

EQUINE DERMATOLOGY

Everything You Wanted to Know (and More) About Skin

The skin is the largest organ in the body. It is the primary interface between the body and the environment. The most important functions of the skin are to protect the body from external injury and to prevent excess loss of water, electrolytes and other macromolecules. Other functions include:

- regulating body temperature
- controlling blood pressure
- regulating the immune response
- allowing the body to secrete and excrete via sebaceous and sweat glands
- serving as sensory perception
- protecting the body from solar damage through pigmentation
- storing water, electrolytes, fat, vitamins, protein and other elements
- acting as an indicator of general health

The skin of the horse represents one of its most important organs for defense against disease, both because of its location as the outer membrane of a complex biological machine, and because the horse's size makes for a large surface area available for possible attack

from infectious microbes or environmental toxins.

Problems of the skin can provoke several responses in horse owners, from annoyance to frustration or alarm. Skin abnormalities can also adversely affect the value of a horse by altering appearance or interfering with performance. Some skin conditions are a sign of underlying disease; some are contagious, and a few are zoonotic, or transmissible from horses to people.

As in all animals, the skin of horses is a complex and organized biological structure that has built-in methods for response, defense and repair. The response of the skin to various agents or conditions is dictated by the types of cells and organic structures contained within the skin, but the ways in which it can respond are limited. The skin reacts to various stimuli by scaling or crusting, creating a lump or bump, changing hair quantity or quality, changing color, or ulcerating. Because there are a limited number of responses, it is difficult to diagnose skin disease based on the lesions seen. Many infections, allergens or toxins will produce lesions of similar appearance.



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DIRECTOR'S MESSAGE



Dr. Gregory L. Ferraro

In the process of reviewing the material for this issue of our *Horse Report*, I was reminded of a peculiarity of horse owners regarding the treatment of skin problems. Veterinarians have often been heard to comment on the fact that there is never a lotion, salve, unguent, ointment, shampoo or dermatological potion that ever gets thrown away. By way of example, a friend of mine asked his client what she had been using to treat a skin problem on her horse. "Oh," she replied, "I used what I had left over from treating my son's diaper rash." "How old is your son?" asked the veterinarian. "He's 38," she responded.

Exorcise Your Tack Box!

Another thing about horse owners often noted by wizened old horse doctors is that people will put things on the skin of their horse that they wouldn't consider applying to the finish of their car. Why do they do that? I guess because their horse is too polite to complain! Perhaps we should suggest self-application prior to treatment for all equine skin conditions?

Am I right or wrong about this? Take a look in your tack box, if you dare. If you're like most people, you will have more bottles, jars and tubes of stuff long forgotten about. Pull

So here's my recommendation: Remove all the brushes, hoof picks, and various tack and equipment from your tack box and then turn it upside down over the nearest garbage can. After that, do the same thing to your stable mate's tack box, because we all know that when you run out of your own you borrow theirs. Then take the pledge. Hold up your right hand and swear after me:

The next time my horse has a skin condition, I will not treat it with leftover ointment. I promise to call my veterinarian for an examination and follow

their prescribed treatment to the letter. And above all, I promise to immediately throw away any unused medications at the completion of treatment.

Do we have a deal? Okay great, now go home and empty out the bathroom medicine cabinet.



I promise to call my veterinarian for an examination and follow their prescribed treatment to the letter. And above all, I promise to immediately throw away any unused medications at the completion of treatment.

a few of them out and look at the expiration date. I'm willing to bet that most of them expired during the Reagan administration.

Equine Dermatology

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The skin is one of the easiest body organs to examine for the obvious reason that it is so accessible and any abnormalities can often be seen readily. Yet, the diagnosis of equine skin diseases is often a difficult undertaking, requiring the highly specialized training and skills of a veterinary dermatologist. A veterinarian's history-taking skills, their visual acumen in examining the skin, and their knowledge in selecting the right diagnostic tests are all key to arriving at an accurate diagnosis and therapy.

It is important for a veterinarian to perform a complete physical exam, because some skin conditions are manifestations of underlying illness. The horse's medical history is a vital part of this exam, as it would be for other medical or surgical problems. Furthermore, horse owners and handlers are an important part of the diagnostic equation. Their knowledge of the onset of the skin condition, their observations of the horse's behavior associated with it (itching, rubbing, biting, etc.), and their insight into any feeding or environmental changes are all extremely valuable information. How long has the horse had this condition? Has the condition been seasonal so that it is better or worse in the summer or winter? Is there a pattern to it so that it resolves and then reappears? The sample Equine Dermatology History Form shown on page 10 demonstrates the kinds of questions that are important to the diagnosis.

