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COLLEGE OF VETERINARY MEDICINE AND BIOMEDICAL SCIENCES

Veterinary Diagnostic Laboratories
College of Veterinary Medicine and Biomedical Sciences
Fort Collins, CO 80523-1644



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Update from the Director

This issue of LabLines has a new look! In an effort to continually improve our quality service to you, the laboratory is implementing some changes. This newsletter will be formatted for ease of use and the web versions will be more easily searched and individual articles downloaded. You will see a new submission form designed at the request of many of you, and with input from our External Advisory Committee. See inside a listing of members and remember, you can contact any of them (or us!) at any time with suggestions. Also, this January we were quite busy serving the needs of



BARBARA POWERS,
DVM/PHD/DACVP
DIRECTOR

testing for the National Western Stock Show (see excerpt inside from a stock show veterinarian). We have also purchased a new Laboratory Information Management System which will improve our ability to track data, access disease trends, track samples through the laboratory and increase efficiency of result reporting. When we implement the system over the next six months, you will see a new look to your reports that will improve readability. As always, we continually monitor and improve our quality system in accordance with our accreditation by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). In this issue of LabLines, you will find informative arti-

cles on our continued Trichomoniasis problem in Colorado, canine Strongyloides, canine lymphoma and mast cell tumors, uterine cultures in horses, rabies and other news items from our laboratory. We also hope you find useful the insert on how to submit biopsy samples. Progress on our new building is moving rapidly; visit our website under "In The News" to see building updates. Also on our website, you will find our 2007 Annual Report with disease statistics of cases seen at the laboratory. By the time this issue gets distributed, we will have been to the Colorado

Cattlemen's Association meeting and the Colorado Livestock Association meeting. Hope to see you at some of these meetings or at the annual Colorado Veterinary Medical Association meeting in September. We also look forward to another information-packed meeting of the AAVLD in October in Greensboro. We hope your summer and fall are rewarding!

LAB NEWS

Barbara E. Powers

In an effort to continually improve our quality service to you, the laboratory is implementing some new changes.

LAB LINES

Diagnostic news and trends from the Colorado State University Veterinary Diagnostic Laboratories
Volume 13, Number 1 Spring/Summer 2008

CSUVDL Reportable Disease Update

Update on Outbreak of Trichomoniasis in Southeast

Although it appears that we are beginning to bring the situation under control, veterinarians and producers are encouraged to be vigilant and continue testing to work through a major outbreak in *Trichomonas foetus*.

An important pathogen of naturally serviced cows in western states, the flagellate protozoan colonizes the stratified squamous epithelial vaginal surfaces, the uterine mucosa, the penile glans and the proximal portion of the prepuce. Infection during natural mating causes pleocellular inflammation throughout the female reproductive tract, inducing abortion in pregnant cows. The disease causes economic losses in affected herds by reducing the size of the calf crop or by reducing weaning weights when cows abort or fail to conceive within the defined breeding season.

In the State of Colorado, trichomoniasis was established as a reportable disease by 8 CCR-1201-1. Herds diagnosed as positive are placed immediately under quarantine until follow-up testing is completed and an adequate amount of time has passed to ensure that no subclinical infections exist.

In the past seven months, the Rocky Ford Laboratory has helped producers diagnose 185 positive cases of *T. foetus* by PCR (147 of the positives were from Colorado). Additionally, 479 PCR pools representing 1,403 bulls have been tested with 46 positive pools found. The individuals identified in the positive pools have been included in the total number of 185 positive cases.

The Rocky Ford Laboratory also provides culture of the organism when requested and so far, 2,100 samples have been cultured with 13 positive cultures, 12 of which were confirmed as *T. foetus*. The outbreak covers a wide area of Southeast Colorado from the Front Range to the Kansas border and south of US Highway 50 with new cases being found between US 50 and I-70.

In the last 60 days, the number of submissions

— Jim Kennedy, Associate Professor, Director, CSUVDL Rocky Ford

for *T. foetus* testing has declined while the percentage of positives has increased from ~4.1% to ~6.1%. However, if positives from outside Colorado are removed from the count, a decrease in positives to 2.1% can be seen. We are beginning to bring the situation under control, but veterinarians and producers should remain vigilant. ▲

BOVINE



Courtesy U.S. Federal Highway Administration

The outbreak covers a wide area of southeast Colorado from the Front Range to the Kansas border and south of U.S. Highway 50, with new cases being found between U.S. 50 and Interstate 70.

