



Backyard Poultry Mini Series

Session Three: Approach to Clinical Signs and Condition II

David Perpinan DVM MSc PhD Dip ECZM
(Herpetology)
RCVS Specialist in Zoo & Wildlife Medicine



BACKYARD POULTRY. SESSION 3 DIARRHOEA

In order to investigate cases of diarrhoea in backyard poultry, it is necessary to know the difference between normal and abnormal droppings. Droppings of birds are formed by faeces, urates and urine. Faeces are solid, brown to green, and colour and consistency may vary depending on the diet. Urates are white and chalky; they are the final by-product of protein metabolism. Water from urine is in part reabsorbed in the cloaca and therefore urine excreted in droppings is a bit different from the urine that leaves the kidney. Chickens also empty their caeca 1-3 times/day and produce caecal droppings, which are caramel-like in colour and texture and should not be confused with diarrhoea.



Normal droppings from a chicken (upper left) and a geese (left). Upper right picture shows a normal dropping and a caecal dropping from a chicken.

Investigation of a case of diarrhoea should start with a clinical history and a clinical exam. Most ex-battery hens weigh 1.8-2 kg. Faecal tests should be done as initial diagnostic tests, but just a few parasite eggs or oocysts may not be significant. Clinical disease usually occurs when more than 50000 coccidian oocysts/gram faeces or more than 400 *Capillaria* eggs/gram faeces are detected. Bacterial overgrowth (e.g. *Clostridium*) can occur with any cause of diarrhoea. A faecal cytology can detect clostridial overgrowth and other conditions. A blood smear may identify cases where diarrhoea is part of a septicaemic process. Necropsy, faecal culture and sensitivity and serology/PCR for specific diseases are additional diagnostic tests. Most common causes of diarrhoea in backyard poultry are endoparasites, dietary indiscretion and bacterial enteritis.

- Chicken with diarrhoea, otherwise bright and no diagnosis with history, physical examination and initial tests: it can be sent home for monitoring.
- Chicken with diarrhoea and no diagnosis with history, physical examination and initial tests, but overall ill or not improving after being sent home: needs treatment and further diagnostics.

Treatment should consist of:

- Warmth.
- Fluid therapy: daily requirements can be estimated at 50 to 100 mL/kg/day. Hartmann's and Ringer's are hypotonic in birds; better use 0.9% saline. If animal is in shock or hypotense (blood pressure less than 90 mm Hg), then give boluses of 5 mL/kg of colloids + 10 mL/kg of crystalloids until blood pressure is restored.
- Antibiotics: no injectable antibiotic is licensed for birds. Give oral antibiotics if case is mild and IV/IO antibiotics if case is severe.

Coccidiosis

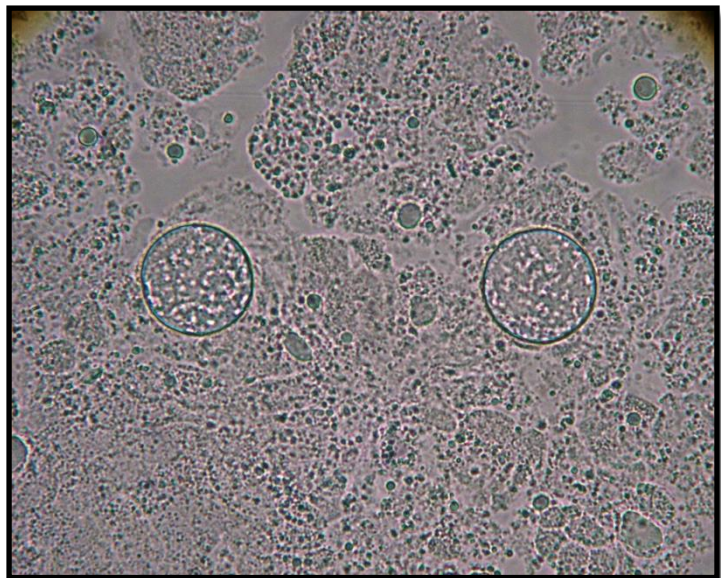
Common clinical signs include diarrhoea and anorexia. In more severe cases, other clinical signs can be seen, such as anorexia, lethargy or haemorrhagic diarrhoea. Mortality is more common in game birds. Infected adult birds are commonly asymptomatic because they have developed resistance, but the disease may be clinical in young animals that still do not have immune protection against coccidia, or even in animals that have spent time in cages without contact with faeces and are then placed outdoors where they can get infected again. Coccidiosis in chicken is caused by different species of *Eimeria*, some of which are:

- *E. acervulina*: raised white nodules in the duodenum.
- *E. maxima*: haemorrhage and mucosal reddening in the jejunum.
- *E. tenella*: haemorrhagic caecal cores and bloody faeces.

