



July - September 1998

No. 88

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## THOUGHT FOR THE MONTH

Everybody is in favor of progress. It's the change we don't like.



## HEAT STRESS IN LLAMAS

**Cause:** Heat stress continues to be a devastating problem for camelids in North America. The exact causes of heat stress are poorly understood. We have recently applied for a grant from the ILA to investigate Heat Stress in Llamas and hope to determine in the coming years why this occurs. Basically, llamas that are in full fiber during the summer months rely on their "underside" for heat exchange. Llamas sweat, exchange heat, and remain normal in most instances. What makes one llama more predisposed to development of heat stress over another is not known. The condition may be an extension of management strategies and general stress (including nutrition).

**Clinical Signs:** Llamas suffering heat stress become more lethargic, may breath more rapidly, eat less, and spend more time lying down. This is the time to intervene! As the heat stress worsens, core body temperature rises to 106° F or greater. At this point, the llama becomes unwilling to get up, will not eat, and gradually worsens until death ensues if no intervention is done.

**Consequences:** Core body temperature > 106° F causes destruction of proteins and enzymes vital to normal cellular function. The cells lining the blood vessels are most severely affected, causing the leaking of protein and fluids into the tissues around the blood vessels. If this occurs in the lungs, respiratory distress develops. If this occurs in the brain, neurologic disease or seizures develop.

**Treatment:** SHADE, VENTILATION,  
COOL WATER, FANS, WET SAND PEN, and  
INTERVENE EARLY!

**Prevention:** Prevention is the real key to managing heat stress. You can estimate when your llama is at risk by using the following formula:

Temperature + Humidity = Heat Stress Index (HSI)

When the HSI is > 120, caution is advised; when the HSI is > 150, this is a dangerous time for the llamas.

For example, look at the HSI for the following temperature/humidity conditions.

$$\begin{aligned}
 80^{\circ} \text{ F} + 40\% &= 120 \\
 90^{\circ} \text{ F} + 40\% &= 130 \\
 80^{\circ} \text{ F} + 60\% &= 140 \\
 90^{\circ} \text{ F} + 60\% &= 150 \\
 80^{\circ} \text{ F} + 80\% &= 160 \\
 90^{\circ} \text{ F} + 80\% &= 170
 \end{aligned}$$

Probably the most critical preventative measures are (1) provide adequate shade for all llamas at all times, (2) provide clean, fresh water at all times for all llamas, (3) shear at least the thorax and abdomen prior to onset of the hottest months (in Ohio, shearing goes on at the end of May), (4) limit breeding activities to the spring and fall (spring breeding causes the least maternal stress and allows the cria to utilize spring pastures and sun), (5) provide balanced nutrition (some clinical evidence suggests that vitamin E and selenium supplementation may provide some protection), and (6) only transport llamas at night during the hottest months. --David E. Anderson, DVM, MS, Assistant Professor, College of Veterinary Medicine, The Ohio State University, as reported in Florida Veterinary Scene, Vol. 7, No. 3, March/April 1998, University of Florida, Gainesville, FL.

## EQUINE RHINOVIRUS INFECTION

Contagious respiratory infections in horses are major causes of both acute and chronic respiratory diseases resulting in impaired pulmonary function and reduced performance. The chronic sequelae are important to the horse industry and include bronchopneumonia, chronic obstructive pulmonary disease, and exercise-induced hemorrhages. A study was conducted to identify the infectious agents more recently implicated in respiratory disease in horses in Ontario. Patient data, clinical examination, isolation, and paired serology for specific infectious agents were analyzed. Nasal swabs from 92 horses with acute clinical respiratory disease from 29 different premises were cultured for viruses, mycoplasma, and pathogenic bacteria. Equine rhinovirus type 2 was recovered from 28/92 horses tested, and equine influenza virus type A, subtype 2, was recovered from 5.