SUBMISSION GUIDELINES FOR SUCCESS

Trichomonas Testing

- ❑ Submit in-pouch or diamonds culture
- ❑ Fee \$25 individual
\$30 per pool of five
- ❑ Questions? Feel free to contact Jim Kennedy, Rocky Ford Lab, (719) 254-6382, James.Kennedy@colostate.edu

3 TIPS TO IMPROVE ECONOMICS OF TRICH TESTING

1 Pool samples. As the number of positives decline, use pooling to screen and monitor herd status.

2 Combine with breeding soundness exams. Bundling a trich monitoring program with other breeding soundness exam services can help expand clinic offerings to the bull buyer or seller.

3 Use trich monitoring to bridge into broader reproductive consulting. Many production losses to the disease are silent because cattle producers may lack reproduction records capable of capturing and analyzing critical data.

CSUVDL Educational Outreach

The Amazing Canine Threadworm

Strongyloides stercoralis

Strongyloides stercoralis, commonly known as the canine threadworm because it is so small (about 2 millimeters in length), is an intestinal nematode of dogs. It's truly an amazing parasite. It has an entirely free-living life cycle in addition to a parasitic life cycle, only parthenogenic females are parasitic, and it is auto-infective. All these variations make this among the most difficult parasites to deal with when clinical cases occur.

COMPLEX LIFE CYCLE

Although the parthenogenic adult females can be found in the large intestine, they tend to favor the



crypts of the small intestine. Females produce eggs

which hatch in the crypts, and the first-stage larvae (L1) pass out in the feces. Two options for the parasite then follow. In both options, the L1 molts to L2, which then molts to L3, all within about 10 hours given favorable environmental conditions. The L3 will be either free-living or parasitic. If free-living, the L3 molts to the L4 and then to adults, all within about 18 hours after leaving the host.

—Lora Ballweber, Associate Professor CSUVDL; and Stacey Elmore, CSUVDL Laboratory Technician

Both males and females are present, although females outnumber the males. After mating, females produce eggs and the L1 hatch, eventually becoming infective, parasitic L3. As infective L3, they penetrate the skin of the dog and migrate through the body, ultimately reaching the small intestine. Here, they molt to L4 and then to the parthenogenic adult female. Eggs are produced and the process continues. However, under certain circumstances, the hatched L1 molt through the L2 to the infective L3 while still within the intestines. These L3 are autoinfective and can lead to chronic infections. They also are responsible for hyperinfections—a condition that develops when autoinfection proceeds at an uncontrolled rate resulting in large numbers of L3s migrating throughout the body. Young age (neonates) and steroid (prednisolone) treatments are both factors that favor autoinfections.

TRANSMISSION AND EXPRESSION

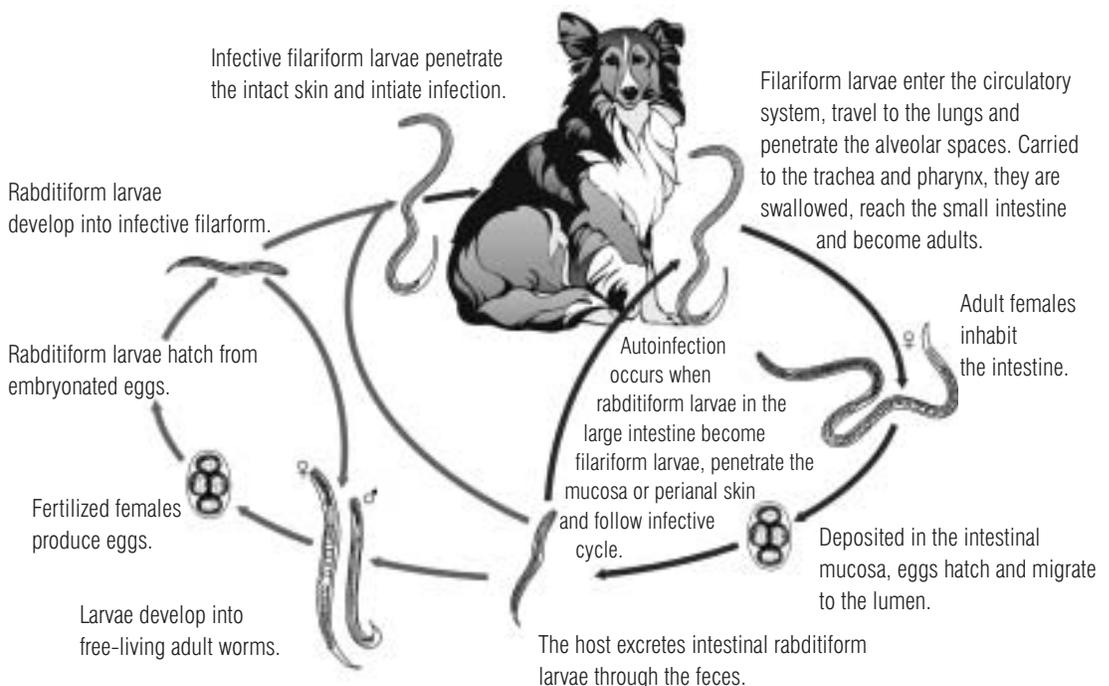
Transplacental transmission never has been documented for this parasite. Transmammary transmission, although quite rare, can occur if an animal has migrat-

