



COVID-19 pandemic and animal testing

As we all deal with the ongoing COVID-19 pandemic, recent cases of a few domestic and exotic animals testing positive for the SARS-CoV-2 virus by polymerase chain reaction have surfaced. These results were confirmed by testing at the U.S. Department of Agriculture's (USDA) National Veterinary Services Laboratories (NVSL), the United States' official international reference laboratory. These are the first pets in the United States to test positive for SARS-CoV-2.

The domestic animals were tested as part of state health department investigations into human cases. SARS-CoV-2 infections have been reported in very few animals worldwide, mostly in those that had close contact with a person with COVID-19.

At this time, routine testing of animals is not recommended by the CDC or the AVMA. Should other animals be confirmed positive for SARS-CoV-2 in the United States, USDA will post the findings [here](#).

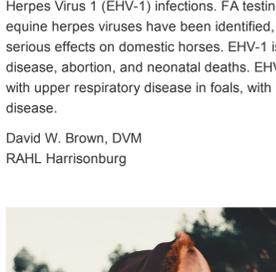
Neither the VDACS Animal Health Laboratory system nor the Virginia Tech Animal Laboratory Services is conducting COVID-19 testing on animal samples. There are National Animal Health Laboratory Network (NAHLN) laboratories across the country that are or will be testing for COVID in animals. All requests for official COVID animal testing should be directed to both the State Veterinarian's Office in Richmond (804-692-0601) and the Virginia Department of Health. State animal health and public health officials will take the lead in making determinations about whether animals should be tested for SARS-CoV-2.

As you know, the situation is extremely fluid. Any questions can be directed to personnel in either of our lab systems.

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Equine

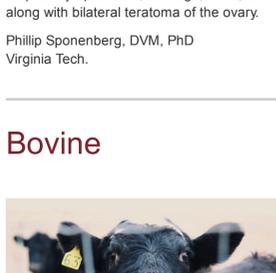


EHV in stillborn foal

A stillborn thoroughbred foal was presented to the HRAHL on March 27, 2020. The foal appeared full term. At postmortem, the spleen and liver were markedly enlarged, and the lungs were dark red and not inflated. Histopathology of lung tissue revealed extensive areas of necrosis, hemorrhages, abundant alveolar fibrin, and numerous viable and degenerate neutrophils and macrophages.

Bronchioles had segmental desquamation of the epithelium, with fibrin and extensive hemorrhages. Remaining epithelial cells displayed intranuclear eosinophilic inclusion bodies with occasional syncytial cells containing intranuclear inclusions within the lumen of airways and alveoli. In the thymus, epithelial cells often displayed one intranuclear inclusion body and were occasionally arranged in syncytia. Histopathologic findings were compatible with Equine Herpes Virus 1 (EHV-1) infections. FA testing of the liver and lung was positive for EHV. Nine equine herpes viruses have been identified, with EHV-1, EHV-3 and EHV-4 having the most serious effects on domestic horses. EHV-1 is associated with neurologic and respiratory disease, abortion, and neonatal deaths. EHV-3 is associated with venereal disease, and EHV-4 with upper respiratory disease in foals, with rare complications of abortion and neurologic disease.

David W. Brown, DVM
RAHL Harrisonburg



Asthma and ovarian teratoma in a mare

An aged Rocky Mountain horse mare was presented for euthanasia due to prolonged respiratory compromise consistent with chronic asthma. At necropsy, the lungs had scattered, firm fibrotic regions, mostly in the periphery of the lung lobes. In addition, the ovaries were both enlarged and had variable textures, from cystic to hard. Some of the cysts contained hair and also tissue consistent with hoof wall. The histologic findings on the lung were peribronchiolar infiltration with plasma cells and lymphocytes, with airways filled with mucus. Large areas were fibrotic, and in some of these, there were lakes of mucus. The ovaries had variable tissue types, including skin,

respiratory epithelium, cartilage, bone, and nerve. A diagnosis of chronic asthma was made, along with bilateral teratoma of the ovary.

