



# VIRGINIA VETERINARY NOTES

VIRGINIA-MARYLAND REGIONAL COLLEGE OF VETERINARY MEDICINE

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## WHAT'S INSIDE!

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LYME BORRELIOSIS: WHY SHOULD WE BE CONCERNED ..... Page 2

CARRYING RABIES VACCINATION PAPERS IMPORTANT FOR TRAVELING PET OWNERS ..... Page 4

COMPARISON OF KITTENS FED QUEEN'S MILK WITH THOSE FED MILK REPLACERS ..... Page 5

CONTROL OF FELINE INFECTIOUS PERITONITIS IN KITTENS ..... Page 5

POSTOPERATIVE ANALGESIA USING PHENYLBUZAZONE, FLUNIXIN, OR CARPROFEN IN HORSES ..... Page 6

EQUINE DENTISTRY ..... Page 6

BOVINE SPONGIFORM ENCEPHALOPATHY ..... Page 6

CONTINUING EDUCATION OPPORTUNITIES, SPRING 1994 ..... Page 7

HORSE CONFERENCE ..... Page 7

NEW COLLEGE FACULTY MEMBERS ..... Page 7

### THOUGHT FOR THE MONTH

VPI Publications

Education is learning what you didn't even know you didn't know

--Daniel J. Boorstin

Kent C. Roberts, DVM  
Extension Veterinarian



## LYME BORRELIOSIS: WHY SHOULD WE BE CONCERNED

Lyme borreliosis is a multisystemic, spirochetal disease which affects man and other animals. Veterinarians and veterinary technicians are considered at risk for this disease, therefore this paper will discuss both human and animal borreliosis.

**Etiology:** Borreliosis is caused by Borrelia burgdorferi, a spirochete.

**Transmission:** Borreliosis is transmitted primarily by the Ixodes species of ticks (scapularis, pacificus, and in Europe, ricinus). These ticks are commonly known as the deer tick on the East coast and the black legged tick on the west coast. Other insects have been questioned as vectors. There is strong evidence that Amblyomma americanum, the Lone Star tick, is spreading a disease which clinically acts just like Lyme disease. Deer flies may serve as mechanical vectors. There was one study implicating mosquitoes. Spread without the presence of a vector has been shown in animals and urine transmission has been considered by several researchers.

**Biology of B. burgdorferi:** The spirochete grows very slowly, and requires special media for growth. Where the average bacteria divides every 20 minutes, this spirochete divides every 12 hours to 18 days and may have long periods of dormancy. Successful culturing usually requires 4 to 8 weeks of incubation. Incubation periods of 10 to 12 months were shown by one researcher. Culturing may be successful in only 20% of the skin samples (erythema migrans rash) and only 1% of blood, synovial fluid, and cerebral spinal fluid of known Lyme patients. B. burgdorferi sheds DNA containing blebs or plasmids, which may be important in the spread of the organism and/or the pathogenesis.

### **Clinical Signs:**

**Skin lesions:** The erythema migrans rash is best described in the human literature. Classically, the rash starts as a red circle at the site of a tick bite, 2 to 32 days after the bite, and then over several days, expands (migrates) from that spot. Some rashes will develop clearing or, conversely, necrotic centers, other remain uniformly red. Secondary rashes can occur at other areas. EM lesions surrounding a tick bite have been demonstrated in the dog, but usually EM rashes are not observed in animals. The hair coat may hide the rash, or the rash may not be a common occurrence in animals. In man the EM rash may not be present in a significant number of human cases. Other skin lesions of Lyme disease described in man include hives, reddening of the cheeks, red patches, and swelling of the eye lids.

**Arthritis:** The typical presentation of borreliosis in the dog is intermittent lameness which may shift legs. Usually there is no joint swelling, but I have found swelling in the carpus, tarsus, and stifle.

**Neurological symptoms:** These symptoms are due to a low grade meningitis within some cases of encephalitis. The animal is lethargic, and in some cases aggressive, probably due to the pain. By the time the dog is seen by the veterinarian, he may be totally normal, or he may have objective evidence of a sore back and neck. Some of the normal dogs, after a few minutes, will lay down heavily as they run out of energy and seem to have trouble getting up.

**Cardiac findings:** Bradycardia, tachycardia, heart block, and congestive heart failure may also occur. The spirochete can be cultured from the heart consistently in inoculated hamsters. I have found a number of dogs with heart rates over 150 bpm. When I recognized that borreliosis may be the cause, I was successful treating all of new cases with amoxicillin.

