

The HORSEREPORT

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Dedicated to the health, well-being, performance, and veterinary care of horses through research and education.

Nutrition for Rehabilitating the Starved Horse

Dr. Carolyn Stull and her team of equine welfare experts provide new guidelines for refeeding starved horses.

It is difficult to comprehend the long-term neglect and surrounding situation that produce such a devastated, depressed creature as a starved horse. The bones are so prominent that the skeleton appears to belong to a larger horse, the head is disproportionately large compared with the body, and the tail is always low and motionless. But the low hanging head tells it all. The ears barely move to any sounds in the environment, no extra energy is spent interacting with herd mates. The eyes are dull, without expression, without expectations.

Researchers from the UC Davis Center for Equine Health conducted a survey to assess the prevalence of starved horses in California and found the results quite disturbing. Among the responders to the survey were animal control and humane society organizations in 36 counties, with an estimated equine population of 1,041,560. Of this number, 2,177 horses were found to be severely malnourished. The most common reason for these cases was owner ignorance, followed by economic hardship.

A research team comprised of

Dr. Carolyn Stull (UC Davis Veterinary Medicine Extension), Dr. Anne Rodiek (California State University, Fresno), Dr. Christine Witham (private clinician), Dr. Pamela Hullinger (California Department of Food and Agriculture), and Kelly Weaver (UC Davis Veterinary

refeeding the malnourished horse. In both humans and horses, abrupt refeeding can cause dysfunction of the body's metabolic systems, which can lead to failure of the heart and lungs and ultimately to death. The goal of this research is to provide new information and guidelines for



"Kung K'ai" (Emaciated Horse), by Yuan Dyn

Medicine Extension), has been studying the problem. Funded in part by Purina Mills, Inc., the study provides a standard body condition scoring system (see page 5) to assess the weight status of a horse and compares different diets for

recognizing and treating malnourished horses.

What Happens During Starvation

During the starvation process, the horse initially uses any fat and

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DIRECTOR'S MESSAGE

Basic Equine Nutrition Is Too Often Underestimated



Dr. Gregory L. Ferraro

Both veterinarians and horse owners often consider equine nutrition a rather mundane topic. Tradition most often rules the territory, with modern feeding practices being dictated by those of our predecessors. Since this system usually results in relatively good health for our horses, most of us assume that if we throw some hay, a little grain, and the latest advertised supplement in the feed bin, everything will be fine.

It is not until we are faced with a health crisis that we realize how uneducated we are in basic equine nutrition. We never really understood that nutritional requirements change with the age or health status of an animal. Since most of us take our animal husbandry responsibilities seriously and provide adequate feed to our horses, we are unprepared when faced with the care of an animal that has been starved, even unintentionally, or otherwise debilitated.

Unfortunately, the starved horse is not all that uncommon. Animals in a country of relative wealth like ours are too often found to be poorly cared for and malnourished, and those in less developed or more impoverished nations are frequently worse off. Even the best cared for horses can become malnourished due to the effects of

serious disease. Sympathy and good intentions alone cannot put the starved or debilitated horse right. Unless one understands the nutritional needs and metabolic parameters of the chronically undernourished, those good intentions can result in serious harm to an already fragile state of health.

The UC Davis School of Veterinary Medicine is fortunate to have Dr. Carolyn Stull as a faculty member. Dr. Stull is both a good scientist and a compassionate

has been one of her most striking research accomplishments. Her work both as an individual and in collaboration with her colleagues has made a significant contribution to the health and welfare of the malnourished or neglected horse worldwide.

This issue, our *Horse Report* describes and explains just a part of Dr. Stull's work and introduces you to the beginnings of another dedicated scientist, Dr. Meri Stratton-Phelps. Our hope is that you will

“Even the best cared for horses can become malnourished due to the effects of serious disease. Sympathy and good intentions alone cannot put the starved or debilitated horse right.”

horsewoman. Her concern for the welfare of animals and her medical knowledge has often combined to solve many of the most serious of animal health and welfare issues. The proper care and nutritional rehabilitation of the starved horse

find the information both useful and stimulating. Who knows, you might even go dig out that old *Feeds and Feeding* book by Morrison, or maybe even buy a newer, more current edition!



