



Newsletter



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From the Director:

DROUGHT IN ARIZONA

We are continually reminded about the difficulties caused by the severe prolonged drought in Arizona. This has affected many species and the unfortunate result is the reductions in numbers and the economic difficulties caused by the necessity of supplemental feeding. The reduction in forage availability results not only in reduced overall nutrition but also in reduction in quality of nutrients in some of the dry forages. We are available for consultation and assistance in testing forage materials with regard to nutrient content. Representatives of the University of Arizona Extension Service can be contacted for assistance in planning for dealing with drought effects on livestock.

BIO SECURITY

We hope to begin a rather extensive remodeling project involving our necropsy area as well as some of our laboratory space. This will be funded through Homeland Security as part of the National Animal Health Monitoring System. It will be directed at improving our ability to serve as a monitor for foreign animal and zoonotic diseases. Our current necropsy area is difficult to clean and sanitize and the remodeling effort will improve traffic flow as well as provide impervious surfaces that can be easily cleaned and disinfected. We will also be able to improve our animal handling facilities and we will make handling of all submissions a bit more efficient. The objective is to ensure that we are able to contain any infectious agents that may be brought into this facility as well as to protect our personnel from possible exposure to zoonotic agents. This process will produce some conflicts with regard to management of submissions over the next several months and we request your cooperation in helping us to improve our overall ability to provide our services in an efficient and safe manner.

Robert D. Glock, Director



*Diagnostic Services offered at
AzVDL:*

- ◆ **Pathology:** gross necropsy, histopathology, cytology, or other diagnostic tools used to determine the cause of disease
- ◆ **Microbiology:** the use of microbiological techniques to identify bacteria, viruses, parasites, and other infectious agents, and their relationships to animal diseases
- ◆ **Toxicology:** identification of toxic substances (toxins) and their involvement in animal diseases
- ◆ **Chemistry:** chemical analysis of feed, forage, and body tissue samples into finite compositions
- ◆ **Serology:** analysis of serum to monitor animals' prior exposure to diseases

Arizona Veterinary Diagnostic Laboratory

Access to the AzVDL: Take Tucson Interstate 10 to the Miracle Mile exit #255. Travel approximately 1/4 mile on the south bound frontage road between Miracle Mile and Grant Rd. Turn west onto the farm at the signed entrance.

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Diagnostic Update

The following are selected samples of cases submitted to the AzVDL during the months of December, January, and February.

BOVINE

Trichomoniasis was the cause of a low pregnancy rate (50%), early abortions, and pyometras in a large beef herd in northern Arizona. *Tritrichomonas foetus* was isolated from the prepuce of almost 60% of the bulls initially tested.

Purulent meningitis and **copper deficiency** were diagnosed in a beef cow from the Elfrida area. Streptococci and staphylococci were isolated from the meninges. The liver copper was 6.6 ppm (reference values: 25-100 ppm).

Atypical interstitial pneumonia was diagnosed in feedlot steers in southern Arizona shortly after a change in the formulation of the ration.

The ingestion of large amounts of *Amaranthum tucsonensis* and *Amaranthum palmeri* is believed to have caused **rumen acidosis/overeating** in a group of beef cows immediately after they were moved to a new pasture in the White Mountains. The pasture contained large numbers of new growth of *Amaranthus* with highly fermentable seeds, and the rumen pH was in the 5.0 – 5.4 range. No other likely causes of death were identified after an extensive investigation.

Severe, chronic, abscessing pneumonia due to a mixed infection of *Pasteurella multocida* and non-hemolytic streptococci was diagnosed in a three-month-old Brown Swiss calf. The owner noted that the "calf just slowed down and died." At necropsy, subcutaneous fat deposits were absent and bilateral consolidation of the anterior ventral lobes of both lungs was evident. Multiple abscesses were present in the apical and cardiac lobes of the left lung with adherence of the lung to parietal pleura. Heavy growths of *Pasteurella multocida* along with non-hemolytic streptococci were isolated from the affected lung tissue.