**Reproductive symptoms:** In man, reproductive problems have been reported by both sexes. These symptoms range from gonadal pain to infertility, miscarriage, still birth, and congenital infection.



Reproductive problems in dairy farms have been blamed on borreliosis.

Eye: Uveitis, vitreitis, edema of the optic nerve, and chronic conjunctivitis can occur. Poor vision and blindness have been documented in human patients.

Other systems: In the human literature, there are reports of infections involving muscle, vertebrae, liver, kidney, and spleen. Gastrointestinal problems have been associated with this disease. The spirochete has been cultured from intestinal biopsies of human patients with colitis. Symptoms of colitis have resolved with antibiotic treatment.

Diagnostic Tests: Testing for this disease is in its infancy. As with FIP in the cat, serologic tests for borreliosis may have false positives and false negatives. Culturing is generally unrewarding. At this time, response to antibiotics has been my best diagnostic tool in animals.

I currently use Marshfield Medical Center in Marshfield, WI, for testing of dogs and cattle (they also do horses). The cost is \$10 and both an immunofluorescent (IFA) and enzyme immunoassay (EIA) test is run in dogs. Their number is 1-800-782-8581.

Treatment: In dogs, I prefer amoxicillin at 5 to 10 mg/# BID, and occasionally TID for 2 weeks. If the owner wants longer treatment, I comply. I have had 3 geriatric patients on permanent amoxicillin. In these cases, I will also use nystatin to prevent candidiasis. I will try cats on 10 mg/# once a day, but quickly increase to BID or TID if there is no response after a couple of days. Equine veterinarians continue to use the long acting penicillins daily for 21 days or Tribissen® paste when daily injections are unacceptable.

Case histories:

Rocky: 25 pound, cross Pomeranian, 5 year old, male.

Intermittent lameness over 2 months, seen in 4/90. Placed on amoxicillin 200 mg BID and slowly responded. Strongly positive IFA, and EIA titers. Given 4 weeks of amoxicillin, off a week, and retreated another 4 weeks. Subtle lameness continued another 6 months. Titters the following spring showed weakly positive IFA and EIA readings.

Rock: 15 year old male Coonhound.

Seen 9/90 for rapid heart rate, fever. Given 2 weeks of amoxicillin and responded. Seen 4/91 for lethargy and vomiting; BUN and creatinine were very high at this time. Treated with IV fluids and amoxicillin and responded. Lyme titers done then were strongly positive IFA and EIA. Two weeks later he deteriorated and euthanasia was requested. I wish I could have had kidneys to sample, as I suspected glomerulonephritis due to borreliosis. These same owners had another dog die of tachycardia the year before (he had been one of 6 such cases seen in a 3 month period at a time when my practice had fewer than 250 dogs). Their 3 remaining dogs were tested. Two had lab values consistent with the post treatment values of the first case (Rocky), and the third was negative. All three dogs were treated with amocillin and vaccinated with Lyme vaccine. All three became more active following antibiotic treatment. In 1988, these same owners had 2 goats euthanized, one for severe weight loss, with a normal gross necropsy, and the other for severe arthritis with contracted tendons. The owner tested positive and was treated for Lyme as well.

Lucy: 15 year old Basset

History of severe lipemia, syncope, hypothyroid, lethargy, dementia, and eventually paralysis with enlarged spleen and liver. This dog had been on repeated courses of amoxicillin for bad gums and bladder infections. Extensive chemistries and thyroid testing had been done to diagnose and regulate her. When the swollen liver and spleen responded to amoxicillin, I ran a Lyme titer. IFA



was borderline, and EIA was negative, but the dog had been on a considerable amount of antibiotics. We continued treatment and ran another Lyme titer a month later. IFA was then negative, and the EIA also declined. We have no idea as to her initial Lyme titers, but suspect she was infected two years before diagnosis. She has now been on 4 months of continuous amoxicillin (along with nystatin, B vitamins, and acidophilus) and has had no more syncopal episodes, and is active and alert.

Loufi: 8 year old Poodle

Seen 8/89 for tachycardia, stiff muscles, and tremor. Treated with 2 weeks of amoxicillin 100 mg BID and resolved. One week later, same symptoms, and responded within a few days again to amoxicillin, this time given for 4 weeks. Two months later, same thing, resolved on amoxicillin again, given for 3 months. Well one year later.

