



VIRGINIA VETERINARY NOTES

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

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Kent C. Roberts, DVM
Extension Veterinarian

THOUGHT FOR THE MONTH

The man who has no means of invisible support
has my sympathy.

--Bill Moyer

HEAT STRESS IN LLAMAS

Heat stress is often a geographic problem which is influenced by the adaptability of the individual, the climate and interactive forces. The combination of elevated heat and/or humidity favors the development of heat stress. Prerequisites for the development of heat stress in llamas include a sum of approximately 160 or greater when totaling the ambient temperature and the humidity. For example, if the ambient temperature is 80°F or higher and the humidity is at least 80%, conditions are opportune for heat stress to develop in susceptible individuals. As one factor rises, the other factor can be lower than the values mentioned while still enhancing the chances of heat stress.

Other factors predispose animals to heat stress when the thermal balance is upset. There needs to be an equilibrium between heat production and heat loss to maintain a constant body temperature. Direct solar energy slows the loss of body heat. Air movement can increase evaporation cooling. Contact with cooler substance, such as water, allows accelerated loss of body heat through convection.

Acclimatization to a different climate requires a minimum of two weeks and perhaps two months to a year. The degree of difference in the climates plays a major role in determining the period of adaptation. The fitness of the animal, the density of the coat and the activity level all influence the likelihood of heat stress.

Stresses such as transportation, regrouping, increased activity, illness (especially respiratory disease) and advanced pregnancy increase the risk of heat stress. Other predisposing factors include a nervous personality, over-conditioned (i.e. FAT) animals, very old or debilitated patients, imbalances, parasitism and poor ventilation.

Signs of heat stress tend to be nonspecific. There can be concurrent illnesses which complicate the diagnosis. There are also varying degrees of severity, from mild lethargy to recumbency to death. Most animals have a fever, classically over 105°F. Any fever should be a warning sign, especially in the face of climatic conditions favoring heat stress. Decreased appetite and dullness can be the first signs noticed. It is important to check the animal's temperature as soon as the initial signs are recognized.

Depression, increased respiratory rate or effort and drooling with resultant dehydration occur as the condition progresses. **Trembling**, weakness, open-mouth breathing and edema can develop. Restlessness, increased heart rate, lying down a lot (especially trying to expose the belly) and sweating may be seen. Recumbency (downer), shock and disorientation or severe depression can result from a serious case of heat stress.

Due to the high body temperature and/or impaired circulation, there can be **muscle damage**. The muscle damage can contribute to the animal's inability to rise. The heart as well as the skeletal muscles may be affected. Any heart damage can contribute to the syndrome when blood circulation and oxygenation of the tissues are impaired.

Laboratory tests can aid in evaluating the severity of the condition as well as assessing the probability of concurrent diseases. Every attempt should be made to determine pre-existing disorders, the severity of the existing disease and the likelihood of complications. All of these factors help to determine how aggressive the therapy needs to be and what the chances are for recovery.

Therapy should be aimed at stopping damage, stabilizing the patient, assisting repair of tissues and physical therapy. Once the patient's body temperature has been reduced and the animal's environment has been improved, reassessment of the patient's condition is usually warranted. Correction of dehydration, shock, hypocalcemia and electrolyte imbalances will help insure recovery.

Cooling can be accomplished and maintained using cold water, ice, fans and shearing. The most critical sites to hose or immerse in cold water are under the belly, in the armpit and groin. These are also the key sites to pack with ice for rapid ability to monitor core body temperature. If the animal is not too stressed, cold water can be given by mouth; drinking, drench or tube. This can be quite effective, but must only be done if the patient can tolerate it. The amount of water given at one time should be moderate, e.g. one quart to one gallon depending on the size of the animal and its condition.

Fans aid evaporation cooling and are more useful on a long term basis rather than of great immediate aid. Shearing can be done once the patient is stabilized. It is especially important to shear the under-belly, armpit region (behind the front leg) and groin or flank region (ahead of the back leg). These are areas which need to be exposed for efficient heat loss by the animal.