Starved Horse

Continued from page 1

carbohydrate stores in his body to supply energy for metabolism. This is the normal process for any healthy horse: fat and carbohydrates are used for energy, exercise, brain function, circulation, etc., and are then replaced with nutrients from food. The cycle is constant and never-ending, even during sleep. In a starved animal, once this source of fat and carbohydrate is gone, energy is derived from the breakdown of protein. While protein is a component of every tissue, there are no inert stores of it in the body such as there are for fat and carbohydrates. Consequently, the starved body uses protein not only from muscles, but also from vital tissues such as the heart and even gastrointestinal tissues—tissue that is necessary for life. The starved body cannot select which tissue protein will be metabolized for energy. As time goes by, the horse's survival is in a precarious situation. When a horse loses more than 50% of its body weight, the prognosis for survival is extremely poor.

The Refeeding Problem

Refeeding starved animals, including humans, is not an easy process. In humans suffering from starvation caused by illnesses such as anorexia, cancer, or gastrointestinal obstruction, patients can develop "refeeding" syndrome when they are given concentrated calories, and this in turn can lead to heart, respiratory, and kidney failure usually 3 to 5 days after the initial meal. This same syndrome has been reported in the literature for horses. Thus, our research team wanted to develop a refeeding program for horses that would minimize these effects and enable the horse to return back to normal body weight. Our goals were to test feeds that were commonly available



This horse has a body condition score of three. The ribs can be observed easily, even with the horse's winter coat, the tail head is prominent and can be felt easily, and the hip bones are rounded and protruding (above and below right). Note the dip in the withers in front toward the neck and behind toward the back, exhibiting little or no fat deposit around this area.



At left, the hip shows an inverted V shape with the spine at the apex, representing a lack of fat deposition.

and used in horse rations, so the refeeding program could be implemented easily in any area of the country.

Experimental Diets for Refeeding

We selected three types of feed that were very different in nutrient composition: alfalfa hay, oat hay, and a commercially available

complete feed consisting of grain, molasses, fat, and alfalfa. Alfalfa is known to be high in protein (20%) but low in the carbohydrate starch (3%). Oat hay is high in fiber but low in protein (7%). The complete feed represented a feed high in carbohydrate concentration, with 19% starch. The three types of feed were given to 22 starved horses that were brought to the UC Davis research site as representative of horses rescued by equine organizations. Horses were fed one of the three diets over a 10-day rehabilitation period. The researchers fo-

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Starved Horse

Continued from page 3

cused on this time period as critical to successfully transitioning the gut from a starved state to a fed state. Even though the diets were different in composition, they were fed in amounts that were equivalent on a caloric basis, so that horses assigned the oat hay diet, for example, received the largest volume of feed, while the horses on the complete feed received the smallest amount but the same number of calories at each meal.

Which Diet Worked Best?

Our results with the complete feed were very consistent with human studies conducted 20 years earlier using concentrated calories. As the horse ate the high-carbohydrate diet, insulin was released in response to the high level of starch. The job of the hormone insulin is to store the carbohydrate in cells for future energy use, but it also simultaneously draws the electrolytes phosphorus and magnesium from circulation into the cell. Since the starved horse has no stores of electrolytes, this depletion may lead to kidney, heart, and respiratory failure. These effects do not occur with the initial meal but usually several days to a week later due to the repetition of insulin release following a high-carbohydrate meal and the cumulative depletion of electrolytes. The oat hay diet was very bulky and caused diarrhea in several horses. Several essential nutrients such as phosphorus and magnesium were low in the oat hay compared with the other diets; thus, this diet did not support a successful rehabilitation. The alfalfa had the best results due to its high composition of quality protein, but also the major electrolytes, phosphorus and magnesium. Since alfalfa hay is very low in carbohydrate content, there were minimal effects due to insulin response.

In a subsequent feeding study, we compared an alfalfa hay diet to a diet of combination alfalfa hay and corn oil. Equine diets usually do not contain much fat, but in recent years the use of corn oil to increase the

energy density of a meal has been widely used in nutrition programs for older horses and in horses undergoing intensive training programs. The two diets were fed again on an equal-calorie basis. Although the corn oil had no harmful effects, substituting calories from corn oil for alfalfa decreased the total nutrient content of phosphorus and magnesium in the diet. Thus, the response to the diet combining corn oil and alfalfa showed a decreasing blood phosphorus level over the 10-day period, which was not advantageous to the rehabilitation. Again, the alfalfa diet was the most effective at delivering the necessary nutrients in the correct amounts to the starved horse.