Phillip Sponenberg, DVM, PhD
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Bovine



Yersiniosis in two cows

Yersinia enterocolitica was the cause of death in two adult beef cows. The farm had a recent outbreak of diarrhea in many of the adult animals, and there were 20 mortalities. Affected cows would develop "gray scours," anorexia, and lethargy. There was no response to penicillin therapy. Two cows presented for necropsy had fluid gray/green intestinal contents. Histopathology of the bowel revealed

severe luminal necrosis/autolysis with rod-shaped bacteria lining the remains of the villi and throughout the mucosa. Yersinia pseudotuberculosis was cultured from the livers and mesenteric lymph nodes of both cows. Salmonella cultures were negative. Yersinia organisms (Yersinia enterocolitica, Yersinia pseudotuberculosis) have been associated with severe enteric disease in beef cattle, particularly young animals. Most isolates are sensitive to the tetracyclines.

Christopher D. Halsey, DVM
RAHL Wytheville



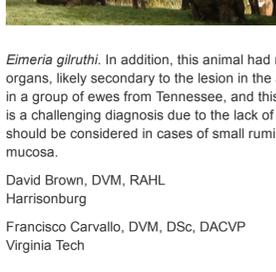
Rabies in a calf

A 37-day-old Angus calf with history of colic, hypothermia, lateral recumbency, bloody scours, and nystagmus was submitted for necropsy. At necropsy, the most significant findings were suppurative bronchopneumonia and ulcerative abomasitis. No bacteria were isolated from the liver, and salmonella testing was negative in the small intestine. Histopathology revealed lymphoplasmacytic encephalitis with glial nodules and multiple eosinophilic inclusion bodies, highly suggestive of rabies. Fragments of the brain were submitted for rabies immunohistochemistry, which were positive. In this case, clinical signs and gross findings pointed to a multisystemic infection, presumptively associated with septicemia. Rabies should be on the differential

diagnosis list for abnormal behavior, inability to swallow, lameness, and central nervous system abnormalities. Local authorities should be contacted immediately if these clinical signs are presented or if there is a suspicion of rabies in your animals.

Francisco R. Carvallo, DVM, DSc, DACVP
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Small ruminants



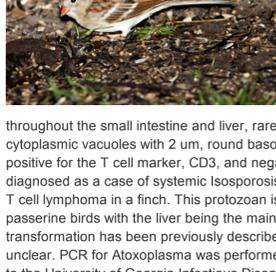
Cache Valley virus

In the winter of 2015-16, multiple sheep flocks had outbreaks of abortion. One or more lambs from each farm were submitted for necropsy to the Wytheville Regional Animal Health Laboratory. Similar abortion outbreaks occurred this past winter (2019-20). The most significant gross findings were scoliosis, arthrogryposis, mandibular

brachygnathia/deformity, and cerebellar aplasia/hypoplasia. Additional lesions in some of the lambs included muscle flaccidity, muscle hypoplasia, various other skeletal deformities, renal hypoplasia, and hypoplasia of the cerebrum. Some of the affected lambs were PCR positive for Cache Valley virus at Texas Veterinary Medical Diagnostic Lab.

Possible teratogenic viruses in sheep include Bluetongue virus, BVD and Border disease (usually these do not cause arthrogryposis), Wesselbourn virus, and the Orthobunyavirus (Cache Valley, Akabane, Schmollenburg, and Aino). In lambs with arthrogryposis, myofibrillar hypoplasia, and CNS abnormalities, Cache Valley virus is the most frequently confirmed Orthobunyavirus in many states, including Virginia. A negative PCR result in fetal tissue is fairly common in mid- or late-term fetuses because the virus is usually cleared by about 65 days gestation. Most infected ewes, though, seroconvert, so testing of the dam's serum by serum neutralization can aid in definitive diagnosis. Serum neutralization testing can also be done on precolostral fetal serum.