If the horse handler has tried to resolve the problem by applying medications or over-the-counter remedies such as topical soaps, salves or solutions and oral or injected medications, it is important to convey this information to the veterinarian. Even treatments that did NOT work can provide good information regarding the skin response pattern. Keep a record of the exact medications used or at least keep their containers to show the examining clinician. A veterinarian needs to know what kind, what dosage, and for what length of time any medication was given.

Additional information that can be helpful to the diagnosis includes whether your horse has been with other horses, any recent changes in bedding or feed, and any recent travel or unusual activities

undertaken. A horse that has recently traveled may have contracted a skin disease that is not common to its home territory. Provide as much information as possible, even if you doubt it is related. More is better than less in this case.

In the following sections, we will describe and discuss some of the more common skin diseases that affect horses. It is also important to note that bacterial and fungal infections of the skin can occur anytime or anyplace secondary to an injury to or irritation of the skin, such as a wound, an insect bite or chemical burn. Thus, the occurrence of a previous injury or irritation is a significant fact to convey in diagnosing skin disease.

Hives

Hives, a localized swelling of the skin varying in size from small circular spots to large lesions, usually represent an acute allergic reaction of the body to something in the environment or something ingested. The acute form of hives (sudden and short-lived) are commonly caused by insect bites or stings or exposure to toxic plants, drugs, contaminants in feed or bedding, or chemical agents that come in direct contact with the skin. These acute reactions can be accompanied by more severe allergic responses such as sweating, difficulty in breathing, swelling of the eyelids and nostrils, and sometimes laminitis. Such additional reactions require immediate treatment and removal

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Horse with an acute case of hives.

Equine Dermatology

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of the offending cause. They generally do not result in permanent disability.

A more common type of hives is chronic and long-lasting and usually results from continuous exposure to drugs, allergens, microbes, insects, or stress. Two interesting triggers of this type of hives are the early stages of ringworm and pemphigus foliaceus, which is an autoimmune disease. Hives are usually but not always associated with itching. In addition to a careful assessment of health history and the horse's environment, fungal cultures for ringworm or skin biopsies for determining the presence of an autoimmune disease may need to be performed to arrive at a diagnosis. Effective treatment for hives would depend on the cause.

Atopic Dermatitis

Atopic dermatitis is characterized by continuous itching and scratching, often called pruritis, and occurs as a result of airborne allergens that come in contact with the skin. Seasonal itching of the face and trunk may be due to allergies to pollens, whereas year-round itching may be due to molds and barn dust. In addition to itching, other signs of atopic dermatitis include hair loss, redness, hives and rashes, which occur most often around the face and the lower limbs or trunk. Secondary bacterial infections characterized by scales or crusts may occur in the affected areas. Although food allergies are rare in horses, they occasionally can cause clinical signs similar to atopic dermatitis.

Atopic dermatitis is diagnosed based on the clinical signs and exclusion of other causes such as insect allergies (no-see-ums or *Culicoides*; see next section). Intradermal tests or serum allergy tests may be performed to identify the causative allergens. The results of such tests are then used to develop treatment and control of the condition. Treatment may include hyposensitization through allergy shots, steroid therapy, antihistamines, antidepressants (which have antihistaminic effects), or some combination of these. Horses presented to the UC Davis Veterinary Medical Teaching Hospital with atopic dermatitis have shown improvement 60 to 70% of the time following hyposensitization therapy.



Atopic dermatitis.



Culicoides lesions along a horse's mane.
Photo courtesy Dr. K. Bergval.



Culicoides lesions along the belly, forming ventral midline dermatitis. Photo courtesy Dr. V. Fadok.

Insect-Induced Dermatitis

The common "no-see-ums", also known as midges or *Culicoides* sp., are a frequent cause of dermatitis in horses. These insects feed on various locations on the horse, causing lesions to appear on the mane, saddle and rump or along the belly of the horse. On the belly, the lesions form a diffuse (widespread) pattern known as ventral midline dermatitis. *Culicoides* induce

a hypersensitivity response in the horse's skin through antigens contained in their saliva, and the condition is commonly known as Queensland itch or sweet itch. Some breeds or family lines may be predisposed to developing the hypersensitivity. Icelandic horses, for example, seem to have a higher incidence of allergic reactions to the *Culicoides* insects than other breeds.