Our research showed that starved horses had very different responses to several diets. We found that the best approach for initial refeeding of the starved horse consists of frequent small amounts of high-quality alfalfa. This amount should be increased slowly at each meal and the number of feedings decreased gradually over 10 days. After 10 days to 2 weeks, horses can be fed as much as they will eat. The horse will show signs of increased



Above, this horse has a body condition score of five. She appears very smooth, with no skeletal prominence. Her neck and withers blend smoothly into her shoulders. Ribs do not show, and the loin and hip are nicely rounded. Below, this horse has a score of nine. Note the obvious crease from his spine sunk between fat deposits on either side.



energy after about two weeks. Ears, eyes and head movement will be the first noticeable movements. Some weight gain can be achieved in one month, but three to five months usually are needed to rehabilitate back to a normal body weight. Veterinary care and nutritional advice should be sought as complications can arise.



Body Condition Scoring System

Body condition, or the measure of fat cover, can be evaluated by visual appraisal and palpation. A scoring system in horses uses six areas of the body: along the neck (A), withers (B), crease down back (C), tailhead (D), ribs (E), and behind the shoulder (F) - to assign scores of one

(extremely emaciated) to nine (obese). A score between five and seven is considered ideal for healthy horses. Horses scoring in the one and two category should be evaluated further for causes such as medical conditions, dental problems, or the lack of proper nutrition.

Description of Individual Condition Scores (Score 1-9)

(1) Poor. Animal extremely emaciated; spinous processes, ribs, tailhead, hip joints and lower pelvic bones projecting prominently; bone structure of withers, shoulders and back easily noticeable; no fatty tissue can be felt.

(2) Very Thin. Animal emaciated; slight fat covering over base of spinous processes; transverse processes of lumbar vertebrae feel rounded; spinous processes, ribs, tailhead, hip joints and lower pelvic bones prominent; withers, shoulders and back structure faintly discernible.

(3) Thin. Fat buildup about halfway on spinous processes; transverse processes cannot be felt; slight fat cover over ribs; spinous processes and ribs easily discernible; tailhead prominent, but individual vertebrae cannot be identified visually; hip joints appear rounded but easily discernible; lower pelvic bones not distinguishable; withers, shoulders and neck accentuated.

(4) Moderately Thin. Slight ridge along back; faint outline of ribs discernible; tailhead prominence depends on conformation, fat can be felt around it; hip joints not discernible; withers, shoulders and neck not obviously thin.

(5) Moderate. Back is flat (no crease or ridge); ribs not visually distinguishable but easily felt; fat around tailhead beginning to feel spongy; withers appear rounded over spinous

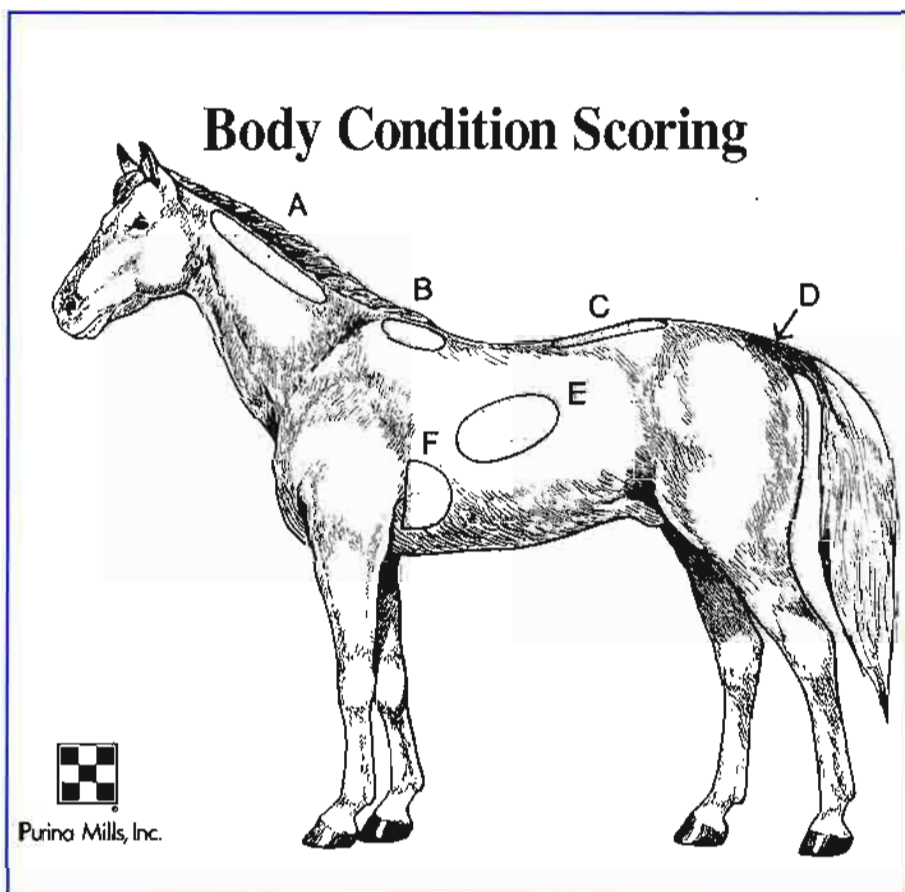
processes; shoulders and neck blend smoothly into body.