HOW TO CONTACT US

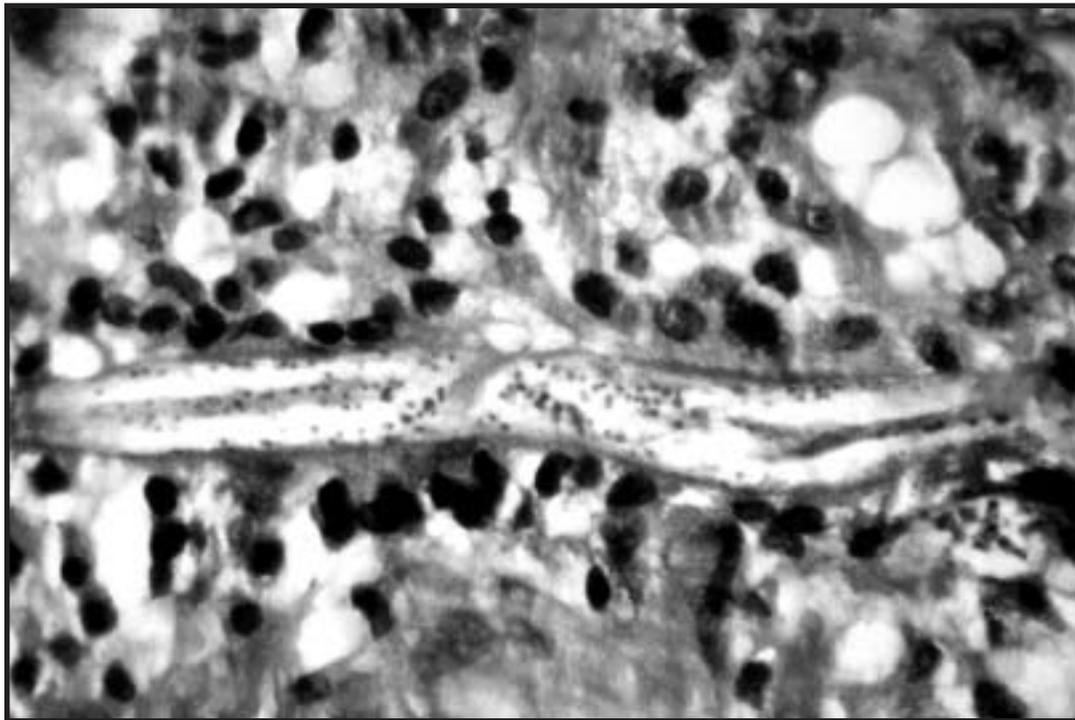
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Adapted from U.S. Centers for Disease Control.



Strongyloides stercoralis parasite embedded in the intestinal MUCOSA. Photo courtesy Dr. Fred Gilbert, U.S. Centers for Disease Control.

ing L3 while nursing. Most infected dogs self-cure and stop shedding larvae after two to three months, but some dogs may shed for a year or more, while others may never shed larvae. In some dogs that have quit shedding larvae, adult females may continue to survive within the intestinal mucosa for several months. Immunosuppression associated with chemotherapy, concurrent disease or pregnancy can reactivate these infections, leading to renewed larval shedding. Mature dogs generally do not become severely infected, and autoinfection is rare. Dogs that self-cure are resistant to reinfection. In young pups, autoinfections are more common, and worm numbers may increase to clinically significant levels, characterized by watery or mucus diarrhea with or without signs of bronchopneumonia.

DETECTION AND TREATMENT CHALLENGES

Detection of *S. stercoralis* depends on finding the L1 in the feces. Fecal flotations using saturated salt solutions are unreliable because the saturated solutions tend to crenate the larvae, making identification difficult. Fecal flotations with zinc sulfate do not crenate the larvae as

quickly. If the preparation is examined promptly, it is possible to identify the larvae before they shrink. The Baermann apparatus is always a good choice for the recovery of identifiable larvae from feces.