Any existing primary disease should be treated. Normal body **temperature** and hydration need to be maintained. Proper heart function needs to be assured. Nutritional support becomes more important the longer the animal is affected. Thiamine is indicated to assist muscle cell repair and to prevent the development of polioencephalomalacia. Vitamin E and selenium will help stabilize muscle cells and other tissue cells. Antiinflammatories (phenylbutazone, aspirin, dipyrone, flunixin meglumine) can reduce problems caused by the tissue damage and the body's attempt to repair itself.

Oral or intravenous **fluids** may be needed to correct the dehydration or to off-set ongoing losses. In severe cases, DMSO (dimethyl sulphoxide) can be given intravenously mixed with 5% dextrose to reduce brain edema and reduce the secondary reaction in the tissues. DMSO can also be applied topically to reduce muscle soreness. Often the secondary reactions are more debilitating than the primary disease. Supplementation of calcium in downers can be done based on laboratory results. Antibiotics may be indicated, especially if there is also an infection present.

Physical therapy must be persistent when weakness, trembling and/or recumbency are displayed. Besides correction of the environment, gentle movement of the limbs, massaging the legs and deep bedding are important to ensure recovery. Down animals need to be "rolled" every 2-4 hours, kept dry and gotten up (sling) as soon as they are stabilized. Slings need to be done atraumatically. The duration will depend on how well the patient handles the treatment. It should be done at least twice a day, with the length of time in the sling increasing as long as it is well tolerated and the patient is weight-bearing. It will usually take at least one to two weeks for an animal down from heat stress to be able to

rise again. If treatment and physical therapy (nursing care) are not aggressive enough, recovery will take longer.

PREVENTION of heat stress must start with planning. The planning should have started yesterday, last month or more likely last year. Once there is a problem, it is beyond the point of optimal results. **Shearing** (whole body or regional) of any animal previously affected and those with dense coats needs to be done prior to the onset of hot, humid weather. Proper shearing technique requires practice and patience.

Avoid late pregnancy (last trimester) during the hot, humid months. Not only does late pregnancy predispose an animal to heat stress, but other problems arise as well. There appears to be increase chance of prematurity and poor milk production by the mother. This results in an escalated chance of death and slowed growth of the surviving crias. Premature birthing can also result in lack of adequate colostrum production, which in return leaves the cria open to fatal infections.

Cool water should always be available. Running creeks or ponds are ideal, but wet sand, water holes or children's wading pools work well. The water and feed should be fresh and fed in a cool shaded area. Feed which is high in energy and easily digestible produces less heat during digestion.

Good health is very important. Animals should be grouped appropriately so they can be fed to insure proper weight and to reduce stress. New arrivals should be isolated while adjusting to the new environment, and should be gradually introduced to native animals after a suitable time.

SHADE is of ultimate importance. There needs to be more than enough shed room at all times of day, with adequate space to prevent crowding or fighting. The shady areas should also have adequate ventilation. Feed and water should be in the shaded areas. Wet sand, if available, should be in the shade. The areas should be kept clean and tidy to encourage the llamas to stay in the shade, and to reduce the risk of disease.

A **combination** of acclimatization, adequate shade, proper ventilation and water supply, a source of salt, an easily digestible diet, fit animals, shearing or combing and trimming, maintaining good health, avoiding stress or transportation during hot weather, early recognition and aggressive treatment are all important to minimize the risk of heat stress. --Karen Baum, DVM, VA-MD Regional College of Veterinary Medicine, Blacksburg, VA.

VMRCVM ALUMNI GATHERING

The veterinary college Alumni Association is planning a weekend of continuing education and social events in Blacksburg on September 14-16, 1990. This will coincide with the College's celebration of its Tenth Anniversary.

All VMRCVM alumni are cordially invited to attend and be part of this important event.