(6) Moderately Fleshy. May have slight crease down back; fat over ribs spongy; fat around tailhead soft; fat beginning to be deposited along the side of withers, behind shoulders and along sides of neck.

(7) Fleshy. May have crease down back; individual ribs can be felt, but noticeable filling between ribs with fat; fat around tailhead soft; fat deposited along withers, behind shoulders and along neck.

(8) Fat. Crease down back; difficult to feel ribs; fat around tailhead very soft; area along withers filled with fat; area behind shoulder filled with fat; noticeable thickening of neck; fat deposited along inner thighs.

(9) Extremely Fat. Obvious crease down back; patchy fat appearing over ribs; bulging fat around tailhead, along withers, behind shoulders and along neck; fat along inner thighs may rub together; flank filled with fat.



SUCCESS STORY

The Journey of the "Magnificent Seven" Thoughts of a Researcher Working with Horses

By Carolyn L. Stull, MS, PhD

It was about this time last year that I was developing a research funding proposal for nutritional programs in rehabilitating chronically starved horses. Purina Mills, Inc., in St. Louis had previously funded some of my research and was interested in this project. Now, you may wonder if this problem is of such magnitude that any research dollars should be spent on the problem. Survey data collected in the years of 1994 and 1995 showed that 2,177 cases of equine malnutrition in California were reported by county humane agencies. The most common reason given for the equine malnutrition cases was owner ignorance. So, there are a significant number of starved horses identified each year, but the problem does not end there. Chronically malnourished horses often do not respond successfully to refeeding and may even die due to a complex array of physiological disorders. The "refeeding syndrome" was first identified in concentration camp survivors after World War II, but is also recognized in patients suffering from anorexia nervosa and gastrointestinal malabsorption associated with cancer. The same adverse physiological responses that occur in humans to concentrated calories upon refeeding appear to occur in healthy but emaciated horses.

In order to study different types of diets for rehabilitation, I needed emaciated horses as research subjects. I called several horse buyers and was told that the southwest was having a drought, and very

thin horses were going to auction. But I needed a group of between 6 to 10 horses to undergo similar environmental conditions and procedures, rather than individual horses. A buyer informed me he could purchase very thin, but otherwise healthy, horses from an Indian reservation in Albuquerque. My instructions were to buy mares and geldings between 3 and 18 years old that were broke to ride. I wanted gentled horses so that I and my students could easily collect blood samples. The seven horses were selected that day as the skinniest members of the herd and transported to UC Davis. The Magnificent Seven had started their journey.

The horses arrived and were unloaded into a small pen. Halters were placed on each horse, and then they were led to a stall. It became obvious that for some this was a first halter experience, but they were tired and weak and easily coaxed into their individual stalls. These stalls were not bedded, since I was sure they would consume any type of bedding. Instead, large rubber mats on the floor provided cushion, and water was available at all times. We placed catheters in the jugular vein that night to facilitate blood collection each morning for the next 10 days. The study and



Powdered Sugar when she arrived in late April, still with her winter coat.

initial feeding would start early the next morning.

At this point, we had given each horse a number for ease of data collection into the computer. But as the 10 days of the study progressed, each horse obtained a name agreed on by all members of the research team. Actually, the undergraduate students were best at this, since I tend to use easy-to-remember names, lacking any originality. The first horse to be named was Waterford Crystal. She by far, and in her own opinion, was the most elegant and from the upper-crust of the equine society. After one of the student caretakers spent hours combing out her mane and then her long and full tail, she was sure she was the cornerstone of the Magnificent Seven. After a few days, with the slow introduction of feed, she became depressed and would not eat, even if hand-fed. I

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Magnificent Seven

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have observed this happening before and became concerned. Several of the students grabbed a pair of scissors and went to cut and collect her fresh forage straight from the university oat hay field. Crystal decided that was proper treatment for a horse of her status and was on the mend again. Never again did she refuse to eat her experimental diet, but I did observe remnants of freshly cut forage on the floor near her stall, even after the students swore they were no longer providing her that service.