Other poultry species may be affected by other *Eimeria* species, which tend to be species-specific. Oocysts undergo sporulation outside the host. Oocysts can be found on faecal floats or intestinal cytologies from deceased animals.

Differential diagnoses: clostridiosis, histomoniasis, salmonellosis, cryptosporidiosis, dehydration, pesticide intoxication. Prevention: hygiene, avoid overcrowding. Treatment can be done with ionophores (lasalocid, monensin and several others) or other compounds (amprolium, diclazuril, decoquinate, sulfadimethoxine, salinomycin and toltrazuril).

Two unsporulated oocysts from *Eimeria* sp. The sample was obtained from mucosal scraping during a necropsy.



Ionophores are recommended in groups as they have lower rates of resistance and allows the host to develop immunity; however, they are not licensed in poultry. Toltrazuril, sulphonamides and amprolium are licensed in the UK. Due to extensive use, resistance to amprolium is common, but this drug continues to be the only licensed drug with a withdrawal period for eggs of 0 days. A vaccine (Paracox, Intervet) is also available.

Histomoniasis: also known as blackhead, it is an important disease in turkeys and game birds, but mortality in backyard chickens has also been reported. *Histomonas meleagridis* is a protozoal flagellate that produces diarrhoea, often having a yellow appearance, and non-specific signs of disease. On post-mortem exam, the liver shows characteristic target-shaped (dark centre and pale edge), multifocal, non-uniform areas of necrosis, and the caeca are markedly thickened with the lumen distended by large amount of caseous necrotic and haemorrhagic material. The intestinal worm *Heterakis gallinarum* serves as a paratenic host for *Histomonas*. Earthworms can serve as second paratenic host for *Histomonas*. Histomoniasis is generally diagnosed post-mortem using histology or scrapes from the caecal lesions (*Histomonas* should be warm up with the light of the microscope and has a slow motion). Differential diagnoses: coccidiosis, clostridiosis, salmonellosis, cryptosporidiosis, dehydration and pesticide intoxication. Prevention: avoiding mixing species, avoiding placing susceptible species in pens that used to hold chickens (due to persistence of *Heterakis*). Treatment: benzimidazole anti-helminthics limit the development of *Heterakis*, and the combination of tetracyclines + tiamulin is recommended to treat *Histomonas*.

Cryptosporidiosis: rare in backyard poultry, affects epithelial cells of intestine and respiratory system and can produce diarrhoea, dehydration, coughing, sneezing and dyspnoea. Diagnosis is made by using acid-fast stain on faeces. Differential diagnoses: same as for coccidiosis and histomoniasis. No effective treatment.

Ascarids: large worms that can interfere with intestinal transit when heavy infections are present. *Heterakis* is small and can be found in caeca. Treatment is commonly done with the licensed drug flubendazole.

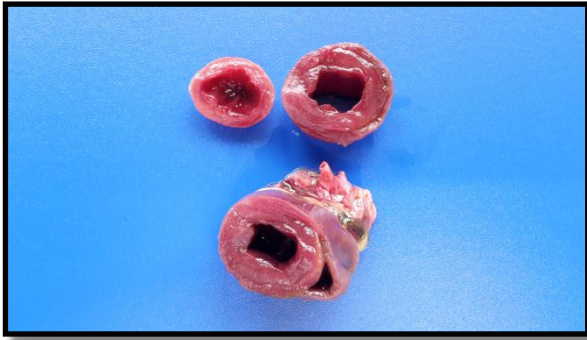
HEART DISEASE

Large poultry (turkeys, broilers) are predisposed to cardiac disease and may die from it. With mild episodes of stress (e.g. handling) they can develop dyspnoea and tachycardia. Fast growing chickens have smaller hearts than slow-growing chickens relative to their body weight.



Ascarids are large worms that can obstruct the intestine in severe cases. Eggs are also large and do not have polar plugs such as in Capillaria or gapeworm.

Clinical signs of cardiovascular disease include dyspnoea, exercise intolerance, cyanosis/hypoperfusion (bluish or pale comb, wattles or periorbital skin and increased capillary refill time), ascites, collapse and sudden death. Investigation of such cases should start with proper auscultation, but the elevated heart rate of birds makes difficult to obtain as much information as in mammals. Laboratory findings may include erythrocytosis (PCV higher than 35-45%), elevated bile acids (due to hepatic congestion), leucocytosis in cases of bacterial myocarditis/endocarditis and the analysis of the ascitic fluid may show low protein, low specific gravity and low cellularity. Radiographs, ECG and echocardiography can provide further help in diagnosis. Echocardiography is actually the best imaging method for assessing cardiovascular function and it is usually performed through a parasternal approach. Treatment is palliative and should start with the drainage of the coelomic or pericardial fluid and avoiding breeding birds where cardiovascular disease can have a genetic component. If medical treatment is started, it will be for life and eggs will not be able to be consumed. When infectious conditions are suspected, IV/IO antibiotics are mandatory.