DIET AND MANAGEMENT OF FELINE UROLOGIC SYNDROME

Veterinarians are frequently presented with both male and female cats exhibiting clinical signs of hematuria, dysuria/stranguria, urination in inappropriate places and, perhaps, urethral obstruction. The diagnosis most likely suggested in these patients would be the "Feline Urologic Syndrome" (FUS), the most commonly diagnosed urinary tract disorder in the cat. FUS, however, is not a specific disease. It is simply a combination of clinical signs that are indicative of lower urinary tract (i.e. bladder and urethra) disease of the cat. Diverse disorders of the feline lower urinary tract result in similar clinical signs. These disorders include bacterial infections, uroliths, urethral plugs (usually crystalline material and matrix), urethral strictures, prostatic disease (rare), nutritional factors, neoplasia, urachal anomalies, trauma (especially from urinary catheters, fungal and parasitic infections, neurologic disorders, possibly virus infections and idiopathic conditions). Because of the many causes of feline lower urinary tract disease, a thorough diagnostic evaluation of each patient is required, especially if the clinical signs are chronic or recurrent. Specific diagnostic procedures should include a complete history and physical examination, neurologic examination, complete urinalysis, quantitative radiography of the urinary tract and routine hematological and biochemical studies. Appropriate therapy will depend on identification of the specific causes of the lower urinary tract signs.

Dietary management has been suggested as an important factor in the treatment of cats with lower urinary tract disorders. Specifically, low magnesium diets have resulted in the dissolution of sterile struvite (magnesium ammonium phosphate) uroliths from the bladder. Average time to dissolution was 32 days. Low magnesium diets have also been recommended for the treatment of plugs and for cats with lower urinary tract signs for which no underlying cause can be found. Further controlled studies are needed to determine the relationship between the diet and the urethral plugs. The effectiveness of low magnesium diets in the treatment of cats with signs of lower urinary tract disorders but without evidence of bacterial infection, uroliths or urethral obstruction must be viewed cautiously. Spontaneous resolution of clinical signs in some cats with idiopathic lower urinary tract disease appears to be common.

Analysis of feline uroliths revealed that nearly 90 percent were composed of at least 70 percent struvite. Analysis of urethral plugs revealed that nearly 95 percent were composed of at least 70 percent struvite. Supersaturation of urine with magnesium-ammonium-phosphate predisposes cats to struvite urolith formation and to the accumulation of struvite crystals in urine. The concentration of magnesium and phosphorus in urine is directly related to the dietary intake of these minerals. Experimental diets high in magnesium greatly increase the risk of cats developing signs of lower urinary tract disorders. Most commercial cat foods contain 4-18 times the amount of magnesium necessary for feline growth. Canned, soft-moist and dry commercial cat foods contain on the average 0.14 percent to 0.16 percent magnesium on a dry matter basis.

Magnesium levels are high in most commercial cat foods because the protein sources used in the preparation of these foods are high in magnesium.

Diets low in magnesium (<0.1 percent on a dry matter basis) have been shown to result in dissolution of struvite uroliths and to decrease the frequency of recurrence of lower urinary tract signs in cats. These diets should also have a

high caloric density. Cats eat to meet their caloric needs. Cats will eat less of a food that has a high caloric density. Consequently, less magnesium (and other minerals) will be consumed and the urine concentration of magnesium will be decreased. Undersaturation of the urine with magnesium and other minerals will result in struvite urolith dissolution and decreased concentration of struvite crystals in urine. Magnesium concentration is not usually listed on cat food labels. The ash content of dry or soft-moist foods can be used as an estimate of the magnesium concentration. Studies have shown that dry and soft-moist foods with 5 percent or less ash on a dry matter basis contained 0.1 percent or less magnesium on a dry matter basis. The ash content of canned cat foods, however, cannot be used to estimate the amount of magnesium in the canned food.

In one study, only two commercial diets with 0.1 or less magnesium on a dry matter basis were available without prescription. These were Carnation's canned diets, Fancy Feast Beef and Liver, and Friskies Beef and Liver. Hill's Pet Products, Inc., produces three magnesium restricted diets - Prescription Diet Feline s/d and c/d and Science Diet Feline Maintenance (Table 1).

Table 1

	s/d canned	c/d canned	c/d dry	Science Diet canned	Science Diet dry
Moisture %	71.0	71.5	9.0	70.5	9.0
Protein %	12.0	12.5	31.0	12.2	30.9
Fat %	9.9	8.5	23.7	7.6	22.0
Carbohydrate %	5.2	5.7	30.2	7.8	32.0
Fiber %	0.4	0.4	1.6	0.2	1.0
Ash %	1.5	1.4	4.5	1.7	5.1
Calcium %	0.2	0.2	0.84	0.26	0.9
Phosphorus %	0.16	0.19	0.81	0.25	0.96
Magnesium %	0.017	0.02	0.07	0.022	0.07
Sodium %	0.23	0.15	0.42	0.16	0.29