Several treatment regimens are available, most requiring multiple doses of anthelmintic. Hyperinfections are particularly difficult to treat because of the lack of efficacy of most anthelmintics against migrating L3. In these cases, daily treatments of up to two weeks may be required. Follow-up fecal exams are a must with all types of infections to confirm that a parasitological cure has occurred. ▲

SUBMISSION GUIDELINES FOR SUCCESS

Fecal Float

Submit fresh feces

Fee \$17

Baerman Test

Submit 10 grams feces

Fee \$14

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New Submission Form

To meet requests from clients for an expanded test menu, we have updated our sample submission forms for the Diagnostic Laboratory. New features include:

- An expanded, two-page form, with the submission information on the first page and a list of tests available on the second page.
- The two-page form has allowed us to list more of our available tests; however, clients should consult the Diagnostic Laboratories User Guide for a complete list, as well as guidance on proper sample submission.
- We also have added a “Multiple Animal Submission” form to be used as a continuation of the “General Sample Submission Form” for clients submitting samples from more than three animals. While the Clinical Pathology, Clinical Immunology and Necropsy sections are listed on the second page of the “General Samples Submission Form,” users will note that these sections require the use of a separate submission form.

For questions about the new form please contact the main office at (970) 297-1281. ▲

The image displays two overlapping forms from Colorado State University. The top form is titled 'MULTIPLE ANIMAL SUBMISSION FORM' and includes a note: 'NOTE: This is a continuation of the General Sample Submission Form - Please fill out the General Sample Submission Form completely and legibly.' The bottom form is titled 'GENERAL SAMPLE SUBMISSION FORM' and includes a note: 'NOTE: This is a Single Form - Please fill out completely and legibly.' Both forms have sections for 'Client Information', 'Animal Information', and a table for 'Test Selection'.



NEW PARASITOLOGY TEST

We now offer our *Neospora caninum* immunofluorescence assay serology for canine in-house, rather than as a send-out. Cost is \$28. Samples are screened at 1:50, the positive cut-off value for the test. Serum samples should be separated from the clot and shipped on ice to reach the laboratory the next day. Results are reported out one to three days after receipt.

E-services and other technology

Four Steps to Automate and Speed your Coggins Test Results

The Fort Collins and Rocky Ford laboratories now are approved to receive submissions of Equine Infectious Anemia (Coggins) test forms and report the results back to veterinarians electronically. Follow these four steps to begin submitting samples electronically:

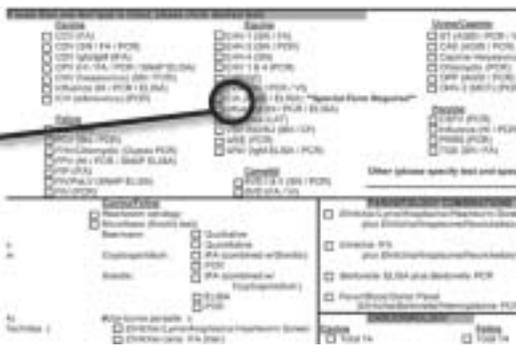
—Hana Van Campen, CSUVDL Associate Professor

1 Obtain level 1 e-authentication by applying for a user ID and a password at: <https://vsps.aphis.usda.gov/vsps/>

2 After you have received approval for your user ID and password, then you may submit test requests through the following Web site: <https://vsps.aphis.usda.gov/vsps/public/Login.do>. Through this Web site, you can set up your name and address, a list of animals with owner addresses, and digital photos of the animals if desired. The electronic eEIA form is filled out automatically and sent electronically to us by selecting “Veterinary Teaching Hospital - Ft. Collins” toward the bottom of the pull-down list of laboratories.

3 Serum samples should be sent to us as you usually do with a regular accession form indicating that you are requesting the EIA AGID or ELISA and that you submitted the electronic form. This information will alert the technicians to look for your form on the Web site. You will receive the results electronically through the VSPS Web site.

4 If you require a copy of the form with the technician’s signature, please indicate that on the accession form. The technician will print and sign the official form and the signed form will be faxed to you. Both the e-authentication Web site and the VSPS Web site have “help desk” links, if you have any problems. If you get completely lost, please call Hana Van Campen at (970) 297-1287 and she will be happy to help you or find someone who can.



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Our External Advisory Committee members volunteer their time to meet with us annually and assess our progress, as well as provide input to our future directions. We are grateful for their time and advice, and hope they feel they are an integral part of the laboratory.

SUBMISSION GUIDELINES FOR SUCCESS

EIA testing

Submit 1ml serum

Fees

AGID \$8

ELISA \$13

Colorado Bacteriology Update

Equine Uterine Culture Observations for 2007

Data on all equine uterine cultures submitted in 2007 were collected from the CSUVDL database. A total of 345 samples were submitted for uterine culture and, of those, 95 had no microorganism isolated.



Of the 250 that had microorganisms isolated, 120 were found in pure culture of one microorganism and 130 had multiple organisms isolated. Data were sorted to account for multiple samples from a single animal and only those data from the first isolation were included in the following summary.

