Avian Emergency Coming In?
An Overview of Common Presentations
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Etiologies
The causes for a bird to have an emergency visit to the veterinarian are similar to those for mammals, but may vary slightly, for example: trauma (hit by ceiling fan, toe closed in door, big bird/little bird incidents, dog/cat attack, burns), toxins (lead, zinc, PTFE fumes from Teflon), metabolic (hypovitaminosis A, hypocalcemia in African Grey Parrots), or infection (due to bacteria, virus, fungus or chlamyphilia usually involving the liver, GI or respiratory tract). Unlike mammals, birds usually present with a terminal manifestation of chronic disease that has just recently showed overt acute signs. Subtle clues of disease have often gone unrecognized by the owner. This is because birds hide signs of disease to avoid being ostracized by the flock; i.e. the flock doesn’t want to be around a bird that is attracting a predator. A common avian emergency is egg binding (dystocia) due to low total body calcium from a long term calcium deficient diet (such as a seed diet).

Clinical goals
First, if possible, obtain a history over phone so as to be as prepared as possible when the bird arrives.

Be familiar with common species problems (i.e. for a seizuring African Grey parrot have hypocalcemia at the top of your rule-out list). Evaluate the history, cage and husbandry, droppings, and observe the bird for clues as to the etiology before stressful restraint. Perform a rapid, but thorough PE, and diagnostic collection (+/- ebc, profile, radiographs, fecal gram stain); sometimes the bird may be so stressed that the exam may need to be performed in less than one minute. Obtain an accurate weight with a gram scale so as to administer accurate drug dosing. Provide supportive therapy to stabilize the patient including providing a warm (85-90°F) and stress free environment (no barking dogs), +/- O2, offer familiar/favorite foods and water that are elevated to sit right in front of the bird, provide 10 hours of daylight and 14 hours of dark, provide a low perch (birds insist on perching on the highest available perch, even when severely debilitated.

ABC’s (airway, breathing and cardiovascular system) for the unconscious patient
Airway
First check to see that the patient has a patent airway. Is the airway patent or is there a mass or foreign body in the trachea? Examples of a mass include, aspergillus granuloma, neoplasia, diphtheritic membrane. Examples of a foreign body include a millet seed in a cockatiel trachea (this can be directly visualized in the trachea with a rigid 1.0 mm endoscope.

Breathing
Second check to see if the animal is breathing, and if not then intubate (use uncuffed ET tubes in birds since they have complete tracheal rings). Provide intermittent partial pressure ventilation (IPPV) in birds at 1 breath/5sec. Due to the unique respiratory system in birds an air sac tube can be placed in caudal thoracic or abdominal air sac and oxygenated air will flow through the lung. An air sac tube can be connected to O2 or anesthesia, and left in place 5 days. To place an air sac tube, make a skin incision over the sternal notch area (borders are the last rib, the femur and the lateral processes of the vertebrae) and use a pair of hemostats to penetrate body wall, and then insert an ET tube.

Cardiac arrest
Third, check to see if there is a heartbeat present. If a bird experiences cardiac arrest, then the prognosis to reverse this situation is poor/grave due to a bird’s high metabolic rate and oxygen demands. The following treatments can be attempted to reinitiate heart beat: rapid heart massage and ventilate (100 beats per minute and 1 breath/5 seconds), epinephrine IV or IT (intratracheally), atropine (usually used to prevent bradycardia), dopram IV or IT (stimulates respirations), bolus IV fluids +/- 2.5 – 5% dextrose and/or colloids.

Common emergency situations and their treatments
Blood loss
The average blood volume of a bird is approximately 10% of its body weight (BW). For example a 1.0 kg blue and gold macaw has an average blood volume of about 100ml. A healthy bird can lose up to 10% of their blood volume (or 1% of BW) without any adverse side affects. Again our healthy 1.0 kg blue and gold macaw could lose up to 10 ml without any adverse side effects. Unlike mammals, a healthy bird can usually lose up to 30% of their blood volume without dying due to compensatory mechanisms. Because of these compensatory mechanisms, it is important to realize that the PCV in a bird is not accurate (i.e. not equilibrated) for 24 hours after a hemorrhagic incident because birds can compensate their PCV during blood loss by shunting blood from large skeletal muscle capillary beds and away from the kidneys via the renal portal system to increase blood to central areas. Therefore, an equilibrated PCV <15%, or an immediate PCV <20% are similar and serious enough to contemplate a blood transfusion. Fluids, hetastarch, oxyglobin or
a blood transfusion (5% of BW) will help a bird with severe blood loss. The anemic patient may require vitamin B complex, iron dextran and vitamin K₁.

**Dehydration**

Most sick birds are 5-10% dehydrated. Severe dehydration is usually > 10%. Clinical signs of dehydration include depression, reduced skin elasticity over digits, sunken eyes, cool digits, decreased refill time of the basilic (cutaneous ulnar) vein. A general rule of thumb is that a normally hydrated bird will have a basilic vein refill time that is instantaneous, such that you cannot see the vein refill after applying digital pressure to the vein. If you can see the vein refill then the bird is at least 5% dehydrated, and if the vein takes 1 second or more to refill then the bird is over 5% dehydrated.

**Therapy for severe dehydration**

Maintenance fluids are the same for birds as they are for mammals at 50 ml/kg/day.

- For example, maintenance fluid calculations for a 500 gram Amazon parrot:
  - 0.5 kg X 50 ml/kg/day = 25 ml/day

- For example, dehydration fluid replacement needed for a 500 gram Amazon parrot that is 6% dehydrated:
  - dehydration replacement in liters is BW (in kg) X % dehydration (expressed as a decimal amount)
  - -0.5 kg X 0.06 = 0.030 liters = 30 ml
  - the calculated dose for dehydration replacement (30 ml) should be administered over a 48 hour period

- For example, maintenance and dehydration fluids given to above bird in 48 hours:
  - day 1: 25 ml for maintenance + 15 ml for half the dehydration replacement = 40 ml
  - day 2: 25 ml for maintenance + 15 for the 2nd half of dehydration replacement =40 ml

**Fluid therapy**

Fluid therapy is a critical component of emergency therapy. The most commonly used fluids are lactated Ringer’s solution or Normosol-R since they most closely resemble the fluid lost. WARM (about 100°F) FLUIDS are imperative, realize the body temperature of most birds is 104-109°F. Sometimes 2.5 % dextrose is added to the SQ or IV fluids. Mild dehydration may only require conservative management such as oral or SQ fluids. SQ fluids are generally administered into the inguinal area in birds. Severe dehydration or shock requires rapid circulatory expansion with IV or IO (intraosseous) fluids since oral or SQ are inadequate in these cases due to lack of absorption at the administration site. Peripheral indwelling catheters have been avoided in birds since they have small fragile veins that easily form hematomas, their dermis is highly mobile causing difficulties in stabilizing the catheter, and they have refractory temperaments and a powerful beak. Repeated IV bolusing can be attempted, but it is stressful to the birds to be repeatedly restrained and it is damaging to the veins. Switch to oral fluids as soon as possible.