Abscessation of the posterior aspect of the right diaphragmatic lung lobes, diaphragm, and reticulum was diagnosed in a range cow that was presented for necropsy from southeastern Arizona. The owner noted that the cow "seemed lethargic and then went down". The animal was underweight. Cultures of the abscessed areas yielded heavy mixed growths of *E. coli* and *Arcanobacterium pyogenes*. It was felt that the lesions were suggestive of an

episode of traumatic reticulitis (hardware disease) in which a foreign body (often a nail or piece of wire) penetrates the wall of the reticulum and typically migrates in a forward direction through the diaphragm into the chest cavity. In this case, a foreign body was not found, but these often corrode and dissolve with time when embedded in the tissues and can be difficult to find. A presence of an infected, chronic active suppurating tract no doubt contributed to the poor health of the animal.

Hypoglobulinemia, probably due to failure of passive transfer of maternal immunoglobulin was diagnosed in a one-week-old Brangus bull calf. The submitter noted that the calf became lethargic. At necropsy, there was purulent exudate in the submeningeal areas of most sulci of the cerebral hemispheres of brain. Purulent exudate was also evident along the base of the medulla oblongata and the underside of the cerebellum. Cultures of the submeningeal exudate yielded moderate growth of *E. coli*. Immunoglobulin was not detectable by zinc sulfate turbidity in cadaver serum. Inadequate intake of colostrum likely predisposed the calf to a septicemic coliform infection.

Severe fibrinous bronchopneumonia due to *Pasteurella hemolytica* infection was diagnosed in a nine-month-old Dorper ram. At necropsy, the lungs were discolored and consolidated. Microscopically, lesions were typical and a heavy growth of *Pasteurella hemolytica* was isolated from attached lung tissue.

EQUINE

Septicemia by *Streptococcus equi* subsp. *zooepidemicus* was identified as the cause of death in two horses in two unrelated cases. The first case was in a yearling Thoroughbred gelding with acute pharyngitis and cervical lymphadenitis. The second case involved an adult gelding with widespread petechial hemorrhages. A group C1 *Salmonella* sp. was also isolated from the intestine of the second horse although autolytic changes in the intestinal tract were too advanced to determine the significance of this isolation.

Granulomatous encephalitis caused by the rhabditiform nematode *Halicephalobus (Micronema) deletrix* was diagnosed in an equine brain received from central Arizona for rabies examination.

A six-year-old pregnant mare was found dead with no history of any previous illness or any significant dietary change. The only significant finding was **gastric rup-**

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ture on the greater curvature of the glandular portion. There was hemorrhage in the surrounding tissues and very early indications of associated peritonitis. The conclusion was that this was, in fact, ante mortem gastric rupture. This occasionally occurs in horses. The difficulty at necropsy is determining whether the rupture was ante mortem or simply the result of post mortem gas production and rupture. In this case the lesions were quite definitive.

A ten year-old Quarterhorse mare was euthanatized because of chronic ill health. Various therapeutic approaches had been attempted with no apparent success. The horse had severe **chronic hepatic cirrhosis**. This resulted in the reduction of the size of the liver and there was extensive fibrosis with some cytomegalic hepatocytes. This type of injury is sometimes associated with consumption of pyrrolizidine alkaloids such as those found in plants. However, other toxins can produce this damage. The exposure in this case was probably several months before the animal was euthanatized.

AVIAN

Quail poxvirus infection was diagnosed in commercially reared young Bobwhite quails from Maricopa County. The owner submitted a bird for necropsy because of "bumps over the eyes", emaciation, and death. Necropsy findings included proliferative masses on the upper eyelids and hard palate, and severe thickening of the esophageal mucosa by hyperplasia of the epithelial cells which contained viral eosinophilic, intracytoplasmic inclusions characteristic of poxvirus. There was also a pneumonia caused by the aspiration of necrotic debris and secondary bacteria from the esophageal mucosa.

