Question

Nearly all of the turkeys in a small flock have acutely developed marked depression, anorexia, and diarrhea. Young turkeys are dying and older ones are failing to gain weight. You note that several turkeys have cyanosis and darkening of the head. You suspect that the turkeys have "bluecomb" and want to confirm your diagnosis. Which of following tests would be most useful in confirming this diagnosis?

- Microscopic assessment of a blood smear
- Direct fluorescent antibody for viral antigens in intestines
- Fecal flotation and sedimentation
- Blood culture
- Histopathology of the comb
- Bacterial culture of the feces using enrichment media

Explanation - This condition, caused by a coronavirus is known as bluecomb, transmissible enteritis, or coronaviral enteritis. Signs may be similar to Salmonella or hexamitiasis (a protozoan parasite).

Definitive diagnosis is based on demonstration of coronaviral antigens in the intestines or by electron microscopy to detect coronavirus particles in the intestinal contents. There is also a commercial ELISA that can detect some infections.

The disease is usually treated supportively with supplemental heat, nursing care, and antibiotics to prevent secondary bacterial infections. There is no vaccine available so control depends on thorough cleaning and disinfection of buildings and equipment.

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Question

Which of these gross lesions would you expect to find on the necropsy of a chicken with Marek's disease?

- Edema and hemorrhage of the cloacal bursa
- Mucous plugs in the bronchi
- An enlarged vagus and sciatic nerve
- Cardiomegaly
- Necrosis and hemorrhage of the intestinal mucosa

Explanation - The correct answer is an enlarged vagus and sciatic nerve. This is one of the most consistent gross lesions in Marek's disease. Other findings could include diffuse or nodular white tumors in the liver, spleen, gonads, heart, kidney, lung, or muscle, enlarged feather follicles, and an atrophied bursa. The final diagnosis is usually made by isolating the herpesvirus from lymphocytes obtained from the buffy coat.

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Question

A farmer arrives with a dead 5 week old chicken and many of his chickens have been doing poorly. Clinical signs include watery diarrhea, incoordination, prostration, and vent picking. Necropsy on the dead chick reveals a swollen cloacal bursa that is edematous and yellow with hemorrhage. There is also congestion and hemorrhage of the pectoral, thigh, and leg muscles. What is the most likely diagnosis?

- Marek's disease
- Infectious bursal disease
- Salmonella
- Avian influenza

Explanation - The correct answer is infectious bursal disease, also sometimes called gumboro disease. This disease is caused by a birna virus and is most readily isolated from the bursa of fabricius. It is highly

contagious and difficult to eliminate from the environment. Subclinical infections commonly occur in chicks less than 3 weeks of age and are of most economic significance. In clinical infection, the signs and necropsy findings are as described. There is no effective treatment, but a vaccine is available.

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Question

You are examining a turkey flock that has been experiencing significant losses recently. Birds have been dying suddenly after exhibiting ataxia and weakness. Necropsy reveals diffuse darkening of the skin and enlarged and friable livers and spleens in affected animals. You perform an impression smear of the spleen and identify Gram-positive, slender, pleomorphic rods. What is the most appropriate treatment for birds in this flock?

- Dissolve copper sulfate and vinegar into the water
- Add oxytetracycline to water
- Intramuscular sodium penicillin
- Add amprolium to feed

Explanation - The key to identifying the disease is the Gram-positive, slender, pleomorphic rods in the liver which suggest this is Erysipelas. Otherwise, other differentials such as Pasteurella, E. coli, salmonellosis, Newcastle disease and others could present similarly.

The treatment of choice for Erysipelas is a rapid-acting penicillin simultaneously with erysipelas bacterin. Oral oxytetracycline is not thought to be effective. Amprolium is used for coccidia and copper sulfate and vinegar is sometimes used in poultry to treat crop mycosis or thrush.

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Question

You examine a small flock of chickens and find that about 5% of the 1-2 week old birds are exhibiting neurologic signs of ataxia, imbalance, and head and wing tremors. Postmortem examination of one of the affected animals reveals neuronal axon-type degeneration (ghost cells) in the brain stem and anterior horn of the spinal cord. You suspect that this is a case of avian encephalomyelitis. Which one of these treatment/management strategies is most appropriate for this disease?

- Vaccinate 10-15 week old breeding animals
- Administer serum from recovered animals to affected animals
- Identify heterozygotes and do not breed them
- Treat chicks with oxytetracycline
- Vaccinate chicks at 1-3 days old

Explanation - Avian encephalomyelitis is caused by a picornavirus. Transmission is commonly vertical (transovarian) but also can be lateral (fecal-oral) as the virus can survive in feces for several weeks. Many older animals remain carriers. Therefore, treating only the symptomatic animals is not an effective strategy. This is not a genetic disease and cannot be bred out of the population.

The best prevention strategy is to vaccinate breeder animals to prevent vertical transmission to progeny and to provide them with maternal immunity during the susceptible period.

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Question

Many turkeys on a poultry farm develop whitish "wart-like" nodules and scabs on the comb, wattles, feet, and vent. Which management intervention would help prevent spread of the disease?

- Immediate removal of fecal waste
- Mosquito control
- Tick control

- Raise the room temperature 5 degrees
- Add antibiotics to the drinking water
- Thoroughly disinfect pens and equipment

Explanation - The condition described here is is the dry form of avian (fowl) pox. This is a relatively slow spreading disease that can be spread by contact or by mosquitoes that may harbor infective virus for greater than a month.

In the dry form of the disease, the main sign is raised, whitish wart-like lesions on unfeathered areas (head, legs, vent, etc.). The lesions heal in about 2 weeks. Unthriftiness, decreased egg production and retarded growth may be seen. Mortality is low with this form of the disease. The wet form mainly involves the oral cavity and upper respiratory tract. Lesions are diphtheritic and can ulcerate or erode mucous membranes. Marked respiratory involvement can lead to mortality

A diagnosis is usually based on flock history and presence of these lesions. This is a pox virus and there is no specific effective treatment but there is a vaccine. Disease control is best accomplished by preventive vaccine as sanitation alone will not prevent spread of disease. Several vaccines are available and a single application results in permanent immunity.

Raising the temperature 5 degrees may be part of the treatment for infectious bronchitis in chickens. Disinfecting pens +/- quarantine is done for quail bronchitis, aspergillosis, and ulcerative enteritis. Antibiotics in the drinking water are most effective for preventing secondary bacterial infections and for mycoplasma but not preventing spread of the virus.

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Question

Which of the following is the causative agent of infectious coryza in chickens?

- Haemophilus paragallinarum
- Paragonimus kellicotti
- Pasteurella multocida
- Clostridium perfringens

Explanation - The correct answer is Haemophilus paragallinarum. This is a gram negative, pleomorphic, microaerophilic rod. Clinical signs include respiratory disease. In particular, you will see nasal discharge, sneezing, and swelling of the face underneath the eyes. Older birds seem to be more susceptible. Diagnosis is based on isolating the organism or inoculation of a healthy bird and then evaluating for development of clinical signs. Swelling of the face and wattle must be differentiated from fowl cholera, which is caused by Pasteurella multocida. This condition is treated with antibiotics. Additionally, turkey coryza is caused by bordetella avium.