Feline s/d diet is recommended for dissolution of struvite uroliths. Caloric density is high because of the increased fat content. Magnesium, phosphorus and calcium concentration are less than many commercial cat foods, resulting in decreased urine concentration of these minerals. The increased sodium content results in a solute diuresis further decreasing the mineral concentrations in the urine. When using s/d Diet, no vitamin or mineral supplements should be given, and no other food should be allowed. Urinary acidifiers are contraindicated for cats on s/d Diet. s/d Diet will typically maintain a cat's urine pH at 6.0 or below. Urinary acidifiers given to a cat being fed s/d Diet could result in anorexia and vomiting secondary to a chronic metabolic acidosis. Because of its increased sodium content, Feline s/d Diet should not be used for cats with edema, ascites, pulmonary congestion, hypertension or liver disease. Feline s/d Diet should be fed for only two to three months to dissolve uroliths or struvite crystals in urine. It is not recommended as a long term maintenance diet or for growing kittens because of its high sodium content.

Feline c/d Diet and Science Diet Feline Maintenance also have decreased amounts of magnesium, phosphorus and calcium. Because of their low sodium content, they can be used as long-term maintenance diets.

References:

- Lewis, L. D., Morris, M. L. Jr.: Small Animal Clinical Nutrition. 2nd ed. Mark Morris Associates, Topeka, KA. pp. 9-1 -- 9-42 (1984).
- Osborne, C. A.: Disorders of the feline lower urinary tract. *Vet. Clinic North Am. (Small Animal Pract.)*, 14:407-717 (1984).

By James D. Brace, D.V.M., Department of Urban Practice as reported in *Tennessee Veterinary Medical Topics*, Vol. 11, No. 2, December 1986 and *Animal Health Beat*, University of Nevada, Reno, March 1990.

RESTAURANT INDUSTRY

As the population grows, so does the restaurant industry. Americans have an insatiable appetite for convenience and free time. According to the USDA, in 1988 food eaten away from home accounted for 38 percent of total food expenditures, up from 33 percent in 1965. In 1988, the average American household ate out 10.3 times per week at a cost of \$31.72 each week, a considerable increase from 1980, when the average American household ate out 6.4 times a week at a cost of \$22.71. This represents a 61 percent increase in the number of meals eaten out and a 40 percent increase in the cost. The industry has grown during all economic cycles in the last 50 years and we believe it will continue to grow into the next century. --*Industry Report, CNL Income Fund, Ltd. April, 1990.*

WARNINGS ON ESTROGEN USE

We recently reported on a study done at Cornell indicating that estrogen compounds can cause severe bone marrow damage. Dr. Sonja Shelly stated that only one or two large doses could be a problem, although dogs could be saved from serious complications if the condition was noticed soon and treated. Confirmation of the dangers estrogen poses has now come from a study by Douglas J. Weiss, DVM, PhD, and Jeffrey S. Klausner, DVM, at the University of Minnesota.

Even though it is still not known exactly how estrogen damages bone marrow, evidence accumulated to date has led to the recommendation that the synthetic estrogen ECP (estradiol cyclopentylpropionate) not be used for dogs. On the more positive side, the Minnesota researchers confirm the Cornell conclusion that even severe and prolonged bone marrow suppression is potentially reversible.

Another commonly used drug, phenylbutazone (used in treating such conditions as disk rupture and hip dysplasia), has also come under scrutiny. Drs. Weiss and Klausner agree with Dr. Shelly. The number of cases of adverse response to phenylbutazone in dogs, they say, now justifies close monitoring of long-term use. Incidentally, this warning comes on the heels of reports that suggest the drug is toxic to bone marrow in both humans and horses. Even naturally produced estrogen (endogenous) can be dangerous. For example, prolonged estrus in unmated intact female ferrets can result in aplastic anemia. --*Reprinted with permission, Cornell Animal Health Newsletter, 53 Park Place, New York NY, Vol. 8, No. 3, May, 1990.*

ROTATING HORSE DEWORMERS

Many horse owners practice anthelmintic rotation and alternate among various deworming products according to some schedule. Rotational programs may be ineffective, however, because of a lack of understanding of the similarities and differences among equine dewormers.