This disease is usually diagnosed by the pattern of clinical signs. The hallmark of insect-induced dermatitis is the constant, ever-present itch it produces. It is uncommon in horses under one year of age and usually first occurs in horses between 2 and 4 years of age. *Culicoides* hypersensitivity may or may not be seasonal during the first few years of occurrence for a given horse in temperate climates. Commercially manufactured allergens are available in the United States, but their efficacy is still under investigation.

Other insects that can cause an itchy dermatitis similar to *Culicoides* include **stable flies** (*Stomoxys calcitrans*), **horn flies** (*Haematobia* sp.), **horse flies** (*Tabanus* sp.), **deer flies** (*Chrysops* sp.), and **black flies** (*Simulium* sp.). Stable flies have been reported to cause an exudative dermatitis on the legs of adult horses. Horn flies may produce a focal (limited) pattern of ventral midline dermatitis.

Black flies are present in most parts of the world, especially in regions with warm climates. These flies are dark, vary in length from 1 to 5 millimeters, and have a rather characteristic appearance with the thorax humped over their head. They are also known as buffalo gnats. Black flies are most active in the morning and late afternoon, causing considerable annoyance and irritation. The females suck blood and produce small skin wounds that are quickly covered with droplets of dried blood. The most common sites of irritation in horses include the udder, scrotum, prepuce, inner surface of the thigh and upper forelimbs, throat, ear, ventral abdomen, chest and body orifices. Various species of black fly probably have favored body sites for feeding.

Black flies may produce a generalized pattern of ventral midline edema. Hives or large edematous wheels in areas of affected skin may be a prominent sign of infestation. There may be considerable itching, leading to ulceration of the

skin surface due to incessant scratching by the afflicted animal. It is likely that a hypersensitivity reaction plays a role in the development of the skin lesions.



Dermatitis caused by horn flies. Photo courtesy Dr. J. Lofstedt.

More serious signs affecting the whole body occur when a large number of flies attack an animal. These signs may be evident either immediately or within a few hours after an attack and may include weakness and listlessness with a rapid pulse and respiration rate. Temperature is usually normal or subnormal, with fever appearing only in cases that are advanced or terminal. Pregnant animals may abort, and in severe cases death may occur within a few hours to several days.

Treatment of the skin lesions involves gently cleansing the affected areas to remove any crusting. If the lesions are confined to a small area, a topical corticosteroid preparation may be applied, but if larger areas are involved or if the itching is intense, a short course of oral prednisolone may be indicated. However, a major objective should be to prevent further fly bites. Because black flies are primarily day biters, horses in afflicted areas should be stabled during the day preferably in screened stalls. Insect repellents should be applied over the entire body of the horse but especially to the more common biting sites. Repellents may need to be used two or three times a day to be effective.

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Equine Dermatology

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Pemphigus foliaceus

Pemphigus foliaceus is an autoimmune skin disease and an important cause of noninfectious crusts in the skin of horses. Studies conducted at UC Davis have not shown a breed, sex or age predisposition for this condition. Interestingly, among horses in our practice area a seasonal onset of the disease was present, with more than 80% of cases occurring from September to February.



Horse with Pemphigus foliaceus

The crusts frequently start on the face and legs and become more widespread on the body as the disease advances. However, crusts may also occur only on the coronary band. Peripheral edema (“stocking up”) is common, often accompanied by a low-grade anemia combined with an elevated white blood cell count.

A diagnosis is made by taking a skin biopsy of the affected areas. When collecting these biopsies, it is important to not wash or disinfect the sampling area because the crusts located on the very surface of the lesions provide valuable information for the diagnosis. Special stains for fungi should be run on all samples taken for biopsy, because the fungi that cause ringworm can occasionally cause microscopic lesions similar to those seen with pemphigus foliaceus.

Corticosteroids at immunosuppressive doses are used to treat pemphigus foliaceus. Injectable gold and azathioprine may also be used, although these products can be expensive. Some horses spontaneously resolve after 3 to 12 months of treatment, while others may require longer treatment.