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Question

A chicken operation has recently been ravaged by a respiratory disease affecting almost all of the chickens in the flock. The chickens are coughing and sneezing and many have facial swelling. You necropsied many of the chickens and found mucoid exudate in the bronchi, thickened air sacs, and in a few of the chickens, interstitial nephritis was present. Which of these diseases is likely?

- Infectious bursal disease
- Fowl cholera
- Aspergillus
- Infectious bronchitis

Explanation - The correct answer is infectious bronchitis. This is caused by a coronavirus. It is spread by aerosol and ingestion and usually affects all exposed birds. The clinical signs and necropsy findings are as described in the question. The disease can be clinically indistinguishable from mild forms of Newcastle disease, laryngotracheitis, and infectious coryza. Virus isolation is needed to obtain a definitive diagnosis.

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Question

Which of the following is not a clinical sign of Newcastle disease in chickens?

- Neurologic signs
- Papillomatous lesions of the foot
- Watery green diarrhea
- Death
- Coughing

Explanation - The correct answer is papillomatous lesions of the foot. Newcastle disease is caused by an RNA virus (paramyxovirus-1). The disease is categorized into 3 groups: 1) velogenic strain-highly pathogenic and easily transmitted. 2) mesogenic strain-intermediate pathogenicity. 3) lentogenic strain-low pathogenicity. Clinical signs include diarrhea, swelling of the head and neck, gasping, coughing, sneezing, drooping wings and dragging legs, circling, torticollis, paralysis, and clonic spasms. Diagnosis is based on rapidly spreading respiratory and neurologic disease, in addition to isolation of the organism. Prevention is via vaccination. Newcastle disease has the potential of causing a transitory conjunctivitis in humans.

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Question

Many chickens on a poultry farm are affected by one of two syndromes. Some chicken develop nodules and scabs that are most prominent on the comb, wattles, feet, and vent. Other chickens develop a diphtheritic membrane in the mouth and pharynx. What is the best treatment for this flock?

- Control mosquito populations and vaccinate chicks or replacement chickens with a single immunization against the suspected disease

- Remove, kill and incinerate all affected birds, no vaccine or antibiotic is effective against this disease
- Control tick populations and vaccinate all healthy chickens twice, two weeks apart
- Control insect populations and treat all chickens in the flock with chlortetracycline added to the water
- Improve ventilation and treat all chickens in the flock with mycostatin in the drinking water for 3 days

Explanation - The condition described here is avian (fowl) pox, also known as sore head or avian diphtheria. This is a relatively slow spreading disease that can be spread by contact or by mosquitoes that may harbor infective virus for greater than a month. This condition can affect most poultry species at any age in one of two forms:

Dry form- Main sign is raised, whitish wart-like lesions on unfeathered areas (head, legs, vent, etc.). The lesions heal in about 2 weeks. Unthriftiness, decreased egg production and retarded growth may be seen. Mortality is low with this form of the disease.

Wet form- Mainly involves the oral cavity and upper respiratory tract. Lesions are diphtheritic and can ulcerate or erode mucous membranes. Marked respiratory involvement can lead to mortality

A diagnosis is usually based on flock history and presence of these lesions. This is a pox virus and there is no specific effective treatment but there is a vaccine. Disease control is best accomplished by preventive vaccine as sanitation alone will not prevent spread of disease. Several vaccines are available and a single application results in permanent immunity.

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Question

Several turkeys recently moved to new housing, which previously housed chickens, have died. One is brought to you for necropsy and you find marked inflammatory changes, cecal wall thickening and ulcerations. There are also rounded necrotic lesions present on the liver. What is the most likely diagnosis?

- Coronavirus
- Mycoplasma gallisepticum
- Histomonas meleagridis
- Aspergillus fumigatus
- Heterakis gallinarum

Explanation - The correct answer is Histomonas meleagridis. Heterakis gallinarum is the parasite which hosts the protozoan Histomonas meleagridis which causes clinical disease. Clinical signs include drooping wings, unkempt feathers; sulfur colored droppings, listlessness, and death. The liver and cecal lesions are considered pathognomonic for Histomonas meleagridis. This is must know information for boards.

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Question

A number of chickens in a flock have been dying acutely with dyspnea and mucoid discharge from the mouth and watery, whitish diarrhea in some birds. On postmortem, evaluation, you find vascular hyperemia of the abdominal organs. Which of the following findings would support a diagnosis of fowl cholera?

- Multifocal necrosis in the liver with large, granular basophilic intracytoplasmic inclusions
- Intracytoplasmic inclusion bodies in the chorioallantoic membrane of inoculated chick embryos
- Intranuclear inclusion bodies in tracheal epithelium
- Gram negative bacteria in blood or tissues
- A positive tracheal wash culture for mycoplasma

Explanation - Fowl cholera is caused by Pasteurella multocida, a Gram negative, non motile, pleomorphic rod. As with most poultry diseases, it is preferable to prevent introduction of the disease into a flock with

biosecurity measures. If treatment is attempted, it should ideally be based on culture and sensitivity but sulfonamides, tetracyclines, or penicillin are most often used.

Intranuclear inclusion bodies from the tracheal epithelium are seen with Infectious Laryngotracheitis caused by a herpesvirus. Fowlpox virus produces intracytoplasmic inclusions. Liver necrosis with large, granular basophilic intracytoplasmic inclusions is consistent with avian chlamydiosis.

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Question

Which of the following disease agents has been transmitted to humans through consumption of eggs?

- Salmonella enteritidis
- Mycoplasma gallinarum
- Avian influenza
- Marek`s disease
- Pasteurella multocida

Explanation - SE can set up chronic infections in asymptomatic chickens and infect the egg. It is initially only on the embryo but if eggs are not refrigerated the yolk membrane weakens and the Salmonella enters the yolk where it multiplies and can be a significant public health problem.

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Question

Marek's disease is caused by what type of agent?

- Herpesvirus
- Birnavirus
- Orthomyxovirus
- Coronavirus
- Paramyxovirus

Explanation - The correct answer is herpesvirus. Marek's disease is one of the most ubiquitous avian infections. It is highly contagious and can survive for months in the environment.

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Question

Numerous chicks in a flock are displaying signs of an unsteady gait, huddling under equipment, diarrhea, and vent pecking. You perform a necropsy on a dead 4-week old chick and find swollen kidneys, hemorrhage in the thigh muscles and an edematous cloacal bursa. Which of the following strategies would be most appropriate for the flock?

- Add fenbendazole to the feed
- Add tiamulin to feed
- Spray birds with permethrin in water
- Dissolve copper sulfate and vinegar into the water
- Vaccinate breeders and progeny

Explanation - These signs are most consistent with infectious bursal disease, also sometimes called gumboro disease. This disease is caused by a birna virus. It is highly contagious and difficult to eliminate from the environment. Subclinical infections commonly occur in chicks less than 3 weeks of age and are of most economic significance.

There is no effective treatment although vitamin-electrolyte therapy may be helpful. Vaccines are available and should be given to breeders and progeny when there has been an outbreak. Breeder flocks should be vaccinated one or more times at 6-8 weeks, first with a live vaccine and then at 18 weeks with an oil-based, inactivated vaccine.