**Intraosseous (IO) catheters**

IO catheters allow continuous access to peripheral circulation, and they provide the ability to administer drugs, fluids, or total parenteral nutrition (TPN). The use of IO catheters is safe, rapid and practical.

IO catheters are most commonly placed in the distal ulna or proximal tibiotarsus. IO catheters should not be placed in a pneumatic bone as this may drown the bird when fluids are administered, since pneumatic bones communicate with the respiratory system. Likewise, intracoelomic fluids should not be administered as this may also drown the bird if fluids get into an air sac.

**IO catheter placement**

1) pluck and aseptically prepare the carpus, 2) position needle in center of distal ulna, 3) support ulna and rotate catheter, 4) past cortex the catheter passes easily, 5) aspiration produces a small amount of blood, 6) anchor to soft tissue of carpus, 7) apply a figure-8 bandage.

**Avian therapy**

**Therapy overview**

Most infections in parrots are due to Gram negative organisms. Most drugs are used empirically, since very few if any pharmacodynamic and pharmacokinetic studies have been performed in any species of bird, or a few species of birds (realize there is no generic bird, different parrot species react differently to different drugs so research on each species would take forever). The goal is to achieve antimicrobial tissue levels at the site of infection that are greater than theMIC, but realize tissue penetrations vary. Also realize that drug excretion is rapid in birds compared to mammals. Antibiotics can cause immunosuppression and change normal flora producing a secondary fungal infection, therefore only use antibiotics when indicated so as not to upset the delicate balance of normal flora. Choose bacteriocidal instead of bacteriostatic antibiotics.

**Water additives**

Advantages of adding medications to the water are that thy easy to administer, the bird medicates itself, and it reduces specific water borne disease. Disadvantages are inexact dose, poor palatability reduces water and drug intake, medications unstable in water, underdosing increases organism resistance, and they are poorly or slowly absorbed.
**Food additives**

Advantages of adding medications to the food are that they are easy to administer, food consumption is fairly consistent, and it is easy to treat hand fed nestlings. Disadvantages are the same as for water above, except realize that sick birds are often anorectic or hyporectic.

**Direct oral**

Advantages of direct oral medications are that they are easy to give a precise dose (unless they spit the drug out or don’t swallow), human pediatric suspensions are available, and you can tube feed at the same time. Disadvantages include stress of capture and restraint, aspiration of drug, drug may be poorly or slowly absorbed, and possible malabsorption (if for example the bird is in shock or has a GI disorder).

**IM - pectoral muscles**

Advantages of IM injections are that an exact dose is given, they are quick and easy to administer and they are quickly absorbed. Disadvantages include that not all drugs are available as IM, and pain and necrosis.

**IV - jugular, etc.**

Advantages of IV dosing include that an exact dose is given, and rapid therapeutic levels are reached. Disadvantages include the stress of prolonged restraint and the fragile veins of birds.

**IO – ulna or tibiotarsus**

Advantages are a precise dose can be given and the IO catheter can be left in place up to 5 days. Disadvantage would be discomfort/pain.

**SQ - inguinal**

Advantages are a precise dose is given and it is quick and easy to administer. Disadvantages include some drugs are irritating SQ and severely debilitated birds may not absorb SQ fluids or drugs.

**Other methods of treatment**

**Topical**

In birds, avoid greasy topical compounds because this reduces the insulation of the feathers. If ointments must be used in birds, then use sparingly. It is better to use water soluble creams.

**Nebulization**

Nebulization is used to deliver medications for respiratory infections. Nebulization is the atomization of a liquid into small (< 3 microns) droplets that can be inhaled. Usually nebulization is performed for 10 - 30 minutes by forcing oxygen through a solution (containing antibiotics or antifungals, etc.).

**Sinus/nasal flushing**

Sinus flushing can be diagnostic (cytology, culture) and/or therapeutic. Remember to use WARM saline. Also, it is imperative to hold the bird completely vertically upside-down so as to avoid aspiration of fluid into the trachea. Flushing can be performed in an awake bird or an anesthetized, intubated bird.

**Tube feeding**

Tube feeding is controversial in critically ill patients (will they process it?). First make sure the bird is hydrated. Usually start with a thin carbohydrate supplement (such as Emeraid) and later use a juvenile parrot hand feeding formula or specially made avian critical care diet (high calorie, easy to digest). Birds have a high basal metabolic rate with very little in reserves, therefore if a bird is losing weight, then it needs to be tube fed. While hospitalized a bird is weighed daily in the morning on a gram scale. Tube feeding is necessary if a bird is not maintaining or gaining weight in the hospital. Generally birds are tube feed 1-4 times/day. Technique: 1) restrain the bird in a normal upright position so as to avoid regurgitation and aspiration. 2) I prefer a stainless steel feeding needle with ball tip, others use a red-rubber catheter and a speculum to prevent the bird biting the tube in two. 3) aim from left commisure to right crop area. 4) avoid the large trachea and avoid excessive force so as not to puncture the esophagus. 5) be absolutely sure of placement by palpating/visualizing tube in crop before administering the formula. 6) if the bird regurgitates, then place it on the floor immediately.

**Approximate feeding quantities (start with small amounts, then increase to amount below)**

- budgie - 1 ml
- cockatiel - 3 -5 ml
- Amazon parrot- 15 - 30 ml
- cockatoo - 20 - 40 ml
- macaw - 30 - 60 ml
Recently, the *AVMA Guidelines for the Euthanasia of Animals: 2013 Edition* was released. This new, expanded version is 102 pages long and includes sections on species that were not addressed in earlier versions, section on how to handle animals before and during euthanasia, and disposal of carcasses. It also includes an avian section pertaining to pet birds, aviary birds, and birds used in falconry, racing, zoos, and educational facilities. The new Guidelines emphasize evidence based medicine and research, but unfortunately in the area of euthanasia of birds, there is little, if any, research or evidence based medicine published compared to mammals. What scientific literature is available pertains to chickens in a commercial environment, otherwise it is anecdotal information. There are separate sections in the Guidelines for wild birds under “Captive and Free-ranging Nondomestic Animal” section of the Guidelines”, and for birds raised for food under “Animal Farmed for Food and Fiber” section” of the Guidelines.

Some peer-reviewed reports are available in the literature regarding euthanasia of individual or small groups of birds, but most of the information consists of anecdotal reports in book chapters, guidelines from various associations, journal roundtable discussions and editorials. The method of euthanasia depends on species, size, anatomic and physiologic characteristics, environment, degree of domestication, clinical state, and anticipated and actual response to restraint. People performing the euthanasia should be knowledgeable about what is normal behavior for a bird compared to what is considered a stressed or fearful bird and handle the bird appropriately to reduce stress before and during euthanasia.