The large numbers of ERhV-2 isolates recovered from 30.4% of horses with acute respiratory disease in this study suggests that ERhV-2 may play an important role in acute clinical respiratory infections in horses in Ontario. Equine rhinoviruses are picornaviruses, which spread readily by direct and indirect contact with nasal secretions or by aerosol inhalation. They are resistant to environmental extremes and therefore readily contaminate an environment. Rhinoviruses replicate in the upper respiratory tract, with viremia occurring 37 days after exposure. Viremia, but not always nasopharyngeal virus shedding, is terminated in 4-5 days with the appearance of neutralizing antibody. Clinical signs can range from severe pharyngitis with pyrexia and serous or mucopurulent nasal discharge to transient pyrexia, with mild or no clinical signs. Virus may be isolated from nasal swabs of clinically ill animals for 1 month after infection and from clinically healthy horses with high antibody titers. Others have reported that equine rhinoviruses may be recovered from clinically normal carrier horses for up to 18 months. The etiopathologic role of equine rhinoviruses may range from being the only infectious agent isolated from horses with mild respiratory signs to altering local host defense mechanisms and enabling other agents to become more invasive, aggressive, and pathogenic. Isolation of rhinoviruses has often been associated with clinical outbreaks of equine herpesvirus and equine arteritis virus.

Of the 28 horses from which ERhV-2 was recovered, a serologic diagnosis of ERhV-2 infection was associated with only 6 horses. Significant change in antibody titers for paired sera could not be demonstrated for 75% of the horses from which ERhV-2 was recovered. Attempts to demonstrate a rise in serum antibody titer to rhinovirus are commonly unsuccessful perhaps because antibody levels rise rapidly from day 6 to peak between days 14 and 18, making it difficult to collect acute samples early enough to be able to demonstrate significant changes. Although ERhV-1 was not recovered from any horse, 9 horses had significant changes in antibody titer to this virus, suggesting that it was also a cause of acute respiratory infections in these horses. --

**Taken from:** Carman, S., et. al., J. Vet. Diagn. Invest. 9:17-23, 1997, as reported in Vet Med, Vol. 4, Issue 3, May 1998, Iowa State Univ., Ames, IA.

## DURATION OF IMMUNITY IN CATS VACCINATED WITH AN INACTIVATED FELINE PANLEUKOPENIA, HERPESVIRUS, AND CALICIVIRUS VACCINE

Duration of immunity, based on antibody titers, was evaluated in a group of specific pathogen free cats vaccinated as kittens with an inactivated triple vaccine (feline panleukopenia, feline herpesvirus, and feline calicivirus). Vaccination of 15 kittens at 8 and 12 weeks of age with two doses of this inactivated vaccine resulted in high antibody titers against FPV for at least 6 years. FHV and FCV antibody titers were low positive after vaccination, but gradually declined over the 6 years. All vaccinated cats had positive FHV antibody titers for at least 3 years after vaccination, and positive FCV antibody titers for at least 4 years. Negative FHV titers were first determined in some vaccinated cats at 4 years after vaccination, and at 5 years for FCV. All 17 unvaccinated contact control cats had negative antibody titers against the three viruses throughout the 6-year study. --F.W. Scott and C. Geissinger, Feline Pract 25: 12, as reported in Feline Health Topics, December 1997.

## EARLY SPAY/NEUTER: AN OVERVIEW

"RESOLVED, that AVMA supports the concept of early (8-16 weeks of age) ovariohysterectomies/ gonadectomies in dogs and cats, in an effort to stem the overpopulation problem in these species."

This resolution passed AVMA House of Delegates vote in the summer of 1993. As with other AVMA positions, it is up to each member to decide whether to adhere to this guideline. Having been taught that 6 to 7 months of age is the proper time to spay/neuter puppies and kittens, and having no information regarding the effects of early spay/neuter on the long-term health of the animal, many veterinarians have been reluctant to advise their clients to have their pets spayed/neutered at 6 to 7 weeks of age. However, there is an accumulating body of evidence indicating that the positive results quite possibly outweigh any remaining unknown risks. Studies conducted on early spays and neuters on kittens and puppies report that the anesthetic and surgical risk is minimal, providing proper protocols are used. These protocols are described in these references and they do differ from those for a 6- to 7-month-old animal. It is emphasized that, in addition, special care must be taken to choose only healthy animals for surgery; prevent hypoglycemia, hypothermia, and blood loss; and keep thorough records so that these animals can be followed.

These studies report that anesthetizing 6- to 7-week-old puppies and kittens was uneventful. Spays are reported to be easier and faster at 6 to 7 weeks than at 6 to 7 months because there is little subcutaneous fat to hinder entrance to the abdominal cavity and the lack of vasculature reduces hemorrhage. Finding organs was no harder than on the older animal. The speed of castrations at 6 to 7 weeks and at 6 to 7 months is the same, and the testicles are easier to remove and break down. Finally, the younger animals recovered faster and with less pain.