Annie: 8 year old DSH

Owner reported lethargy of 3 days duration with a fever of 103.5 on the first day. Seen at the emergency clinic the next day with temp of 100.5 and tentative diagnosis of cardiomyopathy. I saw her the day after with a fever of 104.2, generalized pain, cold feet, and stiff muscles as if she had been given ketaset (which she hadn't). Treated with 100 mg amoxicillin BID for 10 days, followed by 100 mg daily for another 20 days and resolved. Another cat seen the same time with same symptoms had 2 engorged deer ticks attached. --Wendy Fenga, DVM, Twin Oaks Animal Hospital Ellicott City, MD.

### **CARRYING RABIES VACCINATION PAPERS IMPORTANT FOR TRAVELING PET OWNERS**

A recent incident in Virginia underlines the importance of advising clients, when traveling with their pets, to carry documentation that the animals have current rabies vaccinations.

Confusion arose when a dog traveling with its family through Virginia bit a resident of that state, and the dog's owners were unable to document that the dog had a current rabies vaccination.

Prompted by the environmental health specialist who investigated the incident, Dr. Suzanne R. Jenkins, assistant state epidemiologist with the Virginia Department of Health, contacted the American Automobile Association (AAA). She suggested that the AAA, a federation of 139 automobile clubs, warn travelers about this potential problem. The pet's rabies tag is not sufficient proof because it does not indicate the time of year the animal was vaccinated or whether a one- or three-year vaccine was used. Bill Hughes, manager of travel support at AAA national headquarters in Heathrow, Florida, said, "On April 2 we sent out a special auto travel announcement asking clubs that, as they serve their members, they tell them if they travel with a pet, they need to carry documentation indicating that the animal's rabies vaccination is current."

The travel advisory asks travel managers to alert their members that epizootics of raccoon rabies in the East, skunk rabies in the Midwest and California, and coyote rabies in southern Texas have resulted in strict enforcement of rabies control ordinances. A pet dog or cat that bites or scratches a person or encounters a wild animal that could have rabies is subject to the laws and regulations of the locality in which the incident took place. Having proof that the animal is vaccinated makes it less likely that authorities will impound their pet and disrupt travel plans.

Dr. Jenkins, who is also a member of the National Association of State Public Health Veterinarians' rabies compendium committee said, "It would certainly cut down on the time and effort that go into management of potential rabies exposures through bites if people had that documentation with them." -- **JAVMA 202(12), June 15, 1993, as reported in Veterinary News, November 1993, Penn State University, University Park, PA.**



## COMPARISON OF KITTENS FED QUEEN'S MILK WITH THOSE FED MILK REPLACERS

Clinicians at Angell Memorial Animal Hospital in Boston, Massachusetts compared 15 two-week-old kittens fed queen's milk and milk replacers. The kittens were randomly assigned to one of three treatment groups for four weeks--queen's milk, commercial kitten milk replacer (CMR), and an experimental milk replacer (EXP).

Kittens fed queen's milk suckled ad libitum, whereas CMR- and EXP-fed kittens were tube-fed every six hours. The kittens were weaned at six weeks of age and were fed a feline growth diet ad libitum for an additional four weeks. They were examined at 2, 4, 6, 8, and 10 weeks of age. Tests included an ophthalmic examination and blood sample collection for complete blood count, serum biochemical and amino acid analyses.

Kittens fed CMR and EXP diets had weight gain greater than that for queen's milk-fed kittens. The kittens fed CMR, however, had diarrhea throughout most of the milk-feeding trial and developed diffuse anterior and posterior lens opacification and vacuolation at the posterior Y-sutures. The lens opacities noticed in the kittens during the milk treatments resolved to a residual perinuclear halo, and a few incipient cortical opacities were observed by the end of the growth diet-feeding program.

The researchers concluded that the EXP diet supported normal growth in 2- to 6-week-old kittens; CMR supported normal kitten growth rate, but resulted in diarrhea and cataract formation; and serum amino acid data indicated that low arginine concentration may have been related to the CMR-induced cataract formation. --Resource: *Amer J Vet Res* 54:901-907, 1993, as reported in *Feline Health Topics for Veterinarians*, Summer 1993, Volume 8, Number 3. Feline Health Center, Cornell University.