The major object of rotation is to prevent development of anthelmintic resistance. Resistance is the decreased efficacy of a dewormer against parasites that were previously susceptible. Resistance results from changes in worms, not in the drugs. Resistant worms have biochemical or physiologic adaptations to combat the action of dewormers, and are able to transmit this trait genetically to their offspring. One of the surest ways to select for anthelmintic resistance is to use the same or chemically related dewormers exclusively and frequently.

Since the majority of equine anthelmintics are effective against the same spectrum of parasites (large and small strongyles, ascarids, pinworms), a second reason for rotation is to kill parasites that may be susceptible only to certain dewormers. Examples include the seasonal use of ivermectin to kill migrating strongyle larvae, or using specific compounds to kill bots.

Over half of the commercially available equine anthelmintics kill parasites by the same mechanism (see Table 1). Since worms become resistant to modes of action rather than to brand names, resistance of parasite to one of these compounds can result in resistance to all, even to products which have never been previously used. Thus "rotation" among the products in Group A of Table 1 is not true rotation, since these drugs share a similar mode of action. Rotation must be between, and not within, drug groups. True rotation requires alternating among drugs in Group B of Table 1 or between drugs in groups A and B.

There are two basic patterns of anthelmintic rotation. Slow rotation entails the use of a single anthelmintic for an entire year before changing to a chemically unrelated dewormer. Rapid rotation favors switching to chemically unrelated dewormers at every treatment. Either plan is acceptable, provided the horse owner understands the chemical relationships of the various anthelmintics and practices true rotation.

Regardless of the rotation system, the continued efficacy of dewormers should be monitored professionally. A veterinarian can determine anthelmintic efficacy by performing paired fecal egg counts in which the results of a fecal sample taken before treatment are compared to a second sample taken 7-10 days after deworming. Effective anthelmintics should reduce egg counts by 90% over this time period. Lower percentages of reduction might indicate anthelmintic resistance. Once resistance to a dewormer has been demonstrated in a herd, related drugs should never be used on the premises.

Properly performed, anthelmintic rotation can prolong the efficacy of dewormers and improve equine health through effective parasite control. --Dr. Craig Reinemeyer, The University of Tennessee, College of Veterinary Medicine, AAVP New Brief, Vol 1, Winter, 1990.

TABLE 1. COMMERCIALY AVAILABLE EQUINE ANTHELMINTICS

Group A - <u>Similar modes of action</u>		Group B - <u>Unique modes of action</u>	
<u>Generic name</u>	<u>Brand name</u>	<u>Generic name</u>	<u>Brand name</u>
Cambendazole	Camvet	Dichlorvos	Equigard
Febantel	Rintal	Ivermectin	Eqvalan, Zymectrin
Fenbendazole	Panacur	Piperazine	-----
Mebendazole	Telmintic	Pyrantel pamoate	Strongid T and P,
Oxfendazole	Benzelmin		Imathal
Oxibendazole ¹	Anthelcide EQ, Equipar		
Phenothiazine	-----		
Thiabendazole	Equizole		

¹Despite chemical similarities, remains effective against most resistant worms.

NONSTEROIDAL ANTIPRURITIC MEDICATIONS IN DOGS AND CATS

Antihistamines currently used by 13 selected diplomates of the College of Veterinary Dermatology included: Diphenhydramine (Benadryl), Trimeprazine (Temaril), Chlorpheniramine (Chlortrimeton), Hydroxyzine (Atarax), Terfenadine (Seldane) and Cyproheptadine (Periactin).

Four dermatologists offered comments regarding the use of antihistamines:

1. "I think that nonsteroidal antipruritics could play a synergistic role with corticosteroids in helping to spare the amount of prednisolone needed in some chronic cases ...my general opinion would be that oral antihistamines are of minimal effect in the treatment of dermatologic disorders, and are most effective in the treatment of respiratory disorders which is where they are most often used in human medicine.:"
2. "HYDROXYZINE at 2.2 mg/kg, PO, TID and CIMETIDINE at 5 mg/kg, PO, TID in atopic dogs when nothing else is working and people have \$ ---only effective in 20% of these cases, but when it works the results are very dramatic and response is usually within 2 weeks."
3. "Best results using a combination of ATARAX and DERM CAPS, maybe up to 35-49% improve."
4. "Clients are given scripts for 6 different antihistamines and instructed to try each one individually and then grade each for effectiveness on a scale from 1-10, which in the event that none of the antihistamines is 100% effective in controlling the pruritus, the best one may be utilized to help decrease the amount of prednisone needed ...Derm Caps are given at the same time that antihistamines are started since one month or more may be required before beneficial effects are observed ...and at the end of one to two months if no antihistamines or prednisone is required, the Derm Caps are considered successful (taking into account outside factors)." --**Iowa State University Veterinary Extension Newsletter #351-V698, September, 1989, as reported in Animal Health Beat, University of Nevada, Reno, October, 1989.**