Lisa M. Crofton, DVM, DACVP
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Eimeria gilruthi in a ram

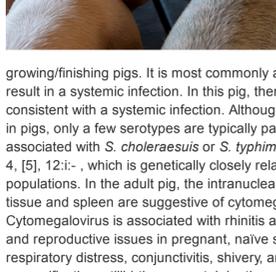
A 1-year-old ram with history of scours, anorexia, and polydipsia was submitted to necropsy. The most significant gross findings were moderate consolidation of the middle lung lobe and multifocal abomasal petechiae. Histopathology revealed multifocal pleocellular to granulomatous abomasitis, with numerous intralosomal apicomplexan parasites, morphology and location compatible with

Eimeria gilruthi. In addition, this animal had multifocal embolic showers of bacteria identified organisms, likely secondary to the lesion in the abomasum. Eimeria gilruthi was recently reported in a group of ewes from Tennessee, and this is the first time that is diagnosed in Virginia. This is a challenging diagnosis due to the lack of Eimeria oocysts in feces. Abomasal coccidiosis should be considered in cases of small ruminants with white to red foci in the abomasal mucosa.

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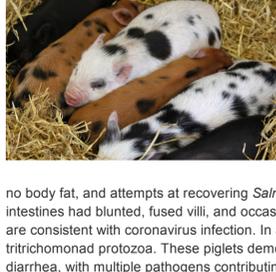
Avian



Gout in a parrot

A pet green parrot was presented for necropsy after having been found weak in the cage by the owner and then dying a few days later. The parrot had abundant opaque white, gritty material in multiple joints, as well as around the liver and heart. The kidneys were pale and irregular. This was a case of gout, which is the buildup of urates. In most cases, gout is secondary to another process; and in this case, histopathology revealed severe chronic renal disease leading to renal failure.

Phillip Sponenberg, DVM, PhD
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Atoplasmosis in finches

A young adult finch housed as part of a research colony was euthanized for a 24-hour progression of weight loss and lethargy. The only significant finding on gross necropsy was emaciation. Multiple tissues were submitted to the VITALS service for microscopic evaluation. Upon examination, sheets of neoplastic lymphocytes were identified effacing sections of small intestine, liver, and spleen. In addition,

throughout the small intestine and liver, rare neoplastic cells and histiocytes contained cytoplasmic vacuoles with 2 um, round basophilic merozoites. Neoplastic cells were diffusely positive for the T cell marker, CD3, and negative for the B cell marker, Pax5. This was diagnosed as a case of systemic Isosporosis (or atoplasmosis) with concurrent, multi-organ T cell lymphoma in a finch. This protozoan is associated with severe disease in young passerine birds with the liver being the main organ involved in systemic infection. Neoplastic transformation has been previously described with this organism though the mechanism is unclear. PCR for Atoplasma was performed on sections of small intestine and liver submitted to the University of Georgia Infectious Disease Laboratory. Results were negative; however, there is a concern for DNA integrity as these samples had been in tissue blocks for more than a year.

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Porcine

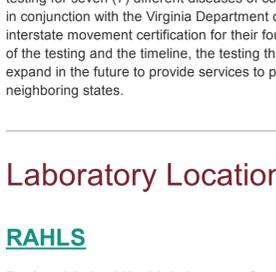


Salmonellosis and Cytomegalovirus infection

Two pigs (one adult and one juvenile pig) were submitted for necropsy after being seized from a farm due to poor living conditions. The origin of these pigs is unknown. The young pig had classic lesions for salmonellosis, with inflammation in multiple organs, while the adult pig was positive for Salmonella spp., but had no lesions (presumed carrier). The older pig had intranuclear inclusion bodies observed in the sinus/nasal tissue and spleen, suggestive of cytomegalovirus infection (Porcine/suid herpes virus 2).

