Diseases of Gamebirds

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Backyard Poultry:

- From small hobby flocks to show flocks to small production/businesses, backyard poultry has become an increasingly prominent part of veterinary medicine. This course focuses on topics affecting the backyard poultry owner and veterinarian with a focus on field investigation and clinical medicine of chickens, turkeys, waterfowl (ducks, geese, swans), and gamebirds (quail, pheasant, peafowl, chukar partridge). This course looks at basic nutrition, housing, handling, clinical medicine, diagnostic testing, and key poultry diseases.

Associations:

- American College of Poultry Veterinarians
- American Association of Avian Pathologists
- American Board of Veterinary Pract26tioners (Avian Medicine and Surgery)
- Association of Avian Veterinarians

Gamebirds

- Pheasants
    - Egg production
        - First chicks as early as mid-March
        - Cull rate up to 4%
        - Incubation (24 days total)
    - Brooding
        - Four chicks per square foot
        - Remain in brooder set up for up to 3 weeks – then a small run with two chicks per square foot
        - Release to pen once 6-7 weeks
    - Flight Pen
        - 20% protein small pelleted feed
        - Density – 15-20 sq ft per hen / 20-25 sq ft per cock
        - Netting – polyethylene or nylon, UV protection, 2 inch holes
        - Sandy, well-drained soil with vegetation
    - Outdoor density
        - 20 – 30 sq ft per bird range
        - One male for every 10-12 hens
        - Move pen every 1-2 weeks

    - Indoor density
        - 5 – 10 sq ft per bird range
        - One male for every 12-18 hens
    - Other notes
        - Hoods & peepers (31 – 37 days of age)
- Quail
    - Incubation (24 days total)
    - Brooding (First two weeks)
    - Grow-out
        - 3 weeks for indoors (0.5 sq ft / bird)
        - 6 weeks for flight pens (2 sq ft / bird)
    - Breeders
        - As early as 18 weeks, consistency at 24-26 weeks
        - Cock:hen = 1:2.5-3.5
    - Housing
        - Floor pen
            - Exposure to parasites & other pathogens
            - Floor eggs
        - Slatted floor pen - birds on slats or wire (0.5 inch wire)
            - Reduce exposure to floor
            - Injury to feet
        - Wire cages (0.5 sq ft / bird)
            - Increased eggshell quality
            - Decreased pecking & cannibalism
            - 12-18 inches in height (or 3-4 ft)
- Peafowl
    - Peacock, peahen, peachick
        - Peacock : peahen = 1:2-3
    - Behavior
        - Aggressive
        - Free-living/roaming (feed to ensure return)
        - Forage behavior
        - Active in early morning, shelter mid-day, roost on high branches at night
    - Housing
        - Spacious pens (12 ft x 60 ft, 24 ft x 30 ft)
            - Less than 100sq ft = aggression
        - Perches to accommodate length of peacock tails
        - Interspecies aggression

    - Feed
        - Foragers, insects
        - Commercial feed for pheasants, turkeys, other gamebirds
            - Young/Starter: 0-6 weeks
            - Gamebird flight conditioner/raiser: over 6 weeks
            - Laying hens: 2.5-3.5% calcium
- Guineafowl
    - Cock, hen, keets
        - Cock : hen = 1:2-5
        - Females work to minimize juvenile victimization
        - Fertility = 60% (lay in evening)
    - Behavior
        - Loud and less docile
        - Foragers
        - Dust bathers
    - Housing
        - Spacing (2-3 sq ft / bird)
        - Perches
        - Interspecies aggression
    - Feed
        - Foragers, insects
        - Mash or crumbles
            - 0 – 4 weeks = 21 – 23% protein
            - 5 – 8 weeks = 19 – 21% protein
            - Over 8 weeks = 15% protein
    - Disease spreaders (thought to be fairly resistant to many diseases)
    - Difficult sexing

Respiratory Diseases

- Quail bronchitis (fowl adenovirus 1)
    - This is a viral disease of young bobwhite quail, typically less than 3-6 weeks of age. The source of this viral infection comes from infected breeders, carriers within the flock, contaminated feces, and fomites. A high morbidity and mortality (80-100%) can be seen and clinical signs include sudden increase in mortality, ruffled feathers, huddling, and open-mouth breathing. On postmortem examination, there is often exudate within trachea, consolidated lungs, airsacculitis, and occasional hepatic necrosis. Diagnosis is achieved by necropsy, histopathology, and molecular testing. Management and prevention of this disease involves supportive care (increase warmth of brooder house) and delaying hatching until 2 weeks after clinical signs have disappeared. This virus persists in

the environment and attention should be paid to cleaning, sanitation, ventilation, and stocking density.