Copper sulfate and vinegar is sometimes used in poultry to treat crop mycosis or thrush. Fenbendazole is

used for internal parasites but should not be used in birds that are producing eggs or are for human consumption. Permethrin is used for mites and lice. Tiamulin is an antibiotic that is active against gram-positive bacteria, mycoplasma, and anaerobes. In poultry, it is sometimes used in infectious synovitis and chronic respiratory disease.

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Question

Your client's turkey developed nasal and ocular discharge, weight loss, inappetence, and then died. You performed a necropsy and found pneumonia, multifocal necrosis in the liver and spleen, and severe pericarditis. Histopathologic findings included many basophilic intracytoplasmic inclusions found in the affected organs. What is the most likely cause of death?

- Newcastle disease
- Fowl cholera
- Aspergillus fumigatus
- Chlamydia psittaci
- Mycoplasma gallisepticum

Explanation - The correct answer is Chlamydia psittaci. The intracytoplasmic inclusions, along with involvement of multiple organs and supportive clinical findings, are indicative of this disease. Chlamydia psittaci is known as ornithosis in turkeys.

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Question

You are visiting a small "back-yard" flock of chickens and examining the animals. You find several chickens with thickened, encrusted skin on the legs. You scrape the area and examine it microscopically to find round, 0.5 mm, short legged mites. Which of the following mites should you suspect?

- Knemidocoptes mutans
- Laminosioptes cysticola
- Ornithonyssus bursae
- Trombicula alfreddugesi
- Dermanyssus gallinae

Explanation - Knemidocoptes mutans is also known as the "scaly leg mite" and affects chickens, pheasants, and pigeons. It causes lesions primarily on the legs and unfeathered parts although irritation can lead to feather picking. The lesions progress to appear thickened and encrusted. The adult females are short legged, round, up to 0.5mm in diameter.

Dermanyssus gallinae is known as the red mite. They are nocturnal feeders and severe infestations can cause anemia and decrease reproductive potential.

Ornithonyssus bursae is the northern fowl mite and often infect the feathered regions around the vent. They spend the entire life cycle on the host.

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Question

What is the causative agent of turkey coryza?

- Ornithobacterium rhinotracheali
- Bordetella avium
- Pasteurella multocida
- Haemophilus paragallinarum

Explanation - The correct answer is Bordetella avium. Turkey coryza or avian bordetellosis is an acute respiratory disease of turkeys with high morbidity and low mortality. Clinical signs include nasal discharge, foamy eyes, and cough. Diagnosis is via isolation on MacConkey agar or serology. A vaccine is available but has mixed results. Antimicrobial therapy is usually unrewarding.

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Question

You are visiting a small "back-yard" flock of chickens and examining the animals. You find several small gray-red mites (approx 0.7 mm) on several of the chickens which you recognize as Dermanyssus gallinae and Ornithonyssus sylviarum. How are these mites best controlled?

- Ornithonyssus sylviarum is controlled primarily by thorough insecticidal treatment of the environment and Dermanyssus gallinae must be controlled by application of approved pesticides to affected birds
- Control of both Dermanyssus gallinae and Ornithonyssus sylviarum relies on thorough insecticidal treatment of the environment
- Control of both Ornithonyssus sylviarum and Dermanyssus gallinae relies on application of approved pesticides to affected birds
- Dermanyssus gallinae is controlled primarily by thorough insecticidal treatment of the environment and Ornithonyssus sylviarum must be controlled by application of approved pesticides to affected birds

Explanation - Dermanyssus gallinae (the common red mite) maintains the majority of the population in the environment so it is important to monitor and treat the environment including the cracks and crevices where mites tend to reside. Ornithonyssus sylviarum mites (northern fowl mites) spend their entire life cycle on the bird. This allows them to multiply more rapidly and makes it essential to treat the birds themselves to control the problem.

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Question

You are managing a poultry flock that has had problems with coccidiosis. In choosing an appropriate prevention plan, you need to consider drug withdrawal times. Which of the following agents has the shortest withdrawal time?

- Sulfaquinoxoline
- Nicarbazin
- Robenidine
- Sulfadimethoxine
- Amprolium

Explanation - Click the drug name below to view the drug information at "Animal Drugs @ FDA":

Amprolium has zero withdrawal time

Sulfaquinoxoline has a 10 day withdrawal time

Sulfadimethoxine has a 5 day withdrawal period

Nicarbazin has a 4 day withdrawal

Robenidine has a 5 day withdrawal period

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Question

Which of the following statements regarding coccidiosis in chickens is true?

- The disease involves little mortality
- The causative agent is of the genus Eimeria
- The causative agent is of the genus Isospora
- The disease causes renal changes

Explanation - The correct answer is the causative agent is of the genus Eimeria. The disease causes severe diarrhea, decreased production, and death. There are numerous species of Eimeria specific to certain regions of the intestinal tract. Diagnosis involves demonstration of oocysts in the feces. Treatment is based on anti-coccidial drugs.

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Question

You are examining a flock of chickens that has recently had a 10-20% drop in egg production. You note that chickens are displaying signs of varying severity including watery eyes, nasal discharge, dyspnea with extension of the neck during inspiration, coughing of mucus and blood, and decreased food intake. There has been low mortality from this condition and you perform a necropsy on a deceased chicken and find caseous exudate and blood in the trachea. You suspect that this may be an outbreak of infectious laryngotracheitis. Which of these findings would confirm your diagnosis?

- Multifocal necrosis in the liver with large, granular basophilic intracytoplasmic inclusions
- A positive tracheal wash culture for mycoplasma
- Intracytoplasmic inclusion bodies in the chorioallantoic membrane of inoculated chick embryos
- Isolation of Heterakis gallinarum from cecal walls
- Intranuclear inclusion bodies in tracheal epithelium
- A positive tracheal wash culture for beta-hemolytic Streptococcus

Explanation - Infectious laryngotracheitis (ILT) is caused by a herpesvirus. Intranuclear inclusion bodies in the tracheal epithelium help distinguish this condition from the diphtheritic form of fowlpox. Fowlpox virus produces intracytoplasmic inclusions. Liver necrosis with large, granular basophilic intracytoplasmic inclusions is consistent with avian chlamydiosis.

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Question

Most of the chickens on a farm are coughing and sneezing and many have facial swelling. You necropsy several and find mucoid exudate in the bronchi and thickened air sacs. You suspect that this may be an outbreak of infectious bronchitis. Which of following would be most helpful in confirming a diagnosis?

- India ink stain of the trachea
- Bacterial isolation using MacConkey agar
- Gomori methenamine silver stain of bronchi
- Viral isolation after serial passage in chick embryos
- Fungal culture on DTM (dermatophyte test medium) plates

Explanation - Infectious bronchitis is caused by a coronavirus. It is spread by aerosol and ingestion and usually affects all exposed birds. The clinical signs and necropsy findings are as described in the question. The disease can be clinically indistinguishable from mild forms of Newcastle disease, laryngotracheitis, and infectious coryza.

Virus isolation after 3-5 passages in chick embryo is needed to obtain a definitive diagnosis. Other techniques including PCR and monoclonal antibody serotyping may also be helpful.

Gomori methenamine silver stain is generally performed to identify fungal organisms and India ink is to aid in identification of Cryptococcus.

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Question

Which of the following is the causative agent of fowl cholera?