Avian tuberculosis due to *Mycobacterium avium* was diagnosed in a mature female Hawkhead parrot. The bird was fluffed up and not acting right for weeks. Grossly, the bird was in thin body condition. Microscopic examination revealed distention of intestinal villi by infiltrates of epithelioid macrophages and giant cells containing myriads of acid-fast bacilli.

Three of four finches from a mixed species aviary died after a short illness. Gross necropsy lesions included abundant, thick, yellow exudate in the celomic cavity. Microscopically this corresponded to a diffuse serositis. Fibrin thrombi were present in sinusoids and there was multifocal hepatocellular necrosis within the liver. Many colonies of bacteria were visualized. A **group B Salmonella sp.** was recovered from the tissues.

Trichomoniasis was diagnosed in a one-year-old cockatiel that died after a history of regurgitation and weight loss.

The bird was in thin body condition. A caseous yellow pseudomembrane covered the mucosal surface of the crop. Microscopically, this corresponded to deep necrosis and inflammation of the wall of the crop associated with numerous trichomonads.

Strychnine intoxication was diagnosed in three domestic birds. All three birds died suddenly and at necropsy, the upper alimentary tract contained milo-type grain that was discolored greenish. This type of grain bait is available commercially as a registered rodenticide. Testing of the alimentary tract content was positive for strychnine in all three birds.

Hemosiderosis was diagnosed in a wild grackle that was found dead around a horse barn. The bird was submitted as part of the AZVDL West Nile virus surveillance program. Microscopically, prominent accumulations of brown, granular, iron-positive pigment were evident in the cytoplasm of most hepatocytes. Analysis of formalinized liver tissue revealed an excessive amount of iron (1,503 ppm; normal ~300 ppm). West Nile virus immunohistochemistry was negative.

FELINE

Thyroid adenoma, cardiac hypertrophy, chronic interstitial nephritis, pulmonary adenocarcinoma, and chronic cholangiohepatitis were the necropsy findings in an eighteen-year-old female domestic shorthair euthanatized because of ongoing **hyperthyroidism** and **renal disease**.

Concurrent salmonellosis and **feline infectious peritonitis** was diagnosed in a fourteen-month-old male domestic shorthair. The cat had a two-week history of lethargy, weight loss and icterus. There was mild elevation of total bilirubin and mild anemia. Abdominal fluid was noted. Grossly, the cat had small amounts of fluid in the thorax. The tissues were slightly icteric. There was abundant clear yellow fluid in the abdomen. A thin coating of fibrin was presented in the capsular surface of the spleen, liver and serosa of the small intestine. Cultures of the lung and liver yielded a heavy growth of *Salmonella*. Microscopic lesions were referable to the feline infectious peritonitis. The *Salmonella* was typed as *Salmonella arizonae*.

Severe suppurating cellulitis of the abdominal subcutis due to a group G Streptococcal infection was diagnosed in a five-year-old, spayed female Russian blue cat. The animal had been presented to a veterinarian with a swollen vulva and an adjacent draining tract. The veterinarian débrided the area and the animal appeared to be fine for about five to seven days and then the lesion became reinfected. At necropsy, there were multiple draining fistula-like tracts in the skin ventral to the vulva. Dissection of the tracts revealed multiple, cavitated areas in the ventral abdominal subcutis and fat. The

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tracts contained yellowish exudate. Additionally, five uroliths were found in the urinary bladder lumen and one was present in the urethra. Cultures of a swab of the suppurating tract in the abdominal fat and subcutis yielded a heavy growth of group G *Streptococcus*.

We received a four-month-old kitten that had died after a history of shallow breathing and increase respiratory rate. Radiographs indicated lesions in the lungs. Gross and microscopic findings indicated **bronchopneumonia** in the lower two-thirds of both lungs. A combination of *Mycoplasma* sp. and *Bordetella bronchiseptica* were identified and were thought to be the causative agents.