The one horse that had everyone fooled, or me primarily, was a horse named Tuti-Fruti. He was a real gentleman in the beginning, but as he was fed over the next two weeks, he began to show how clever he could be. The flashy horse never appreciated having his temperature taken, which was a daily event. Sometimes, he forgot he was halter broken and would not agree to be led to the scale for his daily weighing. Other times he would shake his neck back and forth and then snort as I arrived in the stall to collect a blood sample. But his biggest trick was when he changed from a gelding to a stallion, which has never been done before at this prestigious veterinary school. I never really got a good look, and a palpation of the suspected area was out of the question due to my lack of courage. So I wrote in my notes, he was a gelding upon his arrival, but when we turned the horses out in a group after the conclusion of the study, he amply demonstrated his gender change. I suspect it was

the good nutrition he received while in the barn. Some phenomena you don't have to admit in research reports, thank goodness.

Powdered Sugar and Lady Remington were housed in adjoining stalls. Powdered Sugar was never sure of the halter, but she always was curious and a kind mare. She had a very fresh brand on her hip when she arrived, which I regarded as an "off-limits" area to

experienced student. Perhaps she possessed the most wisdom.

The horse that took the longest to find a dignified name was Abraham Lincoln. Since I am from Illinois, you'd think this would come easily. Well, this horse was long bodied and thin, had a distinguished bulge to his nose, quiet concerned eyes, and stylish, long, knobby legs. He was soft and deliberate in everything he did from

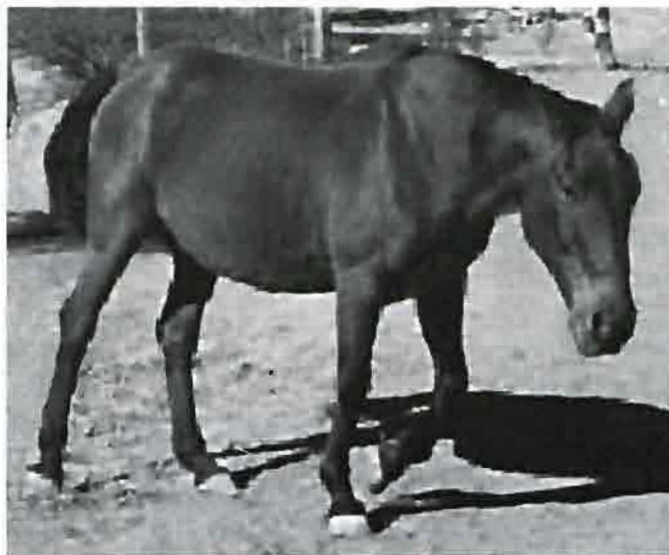
his knicker to his walk.

He was particularly slow at eating and liked to swirl his water in his mouth like a fine Napa wine. So, from his nobility he was named Abe Lincoln, but he adopted nicknames quickly such as Abe the Babe and Stinkin Lincoln (he had a small intermittent diarrhea challenge).

The two simple chestnut horses were paired together in nearby stalls. The mare was called Jane and the gelding Harry. Later, Jane's name was expanded to Plain Jane, since the other study mares had two words composing their formal names. Plain Jane was the most troublesome from

my standpoint, because I suspected she was pregnant early in the study. Not halter-broken and rather protective, I worked in gentling her from the start. But the two clues to her impending birth were that she gained weight daily in greater proportions than the others, and I saw the foal move while watching her skinny belly. But she was really emaciated to carry a pregnancy to term. So, she was on the study, but

"He was particularly slow at eating and liked to swirl his water in his mouth like a fine Napa wine."



Abraham Lincoln

human contact. But she was willing, and after 10 days I could take her temperature by myself. Lady Remington was a 10 out of 10 as far as research horses are evaluated. She was perfect: stood at attention (well, a little pigeon-toed) when I collected a sample of blood, never was pushy when I fed her, stood absolutely still on the scale, and ate every leaf of her alfalfa diet without lifting her head once. She was great to work around, and I always paired her up with the least

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Magnificent Seven

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with extra attention. The rest of the story is sad, but part of the research dilemma. After two weeks housed inside for the study, I placed all the horses in an outside dirt lot. I kept Plain Jane inside and Harry to watch over her and keep her company. He was also still thin. One morning two days later, I opened the top of the Dutch door into her stall to let the sunshine in. I was surprised to discover a black foal, still wet, lying in the straw bedding of the stall. Plain Jane showed no maternal interest in the foal and did not produce any evidence of milk. I suspect she was too thin to provide for the foal. Sadly, the foal did not survive.