According to the 2013 AVMA Guidelines for Euthanasia acceptable methods of euthanasia of birds include injection of a sodium pentobarbital euthanasia solution IV with or without the bird being unconscious or under anesthesia, or intracoelomic, intracardiac or intraosseous injection of a sodium pentobarbital euthanasia solution while unconscious or under anesthesia. Anesthesia is defined as either halothane, isoflurane, or sevoflurane with or without nitrous oxide. Acceptable methods of euthanasia of birds with conditions include inhalant anesthetics alone at high concentrations (isoflurane, sevoflurane, halothane with or without nitrous oxide), carbon dioxide (>40%), carbon monoxide, nitrogen, argon, and the physical methods including cervical dislocation (<200 grams), decapitation (<200 grams), gunshot (field conditions), and the following only as a secondary methods if unconscious or under anesthesia: potassium chloride, exsanguination and thoracic compression. Realize that barbiturate salts are alkaline and irritating and that intracoelomic injections are irritating, especially if they inadvertantly get into an air sac. Also realize that intraosseous injections should not be given in pneumatic bones such as the femur or humerus because these are lined with respiratory epithelium and connect to the respiratory tract.

**Overview of methods**

**Acceptable**

Intravenous (IV) injection with an injectable euthanasia agent (such as sodium pentobarbital) is the quickest and most reliable means of euthanizing birds when it can be performed without causing undue stress. Most birds get stressed with handling so I particularly prefer to gently restrain them in a towel while mask inducing with isoflurane or sevoflurane with or without prior sedation with midazolam given intramuscularly (IM) or intranasally (IN) 15 prior to induction. Other sedatives can be used.

**Acceptable with conditions**

The Guidelines are clear to state that “Methods acceptable with conditions are equivalent to acceptable methods when all criteria for application of a method are met”. Inhaled anesthetics – Birds given high concentrations of inhaled gas anesthetics lose consciousness rapidly and then death occurs after they are rendered unconscious. The condition is that a high concentration of gas be used and the restraint cause little to no stress. This method usually induces minimal tissue damage in case a necropsy is needed.

Carbon Dioxide – Birds require comparatively high (>40%) concentrations of carbon dioxide to induce anesthesia followed by loss of consciousness. There is much scientific literature available on the use of carbon dioxide for the use of euthanasia of chickens, ducks and turkeys. It is important that the application rate of carbon dioxide is just right so that the increase in carbon dioxide is rapid enough to have a short time to loss of posture and unconsciousness, but slow enough that there is less aversion or reaction to the gas. Even though birds are unconscious, they tend to flap with carbon dioxide and this can damage tissue if needed for necropsy. Carbon monoxide – Not generally used in clinical settings due to risk to personnel. Argon and Nitrogen – Not generally used in clinical settings due to availability. Cervical dislocation – Sometimes needed in a field situation, say an emergency at an aviary. Cervical dislocation is typically done in birds that are <200 grams, but has been described in birds as large as 2.3 kg. Acceptable with the condition that the person performing the cervical dislocation is experienced in performing the procedure.
Decapitation – Again, sometimes in a field situation, may need to use this method. Again, decapitation is typically done in birds that are <200 grams, but has been described in birds as large as 3.5 kg. Acceptable with the condition that the person performing the decapitation is experienced in performing the procedure and the device used is very sharp and kept in good working order. One study showed that visual evoked responses were present up to 30 seconds after decapitation.

Gunshot – Not used in a clinical setting due to obvious dangers to personnel and other, better methods are available.

Adjunctive methods are those methods that can be used only if the bird is unconscious and anesthetized prior to their use, and include IV or intracardiac potassium chloride, exsanguination, or thoracic compression. These methods are unacceptable if performed in a conscious bird. Exsanguination is useful if the blood is needed for further testing in the bird.

Unacceptable

In the conscious bird it is unacceptable to perform thoracic compression, exsanguinate, or administer potassium chloride.

Eggs

Bird embryos that are >50% through incubation should be euthanized by above acceptable methods or acceptable with conditions methods including anesthetic overdose, decapitation, or prolonged (>20 minutes) exposure to carbon dioxide. Eggs that are less than 50% through incubation can be destroyed by prolonged (>20 minutes) exposure to carbon dioxide, cooling (<4 degrees C for 4 hours), freezing, or egg addling.

References

Taking and interpreting radiographs of birds is different than it is for mammals for various reasons: they are usually smaller, their anatomy is different, and usually they need to be anesthetized for ideal positioning and interpretation of radiographs. First determine the goals of your imaging study. In order to do this, it is important to obtain a thorough history and physical examination, develop and problem list with primary rule-outs for the problems, and develop and diagnostic and treatment plan. Radiographs alone can make a diagnosis in some cases, but this is not the case all the time. Other diagnostics will most likely be necessary for a complete diagnosis. Obtain high quality images. This is especially important with avian patients since they are so small and fine detail is necessary. Consider if you want to anesthetize or restrain your patient for radiographs and how positioning may affect your ability to determine if a radiographic lesion is present or not. Can the bird withstand the diagnostic test you have planned? And lastly, interpret your radiographic images. There are many texts available to help in evaluating avian radiographs.

Restraint
To obtain the best quality radiographs without artifact from movement of fast respiratory rates or struggling it is best to sedate or anesthetize the bird. So a choice needs to be made regarding whether to use physical or chemical restraint. Considerations include: stress to patient, suspected disease process, pain level and stability of patient, the degree of correct positioning needed, and staff exposure to radiation and anesthetic gas. It is my opinion that it is best to briefly anesthetize at a light plane of anesthesia with either isoflurane or sevoflurane +/- the use of midazolam, +/-intubating. It is my opinion that physical restraint is incredibly stressful to the bird and that positioning is less than ideal. There are plexiglass restraint boards available to tape or Velcro the bird to the board. There are times that the bird is too debilitated for restraint or anesthesia, and if the goal is ascertain whether there is an egg present or whether there is heavy metal present, then a “bird in the box” radiograph can be taken where positioning doesn’t matter as much. Always be prepared to monitor the bird via multiple methods (stethoscope, pulse oximeter, Doppler, ECG), provide thermal support (forced heated air blanket for example), be ready in case of an emergency (have ET tubes there with you that will fit the bird, epinephrine, atropine), and have all equipment available that you think you will need, especially if you are going to combine radiography with another, even if it is brief, procedure.