Several of these studies addressed the question of long-term effects on the health of the animal by comparing, at maturity, groups of animals neutered at 6 to 7 weeks and at 6 to 7 months. The resulting resting metabolic rate and predisposition to obesity of cats neutered in these two age categories have been compared after 24 months of age. The urethral diameters of male or female cats neutered in these categories was compared at 22 months of age.

Many aspects of skeletal dimensions, body weight and composition, physical maturation, secondary sex characteristics or behavioral development of cats and dogs neutered/spayed in the two groups were compared at one year of age. The only notable difference found was that the animals neutered at 6 to 7 weeks of age were more likely to have immature external genitalia at maturity; this has no known clinical significance. The benefits of neutering are the same at either age: reduced risk of reproductive disorders and of mammary neoplasia.

Animal shelters, being closest to the tragedy of mass euthanasia, were first to adopt early spay/neuter policies. Even though the majority of animal care and control facilities have a mandatory spay/neuter policy, typical compliance rates are from 50% to 60%, in spite of pre-adoption screening, spay/neuter contracts, and follow-up reminder. Early spay/neuter provided the potential for 100% compliance by requiring pups and kittens to be neutered before being adopted out. However, only a small percentage of pets are acquired from animal shelters, so neutering these animals can only have a small effect on the overpopulation problem. If veterinarians were to recommend neutering pups and kittens at an early age, a significant decrease in unwanted animals could result.

These studies indicate that early spays benefit the animal, the owner, animal population control, and you, the veterinarian. The animal benefits because the anesthesia is fast and uneventful; surgical procedure is well tolerated and animals recover faster. If made part of the standard puppy/kitten vaccination program, it would also benefit owners by decreasing the number of veterinary office visits necessary upon acquiring a new pet. This convenience to owners would

lead to increased compliance on their part and thereby decrease the number of unwanted dogs and cats produced each year. The veterinarian benefits because spays and neuters at 6 to 7 weeks of age are easier and faster than at 6 to 7 months, they help reduce animal population, and higher owner compliance means more business. It also gives veterinarians the opportunity to interact with shelters, pet stores, and breeders and be seen as leaders in animal welfare in our communities. --  
**Theresa A. Fuess, Ill Vet Bulletin 6(1), Apr 1998, as reported in Veterinary News, May 1998, Penn State University, University Park, PA.**

### CANINE SOMATOTROPIN AND BONE HEALING IN DOGS

Fracture healing is complex, involving numerous cells, regulators of cell function, and biochemical interactions in the repair process. Much study has been devoted to the role growth factors play in bone physiology and healing. Somatotropin (STH), insulin-like growth factor I (IGF-I), fibroblast growth factor, transforming growth factor \$, and bone morphogenetic proteins are some commonly studied growth factors. Recombinant technology has allowed the efficient production of adequate quantities of growth factors to study their roles in bone growth and healing.

Nonunion fractures and delayed union fractures occur in dogs and may result from inadequate fracture reduction and repair, inadequate immobilization, loss of bone fragments, impaired blood supply, advanced age, concurrent medical conditions, and infection. It would be advantageous to enhance fracture healing with a growth factor to reduce the morbidity and poor limb function associated with delayed union or nonunion fractures.

A study was conducted to determine the effect of recombinant canine STH on bone healing using an unstable ostectomy gap model. Ostectomy of the radius, leaving the ulna intact, is a model that reliably produces nonunion or greatly delayed fracture healing in dogs. Although the ulna acts as a splint and allows weight bearing, excess motion occurs at the ostectomy site, and a nonunion fracture develops. After an ostectomy of the midshaft radius, bone healing was evaluated over an 8-week period in control dogs ( $n = 4$ ) and dogs receiving recombinant canine STH ( $n = 4$ ). Bone healing was evaluated by qualitative and quantitative evaluation of serial radiographs every 2 weeks. Terminal dual-energy x-ray absorptiometry and three-point bending biomechanical testing were also performed.