Bumps (Nodules)

The most common form of bumps seen in horses at UC Davis is known technically as eosinophilic granuloma (also called nodular collagenolytic granuloma, nodular necrobiosis, and equine eosinophilic granuloma with collagen degeneration). Although its cause is not known, it is usually thought to be due to a hypersensitivity reaction to insect bites. There are no apparent age, breed or gender predilections, but the disease seems to occur more often in warmer months. Nodular lesions up to 5 cm in diameter may occur either singly or in clusters, most commonly around the neck, withers and back.

Diagnosis is made by skin biopsy of the lesion, which reveals areas of abnormal staining collagen surrounded by granulomatous inflammation containing eosinophils, lymphocytes and histiocytes.



Horse with eosinophilic granuloma, one of the more common nodular skin diseases. Nodules (“bumps”) may be found singly or in clusters, usually around the neck, withers and back.

Eosinophilic granulomas have been seen occasionally at the site of previous medical injections that have used standard silicone-coated stainless-steel hypodermic needles. The

reaction may occur at sites of either intravenous or intramuscular injections and normally consists of nonpainful, cool, raised papules or nodules 0.25 to 1 cm in diameter. The initial nodule appears 24 to 48 hours after the injection and the subsequent eosinophilic granuloma can persist for months or years. Affected horses do not develop a lesion at the injection site if nondisposable, noncoated needles are used. Thus, the noncoated needles are recommended for any horse that develops injection-site nodules.

Horses that have single lesions or just a few may be treated by surgical excision except in areas of contact with a saddle or girth. Steroid injections under the lesions can be used as a means of remission, especially when surgery is not an option. Horses with multiple lesions may be treated with oral prednisolone for two to three weeks.

“Grease Heel” or “Scratches”

These terms represent a group of diseases rather than a specific condition. Included in this group of diseases, or disease complex, are:

- Contact irritant dermatitis
- Bacterial folliculitis (often present as encrusted areas of hair loss)
- Photosensitivity vasculitis (inflammation of the blood vessels)
- Dermatophilosis (“rain scald” or “rain rot”, which is a bacterial infection)
- Dermatophytosis (ringworm)
- Chorioptic mange (leg mange)
- Contact allergic dermatitis
- Pemphigus foliaceus (an autoimmune skin disease described in an earlier section)
- Habronemiasis (“summer sore”, a parasitic disease)
- Sporotrichosis (a fungal infection affecting the deeper tissues of the skin)

A diagnosis is made by taking a skin biopsy of the affected area for histopathology and bacterial and fungal cultures.

Two important causes of “grease heel” that are often overlooked are pastern leukocytoclastic vasculitis and chronic progressive lymphedema in draft horses.



Horse with bacterial scratches.

Pastern leukocytoclastic vasculitis

(photoaggravated vasculitis) is a relatively common but poorly understood disease. It generally affects mature horses and produces lesions confined to the lower extremities that lack pigment. Lesions are multiple and well marked. Initially, erythema (redness), exudation (oozing) and crusting open sores develop, followed by swelling of the affected limb(s). Chronic cases may develop a rough or “warty” surface.

The cause of pastern leukocytoclastic vasculitis is not yet known, but an immune component is possible. The fact that the lesions are limited to nonpigmented areas of the skin suggests a role for UV radiation. Drug reactions may play a role, and a recent report has implicated a *Staphylococcus* bacterial infection as a possible cause.



Horse with pastern leukocytoclastic vasculitis, which typically produces lesions in the lower extremities that lack pigment.

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A diagnosis is made based on skin biopsy of the affected area, which would show leukocytoclastic vasculitis (inflammation of the blood vessels) with vessel wall degeneration and clots involving the small vessels in the superficial dermis. Treatment may consist of systemic corticosteroids at relatively high doses for two weeks and reduced doses for another four to six weeks. A reduction in UV light exposure may be helpful, either by bandaging affected legs or stabling inside during daylight hours or both.

Chronic progressive lymphedema in draft horses is a condition that occurs in certain breeds such as Shires, Clydesdales and Belgians. The condition is characterized by swelling, thickening and scarring of the skin on the lower legs. The disease starts at an early age and progresses throughout the life



Draft horse with primary lymphedema, showing multiple nodules and skin folds. Photo courtesy Dr. V. Fadok.

of the horse, often resulting in disfigurement and disability of the limbs and sometimes premature death. Researchers at UC Davis, together with colleagues in Belgium, have been able to document that chronic progressive lymphedema in draft horses is a systemic disease of the lymphatic system in which the skin lesions on the lower limbs occur secondarily as a result of poor lymphatic drainage and tissue perfusion.