- Mycoplasmosis (*M. gallisepticum*, *M. synoviae*)
    - All ages are susceptible and infections are complicated by additional respiratory viral and bacterial pathogens (infectious laryngotracheitis virus, infectious bronchitis virus, Newcastle disease, *Escherichia coli*, *Pasteurella multocida*, *Avibacterium paragallinarum*, *Gallibacterium anatis*, aspergillosis). *Mycoplasma* is labile and relies on horizontal transmission, vertical transmission, and carrier birds (particularly in multiage flocks). Clinical signs can be slow to develop (weeks to months) and result in respiratory signs and a drop in feed consumption / egg production. Grossly, mycoplasmosis can cause catarrhal inflammation of nasal passages, sinuses, trachea, lungs, and air sacs. Pheasants often present with conjunctivitis, swollen infraorbital sinuses, or polyserositis. Partridges can present with ocular discharge and airsacculitis. Diagnosis can be achieved by serum plate agglutination, HI, ELISA, and molecular testing. Culture is often time consuming. Mycoplasmosis cannot be cured but can be treated with tylosin and tetracyclines. Relapses often occur when treatment is discontinued. Management and biosecurity practices are necessary for the prevention of mycoplasmosis. This includes quarantining new birds and purchasing birds from reliable sources.
- Infectious Laryngotracheitis (gallid herpesvirus-1)
    - Chickens are primarily affected with fewer cases documented in pheasants, peafowl, and guinea fowl. Clinically, ILT can manifest as an elevated flock mortality (1-50%) and mild to severe conjunctivitis, rales, dyspnea, and blood stained nares and feathers. Grossly, the trachea is often hemorrhagic with caseous plugs in the lumen and larynx. Diagnosis is achieved by histopathology or molecular testing. No treatment is available. Vaccination is practiced in commercial poultry but is not often utilized in backyard poultry. Good biosecurity is needed to prevent introduction and spread on site.

Gastrointestinal Diseases

- Crop Mycosis (primarily Candida albicans)
    - Crop mycosis is a common disease of all poultry. However, this lesion may not be noted until necropsy, a thickened, firm, beige crop mucosa. Histopathology and culture can be utilized to confirm the diagnosis and rule out differentials like capillariasis. Predisposing factors include prolonged antibiotic therapy, concurrent disease, age, management issues (unhygienic, unsanitary, overcrowding). Birds should be examined for concurrent diseases, history of antibiotic use, husbandry, and sanitation.

- Capillariasis (*Capillaria annulatus* and *Capillaria contortus*)
    - Capillariasis can affect pheasants, quail, partridges, and guineafowl. Adults embed in crop or small intestine mucosa, produce ova, and ova are shed in feces. An arthropod or earthworm acts as an intermediate host. Diagnosis is made by mucosal scraping, necropsy, and/or histopathology. Management of this disease includes raising smaller game on wire to reduce exposure to feces, rotating flight pens, and ensuring flight pen soil is well-drained and dry.
- Trichomoniasis (*Trichomonas* spp. and *Tetratrichomonas gallinarum*)
    - *Trichomonas* spp. are reported in pheasants, partridges, quail, and guinea fowl. These organisms invade the mucosa of the mouth, pharynx, esophagus and crop, leading to the development of proliferative plaque-like lesions that can result in starvation.
    - *Tetratrichomonas* spp. affects young gamebirds and can cause multifocal necrotic lesions in the liver and cecum.
    - Diagnosis can be achieved by gross lesions, wet mounts, and histopathology. There are limited treatment options in poultry and management practices involve good biosecurity, examination for concurrent infection, and housing/husbandry changes to increase sanitation and a dry environment.
- Quail Disease (*Clostridium colinum*)
    - Quail disease typically affects birds 4-12 weeks of age and manifests as sudden death of well-muscled quail, watery white droppings with variable hemorrhage, and listless, emaciated birds. This disease is spread through acutely infected birds or carrier birds and spores persist in soil. On necropsy, there are multifocal to coalescing areas of necrosis with variable perforation and peritonitis/coelomitis. Diagnosis is established by history, clinical signs, necropsy findings, histopathology, and culture. Traditional treatment options include bacitracin, but there are issues with resistance. It is important to evaluate and treat any underlying coccidiosis or other enteric parasites. Management options include alterations in housing and husbandry to reduce the birds exposure to soil and feces like raising birds on wire.
- Coccidiosis
    - A common, species-specific protozoa that multiples in the intestinal mucosa causing tissue damage, which can lead to clostridial necrotic enteritis. Outbreaks in gamebirds are common at 1-5 weeks of age. Coccidia in gamebirds are particularly prolific and can cause production losses and mortality. Feed and digestion are disrupted, leading to decreased nutrient absorption and decreased production. Diagnosis is achieved by fecal examination, necropsy with intestinal scrapings, or histopathology. Coccidial oocysts are hardy and can persist in the environment for extended periods of time. Preventative measures are essential for controlling coccidia on site and include the use of medications in starter feeds,