Positioning and radiographic technique and interpretation
Typically whole body orthogonal views are taken (ventrodorsal and right lateral). For the VD view, the bird is laid in dorsal recumbancy with both wings extended equally laterally, and both legs extended equally caudally. The keel should be superimposed over the vertebral column, and the femurs, scapula and acetabula should be parallel. The focal point of the beam should be at the caudal point of the sternum. For the lateral view, the bird is laid in right lateral recumbancy, with the wings extended dorsally (either evenly if body is of interest, or staggered with dependent wing slightly cranial if a wing or shoulder is of interest), and the legs are equally extended caudally (equally if body of interest to move knee caudal to ventriculus, or staggered with the dependent leg slightly cranial if legs are of interest). The acetabula, ribs, shoular joints, and kidneys should be superimposed. Again, the focal spot for the beam is just cranial to the caudal tip of the sternum. If the wing is to be evaluated an additional view is needed, specifically the cranio-caudal view, in order to obtain orthogonal views. The bird is placed in dorsal recumbancy and horizontal beam is used. If the foot is to be evaluated, then a caudopantar view of the foot is also needed. For skull radiographs the views include both lateral views, obliques, DV and rostrocaudal. A standard radiograph machine and film can be used, or mammography film can be used, or digital. The ideal focal film distance is 40 inches. Table top is usually used unless the width of the bird is greater than 10 cm. Short exposure times are used (<1/120 sec.) and a high mA (>300mA) with a low kVp (45-65 kV). Develop your own systematic approach to viewing radiographs so as not to miss anything (remember there can be more than one lesion). Learn normal avian anatomy in order to recognize abnormal findings. Follow the SOAP (Subjective, Objective, Assessment, Plan) format to be thorough in evaluation of any radiographic abnormalities identified by developing a differential diagnosis list. Develop a plan for further diagnostic tests and/or treatments.

Musculoskeletal system
The musculoskeletal system includes the skull, spine, pectoral girdle, wings, pelvis, and pelvic limbs. The skull is mainly composed of sinuses. The eye itself has bones to support the eye called scleral oscicles. Realize that in parrots, but not all birds, there is a true joint called the craniofacial hinge (or nasofrontal joint depending on who you read) where the beak joins the frontal bone. Unlike mammals, birds have a variable number of cervical vertebrae, varying between 8 and 25 cervical vertebrae. This allows their beak to reach many places and to be used for preening the entire body, prehending food, biting, and for stabilization. The notarium is a fusion of the first
thoracic vertebrae. The synsacrum is a fusion of the caudal thoracic, lumbar, sacral, and caudal vertebrae. Together, the notarium and synsacrum stabilize the spine. The pygostyle is a distal fusion of the caudal vertebrae making a structure for tail muscle attachment. The tail muscles are used for steering during flight. The sternum usually has a prominent keel for pectoral muscle attachment, unless it is a flightless bird (such as an ostrich) that has no need for strong pectoral muscles. Ratites like ostrich have a flat boat shaped keel with no keel. The pectoral girdle consists of three bones including the coracoid bone (which acts as a strut enabling flight), the clavicle and the scapula. The bones of the wing include the humerus, radius, ulna, ulnar and radial carpal bones and major and minor metacarpals, phalanges, and alula (remnants of a thumb). The bones of the hind limb include the femur, tibiotarsus, tarsometatarsus, and phalanges. The digits are numbered from medially to laterally and the number of phalanges in each digit is one more than the digit number. The femur, humerus and some vertebrae are pneumatic bones, meaning they are air filled and connect directly to the respiratory tract. The medullary cavities of these bones are covered in respiratory epithelium and respiratory tumors have been documented within the medullary cavity of the humerus. Musculoskeletal diseases in birds include arthritis, osteomyelitis, fractures (it is OK to see air in nearby soft tissue is a pneumatic bone is freshly fractured!), polyostotic hyperostosis (from hyperestrogenism in females, from oviductal tumors, breeding hen, Sertoli cell tumors).

Respiratory system

Birds possess an extensive infraorbital sinus, in fact most of their head is sinus. Compared to mammals, birds have a very large trachea, and therefore birds can inhale more air (and bring in more oxygen) than mammals. This helps to enable the energy required for flight. Birds have complete tracheal rings, and that is why the use of uncuffed endotracheal tubes are recommended in birds to avoid pressure necrosis of the trachea. Birds lack a diaphragm, therefore they must be allowed to move their sternum up and down or they will suffocate. The syrinx is responsible for sound generation in the bird, they do not possess a larynx. The syrinx is right at the bifurcation of the trachea just cranial to the heart in a bird. Some male ducks, such as the male Mallard duck, have a bony syringeal bulla coming off the right side of the trachea just cranial to the heart to allow them to have a loud quack. Other strange anatomical structures in some birds include a coiled trachea found in swans, cranes, spoonbills, and birds of paradise. Also, penguins have a trachea that bifurcates very cranially compared to other birds. The pathway of inspired air in the bird is as follows: trachea > primary bronchus > secondary bronchus > parabronchi > air capillaries. On radiographs, the lung itself normally looks spongy or has a honeycomb appearance and that is the end on parabronchi being visualized. Birds have air sacs that store and warm air, and they also act as a bellows. Parrots have 9 air sacs (2 cervicoepheal, 1 clavicular, 2 cranial thoracic, 2 caudal thoracic and 2 abdominal). The air sacs directly communicate with the respiratory system, therefore a tube can be placed in the side of a bird directly into the caudal thoracic or abdominal air sac and the bird can breathe through this tube or can even be anesthetized through this tube. Remember that some bones (femur, humerus, some vertebrae) are pneumatic and not only communicate with the respiratory system, but are also lined with respiratory epithelium. Respiratory diseases include pneumonia (where the fine detail of the lung is lost), air saccitis (where the thickened walls can actually be seen radiographically), and SQ emphysema (possibly from a ruptured air sac).

Cardiovascular system

Birds, like mammals, have a 4 chambered heart, the apex of which is surrounded by the liver (remember there is no diaphragm in a bird). The avian heart is comparatively larger than a mammalian heart at about 1.5 to 2 times larger than a mammalian heart. This allows more oxygen flow for the tremendous work performed during flight. The cardiac silhouette usually lies between the 2nd and 5th rib and constitute 50% of the width of the cranial coelomic cavity on the VD view. The apex of the heart silhouettes with the cranial part of the liver to make a hour glass shape on the VD view called the cardiohepatic silhouette. It is abnormal to see calcification in the greater vessels, so watch for it in older and obese birds.

Gastrointestinal system

Since birds lack a diaphragm they possess a “coelomic cavity”, not an abdominal cavity. Birds do not have teeth, instead they have a beak that is variable between species. Parrots are sometimes called hookbills because of their strong, hooked beak. The esophagus of birds is divided into two sections, the cervical esophagus and thoracic esophagus. The two sections are divided by an out-pouching of the esophagus called the crop (ingluvies). The ingluvies stores food to be digested later when the bird is up in a tree where it is safe. On VD radiographs the crop lies to the right just cranial to the thoracic inlet. Birds possess a proventriculus, also known as the true glandular stomach (on VD overlies the left liver lobe, on lateral is dorsal to the liver), and a ventriculus (on VD slightly to the left, can have grit pieces in it, on lateral is caudoventral to the proventriculus), also known as the gizzard which grinds food such as grains. Birds like raptors that eat soft prey items have a softer, more flaccid ventriculus, whereas birds like chickens that eat hard grain whole without shelling it first, have a firm, thick muscled ventriculus for grinding the grain. On the VD radiograph the liver should not extend beyond a line drawn from the corocoid to the acetabulum and on the lateral it should not extend much past the sternum. Also on the lateral radiographic view there should be a dark triangle with the base being the liver, the cranial edge the lungs, and the caudal edge the intestines. On the lateral view of the radiographs, the round spleen is usually seen slightly dorsal to the proventriculus. The cloaca of birds is the end point for three systems: the GI, reproductive and urinary systems. The most common gastrointestinal disease
is a metallic foreign body within the ventriculus. Sometimes a piece of paint can have enough lead or zinc in it to be toxic to the bird, but only show up as a mineral dense particle on radiographs because of how thin it is. Loss of the cardiohepatic “waist” can be due to hepatomegaly, cardiomegaly, enlargement of proventriculus-ventriculus, air sac disease, splenomegaly, enlargement of reproductive tract, or ascites.