Left: postmortem images of a heart with significant dilatation of the left ventricle. Right: anatomy of a normal chicken heart.

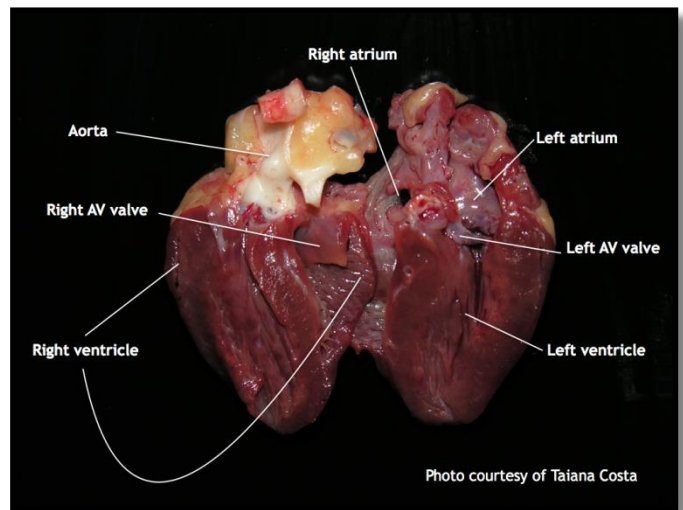


Photo courtesy of Taiana Costa

SKIN AND FEATHER DISORDERS

Avian skin is thinner than in mammals and is loosely attached to the underlying muscle, except in skull, distal legs and carpal areas. Feathers are arranged in tracts (*pteria*) separated by featherless areas (*apteria*); ducks have feathers all around the body, without *apteria*. Birds have a uropygial gland that is located dorsally at the base of the tail and secretes an oily substance that birds use to keep their plumage in good shape and, in waterfowl, it also helps water-proofing the feathers. Most cases of dermatologic disease in backyard poultry are caused by trauma, ectoparasites and poor husbandry and nutrition.

Ectoparasites that affect poultry are mainly lice and mites. Lice are large, species-specific and move fast, while mites are small, not generally species-specific and do not move as fast as lice. Small numbers of lice may be asymptomatic and different species of lice can even infect the same individual. Clinical signs of lice infestation includes hyperaemia and irritation of the skin, with scabs and clots, and moth-eaten appearance of the feathers. Lice found on poultry are usually chewing lice and spend their entire life on the host. The best treatment and prevention of lice infestation is providing dust baths with diatomaceous earth, which kills the parasites by dehydration. Ivermectin is also useful, both injectable or topically, but it is not licensed to be used in egg-producing animals. Mites may spend only part of their life cycle on the host and therefore environmental treatment is also needed with these infestations. *Ornithonyssus*, *Dermanyssus* and *Cnemidocoptes* are the most common mites found in poultry. Clinical signs and treatment are similar to those seen for lice. In addition, herbal oils such as 10% garlic oil can be used in a spray to kill mites. Burrowing mites are better treated with ivermectin.



Louse from a swan (left) and *cnemidocoptic* mite from a chicken (right) looked under the microscope

Trauma is not uncommon in backyard poultry. Dominant males or males with sharp spurs can cause most of the problems. Predators are also a common cause of trauma, as well as inappropriate facilities. Traumatic events can range from mild (requiring no treatment) to catastrophic (requiring euthanasia). Some cases will require stabilisation and even blood transfusions.

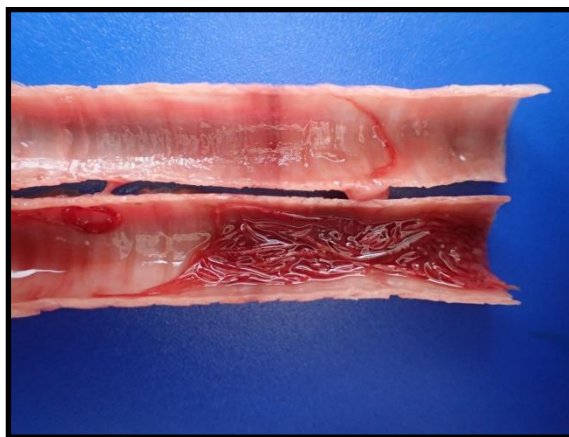
RESPIRATORY DISORDERS

Many respiratory conditions can affect poultry. Most common ones seen in backyard poultry include mycoplasmosis and infectious bronchitis. Newcastle disease and avian influenza can also produce respiratory signs and are notifiable diseases. Fowl cholera and infectious laryngotracheitis are less commonly seen in chickens, but gapeworm, aspergillosis and nasal leeches are more common in ornamental ducks in semi-wild conditions.