The most common bacteria isolated from equine uterine samples, either alone or in combination with other bacteria, were *E. coli* (n=96 isolates) and —hemolytic *Streptococcus* sp. (n=76). Because *E. coli* was the most common bacterial type, susceptibility testing data were summarized for *E. coli* (Table 1 below). Although less commonly isolated, *Klebsiella* (n=6) and *Pseudomonas* (n=13) historically have had more issues with antimicrobial resistance. Data also were summarized for these isolates.

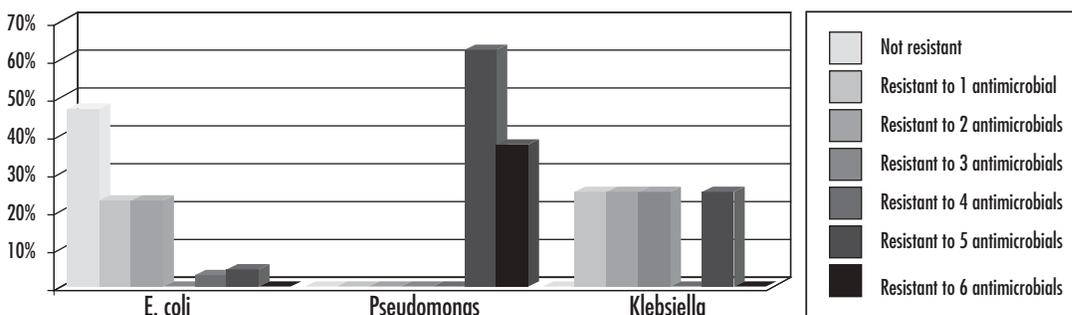
When *E. coli* was resistant to one or more antimicrobial drugs, the most common resistance was reported to trimethoprim-sulfamethoxazole. For those *E. coli* isolates that were resistant to two antimicrobials, the drugs were a combination of enrofloxacin, trimethoprim-sulfamethoxazole, cephalothin, ampicillin, ticarcillin and/or tetracycline. When the *E. coli* isolates were resistant to four or more antimicrobials, the drugs that isolates were resis-

tant to were ampicillin, gentamicin, trimethoprim-sulfamethoxazole, and ticarcillin. For *Klebsiella* sp. isolates, there was not one drug resistance that was common for all four isolates. For *Pseudomonas*, all isolates were resistant to ampicillin, ceftiofur, cephalothin, and all but two were resistant to trimethoprim-sulfamethoxazole. No isolates of any of these three organisms were resistant to more than six antimicrobials (although 12 are routinely tested).

RESISTANCE PROFILES

When interpreting the significance of bacterial isolates from uterine samples, it is important to consider the amount of growth as well as the cytology or uterine biopsy results in determining eventual treatment or management of the mare. In our laboratory, results from culture are given semi-quantitatively (slight growth or growth only in broth enrichment=1, moderate growth=2 and heavy growth=3). Whenever possible, an antimicrobial susceptibility test should be performed to optimize judicious antimicrobial drug use and optimize response to treatment. ▲

Table 1: Antimicrobial resistance reported from *E. coli*, *Klebsiella* and *Pseudomonas* isolates from equine uterine samples during two time periods in 2007.



—Beverly Jackson, Veterinary Student; Doreene Hyatt, CSUVDL Associate Professor; and Josie Traub-Dargatz, Clinical Sciences Professor



ABOUT THE INSERT

This issue of *LabLines* contains a smaller sized version of the popular poster “How To and How Not To Submit a Biopsy,” presented at the 2007 CVMA Annual Convention. It will additionally be available on-line as a power point presentation at www.dlab.colostate.edu (link “How to Submit a Biopsy”) for easy access whenever desired. If you have questions regarding this information or if you have questions regarding other aspects of biopsy submission, please do not hesitate to contact us.



Two New Diplomates

Drs. Kristy Pabilonia and Andrea Torres passed the board certification examination for the American College of Veterinary Microbiologists.

Dr. Pabilonia has worked at Colorado State University since 2004 as coordinator of the Colorado Avian Disease Surveillance Program. Now an assistant professor in the CUSVDL and the Department of Microbiology, Immunology and Pathology, she received her bachelor's degree from the University of Colorado in 1996, and her DVM and master's in microbiology from Colorado State University. She is a member of the American Veterinary Medical Association, American Association of Veterinary Laboratory Diagnosticians, and the American Society for Microbiology – Rocky Mountain Branch.