**Genitourinary system**
Parrots have 3 divisions to their kidney; the cranial, middle and caudal divisions. They are not lobes. The kidneys of birds are located dorsally in a concavity of the sacrum and surrounded on three sides by bone, therefore any swelling of the kidney can only expand ventrally or increase pressure within the kidney or increase the pressure on structures running through the kidney such as the sciatic nerve. This is why a budgerigar with a common renal tumor will present lame in one leg. Radiographs of kidneys are best viewed on the lateral view, but they are summated. The gonad (left ovary or both testicles) are located just cranial to the cranial pole of the kidneys (testicle usually summated) on the lateral view. Genitourinary diseases include renomegally, ureteroliths, egg binding, gout, radiodense deposits, renal calcinosis,

**Advanced avian imaging**
This talk is focused on radiographs of birds, but just a word on advanced imaging that is available for use in birds with normal described in the literature include contract studies either awake or under anesthesia and intubated (barium GI or iodinated material in excretory urograms, etc.) fluoroscopy, ultrasound (difficult due to extensive air sacs in coelomic cavity of birds), echocardiography, CT (computed tomography) or microCT, MRI (magnetic resonance imaging), and PET (positron emission tomography).
Backyard Poultry are Coming in for an Appointment!
Overview of General Care and Husbandry
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Backyard poultry are very popular and they are presenting to veterinarians for basic as well as advanced care. People own chickens for a variety of reasons, either for companionship, to have fresh eggs for their own consumption, or small scale meat and egg production, and the level of care requested varies considerably. Some owners may only want to know what dose of dewormer they should use in their egg laying hen (none are supposed to be used in an egg laying hen by the way), whereas some owners will OK a referral for an MRI (yes, we had a seizuring pet turkey that got an MRI). The old adage of “always offer the best care possible” is also true when offering care to owners of backyard poultry, with the understanding that the owner will be quick to let you know how much they are willing to spend. As veterinarians we can also provide educational information to the public at various venues including co-ops, feed stores, chicken shows, etc., and inform owners about salmonellosis risks, the laws and regulations governing a food animal, the importance of vaccinating against Marek’s disease, how to provide proper care, and what signs to look for that may indicate disease. We can also field questions that the public has about avian influenza. The diseases and care of backyard flocks is different than that of commercial broilers, breeders or layers and the following is an overview of how to provide the best care possible to backyard poultry.

Where to get information?
First and foremost backyard chickens are birds and all of our knowledge of avian medicine can be used in their care including general husbandry and care, handling, approach to medicine and surgery, and anatomy and physiology. Consult an avian textbook for general information on birds. Most information will concentrate on the chicken, although the term backyard poultry also includes turkeys, pheasants, ducks, geese, swans, quail, and other species. There are several websites and books available on the care of backyard poultry.

Examples of websites and books with information on backyard or production poultry
1. Backyardpoultrymag.com
2. Backyardchickens.com
3. CDC’s information sheet on Salmonella, http://www.cdc.gov/features/salmonellapoultry/

Chick and chicken care
Diet
A chick that is destined to become a laying chicken should be fed the following as they age: 0-6 weeks of age feed chick starter (18-20% protein); 6-14 weeks of age feed chick grower (16-18% protein); 14-20 weeks of age feed developer (14-16% protein); 20-24 weeks of age start layer ration (16-18% protein). Some advocate adding some scratch (dried cut up corn) to the diet so that they do not grow too fast and develop valgus limb or wing deformities. Scratch and fresh greens provide enrichment as well. Always provide clean, fresh drinking water in waterers that are constructed such that the birds cannot roost on them to defecate in the water. Use chick starters rations containing a coccidiostat. Always purchase the best feed you can afford. Perosis, or slipped gastrocnemius tendon is caused by a deficiency of choline, manganese or biotin. Valgus limb deformities can be caused by a manganese deficiency or improper substrate.

Medications used in chickens
Any questions regarding use of a drug in a chicken or egg laying hen can be answered by viewing the FARAD website and/or contacting them. In general terms, there are drugs that are prohibited, drugs that are considered off-label, and then drugs that are approved for use in some specific instances (certain drug at certain concentration, at certain does, given to certain poultry at a certain age for a certain duration and frequency), all of which makes it near impossible to develop a formulary for backyard poultry.
Space
Adult chickens need a minimum of about 2-3.5 square feet per chicken. Chicks up to 2 weeks of age need at least 10 square inches per chick. By 4-8 weeks of age they need at least 1 square foot. Crowding or flocks of 4-6 birds can cause stress and lead to cannibalism. Red lights sometimes decrease cannibalism in chicks since apparently it makes the red color of blood or hyperemic tissue less enticing to peck.

Temperature
Chicks initially need 95°F, then decrease by 5°F weekly (usually done by raising heat lamp 3 inches weekly) until reach room temperature. An excellent method to determine if the chicks are at the proper temperature is to observe their behavior. If they are all huddled under the lamp then their environment is too cold. If they are all hanging out at the periphery of the enclosure away from a central heat lamp then their environment is too warm, and if they are scattered about an enclosure with a central heat lamp then the temperature is just right.

An adult chicken is most comfortable and efficient at producing eggs when at 70-75°F. Hot chickens eat less. Chickens may die of heat stress at temperatures over 95°F. Adequate ventilation is absolutely necessary.

Bedding and flooring
Many people use pine shavings or for chicks, then pine shavings, straw, or well-drained soil when older. The flooring of coops can have dirt, wooden slats, concrete, or wire. A variety of products are available. A “chicken tractor” is simply an enclosure that can be moved around a yard over a new substrate (usually grass). These can be very simple structures or very elaborate. A nest for a Leghorn—type chicken can be constructed of wood at 12” wide, 14” high, by 12” deep, with a perch just in front of the entrance. Construct fences and coops strong enough to keep predators, such as raccoons, from getting to the chickens. One of the most common presentations of chickens in private practice is attack by a predator whether it be a dog, raccoon, etc. Sometimes the trauma is from other chickens (cannibalism). When dogs attack chickens there is usually loss of feathers and scratches and/or bite wounds over the dorsum and sides. The chickens usually present in shock. Treatment consists of treating the shock with fluids (usually SC is sufficient), antibiotics to prevent/treat infection, and repair of damaged tissues including debridement of necrotic tissue. Chickens seem to recover well and heal quite severe wounds, so do give them the benefit of the doubt and treat, but do control their pain with either NSAIDs or butorphanol. Various techniques used in other species for wound management can be used in chickens.