## CONTROL OF FELINE INFECTIOUS PERITONITIS IN KITTENS

It appears that kittens in multi-cat homes become infected most commonly from cats other than their mothers. This suggests that transmission of coronavirus to kittens generally takes place horizontally after birth, by adults other than the queen. Seronegative queens in a mixed random adult-mother environment had kittens which became seropositive. As only two were seropositive, it would appear that relatively few queens were excreting virus.

This evidence is from a University of Glasgow veterinary school study which found that 37 percent of kittens that mixed not only with their mothers but with other cats became positive for feline infectious peritonitis (FIP), whereas only 6 percent that were kept only with their mothers became positive. None of the kittens in litters isolated from all other cats including their mothers became seropositive at age 4 to 6 weeks.

Since owners may wish to continue breeding from healthy queens in households where there are seropositive cats, breeders should ensure that any kittens they sell will not infect other cats or later die of FIP themselves. To this end, only seronegative kittens should be sold. It is assumed that seronegative cats are unlikely to be excreting the feline coronavirus of FIP.

The results of the Glasgow study indicate that in these households the queen and her kittens should be kept isolated from all other cats until sold. As coronavirus can be indirectly transmitted, strict hygiene precautions should be observed. Finally, the kittens should be tested at 10 to 12 weeks of age and should be sold only if seronegative. --Abstracted from D.D. Addie and O. Jarrett. *Vet Record* 126 (1990), p. 164, as reported in *Animal Health Beat*, Vol. 8, No. 1, Jan. 1992. University of Nevada, Reno, and *Penn State Veterinary News*, July 1993, as reported in *Veterinary Quarterly Review*, Vol. 9, No. 3, July-September 1993.



## POSTOPERATIVE ANALGESIA USING PHENYLBUTAZONE, FLUNIXIN, OR CARPROFEN IN HORSES

It is not easy to provide effective analgesia in horses after surgery. Analgesic drugs which induce sedation or ataxia must be used with discretion because it is desirable that horses should stand up soon after the completion of surgery. Non-steroidal anti-inflammatory drugs (NSAIDS) have a predominantly peripheral site of action and no noticeable sedation is associated with their use. They have an obvious potential role in the provision of postoperative analgesia and have recently been the subject of a resurgence of interest in medical anesthesia.

Phenylbutazone has been used as an analgesic in horses for about 40 years; other NSAIDS have been developed more recently. Flunixin is licensed as an analgesic for use in horses. Carprofen is a new NSAID that appears to have a mechanism of action other than the inhibition of cyclo-oxygenase. The aim of this study was to compare the efficacy of these three NSAIDS, phenylbutazone, flunixin, and carprofen in the relief of postoperative pain in horses.

Horses undergoing surgery were randomly assigned to one of three groups to receive phenylbutazone at 4 mg/kg (n=72), flunixin at 1 mg/kg (n=68), or carprofen at 0.7 mg/kg (n=63) by slow intravenous injection at the end of surgery, just before they were disconnected from halothane. Pain was assessed by either of two resident surgical clinicians (who did not know which non-steroidal anti-inflammatory drug had been given) when the horses first stood up, 2 and 4 hours later, and the next morning. If repeated doses of analgesic drugs were given the time was recorded and taken as an end point for the study. The presence or absence of side effects was also recorded. In the three groups there was no significant difference between the types of surgery performed, the numbers of horses requiring further analgesia, or the pain scores at any time. In the horses needing further analgesia there was a significant difference in the time after surgery at which the further analgesia was given between those in the flunixin group,  $12.8 \pm 4.3$  hours, and those in the phenylbutazone group,  $8.4 \pm 4.6$  hours; the carprofen group had an intermediate interval of  $11.7 \pm 6.9$  hours. Significantly fewer of the horses that received carprofen during surgery needed further analgesia than of those that did not receive any opioid. -- **Abstracted from Johnson, C. et al., Vet. Rec. 133 (1993) p. 336-338, as reported in Veterinary Medical Extension, November 1993, #396-V747, Iowa State University, Ames, Iowa.**