Dr. Torres received her DVM from Colorado State University in 1998. After time in private practice, she returned to Colorado State University where she completed her residency in Microbiology at the Colorado State University Veterinary Diagnostic Laboratory and obtained her PhD in 2007. Her thesis work examined the pathogenesis of feline leukemia virus. She passed the certification examination for the American College of Veterinary Microbiologists with a subspecialty in virology in 2007. ▲

Get to Know the Laboratory

Dr. Debra Kamstock, Anatomic Pathologist

Dr. Debra Kamstock has been an Anatomic Pathologist with the Diagnostic Laboratory since September 2005; however, we are pleased to announce her acceptance of a tenure-track Assistant Professor Faculty position which began in January.

Dr. Kamstock pursued her undergraduate training in animal science at the University of Florida in Gainesville, which is also where she earned her Doctorate of Veterinary Medicine in 1996. (Go Gators!) Following her veterinary training, Dr. Kamstock pursued a one year internship in small animal medicine and surgery at Rowley Memorial Animal Hospital in Springfield, Mass., and then returned to south Florida as an associate veterinarian in private small animal practice. During her sophomore year of veterinary school, Dr. Kamstock realized her passion for pathology, interest in oncology, and desire to pursue cancer research.

In July 1999 she left the sunshine state for Ram Country, where she began the combined anatomic pathology residency/PhD program at CSU. Dr. Kamstock obtained her board certification in anatomic pathology in 2004 and completed her PhD degree, which focused on tumor angiogenesis and immunology, in 2007.

Dr. Kamstock maintains a strong passion for understanding pathogenesis of disease with an interest in diagnostic investigation, oncological pathology and immunohisto-

chemistry and additionally maintains her interest in cancer research. She currently collaborates with the CSU Animal Cancer Center on multiple projects, provides diagnostic service predominantly via surgical biopsy evaluation and diagnosis to the CSU VTH and veterinary community, and appreciates academia for its opportunities to assist in the



advancement of pathology training and veterinary education through instruction of pathology residents and veterinary students, respectively. She enjoys speaking to and working with clients on her cases, so please feel free to call her when questions arise. Welcome Dr. Kamstock! ▲

Guardians of Public Health

Rabies in Cattle Often Leads to Human Exposure

Rabies is a fatal zoonotic disease with serious public health risks. The disease is an acute progressive viral encephalitis that all mammals are susceptible to and is maintained within wild mammal populations. Pet owners are widely aware of the threat of rabies because of educational programs and vaccination regulations. People who handle cattle often do not recognize the potential risk that cattle pose. Cattle and horses can be infected with rabies and place animal handlers at considerable risk of exposure. Since 2000, only cats have exceeded cattle in the incidence of rabies cases among U.S. domestic animals. Human exposure to rabies via infected cattle occurs commonly and poses serious consequences.

—Roger W. Ellis, *Extension Veterinarian*



SYMPTOMS NOT ALWAYS PREDICTIVE

Cattle most frequently become infected with rabies through contact with or bite wounds from wild animals. Raccoons, skunks, coyotes, foxes and bats are the most common wild animal sources and are well adapted to areas where cattle are raised. The incubation period from viral exposure to the development of symptoms is highly variable, ranging from three weeks to three months with isolated case reports of up to six months. Generally, the knowledge of past wild animal exposure or bite wounds is unknown.

Symptoms of rabies in cattle vary considerably and often are confused with other veterinary conditions. Initial signs may be quite mild and include depression, not eating or drinking, isolation, and lameness. Often, only changes in normal behavior are the early

signs. As the disease progresses, other findings may



include: the inability to swallow which may cause slobbering (excessive salivation); head drooping; difficulty in walking or standing; and signs of pain. Unprovoked and repeated bellowing often is recognized, and repeated straining to urinate or defecate is common. Some, however not all, infected cattle will become severely aggressive and will attack people, other cattle or animals, inanimate objects, and pose a serious risk of injury to all. Progression to full paralysis generally occurs and most affected animals die within one week from the time signs are first detected.

Vague signs and failure to consider rabies as a potential diagnosis creates the potential for cattle handlers, veterinarians and others to come into contact with this important pathogen during the normal course of cattle handling.

Due to the vagueness of signs and lack of consideration of rabies as a potential diagnosis, cattle handlers, veterinarians and other people in contact can be exposed to the virus. During the active course of the disease, the virus is excreted at high levels in saliva. Often the symptoms of slobbering and difficulty swallowing dispose people to attempt to examine the mouth, which affords contact with virus-laden saliva and possible bite wounds. The virus may be introduced into bite wounds, open skin wounds, or on to mucous membranes of the mouth and eyes.