- Pasteurella multocida
- Chlamydophila psittaci
- Mycoplasma gallisepticum
- Reticuloendotheliosis virus

Explanation - The correct answer is Pasteurella multocida. The bacterium is a gram negative rod. It causes fever, mucoid discharge from the mouth, diarrhea, petechia, ecchymoses, increased pericardial and peritoneal fluid, and death. The chronic form of the disease usually causes localized disease. Diagnosis is based on identifying the organism from samples in conjunction with clinical signs. Vaccines are available for prevention of the disease. Sulfa antibiotics are used for treatment.

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Question

You have been called to evaluate a flock of approximately 6 week old chicks who have been showing signs of respiratory disease. You notice that the hatchery equipment and facilities are run down. You perform a necropsy on one of the affected chicks and find cream-colored plaques throughout the lungs. What is your recommendation to the owner?

- Separate affected birds
- Start all birds on appropriate antifungal therapy
- Cull affected birds
- Begin aggressive broad spectrum antibiotic therapy

Explanation - The correct answer is cull affected birds. The clinical signs and necropsy findings are consistent with an Aspergillus infection (aka brooder pneumonia, mycotic pneumonia, or pneumomycosis). The best thing to do is kill affected birds as treatment is considered useless. Additionally, the facilities should be thoroughly disinfected.

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Question

About 10-15% of the chickens in a large commercial flock have begun showing signs of wing or leg paralysis and weight loss. Some affected birds have a gray iris or irregular pupils. Which of the following management/prevention strategies is thought to be a cost-effective method to control this disease?

- Addition of fenbendazole to water
- Addition of lincomycin to water or bacitracin to feed
- Addition of copper-sulfate to water
- Improved insect/arthropod control
- In-ovo vaccination

Explanation - The disease described in this question is most consistent with Marek's disease. Marek's disease is a herpesvirus that causes neurologic signs, cutaneous signs, or visceral tumors.

Key signs that should make you think of Marek's disease are:

1) Thickened nerves (vagus, brachial, and sciatic)
2) Paralysis of legs, wing, and/or neck
3) Gray iris or irregular pupils
4) Raised, rough skin around feather follicles
5) Gray foci of neoplastic tissue in liver, spleen, kidney, lungs, heart, and muscle

Diagnosis is usually based on some combination of these findings. The disease is extremely widespread

and infectious in flocks worldwide and there is no effective treatment.

Vaccination is the key to the prevention and control of Marek's disease. Additionally, improved hygiene and/or an all-in/all-out production strategy can be helpful. There are many different specific types of vaccines (against different serotypes/strains) available but it is unlikely that you would be asked about those details on a board exam. Vaccination strategies and management of young animals is important though because there is a window of weeks before vaccines administered at hatching can provide protective immunity. In-ovo vaccination is now used in commercial broiler chickens because it can be performed via automated machines with precision and reduces labor costs.

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Question

You have been asked to evaluate a small flock in which egg production has decreased by approximately 30%. On examination of the flock, you note that the birds are apparently healthy. However, the eggs that are being produced have soft shells and some have no shells at all. You further notice that the non-shelled eggs are being eaten by the other birds. What is your tentative diagnosis?

- Fowl cholera
- Egg drop syndrome
- False layer syndrome
- Egg binding

Explanation - The correct answer is egg drop syndrome. Classically, you will see poor eggshell quality combined with healthy birds. The disease is caused by an adenovirus and has pretty much been eradicated. However, you may see this in smaller operations. False layers will ovulate normally, but the yolk is dropped into the abdominal cavity rather than being collected by the oviduct as a result of an obstruction usually caused by E. coli or Mycoplasma gallisepticum. Egg binding is when an egg lodges in the shell gland or vagina and is considered a medical emergency in pet birds.

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Question

What pathogen is an important disease of pigs and aquatic fowl, which by mutating can become a major worldwide zoonotic infection of humans?

- Influenza virus
- Nipah virus
- Hendra virus
- Rift valley fever virus
- Parapox viruses

Explanation - Many of the hot strains of human influenza virus emerge from Asia as recombinants from avian influenza.

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Question

After a recent change in feed, numerous chickens in a flock have developed inappetence, ruffled feathers, and dark colored diarrhea. You perform a necropsy on a deceased chicken and find the middle and distal small intestine to be thickened and distended containing dark brown necrotic material; the intestinal mucosa has a diptheritic membrane. Which of the following treatment/management strategies is appropriate?

- Vaccinate breeders and progeny
- Add penicillin to drinking water
- Add fishmeal, barley, and rye to the feed
- Dissolve copper sulfate and vinegar into the water

Explanation - The disease described is necrotic enteritis which is caused by Clostridium perfringens. C. perfringens A and C can cause acute enterotoxemia with sudden onset explosive mortality due to necrosis of the mucosa of the small intestine. Diagnosis is made based on clinical signs and necropsy findings and is confirmed by finding large numbers of short, thick, gram positive rods in mucosal scrapings. The disease should be distinguished from Eimeria brunetti and from ulcerative enteritis caused by C. colinum.

C. perfringens is nearly ubiquitous and usually only causes disease when intestinal microecology is disturbed (due to changes in feed or damage from other pathogens or toxins). This can be treated by addition of antibiotics to feed (virginiamycin, bacitracin, lincomycin) or water (bacitracin, penicillin, lincomycin). Avoiding drastic changes in feed and minimizing levels of fishmeal, wheat, barley, or rye in the diet can also aid in preventing necrotic enteritis.

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Question

You are examining a turkey flock and note that many young turkeys appear depressed and are huddling with ruffled feathers. You note mucoid, blood-stained diarrhea and perform a fecal exam and see multiple Eimeria oocysts. Which treatment recommendation would be best for this flock?

- In-ovo vaccination
- Add copper sulfate and vinegar to water
- Salinomycin in feed
- Vaccinate all breeders
- Add amprolium to water

Explanation - The condition described is coccidiosis and the cause is Eimeria based on the fecal findings. There are many different Eimeria species that can infect poultry. Different species of Eimeria typically parasitize different regions of the intestine.

Coccidiosis in turkeys can be treated with Amprolium or Sulphonamides (ie Sulphaquinoxaline). Salinomycin is a coccidiostat but is toxic to turkeys, even at low doses. Ionophores such as lasalocid and monensin are coccidiostats that are used for prevention of coccidiosis in turkey growers.

Copper sulfate is sometimes used to treat fungal infections (thrush). There is a commercial vaccine available that consists of low doses of sporulated oocysts that can be given to day-old chicks. Prevention of infection by anticoccidial drugs is generally the preferred control method.

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Question

Turkeys and chickens should not be housed together in order to prevent transmission of _____ to _____.

- Lymphoid leukosis, Turkeys
- Lymphoid leukosis, chickens
- Histomonas meleagridis, Turkeys
- Histomonas meleagridis, Chickens

Explanation - The correct answer is Histomonas meleagridis to turkeys. This protozoan parasite, also called blackhead or infectious enterohepatitis, is fatal to turkeys but less pathogenic to chickens. It causes extensive necrosis of the liver and cecum. For this reason, chickens and turkeys should not be housed together and turkeys should not be housed in areas where chickens were previously housed.

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Question

Drastic changes in the feed of chickens should be avoided to prevent which of the following conditions?