Salmonellosis can occur in any age group of pigs, but most commonly affects weaned or growing/finishing pigs. It is most commonly associated with diarrhea, but in young pigs, it may result in a systemic infection. In this pig, there is inflammation in multiple tissues that is consistent with a systemic infection. Although many serotypes of Salmonella can be detected in pigs, only a few serotypes are typically pathogenic in pigs. Most outbreaks within pigs are associated with S. choleraesuis or S. typhimurium. In this pig, serotyping is consistent serotype 4, [5], 12:i:-, which is genetically closely related to S. Typhimurium and reported in some swine populations. In the adult pig, the intranuclear inclusion bodies observed in the sinus/nasal tissue and spleen are suggestive of cytomegalovirus infection (Porcine/suid herpes virus 2). Cytomegalovirus is associated with rhinitis and conjunctivitis in nursing and newly weaned pigs, and reproductive issues in pregnant, naive sows. Clinical signs in piglets include sneezing, respiratory distress, conjunctivitis, shivers, and possible death. In pregnant sows, fetal mummification, stillbirths, neonatal deaths, and failure-to-thrive piglets can be seen.

Jaime Weisman, DVM, MSc
RAHL Warrenton



Enteritis in piglets

Several piglets were presented over the course of a week for necropsy. These were all from a single pen that was experiencing diarrhea and poor growth. All piglets had very poor body condition with essentially no body fat. The first piglet had a moderate acute suppurative enteritis, and Salmonella spp. was cultured from ileum. Following that diagnosis, other piglets were submitted, as well. These also had

no body fat, and attempts at recovering Salmonella were unsuccessful. Histologically, the small intestines had blunted, fused villi, and occasional crypts had necrotic debris. These findings are consistent with coronavirus infection. In addition, some crypts contained numerous tritrichomonad protozoa. These piglets demonstrate the complex interactions that can lead to diarrhea, with multiple pathogens contributing to final outcomes. The Tritrichomonas spp. of pigs are generally commensal and only weakly pathogenic, but in this case were likely contributory due to the co-infection with viral pathogens, as well as the poor body condition.

Phillip Sponenberg, DVM, PhD
Virginia Tech

Companion animals



Ethylene glycol toxicity

Ethylene glycol toxicity was diagnosed in a dog that had a chronic history of vomiting and lethargy, and an acute history of oliguric renal failure. Out of a multiple dog household, this was the second animal to die within a 48-hour period; a third dog in the household was exhibiting identical clinical signs. There was no known exposure to ethylene glycol at the time of presentation, but the dogs were allowed to

wander the yard unsupervised.

Vanessa Oakes, DVM
Virginia Tech

Feline Infectious peritonitis

A two-year-old domestic shorthair cat was euthanized after a flair-up of suspected urinary disease and acute ataxia. The cat had enlarged kidneys and mesenteric lymph nodes on the enlarged kidneys, and hyperglobulinemia with elevated liver enzymes and total bilirubin. The cat was pale and mildly icteric and had pyogranulomatous vasculitis in the lungs, liver, and kidneys. A diagnosis of feline infectious

peritonitis (FIP) was made based on the histologic lesions. FIP occurs with either a mutation of the non-virulent feline enteric coronavirus to a more virulent form, or an aberrant host immune response to the virus. A resulting intense inflammatory reaction around blood vessels is responsible for the clinical disease depending on which blood vessels are involved. Unlike other coronaviruses that replicate in and damage epithelial cells, FIP is unique because the clinical disease is associated with an immune-mediated reaction to the virus. The VITALS lab has a PCR test that can identify feline coronavirus in tissues and fluids.

Tanya LeRoith, DVM, PhD, DACVP
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Laboratory News

During the spring of 2020, the Wytheville RAHL added bacteriology, virology, and parasitology testing for seven (7) different diseases of coldwater fish raised in Virginia. This work was done in conjunction with the Virginia Department of Game and Inland Fisheries (DGIF), and the interstate movement certification for their four in-state hatcheries. Given the brand-new nature of the testing and the timeline, the testing this year was a great success, and there are plans to expand in the future to provide services to private fish producers located in Virginia and neighboring states.

Laboratory Locations

RAHLS

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