ALWAYS PRUDENTLY SUSPECT

Rabies infection should be considered in all cattle with abnormal behavior or neurological signs that cannot be clearly diagnosed. All suspicious cases should be examined by a veterinarian to differentiate the disease risks and to propose further recommendations. Cattle that die under similar suspicious conditions should be sent for necropsy or the brain collected for submission to us for testing. Public health officials should be contacted and medical advice received for all exposed humans. The carcass should be disposed of in a manner that prevents further animal or human contact. Consideration should be given to other animals, especially pets, that also may have been exposed. If herd expo-

sure is significant, state regulatory veterinarians should determine the public and animal health ramifications and determine the course of action.

PREVENTION REMAINS DIFFICULT

Prevention of rabies is not an easy task due to the unpredictable nature of exposure to wild animals with rabies. Vaccines approved for use in cattle, sheep and horses are available and should be seriously considered for high-risk exposures or high-value animals. Due to costs of the rabies vaccine and relatively low incidence rates, vaccination is not routinely used in most cattle herds. Wildlife control should be a concern for all cattle operations, particularly in areas with increased reports of wild or domestic animals testing positive for rabies.

Although rabies occurs at low incidence rates in cattle, the threat is present due to maintenance of the viral infection in wild animals. The most serious threat is the exposure of humans to rabid cattle due to a lack of awareness and difficulty in correct diagnosis prior to

handling and treatment attempts. If rabies is suspected, a veterinarian should be contacted and samples submitted for diagnostic testing. A little extra precaution is warranted due to the fatal outcome of rabies in all animals. Prevention of human exposure is paramount.

FOR MORE INFORMATION

Further information can be obtained through:

- Colorado Department of Public Health and Environment
- Colorado Department of Agriculture - Animal Industry Division
- Colorado State University College of Veterinary Medicine and Biomedical Sciences
- Colorado State University Veterinary Diagnostic Laboratory
- Colorado Veterinary Medical Association. ▲



RABIES SURVEILLANCE IN SKUNKS

We are assisting the Colorado Department of Public Health and Environment in its new surveillance program by performing rabies tests in skunks. In the last two years, we have seen a number of skunks testing positive for rabies, which we had not seen for many years previously. In April and May, we detected three positive cases of rabies in skunks in southern and eastern Colorado.

Please visit: www.dlab.colostate.edu (link "2008 Skunk Surveillance Info") for further information about how you can help. The test costs are covered by CDPHE.



WORKSHOP ON AVIAN INFLUENZA DIAGNOSTIC TESTING IN TURKEY

Dr. Kristy Pabilonia (first row standing, second from left) and Christina Gerhard (second row standing, fourth from left) recently returned from serving as instructors for a USDA collaborative workshop on avian influenza diagnostic testing methods in Turkey. A series of lectures, discussions and hands-on laboratories covered a variety of topics including building and working in a Biosafety Level 3 laboratory, agar gel-

immunodiffusion, hemagglutination and hemagglutination-inhibition, virus isolation in embryonated eggs, real-time PCR and sequencing. Two week-long courses were conducted, the first at the Etlik Central Veterinary Control and Research Institute in Ankara, and the second at the Bornova Veterinary Control and Research Institute in Izmir. Dr. Pabilonia also served as an instructor at four USDA avian influenza epidemiology training courses and a national workshop in Indonesia.

CSUVDL In Press

Prognostic and Comparative Analysis of Survivin Expression

Survivin, a member of the inhibitor of apoptosis family of proteins, plays a critical role in cell proliferation and resistance to apoptosis. Expression of survivin is an independent poor prognostic parameter in several human cancers including diffuse-large B-cell lymphoma. The purpose of this investigation was to:

- 1) Determine expression of survivin in canine lymphoma patients,
- 2) Assess whether survivin expression may serve as a prognostic factor, and
- 3) Determine if survivin expression is unregulated in relapsed canine lymphoma.

Immunohistochemical analyses were performed on patient-matched naïve (N=31) and relapsed (N=16) samples from canine lymphoma patients treated identically with an abbreviated CHOP-based chemotherapy protocol. Survivin expression was determined using a semi-quantitative scoring method incorporating percent of cells staining positive, intensity of staining, and the product of the two scores for each sample.

Survivin was expressed in 29 of 31 (~94%) biopsies

—Robert B. Rebhun, Postdoctoral Fellow; Susan E. Lana, Associate Professor; Eugene J. Ehrhart, Associate Professor; Joseph B. Charles, Research Associate; and Douglas H. Thamm, Assistant Professor

pre-treatment, and 14 of 16 (~88%) biopsies obtained at relapse. In the absence of known concurrent negative prognostic factors, dogs with B-cell lymphoma that had high survivin immunoreactivity scores experienced a significantly ($P < 0.01$) shorter median disease free interval than did dogs with low survivin immunoreactivity scores (171 days vs. 321 days respectively).