<u>DRUG</u>	<u># INCL</u>	<u>DOSAGE</u>	<u>% EFFECT</u>	<u>ANIMAL</u>
Benadryl	12/13	1 mg/#, B-T	20-25	dog
Temaril	3/13	0.25 mg/#, B	20-50	dog
Chlortrimeton	9/13	0.25-1 mg/#, B-T	20-50	dog/cat
Atarax	13/13	1 mg/#, T	20-50	dog/(cat?)
Seldane	6/13	2-5 mg/#, B	20-30	dog
Periactin	3/13	2/5-8 mg/, B	10-30	dog

**CONTINUING EDUCATION OPPORTUNITIES
VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE
FALL 1990**

<u>Date</u>	<u>Program</u>	<u>Location</u>	<u>Contact Hours</u>
Sept 27	Small Animal Medicine Update	Charlottesville	4
*October 11	Cardiodiagnostics	Charlottesville	6
*Nov 9-10	Gastrointestinal Endoscopy	Blacksburg	9
*Nov 16-17	Orthopedic Surgery/Canine Hindlimb	Blacksburg	10
*Nov 30-Dec 1	Practical Eye/Ear Surgery	Blacksburg	10
*Dec 7-8	Acute Abdomen in the Dog and Cat	Blacksburg	10
*Dec 14-15	The Computer in Veterinary Practice	Blacksburg	10

*Limited enrollment course

NOTE: Program brochures are mailed six-eight weeks prior to the course date. For course information or assistance, please contact:

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**ANNUAL FALL CONFERENCE - BOVINE PRACTITIONERS
OCTOBER 4-5, 1990 - FREDERICK, MD**

The conference begins at 1:00 pm on Thursday, October 4. Agenda topics include: improving dairy herd reproductive performance; dystocia management; milk quality assurance program guidelines; practice tips; a panel discussion on alternative careers for food animal veterinarians. Topics for the October 5 session include: toxicology investigations; management of neonatal diarrhea; management of coliform mastitis; the nutrient value and evaluation of forages.

Registration fees are \$90 for both days and \$50 for one day of the conference. This includes meals at the Sheraton Inn, Frederick, site of the conference.

For more information and registration, contact: Dr. Douglas Carmel, VMRCVM, University of Maryland, College Park, MD 20742. (301) 935-6083.

OCTOBER CONFERENCES - COLLEGE OF VETERINARY MEDICINE

A workshop on bovine and equine reproduction, sponsored by the student AAEP and Food Animal Practice Club, will be held at the College in Blacksburg on Saturday, October 20. This will feature talks on embryo transfer in cattle and horses, and a wet lab using reproductive tracts.

A seminar on practice with nondomestic species will be held on Sunday, October 21 at the College and will feature the veterinarian from the Louisville Zoo. This program is sponsored by the student chapter, AAZV.

MAILING LIST UPDATE

We need your help in our continuing efforts to update our mailing list of veterinarians in Maryland, Virginia and neighboring states. This list provides the labels for mailing Virginia Veterinary Notes and our continuing education program brochures.

Please assist us by making any of the following additions or corrections:

- _____ 1. New addition
- _____ 2. Change of address
- _____ 3. Delete from mailing list

Practice type:

- _____ 1. Small Animal
- _____ 2. Mixed
- _____ 3. Large Animal
- Food Animal _____
- Equine _____

New Address

Old Address

Questions/Comments on newsletter or CE programs

Please mail to:

Virginia Veterinary Notes
VA-MD Regional College of Veterinary Medicine
Blacksburg, VA 24061

Thank you,

Kent Roberts, D.V.M.

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