- Salmonellosis

- Coronavirus enteritis
- Necrotic enteritis (clostridium perfringens)
- Hepatic lipidosis
- Coccidiosis (Eimeria spp.)

Explanation - The correct answer is necrotic enteritis (Clostridium perfringens). C. perfringens A and C can cause acute enterotoxemia with sudden onset explosive mortality due to necrosis of the mucosa of the small intestine. This usually occurs when intestinal microecology is disturbed (due to changes in feed or damage from other pathogens or toxins). Diagnosis is made by finding large numbers of short, thick, gram positive rods in mucosal scrapings.

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Question

What is the causative agent of laryngotracheitis in chickens?

- Coronavirus
- Paramyxovirus
- Orthomyxovirus
- Herpesvirus

Explanation - The correct answer is herpesvirus. Infectious laryngotracheitis is an acute infection which results in dyspnea, coughing, rales, and bloody tracheal discharge. Mortality is variable but can reach up to 50%. Diagnosis is based on clinical signs but is confirmed by demonstration of intranuclear inclusion bodies in the tracheal epithelium or by isolation of the virus through tissue samples. Treatment is aimed at prevention and supportive care if cost effective. Vaccination is recommended.

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Question

Which of the following avian diseases is considered to be zoonotic?

- Lymphoid leukosis
- Infectious bursal disease
- Chlamydophila psittaci
- Avian encephalomyelitis

Explanation - The correct answer is Chlamydophila psittaci. This is the causative organism of avian chlamydiosis, a disease of pet birds, poultry, and wild avian species. It is also the cause of parrot fever or psittacosis in humans.

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Question

Which of these diseases of chickens causes progressive paresis and can lead to paralysis of one or more extremities?

- Marek's disease
- Newcastle disease
- Fowl plague
- Renal carcinoma

Explanation - The correct answer is Marek's disease. Marek's disease can affect the sciatic nerves and can cause vasogenic brain edema which contributes to clinical signs described. Renal tumors can cause paresis/paralysis but would be expected to be unilateral.

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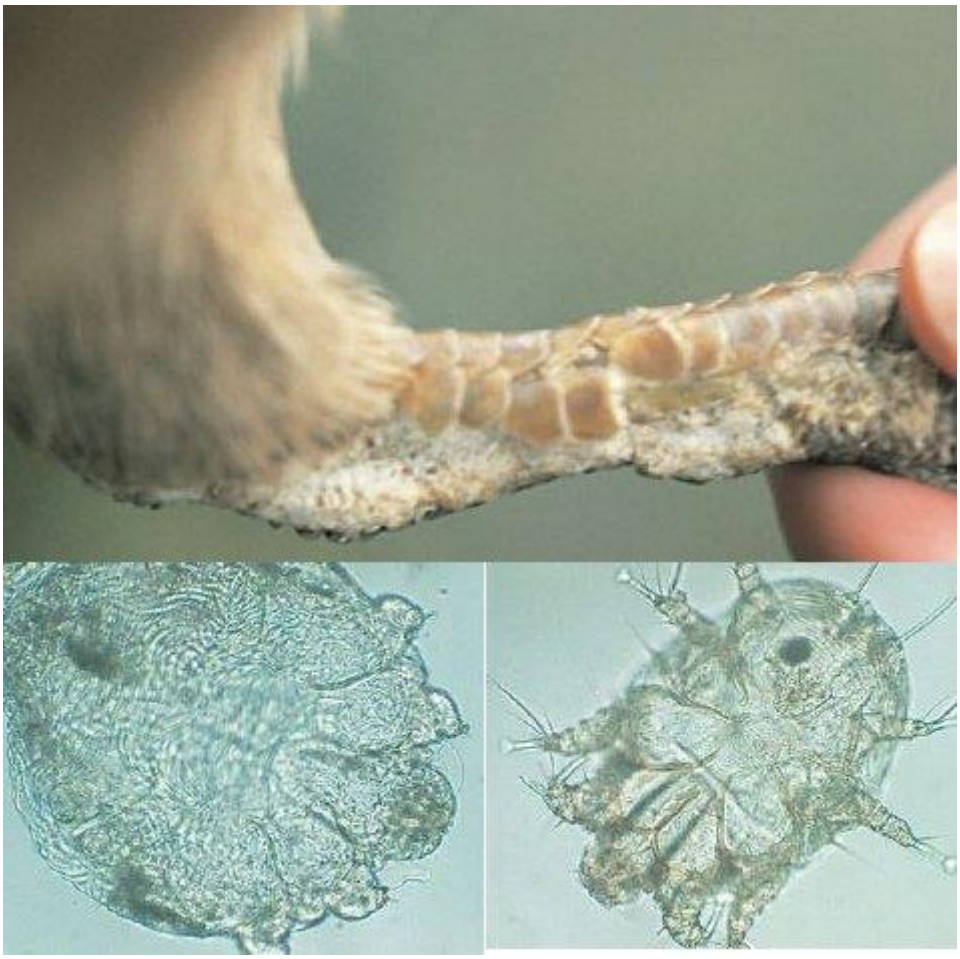
Question

A small scale rearer of pheasant chicks reports that several birds from a group had developed abnormalities of the legs around 5-weeks of age (see image) resulting in mild lameness. You perform a microscopic evaluation on the underside of some of the crusts and see the mites shown in the images below. What is the best interpretation?



- This is a mixed infestation of Sarcoptes and Cheyletiella
- This is a Sarcoptes infestation
- This is a Knemidocoptes (also can be spelled Cnemidocoptes) mutans infestation
- This is a mixed infestation of Cheyletiella and Knemidocoptes
- This is a mixed infestation of Knemidocoptes and Sarcoptes

Explanation - The location and appearance of these lesions is most suggestive of a Knemidocoptes mite infestation, also known as scaly leg mite. White-grey powdery debris forms between and on the surface of the scale resulting in the honeycomb crusts. The legs may become thickened and distorted. Diagnosis can usually be made by skin scraping or examination of the underside of a crust microscopically to detect the mite. The microscopic evaluation reveals two mites that look substantially different. These are the male and female Cnemidocoptes mites. The adult female, seen on the left, is almost round with short legs and devoid of suckers. The adult male is smaller with longer legs and suckers on long stalks. Treatment of choice is ivermectin.

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Question

You are called to evaluate a turkey flock after several turkeys have died. You notice several turkeys appear dull and depressed, standing by themselves with ruffled feathers and yellow droppings. You perform a necropsy on one of the recently deceased birds and find inflammatory lesions, ulcerations, and

thickening of the cecal wall. The contents of the cecum are dry and cheesy. The liver has large ring shaped yellow lesions.

Which of the following interventions would reduce transmission of this disease in the flock?

- Vaccinate breeders and progeny
- Amprolium added to water
- Fenbendazole added to feed
- Salinomycin in feed
- Chlortetracycline added to feed

Explanation - The case describes the typical findings for Histomoniasis (also known as Blackhead) in turkeys. This disease is caused by the protozoan parasite, Histomonas meleagridis. It is usually transmitted in embryonated eggs of the cecal nematode Heterakis gallinarum. It may also be transmitted in turkeys by **intake of infected feces from other turkeys** (also known as cloacal drinking). The combination of liver and cecal lesions are strongly suggestive of this disease in turkeys.