The earliest lesions are characterized by skin thickening and crusting. Both are often visible only after clipping the long feathering. Secondary infections develop very easily, and both dark and

white skin on the lower legs are equally affected. As the disease progresses, thick skin folds and sometimes multiple small, well-demarcated ulcerations develop predominantly in the rear of the pastern region. The ulcerations are covered with adherent crusts. Over time, the lesions extend up the leg and affect the skin as high as the knees or hocks.

Severely affected horses often exhibit generalized swelling in all four legs. As the condition becomes more chronic, the lower leg enlargement becomes permanent and the swelling is firm to the touch. The disease often progresses to include massive secondary infections and parasite infestations that produce copious amounts of foul-smelling exudates, generalized illness, debilitation, and subsequent death.

Currently, a diagnosis is made by the clinical appearance, the breed and a skin biopsy of the affected tissue. Palliative therapy such as antibiotics to treat secondary infections can sometimes improve the quality of the affected horse's life.

Hereditary equine regional dermal asthenia (HERDA or hyperelastosis cutis) is also a disease for which there is no known cure. It occurs early in life in certain breeds of horses, most commonly in quarter horses. Paints and appaloosas with quarter horse lineage also have been afflicted with this disease. Many of the quarter horses are from high-quality cutting lines. The working hypothesis is that



Mare (1.5 yr old) with HERDA, showing torn skin over the back.

these horses have a defect in their collagen fibers in the deep areas of the skin. Typically, these areas are over the back and sometimes the sides of the neck. The skin in these areas may be easily torn or stretched or develop seromas and hematomas (blisters filled with serum or blood).

A diagnosis is usually based on clinical signs alone. Histologic findings are sometimes subtle, but clumped or poorly organized collagen fibers below the level of the hair follicles may be seen.

Healing is usually adequate, but often there are unsightly scars. The skin of affected horses appears to improve when they are kept indoors and away from other horses, probably due to the avoidance of trauma to the affected areas.

There are currently no blood or skin tests available to confirm the disease. This condition is almost certainly present at birth but is often not noticed until around 2 years of age when horses start being trained with tack, saddle and other equipment, and the friction of this induces the typical lesions.

As with many genetic diseases, there is no effective treatment or cure. Clinically affected horses should be not be bred. *

CONTROL FLYING INSECTS TO PROTECT YOUR HORSES

1. Stable horses at sunrise and sunset—peak feeding hours.
2. Place ultrafine screens in windows (60 squares/in²).
3. Keep horses away from standing water. Apply permethrin repellent products to the horse. Usually these are 2% permethrin sprays, but 44-65% permethrin spot-on formulations have been used successfully also. Sprays should be applied daily initially, which is usually more frequent than recommended on the label.
4. Install overhead or stall fans to interfere with the flies' flight.
5. Use fly masks or other forms of dress that physically obstruct the insects from reaching the skin.
6. Cover manure piles or containers and dispose of them as often as possible to eliminate breeding sites.
7. Expect that hyposensitization may be variable in its success.
8. Consult your veterinarian for using prednisolone orally to manage the pruritus.
9. Be aware of the relationship of the various flies to the environments they favor or require for breeding as well as their feeding times.

Fly Type	Breeding Environment	Feeding Time
Horse flies Deer flies	Vegetation/water	Daytime
Horn flies	Cattle	Daytime
Stable flies	Manure/decaying bedding	Daytime
Black flies	Running water	AM/PM
Culicoides	Standing water/manure/ decaying vegetation	Twilight to dawn
Mosquitoes	Water	Dusk to 2 hr after sunset

DERMATOLOGY SERVICE AT THE UC DAVIS VETERINARY MEDICAL TEACHING HOSPITAL

The Dermatology Service of the Veterinary Medical Teaching Hospital sees horses in consultation with the Large Animal Medicine Service. The Dermatology Service consists of three faculty members—Dr. Stephen White, Dr. Peter Ihrke and Dr. Catherine Outerbridge—and two residents. Horses will be examined by at least one faculty member and one resident in addition to the Large Animal Medicine clinician.

Appointments may be made by calling the Large Animal Clinic at (530)752-0290 and are usually made for Monday afternoons. Other times may be arranged on an individual basis.