## EQUINE DENTISTRY

For equine dentistry, this practitioner uses (1000 lb horse), 1.5 ml (150 mg) xylazine, with 0.5 ml Torbugesic (in the same syringe). If necessary for a fractious horse, 0.3 to 0.5 ml of Dormosedan is added to the same syringe and given IV. For equipment, the author prefers using the following: 1) Rusher Mouth Gag; 2) Fischer Floats, they are stainless steel with neoprene handles and are guaranteed for 20 years; 3) Medium (coarseness) tungsten carbide floats; 4) Proctor (curved) Rasp, used to round off the second premolars; 5) Double action molar cutters, protruding molars (except for third molars) can be easily cut (sedation may be required). The above instruments are available from Albert's, 1-800-DENTAL8. --**Oscar G. Swantstrom, The Capsule Report 7(3):4, June 1993, as reported in Veterinary News, November 1993, Penn State University, University Park, PA.**

## BOVINE SPONGIFORM ENCEPHALOPATHY

Since June 4, 1993, Great Britain has had 7,981 newly confirmed cases of bovine spongiform encephalopathy (BSE) with 1,225 more herds affected. About 46.5 percent (up from 44.6 on June 4) of the dairy herd and 10.3 percent (up from 9.5) of the beef suckler herds in Great Britain have been affected. In the last three months, 108 additional confirmed cases of BSE have been reported from Northern Ireland, while the Republic of Ireland and Switzerland have had two and six cases respectively. France has reported the addition of one case since July 31, 1992. --**Dx Monitor, FALL 93.**



**CONTINUING EDUCATION OPPORTUNITIES  
SPRING 1994**

<u>Date</u>	<u>Subject</u>	<u>Location</u>	<u>Contact Hours</u>
+*March 18-19	Clinical Hematology & Transfusion Medicine	Blacksburg	10
+*March 24	Small Animal Medicine Update	Charlottesville	4
*March 25-26	Cardiac Imaging	Blacksburg	10
*March 27	Small Animal Medicine Update	Charleston, WV	4
*April 15-16	Gastrointestinal Endoscopy (Basic)	Blacksburg	10
*April 22-23	Diagnostic Ultrasonography	Blacksburg	10
+*April 29-30	Diagnostic Cytology	Blacksburg	10

\*Limited enrollment course featuring hands-on lab instruction.

+Open to veterinary technicians.

Note: Program brochures are mailed out six-eight weeks prior to the course date. No registrations accepted until brochures go out. For further information, please contact:

Kent Roberts, DVM  
VMRCVM - Virginia Tech  
Blacksburg, VA 24061-0442  
(703) 231-7181

**HORSE CONFERENCE**

The Virginia-Maryland Regional College of Veterinary Medicine is sponsoring a conference for horse owners at the College on the Virginia Tech campus on Saturday, February 5, 1994, 8:00 AM to 4:30 PM. Faculty members from the College's Production Management Medicine section and the Large Animal Medicine and Surgery section will present lectures on first aid for horses. Topics to be covered include wounds, allergic reactions, orthopedic injuries, reproductive and foal emergencies, laminitis, and colic. The cost of registration is \$25. Telephone (703) 231-5999 for more information.

**NEW COLLEGE FACULTY MEMBERS**

Two new equine ambulatory clinicians have recently joined the VMRCVM faculty to add their expertise to the College's Production Management Medicine section.

John J. Dascanio, VMD, Diplomate ACVP. Dr. Dascanio graduated from Penn State University in Animal Bioscience before attending veterinary school at the University of Pennsylvania. He completed an internship and residency in large animal ambulatory medicine at Cornell. Prior to joining the College faculty in July 1993, he was an assistant professor of rural practice at Oregon State University in Corvallis, OR.

Scott M. Austin, DVM, Diplomate ACVIM. A native of Idaho, Dr. Austin received a BS degree in microbiology from Brigham Young University prior to attending veterinary college at Washington State. He worked as an associate veterinarian in a Utah practice before taking a residency in equine medicine at the University of Illinois. Dr. Austin then practiced in equine clinics in Illinois and Nebraska before joining the Blacksburg faculty in May 1993. He has done special work in equine parasitology.

Virginia-Maryland Regional College of Veterinary Medicine Extension Staff:

Dr. J.M. Bowen - Extension Specialist - Equine  
Dr. C.T. Larsen - Extension Specialist - Avians  
Dr. K.C. Roberts - Extension Specialist - Companion Animals  
Dr. W. Dee Whittier - Extension Specialist - Cattle

K.C. Roberts, Editor

Maura M. Wood, Production Manager of VIRGINIA VETERINARY NOTES

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