Pododermatitis
Ulcerative pododermatitis tends to occur if the chicken is overweight, on a roughened surface, or if one leg and foot bears more of the body weight than the other, or a combination of all these factors. There are varying grades of ulcerative pododermatitis from mild with hyperemia of the skin, to severe with osteomyelitis of underlying bone. A radiograph is the best method to determine if there is underlying osteomyelitis, a condition that requires long term antibiotic therapy and probably debridement of necrotic tissue. Most cases of ulcerative pododermatitis are somewhere in between mild and severe and consist of a thickened area of skin on the plantar surface of the foot usually over the metatarsal pad, but can also be seen on the phalangeal pads. There are differing opinions as to how aggressive to be with debriding the tissue or not – usually if there is necrosis, then debridement is necessary. Soaking the foot will greatly soften the tissue and ease surgery. Surgery should be performed under general anesthesia with administration of a pain reliever such as butorphanol since this is inherently a painful procedure. An aspirate or tissue sample is often needed to culture the area and prescribe the appropriate antibiotics. The substrate should be made as soft as possible and kept clean. Underlying lameness should be corrected. Pain relief should be addressed.

Salmonellosis
There are several organisms responsible for salmonellosis in poultry and people including S. pullorum = Pullorum dz, S. gallinarium = Fowl Typhoid, S. typhimurium = Paratyphoid infection, S. arizona = Arizonanosis (turkeys only). In poultry salmonellosis causes lethargy, diarrhea, pasty vent. Salmonella can be normal GI flora in poultry providing a source of infection for humans, but it is significant (and indicate disease) if a salmonella is cultured from anywhere other than intestines in poultry. Salmonellosis is almost eliminated in US commercial flocks. Treatment = antibiotics. See the USDA and CDC handouts on the zoonotic implications of salmonellosis. Veterinarians should educate owners on the risk of salmonellosis in humans from handling poultry. The elderly, those under 5 years of age, and immunosuppressed individuals are most at risk for a fatal infection. There have been deaths recently in young children after handling chicks and ducklings.

Coccidiosis
Coccidiosis is caused by coccidia, protozoan organism. The are many species (9 in chickens, 7 in turkeys at least 4 in quail) and they are host specific and not zoonotic. In other words a chicken cannot infect a turkey and visa versa. A flock may develop resistance to one species only to be infected with another species. Cecal coccidiosis is worse in that it typical causes bloody droppings and is associated with higher mortality, whereas intestinal coccidiosis is typically more chronic in nature and is associated with a lower mortality. The clinical signs of coccidiosis are severe in young (4-16 weeks of age) chickens by having bloody diarrhea, pale combs, lethargy, tendancy to huddle, partial anorexia, weight loss, dehydration, and death. The typical clinical signs are diarrhea, unthriftyness, and variable levels of mortality. As chickens get older they become more resistant and show little to no clinical signs, but can act as carriers to later expose young chicks. Transmission is through direct or indirect contact with droppings from infected...
birds (fomites, free-flying birds, insects and rodents). The oocysts shed in feces are not immediately infective, they have to first go through a maturation phase (sporulation) which can take as little as 1-3 days in warm, damp litter. The disease is most common in the springtime. Diagnosis is based on a fecal float. There are many species of coccidian with varying areas of the intestine affected and various clinical signs. *Eimeria tenella*, the cecal coccidian, is one of the most common species and is associated with bloody droppings, and shows a typical hemorrhage of the ceca on histopathology. The other species (E. acervulina and E. necatrix) affect the intestine and are less severe. The key is prevention. Wet litter, poor sanitation, poor nutrition, and concurrent immunosuppressive diseases are the most common triggers of a coccidiosis outbreak. Treatment is with a coccidiostat such as amprolium or sulfamethazine. The best recommendation is to prevent the disease by feeding medicated feed between the ages of 0 and 16 weeks. Commercial broilers don’t typically live long enough for this disease to be enough of a problem. There is a coccidia vaccine available for use in 1-3 days old chicks, but it is only useful in certain poultry operations, since it uses live organisms and re-ingestion at 4-25 days is necessary as a booster.

**References**
Good Layer Gone Wrong:  
Backyard Hens with Reproductive Diseases  
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The number of backyard poultry is increasing as more people own chickens for either companionship or small scale meat and egg production, and more municipalities allow urban and suburban chicken ownership. Avian practitioners are increasingly being asked to care for backyard poultry and are seeking practical information on husbandry, medicine, and surgery in order to provide state of the art medical care for their patients. The diseases and care of backyard flocks is different than that of commercial broilers, breeders or layers and the following is a an overview of the how to identify and treat some of the most commonly encountered non- infectious diseases of backyard poultry.

Egg related celomitis

Egg related celomitis is an acute or chronic, celomitis involving all or part of an egg. It can be septic or not. It is common for chickens to have some degree of egg related celomitis, and mild cases are commonly encountered at necropsy in production hens. Generally chickens tolerate mild peritonitis better than parrots. Causes usually involve retrograde flow of shelled or shell-less eggs from the oviduct back into the celomic cavity due to oviductal bacterial infection, oviductal impaction, or abnormal confirmation of the oviduct. Heavy production hens or those with inadequate calcium in their diet can have calcium depletion and uterine inertia leading to retrograde flow of egg material. Bacterial infections commonly involve E. coli migrating up the oviduct from the vent.

Clinical signs of egg related peritonitis can be obvious such as a sudden drop or cessation in egg laying, or can be vague or seem unrelated to the reproductive tract such as lethargy, partial anorexia, weight loss, and lameness. Physical examination findings can include a thin bird, increased respiratory and heart rates, crackles of lower respiratory tract, a large doughy celomic cavity, fluctuant celomic fluid, and a lameness not explained by other obvious reasons.

Diagnosis is based on typical clinical signs and radiographs. Endoscopy is possible but may be hampered or risky due to celomic fluid and limited air sac space. Radiographically a large variety of findings can be encountered such as the ground glass appearance of celomic fluid, multiple or single shelled or shell-less eggs inside or outside the oviduct, hernia or expanded celomic wall, thickened air sacs, and masses in the caudal thoracic and abdominal air sac area. (Figure 1, and other rad pics of ERC) A CBC and chemistry profile including total and ionized calcium can be performed to determine the degree of infection or inflammation, amount of dehydration, if there is concurrent liver or kidney disease, or if calcium depletion is present.