CANINE

Canine hemorrhagic gastroenteritis (CHG) produced by *Cl. perfringens* type A was the cause of death of a mixed-breed female after a brief clinical course of projectile vomiting, diarrhea, and disorientation. The isolate was a non-enterotoxigenic strain of *Cl. perfringens* type A. Most cases of CHG involve enterotoxigenic strains.

Congenital **diaphragmatic and umbilical hernias**, produced by the persistence of fetal openings, were found in a Shih Tzu puppy. The diaphragmatic hernia had produced eventration of a large intestinal loop that compressed the thoracic viscera.

Three unrelated cases of **Coccidioidomycosis** involved a seven-year-old male Irish wolfhound with granulomas in ribs, hocks, lung, and liver; an adult female Dalmatian with cutaneous and pulmonary lesions; and a ten-year-old mixed-breed male with widely disseminated coccidioidomycosis, renal and splenic amyloidosis and lymphoplasmacytic gastroenteritis.

Osteomyelitis and thrombophlebitis and infarction of the spinal cord along with granulomatous nephritis and lymphadenitis due to *Aspergillus terreus* was diagnosed in a six year-old, spayed female German shorthair pointer. Nephritis and osteomyelitis are a unique combination of lesions associated with this opportunistic fungal infection.

Hydrocephalus, hydromyelia and syringomyelia were diagnosed in a six -month-old male Japanese Chin presented with a history of circling, pacing, vision changes and decreased mentation. Grossly the head was dome shaped and contained several small open fontanels. The bone of the cranium was thin. As soon as the skull was open, the brain collapsed. The lateral ventricles, third ventricles, mesencephalic aqueduct, fourth ventricle and spinal canal were all dilated and filled with clear fluid. The lesions were considered compatible with congenital hydrocephalus with secondary hydromyelia and syringomyelia.

Moderate **diffuse interstitial pneumonia** was diagnosed in

nine-month-old male Golden Retriever. The owner found the dog dead. At necropsy, the lungs were discolored and the trachea was full of froth. Microscopically, postmortem decomposition obscured most cellular detail but inflammatory changes typical of an interstitial pneumonia were discernible in less decomposed areas of lung. Bone marrow was severely hypoplastic and it was felt that the dog likely became septicemic as a result of bone marrow hypoplasia. PCR testing of spleen was negative for *Ehrlichia canis*, which is the most common infectious cause of bone marrow hypoplasia in the canine in this area. Additionally, there was no histologic evidence of active Ehrlichiosis. Other possible causes of bone marrow hypoplasia include bone marrow toxicants and drug reactions.

Meningioma with locally extensive intracranial hemorrhage was diagnosed in a six-year-old mix-breed canine. The submitter noted that the dog was normal in the morning but became very lethargic and urinated uncontrollably. Drooling was also noted. The animal was presented to a veterinary emergency service and died the next day. At necropsy, there was a moderate amount of free blood present in the ventral aspect of the cranial vault along the base of the brain. Compression of the left lateral aspect of the cerebral cortex was evident and a dark-purplish mass was evident protruding from the adjacent extradural space. The mass compressed adjacent cerebral cortex leaving an indentation. Dissection of the mass revealed it to extend laterally and extradurally. The tumor contained considerable blood and friable dark red tissue. The tumor mass protruded through a bony defect in adjacent cranium and appeared to infiltrate overlying temporal muscle. Microscopically, tumor cell morphology was typical of meningioma.

Renal dysplasia was diagnosed in an eight-month-old Shih Tzu that was also reported to be positive for *Ehrlichia canis* by the submitting veterinarian. At presentation to the veterinarian, the dog had a hematocrit of 21% and was diagnosed with ehrlichiosis with an in-house test. The dog collapsed five minutes after the exam. At necropsy, the kidneys were bilaterally smaller than normal, and had corrugated subcapsular surface. The cortical areas appeared to be atrophic. Microscopically, both kidneys had changes typical of renal dysplasia. As an additional note, PCR testing at the AzVDL of spleen tissue from the dog was negative for *Ehrlichia canis*.

