



UC DAVIS
VETERINARY MEDICINE
California Animal Health and
Food Safety Laboratory System

CAHFS CONNECTION

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Inside this issue:

Bovine - Nitrate toxicosis

Camelids - Diaphragmatic paralysis

Equine - Co-infection with *C. perfringens* type C and *C. difficile*

Other Avian - Proventricular Dilatation Disease (PDD)

Poultry - Fowl cholera

Small Ruminants - Enterotoxemia by *Clostridium perfringens* type D

Toxicology - Big Machines & Tiny Masses

Bovine

Approximately 15 beef cattle of multiple ages were found dead on a 500-acre ranch. Cattle were fine 12 hours previously. Cattle had been on a field of wheat grass stubble the previous three weeks. Four adult animals and one fetus were necropsied and all had high levels of nitrates in the eyeball fluid compatible with **nitrate toxicosis**. Wheat stubble and water from the trough were tested. The water trough had a toxic level of nitrate, but the stubble's level of nitrate was considered to be non-toxic.

Camelids

A 6-month-old alpaca cria, with a history of 24-hour respiratory distress before death, was presented for post-mortem examination and diagnostic work-up. **Enterotoxemia by *Clostridium perfringens* type D** infection is a frequent cause of death in sheep and goats. Sudden death, neurologic or respiratory signs in sheep and goats and diarrhea in goats may be seen. **Diaphragmatic paralysis** was suspected clinically. Diagnosis was confirmed based on the presence of degenerative lesions in diaphragm and both phrenic nerves. Extensive toxicological testing, including heavy metals screen, vitamin E, organophosphorus insecticides, tin, and GC-MS screen, were unremarkable. The lesions in the diaphragm were characteristic of denervation atrophy, which suggests that the degenerative lesions in both phrenic nerves were the primary event that led to diaphragmatic degeneration and paralysis. Diaphragmatic paralysis associated with neuropathy of phrenic nerves has previously been described in several animal species, including a llama, several alpacas, a dog and a horse. The etiology remains undetermined. The postmortem diagnosis of diaphragmatic paralysis associated with phrenic nerve neuropathy can be challenging and it will be missed unless samples of phrenic nerves and diaphragm are examined histologically.

Equine

Six foals, between 1-day and 1-week-old were submitted over the past three years to CAHFS for post-mortem examination and diagnostic work up. All had clinical histories of colic and diarrhea, followed by acute death. None of these animals had received antimicrobials. Postmortem examination revealed hemorrhagic and necrotizing **enter-typhlo-colitis**. A diagnosis of **co-infection with *C. perfringens* type C and *C. difficile*** was made based on detection of beta toxin of *C. perfringens* and *C. difficile* toxins A/B in intestinal content of these animals, by ELISA.

Clostridium perfringens type C is one of the most important agents of enteritis in newborn foals. *C. difficile* is now recognized as an important cause of enterocolitis in horses of all ages; the most important predisposing factor being antibiotic treatment (almost every antibiotic can predispose to enterocolitis by *C. difficile*). While infections by *C. perfringens* type C or *C. difficile* are frequently seen in foals, diagnosis of concurrent infection by these two agents had not been made previously.

These cases suggest a possible synergism of *C. perfringens* type C and *C. difficile* in foal enterocolitis. Because none of the foals had received antibiotic therapy, the predisposing factor for the *C. difficile* infection remains undetermined; it is possible that the *C. perfringens* infection acted as a predisposing factor for *C. difficile* or vice versa. This report also stresses the need to perform a complete diagnostic work-up in all cases of foal digestive disease even when a causative agent has already been identified.

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Other Avian

Proventricular Dilatation Disease (PDD) is one of the most common and fatal diseases of psittacines. Clinical signs of PDD include anorexia, regurgitation, passing of undigested seeds in the feces, diarrhea, lethargy, loss of weight and neurological signs as well as sudden death. PDD is characterized by dilatation of the proventriculus in most cases, with associated microscopic changes such as ganglioneuritis in the gastrointestinal tract and in several other organs. The cause of PDD was discovered in 2008 and was named Avian Bornavirus (ABV). PDD can be diagnosed in birds based on clinical signs and radiography, histopathology of crop biopsy and necropsy and histopathology of the gastrointestinal tract, brain and adrenal glands.

Poultry

Fowl cholera (FC) is a highly infectious and contagious disease caused by the bacteria *Pasteurella multocida*. FC outbreaks are most common in late summer, fall and winter. Probably all species of birds are susceptible. Water fowl and particularly turkeys are very susceptible. Layers are more susceptible as they become sexually mature. In turkeys, FC usually causes severe pneumonia associated with lung consolidation. FC in layers may present as an acute septicemia with high morbidity and mortality, or in a chronic form with localized infections in the wattles, sinuses, and joints. In acute FC the only clinical sign may be sudden death. FC is diagnosed by isolation and identification of *Pasteurella multocida*. Serotyping and DNA analysis (fingerprinting) provide useful information on the strain of *P. multocida* involved in a particular outbreak in order to select the most appropriate bacterins and vaccines to control the disease, as well as for epidemiological studies.

Small Ruminants

Enterotoxemia by *Clostridium perfringens* type D infection is a frequent cause of death in sheep and goats. The disease is often associated with a sudden diet change to a feed rich in highly fermentable carbohydrates (hence the name "overeating disease"). The final confirmation of the diagnosis in both sheep and goats should be based on detection of epsilon toxin in intestinal contents by ELISA and/or histopathology of the brain since approximately 95% of sheep (and only a handful of goats) with enterotoxemia develop characteristic perivascular edema in the brain, a lesion which is pathognomonic of the disease. Click [here](#) for more information.

Big Machines and Tiny Masses

The CAHFS Davis Toxicology laboratory performs testing using big machines. The field of chemistry we occupy is called Analytical Toxicology. Over the past 30 years, this field has changed dramatically as analytical techniques have advanced from colorimetric tests (like litmus paper) to very sophisticated electronic analyzers. CAHFS Toxicology is fortunate to have some of the newest and most sophisticated of these instruments. Our newest machine is called an Exactive High Resolution Mass Spectrometer. This instrument allows us to detect and identify chemicals based on their mass, and to do it very precisely. This capability helps to quickly and accurately identify toxicants. For example, this equipment recently was utilized to quickly identify the **carbamate insecticides** methomyl and carbofuran in separate cases involving **a group of dogs and a bald eagle**, respectively, and the **organophosphorus insecticide**, coumaphos, which was involved in the **poisoning of backyard chickens**.



Mike Filigenzi working at the Exactive High Resolution Mass Spectrometer. (photo by Don Preisler)