Treatment can involve fluids, antibiotics, non-steroidal anti-inflammatory drugs (NSAID), butorphanol, and/or surgery. (Figure 2 and 3) The difficult decision is whether surgery will provide a better outcome than antibiotics and pain relievers alone. Generally the more severe the egg related celomitis then the more likely surgery will provide a better outcome, but I have had a few clients not chose surgery for their hens what I thought to be a moderate egg related peritonitis (lameness, large fluctuant celomic cavity, cessation of egg laying, but no shelled eggs in the celomic cavity) cleared up with just oral trimethoprim sulfa and meloxicam. Oviductal impaction should be resolved with surgery to remove the egg material before it adheres to the oviduct. Calcium injection for oviductal inertia is usually not needed since the egg related celomitis is rarely due to calcium depletion in backyard hens, but it can be given as there is minimal to no adverse effects from giving one calcium injection.

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Backyard poultry are increasing in popularity as more people own chickens for either companionship or small scale meat and egg production, and more municipalities allow urban and suburban chicken ownership. People are rediscovering that chickens have personality! Practitioners are increasingly being asked to care for backyard poultry and are seeking practical information on husbandry, medicine, and surgery in order to provide state of the art medical care for their patients. The diseases and care of backyard flocks is different than that of commercial broilers, breeders or layers and the following is an overview of the how to identify and treat some of the most commonly encountered respiratory diseases of backyard poultry, or those diseases that are highly pathogenic that you need to know how to recognize.

**Mycoplasmosis (MG)**

Mycoplasmosis is a very common, chronic respiratory disease. There are three different species of Mycoplasma that can infect chickens. *Mycoplasma gallisepticum* causes respiratory disease in chickens, but an infectious sinusitis in turkeys. *Mycoplasma meleagrisis* causes an air sacculitis and skeletal deformities in turkeys. *Mycoplasma synoviae* causes air sacculitis and synovitis /lameness in chickens. *Mycoplasma gallisepticum* (MG) is seen in backyard flocks and is of concern because it can easily spread to nearby commercial flocks and cause economic devastation for that commercial flock. Most commercial flocks are MG free. To participate in the National Poultry Improvement Plan (NPIP) a flock needs to be MG free. Transmission is through fomites. Clinical signs of MG in chickens includes an upper respiratory disease with swelling of the infraorbital diverticulum of the infraorbital sinus with caseated pus. The best prevention is to depopulate and repopulate with clean stock, but for special birds, treatment can be attempted with antibiotics (spectinomycin, lincomycin, erythromycin, or tylosin), but birds remain carriers for life.

**Infectious bronchitis virus (IBV)**

Infectious Bronchitis virus, caused by a coronavirus, affects only chickens and has a worldwide distribution. Younger, immunosuppressed chickens show worse clinical signs than older immunocompetent chickens. Clinical signs include upper respiratory signs including sneezing, gasping, rales, and nasal discharge. Young are affected worse than adults showing gasping and labored breathing. In an affected flock of chicks, all birds will typically develop clinical signs within 36-48 hours and the clinical disease will typically last approximately 4 days (longer if secondary infections develop). Older chickens show a 5-10% drop in egg production for about 10-14 days. The reproductive tract can also be affected by this virus resulting in irregular and roughened eggshells with watery albumin and decreased egg production. Also newer strains may affect the kidneys. Tests include virus neutralization, hemagglutination inhibition or ELISA. The best method to control is to disinfect, repopulate and use live vaccine. This disease is highly contagious that easily spreads via airborne particulate matter and via fomites. There is no treatment, but antibiotics can be given to prevent secondary bacterial infection, especially with Infectious Coryza. The virus is easily destroyed by disinfectants, sunlight and heat. Increasing the environmental brooder temperature by 5 degrees Farenheit helps chicks to recover. There is a vaccine available, but it is not used in backyard flocks since there are numerous serotypes.

**Infectious coryza**

Infectious Coryza virus, caused by a coronavirus, affects only chickens and has a worldwide distribution. Younger, immuno suppressed chickens show worse clinical signs than older immunocompetent chickens. Clinical signs include upper respiratory signs including sneezing, gasping, rales, and nasal discharge. Young are affected worse than adults showing gasping and labored breathing. In an affected flock of chicks, all birds will typically develop clinical signs within 36-48 hours and the clinical disease will typically last approximately 4 days (longer if secondary infections develop). Older chickens show a 5-10% drop in egg production for about 10-14 days. The reproductive tract can also be affected by this virus resulting in irregular and roughened eggshells with watery albumin and decreased egg production. Also newer strains may affect the kidneys. Tests include virus neutralization, hemagglutination inhibition or ELISA. The best method to control is to disinfect, repopulate and use live vaccine. This disease is highly contagious that easily spreads via airborne particulate matter and via fomites. There is no treatment, but antibiotics can be given to prevent secondary bacterial infection, especially with Infectious Coryza. The virus is easily destroyed by disinfectants, sunlight and heat. Increasing the environmental brooder temperature by 5 degrees Farenheit helps chicks to recover. There is a vaccine available, but it is not used in backyard flocks since there are numerous serotypes.

**Fowl pox**

There are many species of poxvirus. The Fowl Pox virus affects chickens, turkeys and quail. Clinical signs include erosive, proliferative scabs on the exterior surface of the face and feet in the form of the disease called dry, or cutaneous, pox. When there are ulcerative and proliferative lesions in the oropharynx and tracheal area it is called wet, or diphtheritic, pox and it is associated with much more severe clinical signs such as difficulty breathing and swallowing and can cause death. Histopathologically,
intracytoplasmic inclusion bodies (Bollinger bodies) are seen in infected skin or mucosa. Transmission is through mosquitos or broken skin (conspecific pecking, etc.) The disease can also be spread by ingestion of the virus in scabs that infect food, etc. The virus is highly resistant to drying and may survive months to years in the dried scabs. Inhalation of pox virus has also been shown. There is no specific treatment. Antibiotics can help with any secondary infection that occurs. There is a live quail pox vaccine available and can be used during an outbreak to prevent further spread since the disease spreads slowly through a flock.

Avian influenza
Avian influenza affects many species. The causative agent is an Orthomyxovirus. It is also known as “Fowl Plague”. The clinical signs are variable since there are mild and highly pathogenic forms, but include anorexia, decreased egg production and respiratory disease with the mild form to respiratory distress, facial swelling, diarrhea and neurological signs with the highly pathogenic form. Usually the mild form of the disease is associated with high morbidity and low mortality. Basically coughing, sneezing and sudden death are the typical signs of this disease. This a highly contagious disease associated with high mortality of both domestic and wild birds. There is no treatment. Testing usually involves virus isolation. This is a reportable disease. A killed vaccine is available, but not used in backyard flocks. Depopulation is usually the recommended action during an outbreak and the disease should be reported to the state veterinarian.