I have left the best for last in describing the Magnificent Seven. Harry was one of my most memorable horses in both my research and personal encounters with horses. There are some horses that are givers and appreciative about the simplest things you do for them. Harry was losing all his hair coat and was one of the sorriest of the

group. His four shoes were so embedded in his feet, I did not know he had shoes until I walked him on concrete. He watched over Plain

Jane the morning of her parturition, and then stood by her and nuzzled her neck over the gate as the foal struggled to stand. He stood without a halter one afternoon while I bathed him in warm water and medicated soap as I tried to tend to his falling hair coat. But, the one moment I will always remember occurred on the morning of first feeding. I fed each horse their assigned meal and they all dug right into the feed. Several minutes later as I checked on each horse, Harry raised his head and let out a high-



Powdered Sugar in late September, six months after starting rehabilitation. A successful refeeding program typically takes several months before the horse can obtain its proper weight.

pitched whinny directly at me. I spoke back and said "You're welcome." Now, I have fed many horses that nicker prior to feeding, but never has a horse nickered to me after chowing down on the feed. I don't know if he was in ecstasy after such a long period of feed deprivation (can a horse get "high" from alfalfa?) or if he was thanking me. I'll never know and it doesn't matter; he really appreciated the meal. I really appreciated his journey.

Harry died of complications several months after leaving the university. But I always felt that he had the very best of life from the caring members of the recreational ranch that adopted these horses. He had great quality feed, nice equine companions, a better hair coat, and people to provide watch over his well-being. Thanks for providing for each member of the Magnificent Seven; it helps to balance the unfortunate circumstances encountered early in their journey, the year prior to arriving at the safe horse haven in California.



HELPFUL TIPS

Refeeding Recommendations

Days 1-3

Feed one pound (approximately 1/6 flake) of leafy alfalfa every four hours (total of six pounds per day in six feedings). Contact a veterinarian to evaluate the medical status of the horse.

Days 4-10

Slowly increase the amount of alfalfa and decrease the number of feedings so that by day six, you are feeding just over four pounds of hay every eight hours (total of 13 pounds per day in three feedings).

Day 10 - several months

Feed as much alfalfa as the horse will eat and decrease feeding to twice a day. Provide access to a salt block. Do **not** feed grain or supplemental material until the horse is well along in its recovery; early feeding of grain and supplemental material complicates the return of normal metabolic function and can result in death.

*Provide clean, fresh water at all times.

*De-worming and correction of dental problems are very beneficial to the horse's recovery.

PROFILES

Carolyn L. Stull, MS, PhD

When it comes to animal welfare, UC Davis remains on the cutting edge with Dr. Carolyn Stull leading the way, sorting through the issues and finding ways to improve the well-being of agricultural animals, including horses.

Dr. Stull was appointed to the UC Davis Veterinary Medicine Extension Animal Welfare Program in 1992. She juggles her time between applied research projects, outreach teaching activities, and public service. Her work in public service is focused on welfare issues of agricultural animals on the farm and at the state and national levels, often requiring collaboration with colleagues in various disciplines such as immunology, pathology, physiology, and nutrition to effectively study a situation.

She received her undergradu-

ate degree in biochemistry in 1977 from Purdue University, and master's and Ph.D. degrees in animal science from the University of Illinois in 1979 and 1984, respectively. She is also board-certified with the American College of Nutrition, American Registry of Professional Animal Scientists.

Animal welfare issues, which are different for each species, provide an interesting challenge for Dr. Stull. However, being a long-time horse owner herself, welfare issues of the horse are of special importance to her. "I have a deep appreciation for the horse as a companion animal and as a business enterprise," she indicated. By competing on her hunter/jumper, she was able to finance part of her education, so she can relate to the business and pleasure sides of the equine industry. "I enjoy enhancing



Carolyn Stull and her horse Windfall, who never had a low-calorie day in his life.

the welfare of the horse for the future through education, political issues and research," she continued. "I especially like seeing the immediate impact of scientific research on enhancing the welfare of the species. It is very rewarding when research is immediately applied to these issues."

Anne Rodiek, MS, PhD

Dr. Anne Rodiek is a Professor of Animal Science at California State University, Fresno, and has long been interested in horse nutrition. Because a good deal of her time is spent on undergraduate teaching, her research interests tend to be in areas that are practical and have direct application to the benefit of horses. Some of her more recent research interests have encompassed glycemic responses of horses to different feeds, neonatal energy metabolism, interaction of nutrition and athletic performance, practical nutritional management, and new product testing.