Cerebral cortical meningioma was diagnosed in a 12 year-old neutered female Dachshund that was presented to a veterinarian with a one-day history of seizures and severe disorientation and aggression. The dog initially responded to treatment but over the next few days deteriorated. No lesions were found in the spinal column or cord. Rabies testing on brain tissue was negative. When brain

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was trimmed for sectioning, a lightly discolored, irregular, and approximately 2 cm diameter lesion was noted in the basilar area of the cerebral cortex of one hemisphere. Microscopic examination of additional sections of this area revealed a tumor mass with morphology typical of meningioma.

Severe, massive trauma with fracture of the cranial bones and spinal column with associated hemorrhage were diagnosed in a male Shepherd mix canine that was submitted as part of a suspected animal cruelty investigation by a municipal police agency. The body of the dog has been retrieved from a dumpster. The extent of the trauma and hemorrhage suggested that the lesions were possibly the result of an automobile impact.

Brodifacoum toxicity was the identified cause of diffuse hemorrhagic lesions in a six year-old, German shepherd mix. There were hemorrhages in the lung, spleen, stomach, intestine and bladder. There was also free blood in the thorax. Brodifacoum is a fairly common ingredient in rodent poisons. It is unknown whether the poisoning in this case was malicious or accidental. Our records indicate that we have identified brodifacoum poisoning five times in the past year.

OVINE

Campylobacter jejuni was the cause of sporadic abortions from a flock in Cochise County.

Blue tongue was diagnosed as the cause of death in a four-year-old Cotswald wether. The sheep presented late last fall for unexplained lethargy and inappetence. Treatment with antibiotics and anti inflammatories was instituted. The wether was having difficulty eating and was hypersalivating. It became neurological characterized by hyperreflexive back legs. There were also increased lung and airway sounds. Ultimately the wether collapsed and died. Gross necropsy lesions included a few petechial hemorrhages on the epicardial surface of the heart. There was a 2 cm diameter ulcer in the pyloric region of the abomasal mucosa. There was subcutaneous edema of the intermandibular space and sternal area. Blue tongue virus RNA was identified in spleen tissue by PCR.

A three-day-old female lamb was found to have heavy populations of **group D *Salmonella* sp.** in the small intestines. The related deaths of several other lambs at the same age suggest that this was an exposure of young lambs to *Salmonella* sp.

We received an ovine fetus with a history of several abor-

tions in the flock. Inflammatory lesions were identified in the liver and lung and there was considerable necrosis with suppurative inflammation in the placenta. *Chlamydia* sp. were identified by PCR testing.

CAPRINE

We received a five-day-old pigmy goat with a history of lethargy, inactivity, and failure to nurse. Diffuse **bacterial meningoencephalitis** was identified and additional inflammatory lesions were identified in the lungs. *E. coli* was isolated from various tissues and was thought to be the cause of septicemia and meningoencephalitis.

EXOTICS

Zinc deficiency, hepatic lipidosis and a bacterial septicemia were found in the necropsy of a ten-month-old Alpaca cria with a history of poor growth. Although zinc deficiencies have been associated with growth retardation and poor immune responses, there is no known association between zinc and hepatic lipidosis. Hepatic lipidosis is an insidious health problem in alpacas and other camelids. Its causes are largely unknown. Nutritional diseases, stress, parasitism, bacterial infections, and other poorly defined conditions have been suspected.