Newcastle’s disease
Newcastle’s disease affects many species of birds. The causative agent is a Paramyxovirus. There are 4 different forms that vary in severity. The least pathogenic form is the Lentogenic form which causes a mild upper respiratory disease and usually only affects the young. The mesogenic form also causes a mild upper respiratory disease, decreased egg laying, and has a low mortality. The Neurologic/velogenic form causes a sudden onset of upper respiratory disease followed by neurological signs with approximately a 50 to 90% mortality. The worst form, which is a foreign animal disease for the US, is the “Exotic Newcastle’s Disease” END or also known as the viscerotropic velogenic form that is associated with neurological signs and high mortality. In the US there is a vaccine for the first three forms listed here, but in the US we do not vaccinate against END, we test and eradicate since it is a foreign animal disease. There is a serology test available at California’s San Bernardino County Laboratory for PMV 1,2 and 3. A paramyxovirus; many different kinds of Newcastle disease; mostly mild disease in poultry and they are vaccinated at one day of age; causes mild conjunctivitis in people; test at US Quarantine stations. Exotic Newcastle’s Disease (aka VVND or viscerotropic-velogenic Newcastle’s Disease) is a foreign animal disease and millions are spent to eradicate all exposed birds when there is an outbreak in the US (last one was in California, 2002/2003 – 3.5 million birds)

Infectious laryngotracheitis (ILT)
Infectious laryngotracheitis affects only chickens (and pheasants). The causative agent is a Herpesvirus. Chickens older than 14 weeks are more affected than younger chickens, so the disease is usually seen in mature chickens. There is a mild form in the US that is associated with decreased egg production, conjunctivitis, nasal discharge, swollen infraorbital sinus and in more severe cases moist rales. Shaking of the head and flinging necrohemorrhagic material from the trachea is a hallmark of this disease including an inspiratory dyspnea and death. At gross necropsy a mucoid to necrohemorrhagic tracheitis is present. Diagnosis is confirmed via virus isolation, ELISA, or Indirect fluorescent antibody test. Prevention is through the use of a live vaccine. The disease can be spread by fomites. Properly dispose of dead birds to prevent spread (incinerate). Antibiotics can be used, but it is better to depopulate and then vaccinate new birds.

Avian cholera (Pasteurella multocida)
Clinical signs include: Drop dead in good flesh. Hemorrhage on heart, lungs, fat and intestinal mucosa seen at necropsy. Free flying waterfowl are source. Incinerate or bury carcasses ASAP. Killed and live vaccines available for chronic problems.

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Let’s Work Up Some Backyard Poultry Diseases Together!
Cheryl Greenacre, DVM, DABVP (Avian, ECM)
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Case 1
Six days prior to presentation a group of 17 Barred Rock adult (2 years old) hens and 3 adult (one was 2 years old, the other two were 2 years old) roosters were purchased from a man who had said they were raised on his farm. Two days prior to presentation the chickens exhibited varying degrees of rales, mild coughing, periorbital swelling and edema of the head. A mild serous nasal discharge was also present and some of the hens had laid eggs with abnormal shells. At presentation approximately half the birds had died and the owner brought three for euthanasia and testing.

Video of birds will be shown.

While under isoflurane anesthesia, but prior to euthanasia with pentobarbital IV, a choanal swab was taken and blood was collected from the right jugular vein.

What tests would run?
Samples were submitted to the Poultry Disease Research Center in Athens, Georgia. The birds were found to be negative for Avian Influenza, Infectious Laryngotracheitis, Infectious Coryza, and Mycoplamsosis, but were positive for Infectious Bronchitis Virus.

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Case 2
A case of Grade II pododermatitis. Let’s have a discussion of the various ways people treat this condition and what can be done to prevent it.

Ulcerative pododermatitis tends to occur if the chicken is overweight, on a roughened surface, or if one leg and foot bears more of the body weight than the other, or a combination of all these factors. There are varying grades of ulcerative pododermatitis from mild with hyperemia of the skin, to severe with osteomyelitis of underlying bone. A radiograph is the best method to determine if there is underlying osteomyelitis, a condition that requires long term antibiotic therapy and probably debridement of necrotic tissue. Soaking the foot will greatly soften the tissue and ease surgery. Surgery should be performed under general anesthesia with administration of a pain reliever such as butorphanol since this is a painful procedure. Culture and prescribe appropriate antibiotics. The substrate should be made as soft as possible and kept clean. Underlying lameness should be corrected.

Case 3
A 2 year old Welsummer hen presents with a left leg lameness. She has recently stopped laying eggs. On physical examination your only abnormal finding is an enlarged doughy coelomic cavity that is more firm than you would expect in an egg laying hen.

What diagnostic tests can you run?
What treatments would you consider in an egg laying hen?

Egg related coelomitis is an acute or chronic, coelomitis involving all or part of an egg. It can be septic or not. It is common for chickens to have some degree of egg related coelomitis, and mild cases are commonly encountered at necropsy in production hens. Generally chickens tolerate mild peritonitis better than parrots. Causes usually involve retrograde flow of shelled or shell-less eggs from the oviduct back into the coelomic cavity due to oviductal bacterial infection, oviductal impaction, or abnormal confirmation of the oviduct. Heavy production hens or those with inadequate calcium in their diet can have calcium depletion and uterine inertia leading to retrograde flow of egg material. Bacterial infections commonly involve E. coli migrating up the oviduct from the vent.

Clinical signs of egg related peritonitis can be obvious such as a sudden drop or cessation in egg laying, or can be vague or seem unrelated to the reproductive tract such as lethargy, partial anorexia, weight loss, and lameness. Physical examination findings can
include a thin bird, increased respiratory and heart rates, crackles of lower respiratory tract, a large doughy coelomic cavity, fluctuant coelomic fluid, and a lameness not explained by other obvious reasons.

Diagnosis is based on typical clinical signs and radiographs. Endoscopy is possible but may be hampered or risky due to coelomic fluid and limited air sac space. Radiographically a large variety of findings can be encountered such as the ground glass appearance of coelomic fluid, multiple or single shelled or shell-less eggs inside or outside the oviduct, hernia or expanded coelomic wall, thickened air sacs, and masses in the caudal thoracic and abdominal air sac area. (Figure 1, and other rad pics of ERC) A CBC and chemistry profile including total and ionized calcium can be performed to determine the degree of infection or inflammation, amount of dehydration, if there is concurrent liver or kidney disease, or if calcium depletion is present.

Treatment can involve fluids, antibiotics, non-steroidal anti-inflammatory drugs (NSAID), butorphanol, and/or surgery. (Figure 2 and 3) The difficult decision is whether surgery will provide a better outcome than antibiotics and pain relievers alone. Generally the more severe the egg related coelomitis then the more likely surgery will provide a better outcome, but I have had a few clients not chose surgery for their hens what I thought to be a moderate egg related peritonitis (lameness, large fluctuant coelomic cavity, cessation of egg laying, but no shelled eggs in the coelomic cavity) cleared up with just oral trimethoprim sulfa and meloxicam. Oviductal impaction should be resolved with surgery to remove the egg material before it adheres to the oviduct. Calcium injection for oviductal inertia is usually not needed since the egg related coelomitis is rarely due to calcium depletion in backyard hens, but it can be given as there is minimal to no adverse effects from giving one calcium injection.