Dr. Rodiek received her undergraduate, master's, and Ph.D. degrees in animal science from the University of Illinois, obtaining her final degree in 1984. She has collaborated with Dr. Stull on

several research projects, most recently in the study to rehabilitate starved horses. She also has worked with various industry groups. Dr. Rodiek believes animal welfare is a very important and timely issue in animal science and production. "I think science needs to fill the space between the different factions and their sometimes opposing views about animal welfare/rights. Scientific investigation should tell us what producers probably already know, that certain practices enhance or decrease animal welfare, and will give the producers real information that hopefully will not only help them provide a better environment for animals, but will motivate them to make the effort to do so."



Anne Rodiek and her horse Jennie, a 16-year-old Friesian gelding.

What she has enjoyed most about her work with starved horses is the probability that some practical, science-based solutions can be found to restore these magnificent creatures to health. The flip side of this is what she likes the least: that so many horses really are in this condition.

Nutrition for Sick Horses

By Meri Stratton-Phelps, DVM

Providing optimal nutrition to a healthy horse is relatively simple. However, when a horse becomes ill, it usually is unable to consume enough energy, protein, and essential vitamins and minerals to meet its daily requirement. Anorectic horses, or horses with certain diseases, require special care by a veterinarian or a veterinary nutritionist. It is important to begin treatment as soon as possible, since a horse that does not eat after a 24-hour period of fasting will begin to break down body tissues to meet basic energy needs to sustain life in a process called catabolism.

Body stores of fat and protein provide the greatest source of energy and are catabolized during periods of anorexia that last beyond 24 hours. Both wound healing and the ability of the immune system to control infections are compromised in an undernourished animal. In order to optimize the health of a sick, anorexic horse, nutritional support should be offered within the first 48 to 72 hours in which a horse is not consuming enough nutrients to meet its requirements. Horses that are unable to tolerate enteral feeding (administration of nutrients through a nasogastric tube) can still receive nutrients through an intravenous route through parenteral nutrition (intravenous administration of lipid, protein, and dextrose). Parenteral nutrition is reserved for horses that are hospitalized, due to the absolute requirement for sterility during the treatment. Although it can be costly (\$400/day), many horses have been saved because they received parenteral nutrition. Enteral therapy can be administered to horses that are being treated in the field and is a good way to

provide nutritional support for a horse with short-term anorexia.

The nutritional care of a sick horse should continue throughout the time the patient is recovering. In many cases, the diet that the horse was consuming before it became sick will not provide adequate nutrition during the recovery period. Horses recovering from an acute illness can be treated with a therapeutic ration that is formulated to support the animal's metabolic and nutritional needs until the regular diet can be fed. Horses affected by a terminal illness such as kidney or liver disease may enjoy a longer survival time if they are also treated with a personalized diet that is formulated to meet their unique metabolic requirements. For general nutrition questions, or to inquire about a therapeutic ration for your horse, you can contact the Nutrition Support Service at the UC Davis Veterinary Medical Teaching Hospital at (530) 752-0290.



DONOR SUPPORT

The UC Davis Center for Equine Health 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 2003:

Dr. Keith Latson - Dan Evans Memorial Endowment

Dr. Mathilde Leclere - John P. Hughes Memorial Endowment

Dr. Nicola Pusterla - Peray Memorial Endowment

A description of the research made possible by these endowments is provided on the following page. Congratulations to Drs. Latson, Leclere and Pusterla!

COMING EVENTS

Dollars for Davis Benefit Ride

Sunday, August 10, 2003. The Moraga Horsemen's Association once again invites you to ride the beautiful Moraga East Bay trails to benefit the Center for Equine Health. You and your horse will enjoy a six-mile trail with moderate to steep terrain, tall shade trees and wonderful views. If you are feeling a bit competitive, you can also compete in the optional Trail Trials competition and earn ribbons. A minimum

donation of \$25 is required; all proceeds go to the Center for Equine Health. Lunch will be available for sale following the ride, and a veterinarian from the Center for Equine Health will give a brief presentation about new developments in their research program. For more information, a registration form and a map, contact Linda Ostman at (925)376-9472 or Wisti Nelson (925)377-7114.



Dan Evans Memorial Endowment

Dr. Keith Latson is the recipient of this year's Dan Evans



Memorial Endowment. His research concerns infections that occur secondarily to treating joint diseases in horses, which unfortunately is well-documented in veterinary medicine.