Several species of *Mycoplasma* can produce respiratory disease in backyard poultry. Clinical signs include cough, abnormal tracheal noises, foam in the corner of the eye and sinusitis. More severe disease or even mortality are more common when concurrent infection with *E. coli* occurs. Diagnosis can be done through PCR or serology at the AHVLA laboratories. *Mycoplasma* is susceptible to tetracyclines and tylosin, but treatment is seldom recommended and control is done through culling and restocking from reliable sources. *Mycoplasma* is a serious condition in production farms and actually many farms are specifically negative for this pathogen.

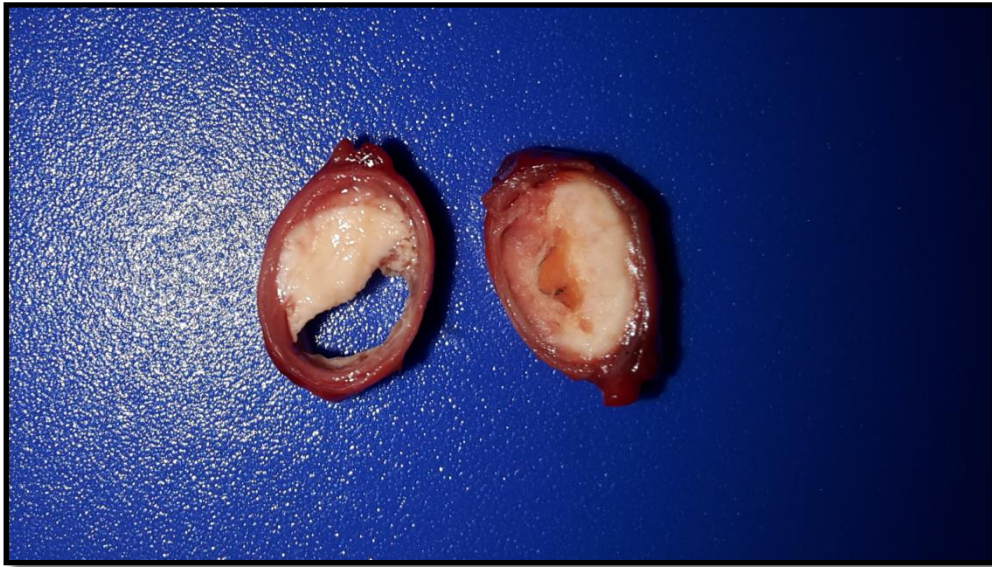
Infectious bronchitis is an important disease in production and backyard poultry. Young birds are more commonly affected and other pathogens such as *E. coli* or *Mycoplasma* can exacerbate the disease. Infectious bronchitis virus affects the respiratory and urogenital systems and produce clinical signs such as conjunctivitis, watery eyes, tracheal rales, nasal discharge, dried nasal crusts, head shaking, head scratching, polyuria/polydipsia, white faeces and increased mortality. Laying females chronically infected with the virus can show a variety of reproductive problems such as decreased egg production, fluid within the oviduct, abnormal eggs (both on the surface and on the contents) and decreased hatchability. Diagnosis can be confirmed with PCR and serology. There is no treatment for infectious bronchitis and culling is recommended for control.

Gapeworm involves the species *Syngamus trachea* in chicken and game birds and *Cyathostoma bronchialis* in waterfowl. Worms are bright red and are located in trachea, bronchi and bronchioles. Large worms are females, small ones are males, and *Syngamus* males and females attached together and can be seen as a “Y shape”. Clinical signs include cough, gasping for air (which is basically open mouth breathing with dyspnoea and extension of the neck and head) and lethargy. Head shaking, weakness, emaciation and semiclosed eyes can also be seen. Eventually, death occurs if treatment is not performed with flubendazole or fenbendazole.



Necropsy images of gapeworm in the trachea of waterfowl.

Aspergillosis is a common fungal condition in ornamental ducks. It is related to immune suppression and it is more commonly seen as a chronic process in adult birds. Clinical signs include weight loss and respiratory problems. *Aspergillus* is acquired from the environment and it is not transmitted from bird to bird. The fungal infection produces granulomas in any part of the respiratory system, and acute presentations can occur when granulomas obstruct the trachea. Several diagnostic tests can provide useful information, as the disease produces leucocytosis with heterophilia and monocytosis, abnormal protein electrophoresis patterns, and granulomas can be easily detected using coelioscopy. Antigen and antibody detection can produce false-positives and false-negatives. Main differential diagnosis is avian TB, but aspergillosis is always restricted to the respiratory tract. Treatment is unrewarding once the disease is quite developed and euthanasia should be performed.



Sagittal cuts of a trachea from a duck that died with an acute presentation of aspergillosis. The granuloma is occupying most of the lumen of the trachea.