Clients are asked to bring records from their local veterinarians (if possible) regarding previous treatments for the skin condition, as well as all medications and/or containers of medications that have been used. As appropriate to the case and clinical signs, the veterinarians may perform skin scrapings, fungal cultures, biopsies or intradermal allergy testing.

EQUINE DERMATOLOGY HISTORY FORM

Date _____

Age when purchased _____

What is this horse used for? _____

What is the problem with the horse's skin? _____

Age of horse _____ Age when skin problem started _____

Where on the body did the problem start? _____

What did the skin problem look like initially? _____

How has it spread or changed? _____

Is the problem continual or intermittent? _____

In what season did the problem start? _____

Is the problem seasonal or year-round? _____

If seasonal, what seasons is the disease present? _____

Does the horse itch? _____ If so, where? _____

Do any horses in contact with the affected horse have skin problems? _____

If so, are they similar or different from this horse's problem? _____

Do any people in contact with the affected horse have skin problems? _____

If yes, explain: _____

Please list any injectable, oral, or topical medications that have been used to treat the problem (either veterinary or over-the-counter or "home remedies"): _____

Did any help the condition? _____ If yes, which helped? _____

Did any aggravate the condition? _____ If yes, which ones? _____

Describe the environment where the horse is kept (a) indoors and (b) outdoors: _____

What is the horse fed? _____

What feed additives do you use? _____

What is your deworming schedule? _____

Did the horse receive ivermectin? _____ If so, when? _____

List any other medical problems or drugs that the horse has had: _____

List any additional information you feel may be relevant to the skin problem: _____

An Ongoing Case of Pemphigus Foliaceus in a Foal

Independence was a four-month-old Morgan filly when she developed multiple hives, primarily on the neck and front half of her body. These hives progressed to crusts and areas of hair loss. The filly was treated by the referring veterinarian with intermittent oral and injectable corticosteroids, which had some beneficial effect, as well as oral and injectable antibiotics and numerous baths, which had no effect.

After one month, the foal was brought to the UC Davis Veterinary Medical Teaching Hospital where she was examined by veterinarians of the Dermatology and Large Animal Medicine Services. On examination, the filly was found to have multiple hives, circular areas of hair loss, and crusts, primarily on the neck, shoulders and saddle area but also on the legs.

The most likely diagnosis was pemphigus foliaceus, although the lesions could also have been caused by infections with a dermatophyte (ringworm) or bacteria such as staphylococcal pyoderma. Two skin biopsies were taken from areas of both crusting and hives. The diagnosis of pemphigus foliaceus was confirmed, and the owner was informed of the autoimmune nature of the disease. Treatment with a high dose of oral prednisolone was initially very successful, but after one week the owner telephoned and described a worsening of the lesions. The treatment was then changed to oral dexamethasone and continued through the next



Independence when she arrived at the Veterinary Medical Teaching Hospital with hives.

appointment at the Veterinary Medical Teaching Hospital five weeks later. On recheck, Independence had improved considerably, with resolution of over 90% of the hives and crusts and dramatic regrowth of her hair coat.

At this point, the filly's dexamethasone dosage is being lowered, eventually to at least

an every-other-day frequency. It is not yet known how she will respond. If the higher doses are required to control the disease, other medications may need to be added to the treatment. A minority of equine cases of pemphigus foliaceus eventually resolve spontaneously, which would be the best-case scenario for Independence. *



Independence at her recheck five weeks after treatment with oral dexamethasone.

UC Davis School of Veterinary Medicine presents
The Twentieth Annual
Charles Hemphreus Memorial Lecture
Saturday, January 21, 2006
9:00 am – 12:00 noon

*Recognizing the True Foot:
Applied Anatomy of the Equine Digit*

Dr. Michael T. Savoldi, Farrier Science Instructor
California State Polytechnic University, Pomona

Research update by
Dr. Susan M. Stover, Professor
Anatomy, Physiology and Cell Biology
UC Davis School of Veterinary Medicine

Hands-On forging clinic with Austin Edens after lecture.

For more information, contact Sophie Smith, Office of Public Programs,
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CEH HORSEREPORT

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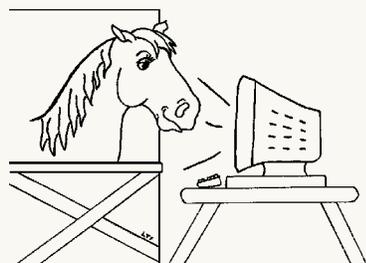
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