Because of the importance of the Heterakis worms in the life cycle and transmission of this disease, benzimidazole anthelminthics would be a reasonable intervention to decrease spread of the disease. In addition, isolation of infected animals would be helpful and depopulation of the herd could be necessary.

Nitarsone is an arsenical compound used as a feed additive that was used for the prevention and treatment of histomoniasis in turkeys but is no longer on the market. Coccidiosis in turkeys can be treated with amprolium. Salinomycin is a coccidiostat but is toxic to turkeys, even at low doses. There is no vaccine for this disease readily available. Chlortetracycline is an antibiotic and would not be appropriate to treat this protozoal disease.

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Question

After treating a chicken for cholera with penicillin, she develops a thickened, whitish, lesion in the mouth. What is your diagnosis?

- Candidiasis
- Ergotism
- Salmonellosis
- Fowl pox

Explanation - The correct answer is candidiasis, aka thrush or sour crop. It is common for chickens to develop Candida albicans infections after use of antibiotics. Lesions consist of thickened mucosa and whitish raised circular ulcers that can be seen in the mouth, crop, or esophagus. This can be treated with copper sulfate in the water or nystatin in feed.

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Question

A chicken flock is having problems with mortality due to development of tumors, particularly in egg layers. You perform a post-mortem exam on a deceased chicken and find multiple focal grey tumors in the bursa, liver, spleen and kidney. Histologically, the tumors are composed of large lymphoid cells that are histologically uniform. You suspect that the flock may be affected by lymphoid leukosis. Which of the following is true about this disease?

- Eliminating infected cocks will clear the flock of the problem within 4-6 months
- The most important route of transmission is respiratory
- It is caused by viruses that are rapidly inactivated at ambient temperatures or by most disinfectants
- The incubation period is 1-2 weeks

Explanation – The correct answer is it is caused by viruses that are rapidly inactivated at ambient temperatures or by most disinfectants. Avian leukosis is caused by the strains of the leukosis/sarcoma group of avian retroviruses. Certain subgroups of these viruses can cause lymphoid leukosis which is a clonal malignancy of the bursal lymphoid system. Transformation can occur as soon as 1-2 months after infection although tumors can take several more months to develop.

The most important mode of transmission appears to be vertical due to shedding by the hen into the egg. This can result in a congenitally infected chicken that remains viremic for life. Horizontal infection can occur, primarily by fecal-oral transmission. For this reason, eliminating infected cocks will not dramatically influence the rate of infection.

In addition, the virus can cause a subclinical disease syndrome of decreased egg production without tumor formation that may actually be the more economically important form of the disease.

Lymphoid leukosis can be difficult to distinguish from Marek's disease or from other B-cell lymphomas caused by reticuloendotheliosis virus. ELISA detection kits against several subgroups of avian leukosis viruses are available.

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Question

Which of the following diseases in chickens carries the best prognosis for recovery?

- Infectious laryngotracheitis
- Avian influenza
- Infectious bursal disease
- Infectious coryza

Explanation - The correct answer is infectious coryza. Because infectious coryza is caused by a bacteria, it can be effectively treated in many cases with antibiotics, whereas the other diseases listed are viral and carry significantly higher morbidity and mortality with no specific treatment available.

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Question

What is the most common cause of liver damage in broiler chickens?

- Aflatoxin ingestion
- Cholangiohepatitis from Clostridium perfringens infection
- Hepatic lipidosis
- Viral hepatitis

Explanation - The correct answer is cholangiohepatitis from Clostridium perfringens infection. This is a common cause for ascites in this bird. Other causes of ascites may be heart failure or pulmonary hypertension.

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Question

You are inspecting a flock of chickens with a history of slightly decreased egg production. You note, greenish diarrhea, cyanosis, and edema of the head, comb, and waddle. You also find discoloration of the shanks and feet and blood tinged oral and nasal discharge. You suspect fowl plague. What is the most appropriate next course of action?

- Begin aggressive broad spectrum antibiotic therapy
- Vaccinate all affected and unaffected chickens
- Do nothing, the disease is self limiting and no intervention is needed
- Contact regulatory authorities

Explanation - The correct answer is contact regulatory officials. Fowl plague is caused by an avian influenza virus. Due to concern over mutation and subsequent zoonotic potential, this disease is reportable and officials should be notified immediately.

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Question

Several grower chickens are found dead in a free-range poultry farm. The carcasses are very pale and have large numbers of mites (see image) present in the feathers. What is the cause of death in the chickens?

- Anemia secondary to severe Knemidocoptes mutans infestation
- Anemia secondary to severe Dermanyssus gallinae infestation
- Septicemia secondary to Laminosioptes cysticola infestation
- Anemia secondary to severe Ornithonyssus bursae infestation

Explanation - Dermanyssus gallinae is known as the poultry red mite. They are nocturnal feeders and severe infestations can cause anemia and even death in severely infested animals. Management of Dermanyssus depends on effective treatment of the environment with residual insecticides. Individual animals can be treated with a variety of topical agents but long term management depends on environmental control.

Knemidocoptes mutans is also known as the "scaly leg mite" and affects chickens, pheasants, and pigeons. It causes lesions primarily on the legs and unfeathered parts although irritation can lead to feather picking. The lesions progress to appear thickened and encrusted. The adult females are short legged, round, up to 0.5mm in diameter.

Ornithonyssus bursae are the northern fowl mite and often infect the feathered regions around the vent. They spend the entire life cycle on the host.

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Question

During the summer, a number of waterfowl have been found dead or not moving (see image) on the shore of a lake at the city park. The lake is shallow and heavily overgrown with foliage. You perform a necropsy and find no gross lesions. What is your preliminary diagnosis?

- Botulism
- Psittacosis
- Pacheco's disease
- Blackhead
- Polyoma virus

Explanation - Outbreaks of botulism often occur in hot weather due to alkali and anaerobic conditions arising, often in stagnant water. As the water temperature rises, oxygen levels fall. Fish and invertebrate carcasses act as a substrate for clostridial spores and toxin production.

Diagnosis of avian botulism can be confirmed by identification of Clostridium botulinum type C toxin by serum toxin analysis or from maggots found on carcasses because the toxin becomes concentrated in the maggots.

Affected birds can be treated with nursing and supportive care if they are still at least able to walk (but not fly). If unable to walk, the prognosis is poor. Prevention relies on improved water flow and oxygenation, removal of any carcasses from the water, and yearly vaccination with type C toxoid.

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Question

An adult chicken in a small, back-yard flock has lost weight and is thin and sluggish. The chicken is euthanized and on necropsy, you find multiple solid-to-soft crumbly, gray nodules that range in size from less than 1 millimeter to several centimeters in size deeply embedded and throughout several organs and tissues including the liver, spleen, and intestines.

Which of the following would you expect to find on the rest of your necropsy or on a diagnostic test?

- An unstained organism with a large capsule when India ink is applied to a smear
- Isolation of a hemagglutinating virus
- Fungal spores in smears from the lesions
- Intranuclear inclusion bodies in cells from the liver, kidneys, heart, and spleen
- Acid-fast bacteria in smears from the lesions
- An enlarged sciatic nerve

Explanation - This case describes the typical appearance of avian tuberculosis. The disease is rarely seen in commercial chickens because of their short life span and the husbandry practices utilized. Signs develop late in infection with weight loss, lethargy and lameness as common signs. Granulomatous nodules of varying sizes are commonly found in the liver, spleen, bone marrow, and intestine. Other tissues may also be involved.