rotation of anticoccidial compounds to reduce the chance resistance, avoiding litter build-up and replacement of the top 3 inches, rototilling, and ensuring proper space for the flock. Smaller gamebirds can be raised on wire to reduce exposure to soil and feces. Differentials for caseous cecal cores include coccidiosis, histomoniasis, and salmonellosis. Other intestinal parasites, such as ascarids, cecal worms, and tapeworms can be seen on fecal examination or necropsy. Large infestations of ascarids can result in impactions.

- Histomoniasis (*Histomonas meleagridis*)
    - This protozoal organism affects turkeys, peafowl, grouse, quail and chickens. Transmission is fecal-oral, often by ingestion of hardy cecal worm ova (*Heterakis gallinarum*) containing the labile protozoan or earthworms containing cecal worm larvae with protozoa. Clinically, histomoniasis results in depression, diarrhea (classically "sulfur-colored feces"), and death. On necropsy, targetoid lesions are present on the liver and caseous cecal cores expand the ceca. Coelomitis and airsacculitis can result from perforation of the cecal wall. Chickens are considered less susceptible to histomoniasis and can harbor *Heterakis* sp. For this reason, the mixing of more susceptible birds (gamebirds and turkeys) and chickens can result in high mortality. It is important to make clients aware of this risk. *Heterakis* ova are hardy and raising susceptible birds on sites formerly populated by chickens can have similar results. Good soil drainage and rotation of ranges periodically and replacement of the top three inches of soil every few years can help reduce exposure.
- Fowl Pox (avipox)
    - There are many strains (fowl pox, turkey pox, pigeon pox, canary pox, etc) of this slow-spreading viral disease in avian species. Mortality in gamebirds is typically low. Virus can be inhaled or enters the skin through minor abrasions, cannibalism, and blood-sucking insects. Virus-containing crusts are desquamated into the environment. Two forms of fowl pox are recognized, cutaneous and diphtheritic. The cutaneous form manifests as proliferative pock lesions on unfeathered portions of skin such as the head and legs. The diphtheritic form causes proliferative lesions in the oral cavity and can cause starvation or suffocation if the lesions block the esophagus or trachea respectively. Diagnosis can be presumptive based on the gross lesions with confirmation by histopathology. There is no treatment. Mortality is typically low to moderate in uncomplicated cases and the course of disease is 2-3 weeks. Recovery is more common in the cutaneous form and results in strong immunity.
- Cannibalism
    - Cannibalism can lead to disease transmission and secondary infections. Measures to reduce cannibalism include peepers/hoods to reduce aggression, separating

aggressive species, altering light intensity, ensuring proper sex ratios, and providing adequate feed, water, and nest boxes to reduce competition.

