TNF- $\alpha$  levels and facilitating better case management. ❄



*Dr. Amy Poulin*

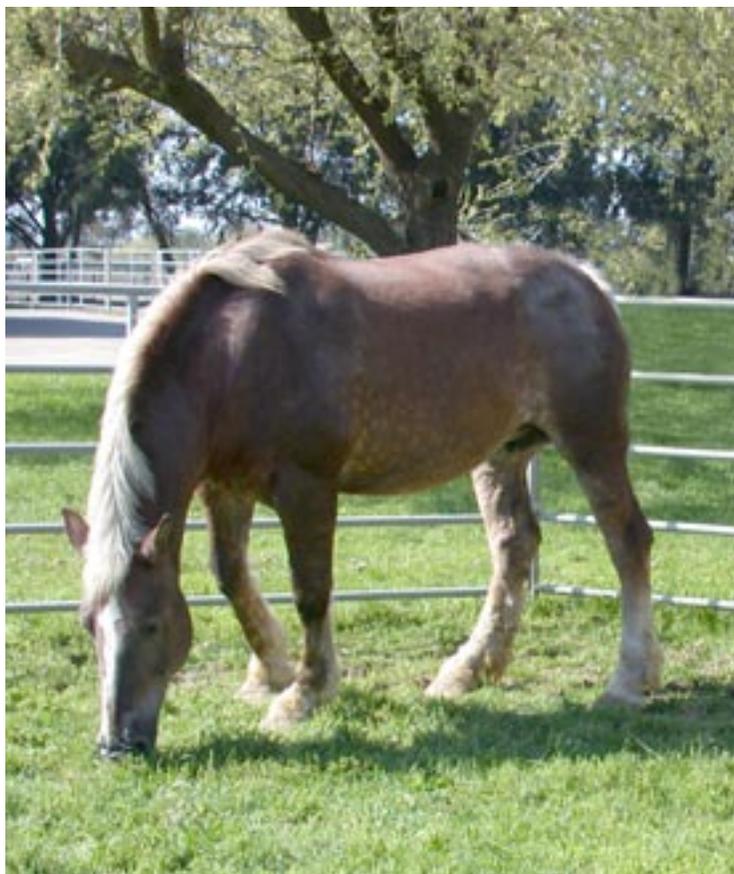
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## COMING EVENTS

UC Davis School of Veterinary Medicine  
Equine Medicine Club Annual Symposium

**Preventative Equine Medicine**

Saturday, May 13, 2006

8:00 am to 5:00 pm

Location: Schalm 170

Registration: \$85

Lectures will be presented on topics of preventative nutrition, behavior, vaccines, deworming, and foot care. The nutrition lecture will include a section on dentistry and its role in preventing GI problems. There will also be some great educational labs in the afternoon. For more information please contact Adrienne Wood at [acwood@ucdavis.edu](mailto:acwood@ucdavis.edu) or [ucdavisquinemedicineclub@yahoo.com](mailto:ucdavisquinemedicineclub@yahoo.com).

**CEH**

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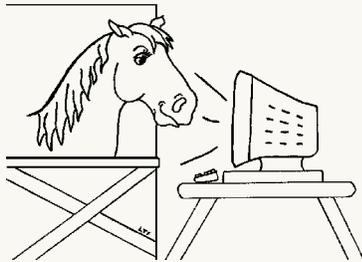
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