Conclusions: Survivin is expressed in the majority of canine lymphomas. Furthermore, high expression of survivin is a negative prognostic factor in dogs with B-cell lymphoma. There was no significant difference in the expression of survivin in patient matched naïve and relapsed canine lymphomas. ▲



Investigation of the Outcomes of Mast Cell Tumors in Dogs

Mast cell tumors are among the most common lesions submitted to the Diagnostic Laboratory. These tumors are graded one, two, or three based on specific histologic criteria. Unfortunately, there are gaps in our understanding of the behavior of these tumors.

Currently, a group of people in the Diagnostic Laboratory and Veterinary Teaching Hospital is investigating the relationship of histologic features of mast cell tumors with the outcomes of the patients. In order to do this study, some clients of the Diagnostic Laboratory were contacted about the outcomes of patients that had had mast cell tumors completely removed more than two years earlier.

Of the 98 dogs for which follow up information was provided, two had local recurrence of the disease, one had metastatic disease, and the others had no further problems caused by the tumor that was

—David W. Gardiner, CSUVDL Veterinary Resident; Patricia C. Schultheiss, CSUVDL Assistant Professor; and Joanne L. Tuohy, Doctor of Veterinary Medicine Student

removed. Some dogs did develop additional mast cell tumors that needed removal.

We are in the midst of analyzing the data from these cases. We are very grateful to the veterinarians who provided the information about the clinical outcomes of these cases. ▲



SUBMISSION GUIDELINES FOR SUCCESS

Biopsy/Histopathology

- Submit mass in 10% neutral buffered formalin
- Fee=\$37

Enteric Virus-Specific Test Options

Due to the high cost of maintaining the electron microscope and its elderly condition, we are eliminating EM on negative stained fecal preparations as a means to test for enteric viruses. Instead of choosing the fecal virus scan, you now can choose virus specific tests as outlined below.

SPECIES	TEST	VIRUS DETECTED	SPECIMEN	FEE/\$
Bovine	Rota latex agglutination	Rotavirus	Feces	\$17.50
	Bovine coronavirus FA	Bovine coronaviruses	Fresh small intestine or intestinal impression smears	\$5.00
Canine	Canine parvovirus "SNAP" test	Canine parvovirus-2	Feces, fresh small intestine	\$25.00
	Canine coronavirus FA	Canine coronaviruses	Fresh small intestine or intestinal impression smears	\$5.00
Equine	Rota latex agglutination	Rotavirus	Feces	\$21.00
Feline	Feline parvovirus (panleukopenia)	Feline parvovirus /panleukopenia	Feces, fresh small intestine	\$25.00

'Dear CSUVDL...'

From a Stock Show Veterinarian

A potential precedent for major livestock shows across the United States was set by Denver's National Western Stock Show when it instituted a new regulation for the 2008 show requiring all cattle, bison, yaks and camelids be tested negative for Bovine Virus Diarrhea-Persistently Infected (BVD-PI) status prior to entry onto the show grounds. The implications of this requirement with respect to its reception by exhibitors and how it might affect their participation in the show was a concern of the NWSS management, but that concern proved to be without merit. There was very minimal objection to the rule on the part of participants whereas the benefit of it to all parties concerned was realized. Given the manner in which animals are brought together and then distributed across the United

States, Canada and Mexico, the rule proved to be quite well received.

As with any regulation, new or old, there was the expected breach of the rule: Even though NWSS made special effort to see that the new information was made available to everyone well before the show through a number of media sources, a significant number of animals arrived at the check-in point without proof of valid testing for BVD-PI status. As the veterinarian for the yard portion, I would like to make known the fact that the clinical staff at the veterinary teaching hospital was more than helpful with the sampling of animals.

Of equal if not more importance to me was the helpfulness and service provided by the Diagnostic Laboratory at CSU. It is my opinion that the service provided by the lab went beyond what a clinician or client should normally expect, given the constraints of test protocols and working hours. The service I experienced as the NWSS yard veterinarian made me aware that the staff at CSU Diagnostic Laboratory are not just locked into working hours, but there is a clinical awareness and sense of practicality that require service to be stepped up on occasion. That happened in this instance. ▲

PARASITOLOGY UPDATE

In response to requests for bundling of tests, we now offer the Fecal Parasite Exam. The cost of this screen, which includes a centrifugal fecal flotation, direct smear and IFA for the detection of *Cryptosporidium* and *Giardia*, is \$40—priced less than the total cost of each procedure when ordered separately.

To run all tests, 6 to 8 grams of feces are needed. Submit samples in sealed containers. If samples are to be shipped, be sure to ship on ice. For questions, please contact Dr. Lora Ballweber at (970) 297-5416.