A five-year-old Koi exhibited clinical signs that included rubbing itself on the gravel bed and sides of the tank, anorexia and decreasing activity. It isolated itself in the corner of the tank and was not swimming. It developed increased respiration and was losing equilibrium. The fish died and was submitted for necropsy. Necropsy examination revealed excess mucus on the surface of the gills. Microscopically, there was multifocal hyperplasia of the gill epithelium with inflammatory infiltrations. Large numbers of parasites were present between secondary lamella. The parasites were consistent with **gill flukes**. The most likely parasite is *Dactylogyrus* sp.

Polyarteritis nodosa was diagnosed in a three year-old, Agile gibbon. The animal presented depressed, hypothermic, dehydrated and had oral ulcers, uremic mouth odor and bradycardia. There was also extensive muscle rigidity, ataxia and pinpoint fixed pupils. Ecchymoses and hematomas were seen in the skin. At necropsy there were shallow ulcers in the mucosa of the upper and lower lips. Multiple ecchymotic hemorrhages were present in the small intestine. The intestinal contents were fluid, yellow material. Microscopically, blood vessels in the submucosa of the small intestine exhibited degenerative inflammatory changes of arteries consistent with **Polyarteritis nodosa**.

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This is an inflammatory disease of small arteries of unknown cause. The gastrointestinal tract is one of the common sites for this condition.

The body of a black bear was received for necropsy examination. The bear was found inside of a commercial property fence. There was discharge from the mouth and watery eyes. The bear was euthanized. The animal was in thin body condition and had a rough unkempt hair coat. The lungs contained multifocal to coalescing firm tan areas with pockets filled with mucoid tan material. Cultures of the lungs yielded a group C *Streptococcus* sp. The diagnosis was chronic, multifocal to coalescing, **bronchopneumonia with bronchiectasis**.

Pasteurellosis was diagnosed in a rabbit that was received for necropsy. The owner reported that multiple rabbits were dying in the rabbitry. At necropsy, there was fecal staining at the hair of the perineum. The most prominent gross lesion noted at necropsy was a severe tracheal inflammation and necrosis with sloughing of affected tracheal mucosa. Cultures of the trachea yielded a heavy growth of *Pasteurella multocida*.

WILDLIFE

Two cases of **rabies** were diagnosed, one in a skunk and the other in a bobcat. The bobcat came from north central Arizona and reportedly attacked two dogs and continued to fight with the dogs until it was treed. The cat came down from the tree on two occasions and charged one of the workers at the ranch. In the case of the skunk, dogs at a residence in south-eastern Arizona killed the animal.

Diaphragmatic hernia with herniation of the abdominal viscera into the thorax was diagnosed in a deer that was presented for necropsy. The deer was found sick in the Scottsdale area. At necropsy, the animal was a mule deer weighing 222 pounds. The lesions were likely the result of an automobile impact.

Proliferative enteritis was diagnosed in ten-week-old and five-month-old collared peccaries submitted from a rehabilitation center. History included diarrhea. Necropsy findings included a thickened small intestine with extensive proliferation of mucosal glands. Tests for *Lawsonia intracellularis* by PCR were positive. This organism has commonly been associated with proliferative enteritis in swine and hamsters and rarely in numerous other species. We are unaware that *Lawsonia intracellularis*-associated proliferative enteritis has been previously reported in collard peccaries (javelina).

Blue Tongue infection was diagnosed in a mule deer found south of Tucson, appearing to be blind. AGF field personnel euthanized the animal and delivered the head to the laboratory for examination. The lesions observed include bilateral keratitis with corneal ulceration in one eye, and non-suppurative encephalitis. The infection was confirmed by a PCR test of the brain tissue. Tests for rabies and CWD were negative.

Pulmonary Aspergillosis by *Aspergillus niger* was the cause of death of a Red-tailed hawk from a wildlife exhibit.

A large ovarian **granulosa cell tumor** was found in a Pigmy owl from a zoo collection. The bird had a history of progressive weight loss.



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Rana chiricahuensis. Photographer: Dr. Carl S. Lieb. Hidalgo Co., NM. 17 May 1986.

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