Intra-articular injections of medication are commonly performed in equine practice for treating joint disease. In addition to medications, local anesthetics are routinely injected into the joints during lameness exams in order to localize the source of pain. Even under the best of conditions when appropriate aseptic techniques are used, there is always some risk of infection following a joint injection. In many cases, despite meticulous skin preparation, the joint is inoculated with low numbers of resident bacteria from hair follicles and sebaceous glands when the joint capsule is penetrated with a needle. If a sufficient number of organisms are introduced, or if the horse's immune response is inhibited for any reason, an infection can become established. Despite prompt treatment with antibiotics once a joint infection is established, extensive destruction of the articular cartilage may still occur, resulting in debilitating lameness or permanent loss of use.

Dr. Latson's research will investigate the efficacy of currently used antibiotics given prophylactically in combination with local anesthetics or other medications to minimize the potential for subsequent infection. The ultimate goal of this study is to reduce the occurrence of infections acquired during the course of treatment.

John P. Hughes Memorial Endowment

Dr. Mathilde

Leclere has been awarded the John P. Hughes Memorial Endowment. Her research will investigate a relatively new antibiotic that has shown promise for improving the treatment of respiratory infections in horses.



Numerous disease states in horses require long-term antibiotic therapy. However, due to the small number of oral antibiotics available for use in horses, and because intramuscular injections are not often tolerated for more than a few days, chronic antibiotic administration can require intravenous catheterization and prolonged hospitalization. Moreover, the use of oral antibiotic therapy in horses is not without risks, particularly gastrointestinal, including diarrhea and colitis.

Azithromycin is a relatively new oral antibiotic available in veterinary medicine. It has fewer side effects than commonly used oral antibiotics and may allow for a shorter duration of treatment. If proven feasible, it may be used as an alternative for treating infections caused by *Streptococcus zooepidemicus* and anaerobic isolates that are resistant to one of the most commonly used oral antibiotic combinations in equine practice. A major advantage of azithromycin would be the practicality of administration for horse owners and practitioners (once daily followed by every other day). This pilot study will provide valuable information for use in longer-term studies to evaluate the safety and efficacy of azithromycin in horses.

Peray Memorial Endowment

Dr. Nicola Pusterla is the recipient of this year's Peray Memorial Endow-



ment. He is interested in investigating an improved analytical method for detecting and diagnosing infections caused by equine herpesvirus.

Equine herpesvirus 1 (EHV 1) and equine herpesvirus 4 (EHV 4) are important, widespread viral pathogens in horses, causing significant economic losses to the equine industry due to lost training time, secondary pneumonia, abortion, neonatal mortality, and neurologic disease. EHV 1 and EHV 4 both can cause respiratory disease, although acute respiratory disease is caused primarily by EHV 4 and occurs mainly in foals, weanlings, and yearlings. The traditional approach to diagnosing infections caused by both viral strains is virus isolation, but this method is often unsuccessful because herpesviruses are fragile, viral shedding is transient, and the virus is present in low numbers. Another approach to more successful diagnosis of EHV infections may lie in quantitative PCR analysis, which will be studied in the research made possible by this endowment. It is expected that a new diagnostic tool eventually can be developed that will contribute to a better understanding of the dynamics of the disease brought on by EHV 1 and EHV 4. The information will help clinicians in determining the diagnosis and in setting appropriate guidelines regarding risk of exposure, management of the disease, and length of isolation time.

COMING EVENTS

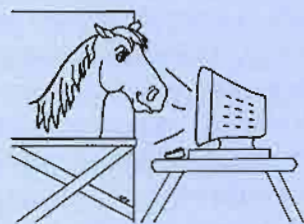
Celebrate the Champions at Del Mar

*Champions of the 2002 Del Mar Season - July 26, 2003
6:00 to 10:30 pm - Del Mar Fairgrounds and Racetrack*

The seventh annual Celebrate the Champions at Del Mar event will be held July 26, 2003, from 6:00 to 10:30 pm, at the Del Mar Arena, Del Mar Fairgrounds and Racetrack. The benefit is an opening-weekend tradition of the much-anticipated summer racing season. It brings together prominent community leaders, horse owners, trainers, jockeys, and racing fans for an enjoyable evening of fundraising to benefit various equine and community-related charities. Celebrate the



Champions at Del Mar has grown to be known as one of the hottest tickets in town and is considered one of the most important fundraising efforts for the Center for Equine Health at the University of California, Davis. This event includes cocktails, auction, dinner and awards, as well as a high-energy performance by Academy of Country Music Award-winner Collin Raye. For more information, please contact Lisa MacDonald, Del Mar Thoroughbred Charities, at (858) 792-4245.

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The HORSEREPORT

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THE HORSEREPORT

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