Avian tuberculosis is caused by Mycobacterium avium var avium. There are several strains or serovars that can cause disease. Large numbers of acid-fast bacteria provide a tentative diagnosis.

Enlarged sciatic nerve is seen in chickens with Marek's disease. Intranuclear inclusions are seen with certain viral infections in poultry. An organism with a large capsule seen with India Ink is Cryptococcus. A hemaggluintating virus is the cause of Newcastle disease.

A good review of avian tuberculosis with several images can be found in this chapter from the USGS field manual.

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Question

Several young 2-week old turkeys in a flock have died suddenly after showing signs of labored, gasping breathing. Other young turkeys show signs of ruffled feathers and an unkempt appearance in addition to labored breathing. You are concerned that these may be cases of round heart disease (also known as spontaneous cardiomyopathy). Which of the following tests would be most helpful in confirming the diagnosis?

- Gross necropsy
- Histopathology of heart muscle of affected turkeys
- Measure taurine levels in feed or from serum of affected animals
- Measure selenium levels in feed or from serum of affected animals
- Test for mutation in cardiac troponin gene
- Electrocardiogram on turkeys showing clinical signs

Explanation - Spontaneous cardiomyopathy, also known as round heart disease of turkeys, is a disease that manifests as sudden death due to cardiac arrest in young (less than 3-4 week old) turkeys. While the precise etiology is unknown, it is thought that ischemia, particularly during the brooding period, plays an important role.

The characteristic finding is an affected animal less than 4-weeks old that has a markedly enlarged heart with dilatation of the ventricles, congested lungs, and an enlarged liver. In some cases, ascites and other signs of congestive heart failure may be present.

The diagnosis is usually based on history and gross necropsy findings. Electrocardiogram findings are not considered useful and histologic lesions are nonspecific. They include lymphocytic infiltration and damage of the myofibrils in the cardiac muscle tissue. The disease is not thought to be related to nutritional deficiencies such as taurine or selenium.

If you chose selenium, you may have been thinking of mulberry heart disease of pigs which is related to Vitamin E and selenium deficiency. If you chose taurine, you may have been thinking of dilated cardiomyopathy in cats which can be caused by taurine deficiency.

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Question

Many of the 6-12 week old turkeys in a large flock have recently developed signs of depression, bloody diarrhea, and sudden death. On postmortem exam, you find intraluminal hemorrhage in the proximal small intestine and an enlarged, friable spleen. You diagnose hemorrhagic enteritis. Which of the following treatments would be most effective at managing this outbreak?

Add fenbendazole to water

Vaccinate 4-5 week old turkeys [Correct answer]

Treat infected birds with tiamulin

Treat infected and uninfected younger birds with tiamulin

Vaccinate 1-3 week old turkeys

Explanation - Hemorrhagic enteritis is caused by an adenovirus. Birds <4 weeks typically are protected by maternal antibodies and would likely not generate a strong immune response to vaccination. Tiamulin is an antibiotic that is active against gram-positive bacteria, mycoplasma, and anaerobes and is not going to control the viral outbreak. Fenbendazole is used for internal parasites but should not be used in birds that are producing eggs or are for human consumption.

Virulent outbreaks of hemorrhagic enteritis can be treated by injection of antiserum from recovered birds. Prevention and management usually depends on administration of vaccines in the water to 4-5 week old animals.

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Question

The 18-day duck embryo on the left (see image) is normal while the one on the right of the same age shows cervical lordosis, a shortened axial skeleton, and subcutaneous emphysema. Which management change would be most likely to reduce the incidence of such abnormalities?

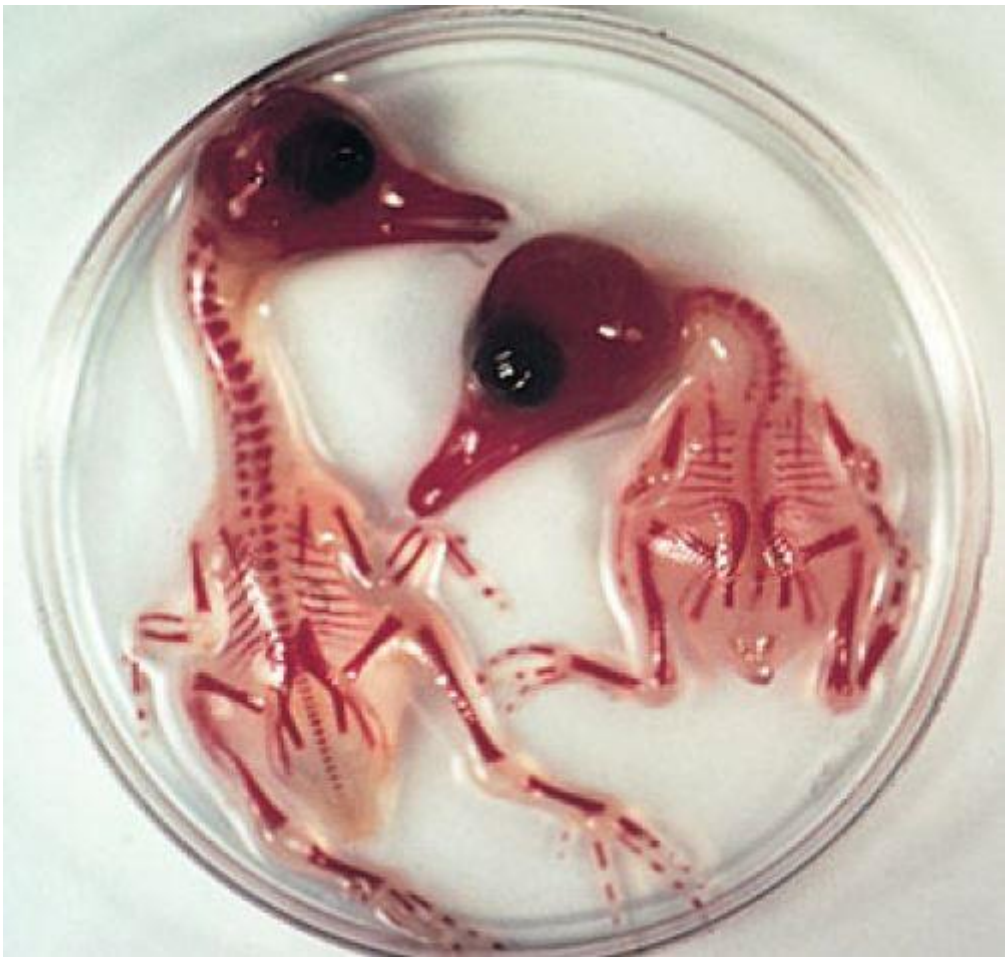

Image used with permission, from Avian Medicine (Forbes), courtesy of Manson Publishing.

Supplement ducks with iodine

Reduce or eliminate organophosphate use [Correct answer]

Depopulate the flock and replace with pathogen free ducks

Reduce or eliminate use of polychlorinated biphenols (PCBs)

Supplement ducks with calcium

Explanation - These deformities are associated with organophosphate insecticides, particularly parathion, which can cause several vertebral and long bone abnormalities as well as generalized stunting of embryonic development.