Multisystemic Diseases

- Marble Spleen Disease (adenovirus)
    - This is a viral disease affecting pheasants, particularly at 2-8 months of age. Mortality ranges from 5-15% and the course of disease is 10-14 days. Birds are often found dead and have splenomegaly and pulmonary edema on necropsy. Diagnosis is achieved by clinical history and gross lesions with correlating histopathology, molecular testing, and/or culture to rule out other agents like *Pasteurella multocida*. There is no treatment but antibiotics are often used to treat secondary infections. Prevention of this disease involves proper stocking densities and strict sanitation.
- Colibacillosis (*Escherichia coli*)
    - *E. coli* can cause variably morbidity and mortality in all ages of poultry. It is frequently a secondary infection. Colibacillosis can manifest in several syndromes including airsacculitis, omphalitis, septicemia, salpingitis, and coligranulomas. Predisposing factors include concurrent disease, stress, and high levels of ammonia. Diagnosis is achieved by culture (and sensitivity to assist with treatment choices), necropsy, and supportive histopathology. Tetracyclines have been used as a treatment choice but efficacy can diminish with continued use. To help prevent colibacillosis, examine the flock for concurrent disease, evaluate sanitation and ventilation of the house, remove dead birds quickly, and avoid overcrowding.
- Salmonellosis
    - Salmonella Typhimurium and Enteritidis can cause acute infection or chronic infections of gamebirds. Transmission occurs via direct contact, fecal-oral, or shell contamination. Necropsy findings include acute necrotizing lesions, fibrinous to caseous inflammation, and arthritis in chronic lesions. Diagnosis is achieved by culture (and sensitivity to assist with treatment choices), necropsy, and supportive histopathology. Tetracyclines have been used as a treatment choice but efficacy can diminish with continued use. Proper handling, cleaning, and handwashing should be emphasized to clients, particularly small children, to prevent salmonellosis.
- Fowl Cholera (*Pastuerella multocida*)
    - Fowl cholera can manifest as acute mortality or chronic, localized lesions. The most susceptible gamebirds are pheasants and quail, followed by partridges, peafowl, and guinea fowl. Sources of infection include contaminated water, cannibalism, rodent and feline bites, and chronically infected birds. Diagnosis is achieved by culture (and sensitivity to assist with treatment choices), necropsy,

and supportive histopathology. Samples to submit for culture include liver, spleen, cardiac blood, and bone marrow. Management and prevention of fowl cholera includes elimination of sources, all-in all-out practices, single species sites, timely removal of dead birds, and pest control.

- Erysipelas (*Erysipelothrix rhusiopathiae*)
    - Sources of erysipelas in poultry include carrier birds, artificial insemination, and mechanical transmission. Birds exhibit depression, diarrhea, and occasionally sudden death (mortality can range from 5-50%). Postmortem lesions include multiorgan hemorrhages, splenomegaly, hepatomegaly, and swollen joints and valvular endocarditis in chronic lesions. Diagnosis is established by clinical history and gross lesions in conjunction with smear samples and histopathology. Penicillins have been utilized in the face of an outbreak. Prevention involves elimination of sources (contaminated feed, soil, decaying material, infected carriers, and infected rodents) and all-in all-out practices. Decontamination of equipment and removal of dead birds will reduce transmission.
- Avian Influenza (Influenza A, orthomyxovirus)
    - Risks to backyard poultry include access to migratory waterfowl, bodies of water, or travel. Clinical signs vary depending on the stain and species of birds. Mild strains can manifest as snicking, coughing, rales, sneezing, and production losses. More pathogenic strains can see massive mortality overnight, neurologic signs, and cessation of egg production. Gross lesions include multisystemic hemorrhages, particularly of the proventricular mucosa, cecal tonsils, and shanks. These lesions are not specific to AI and can be seen in other virulent processes so proper sample collection, communication with state agencies, and selection of diagnostic tests is crucial. Diagnosis of AI is achieved by molecular testing on swabs (synthetic tip swabs) inoculated in BHI broth, sterile saline, or viral transport media. Choanal and tracheal swabs are utilized for gallinaceous birds and cloacal swabs are utilized for waterfowl.
- Newcastle Disease
    - Outbreaks of Newcastle disease are uncommon outside of California. Risks to poultry include international or unregulated interstate bird movement. Clinical signs vary depending on the pathotype, ranging from no signs, mild respiratory signs, neurologic signs and respiratory signs, and high mortality. Gross lesions, samples to take, communication of findings, and diagnostic tests are similar to that of AI.