Dogs receiving STH had more advanced radiographic healing of ostectomy sites. Bone area, bone mineral content, and bone density were two to five times greater at the ostectomy sites of treated dogs. Ultimate load at failure and stiffness were three and five times greater in dogs receiving STH. Using the ostectomy gap model, recombinant canine STH enhanced the radiographic, densitometric, and biomechanical aspects of bone healing in dogs. Reduced STH secretion in aged animals may be one factor associated with reduced capacity for bone healing. Dogs at risk for delayed healing of fractures may benefit from treatment with recombinant canine STH. --  
**Abstracted from: Millis, D. L., et al., Vet. Surg. 27:85-93, 1998, as reported in Vet Med, Vol. 4, Issue 3, May 1998, Iowa State University, Ames, IA.**

### IT'S NOT EASY BEING GREEN

In the United States, lawns occupy more land than any single crop, including wheat, corn or tobacco. Homeowners use 10 times more chemical pesticides per acre than farmers do. As much as 60 percent of water in western cities is used for lawns; as much as 30 percent in eastern cities. Of the 34 major pesticides commonly used on lawns, 32 have not been tested for their long-term effects on humans and the environment. --**The Lawn Institute, reported in Newsweek, Livestock Conservation Institute, June, 1993, as reported in Clinical Veterinary Medical Newsletter, KSU Veterinary Medical Teaching Hospital, March 1, 1993.**

## CE OPPORTUNITIES

Date	Topic	Location	Contact Hours
July 18	Small Animal Radiology for Veterinary Technicians	Blacksburg	6
August 7-8	Small Animal Reproduction	College Park, MD	10
October 2-3	Diagnostic Ultrasonography	Blacksburg	10
October 9-10	Practical Eye Surgery	Blacksburg	10
October 23-24	Orthopedic Surgery - Canine Forelimb	Blacksburg	14

### Soft Tissue Surgical Series

September - December 1998

Blacksburg

Six sessions of five hours each = 30 contact hours

**Please Note:** The courses listed above are limited enrollment and feature a hands-on laboratory experience under the guidance of clinical faculty members. Program brochures provide course details. For registration or more information, please contact:

Dr. J. M. Bowen  
VMRCVM - Virginia Tech  
Blacksburg, VA 24061  
(540) 231-7388

Conference Registration  
Continuing Education Center  
(540) 231-5182

## EXOTIC PET CARE TIPS - HEDGEHOGS

Veterinarians are seeing more of these little guys than ever before. The first time one comes into your office you are in for a surprise. When you try to do a physical examination-you won't be able to do one! Hedgehogs have a bad habit of curling up into a little ball. Physically unrolling one (without injuring it) is almost impossible. I routinely use isoflurane to gas them down. Once asleep, you can unroll them and use a small mask to keep them down for the examination.

Common ailments include parasitism and respiratory disease. *Chorioptes* mites are very common. Excessive dander will be present. Treat as for all mites, ivermectin 200 micrograms/ kg, repeated in 2 weeks. Be sure the client thoroughly clean the enclosure. Scabies is also possible. Worms are treated as any other species.

Respiratory infection is almost always due to an excessively low environmental temperature. Hedgehogs need to be kept at 75-80 degrees. Any lower and problems are likely. A good antibiotic choice is penicillin (Flocilin) given a 3 IU/kg IM q48 hrs. Have the owners increase both the temperature and humidity.

Husbandry should include a hiding box, newspaper bedding and a diet composed of chopped vegetables, dog food and fruits along with mealworms, waxworms and crickets. Feed at night, as they are nocturnal. Life expectancy is 7-10 years. -- Dr. Alex Cassucio, Animal Medical Center, Morgantown, WV, as reported in WVVMA Fact Line, Volume 13, Issue 1, March 1998.

## WORTH NOTING

There are 25 million acres of lawn in the U.S. That is an area about the size of Pennsylvania. -- KCR, May 1998.

## MAILING LIST UPDATE

Dear Colleagues:

In our continuing efforts at maintaining a current and accurate mailing list for this newsletter, I request that you take a minute to update us on any changes in address, name, practice, etc.

If you no longer wish to receive the newsletter or know of a colleague who would like to be added to our mailing list, please fill out and return the form below at your earliest convenience. Because of budgetary restrictions, we cannot send separate newsletters to each and every veterinarian in our circulation area. Please share your copy with a colleague.

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It is a great help to us if you include Virginia Veterinary Notes when notifying people of an address change.

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