PCBs are mixtures of compounds released in combustion. They cause reproductive toxicity in avians by binding to estrogen receptors and altering thyroid and adrenal homeostasis. They do not cause specific fetal abnormalities.

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Question

Visceral gout in poultry can be observed when renal damage from any number of causes or severe dehydration has occurred. What substance is accumulating in the affected organs in visceral gout?

Magnesium phosphate crystals

Urate crystals [Correct answer]

Retinol

Cholesterol

Calcium phosphate crystals

Explanation - Uric acid is produced in the liver of birds as the end product of nitrogen metabolism. This chalky substance accumulates in liver, myocardium, spleen and on serosal surfaces in visceral gout. Articular urate deposits can also occur.

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Question

Your client has ignored your advice and has housed his chickens and turkeys together. Many of his chickens now have a mild cough and sneeze while the turkeys have more severe signs with nasal discharge, swelling of the paranasal sinus and decreased weight and egg production. What disease do you suspect?

Histomonas meleagridis

Trichomonas gallinae

Mycoplasma gallisepticum [Correct answer]

Candida albicans

Explanation - The correct answer is Mycoplasma gallisepticum. The key to this question is the respiratory signs that are more severe in the turkeys than the chickens. M. gallisepticum causes severe sinusitis and air sacculitis in turkeys with much milder signs in chickens. Diagnosis can be made by ELISA, rapid plate agglutination, or PCR. Secondary pathogens commonly play a role in this disease. Histomonas meleagridis is also a potential pathogen that may affect turkeys when housed with chickens. Clinical signs associated with this organism are gastroenteritits and not respiratory signs. Candida and Trichomonas are not primary respiratory diseases.

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Question

About 15% of the turkeys in a commercial flock have developed swollen, edematous pectoral muscles. There is degeneration, necrosis, fibrosis and a green appearance of the muscle which is resulting in condemnation at processing. How can you decrease the incidence of this condition in the flock?

Vaccinate breeders and progeny

Selective breeding [Correct answer]

Add tiamulin to feed

Selenium supplementation

Separate all affected birds from rest of the flock

Add amprolium to water

Explanation - Deep pectoral myopathy, as described in this case, is a heritable condition associated with rapid growth rate. Vigorously exercised muscle, which commonly occurs when turkeys are handled, leads to swelling, ischemia, and necrosis of the deep pectoral muscles. This condition is thought to be due, in part, to extreme selection for breast meat. The condition is not contagious and there are no specific

nutritional factors that are known to influence the condition.

Incidence can be decreased by careful handling of susceptible birds and selective breeding.

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Question
Reticuloendotheliosis in chickens and turkeys cause which of the following?

Pulmonary hypertension

Syncytial respiratory cells

Egg shell fragility

Lymphoma [Correct answer]

Explanation - The correct answer is lymphoma. This virus affects turkeys, chickens, ducks, geese, and quail. The virus is a retrovirus that can cause runting of the birds, acute neoplasias, as well as chronic B and T cell lymphomas. The disease is often difficult to differentiate from Marek's disease and lymphoid leukosis. The runting syndrome causes weight loss, paleness, abnormal feathering, and occasional paralysis. Clinical findings may also include thymic and bursal atrophy, enlarged nerves, and anemia. The neoplasias usually involve the liver, spleen, intestine, and heart. Definitive diagnosis is based on virus isolation or antibody detection. This disease is not a major economic concern at this time, so there are no control measures for the disease.

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Question

A chicken producer is concerned that geese infected with West Nile virus were found near his farm. He has instituted strict biosecurity measures for his chickens as well as a mosquito control regimen. Which of the following additional recommendations is most appropriate?

Advise the farmer that there is minimal evidence that chickens can develop clinical disease from West Nile virus [Correct answer]

Advise the farmer that adding sulfonamides to the water has been shown to decrease the morbidity of West Nile virus in chickens

Advise the farmer to monitor for development of any neurologic signs in his chickens and immediately euthanize affected chickens because they are likely infected with West Nile virus

Advise the farmer that vaccination of the chickens will decrease the risk of them developing encephalitic signs from West Nile virus

Explanation - Crows, geese, and exotic birds are susceptible to clinical disease from West Nile virus.

Many birds and mammals can become transiently infected if bitten by mosquitoes that are infected with West Nile virus. However, there is no evidence that clinical disease develops in chickens or turkeys. Chickens and turkeys quickly develop antibodies and clear the virus. Infected poultry are also not thought to represent a reservoir for the virus or a significant public health risk.

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Question
The goose shown in the image below was found weak on the shore of a local pond where oil had been dumped. The goose was covered in oil, dehydrated and weak but responsive. Which of the following is an important acute clinical effect of oil on affected birds?

Image used with permission, from Avian Medicine (Forbes), courtesy of Manson Publishing.

Lead toxicity

Nephrotoxicity

Disruption of function of the plumage [Correct answer]

Hepatotoxicity

Contact dermatitis

Explanation - Feathers serve a critical waterproofing and insulatory function which is disrupted by oil and can rapidly result in hypothermia. Other concerns for oiled birds include GI irritation from ingestion of oil during preening, hemolytic anemia, and pneumonia due to inhalation of oil.

Treatments include heat, supportive care, and activated charcoal. Once stabilized, frequent high pressure, warm, mild detergent baths and clean warm water rinses until water beads freely off of the feathers is important. Birds should be placed in warm air flow until dry and they should be maintained on self-skimming ponds for several days after washing to ensure full waterproofing.

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Question

Several of the 1-3 week-old broiler chicks on a small chicken farm are exhibiting stunted growth. On examination, you find that they also have decreased pigmentation of the skin, feet, and beak and many broken or twisted feathers. You perform a post-mortem examination of a few chicks and find that they have orange mucus in the small intestine, an enlarged proventriculus, a small gizzard and an atrophied pancreas. How should you treat the flock?

In-ovo vaccination

Add fenbendazole to water for all birds

Cull affected birds daily [Correct answer]

Treat severely affected birds with oxytetracycline

Spray birds with a permethrin solution

Explanation - The condition described is known as malabsorption syndrome, also known as runting-stunting syndrome or pale-bird syndrome. It is mainly seen in 1-3 week old chickens and appears to have a complex or multifactorial etiology related to numerous enteric viruses as well as possible mycotoxins.

Key clinical signs include the poor growth and feathering in birds of the appropriate age as well as abnormal feathers and pale feet and skin. Orange intestinal contents or feces is also a common finding.

There is no treatment and daily cull of affected birds in the appropriate age range is appropriate. Improved hygiene and sanitation, good nutrition and egg selection are also important management steps to minimize the damage from this condition. As no single specific cause is identified, the benefit of vaccination is unclear. There are vaccines against avian reovirus available but these are not given in-ovo.

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Question

Young turkeys on a large new farm are showing stunting, poor feathering, and short thick bowed legs. Histologically they have chondrodysplasia. The most likely cause of this is_____?

Choline deficiency [Correct answer]

Magnesium deficiency

Vitamin E deficiency

Selenium deficiency

Copper deficiency

Explanation - This occurs in both chicks and young turkeys, but turkeys have a particularly high choline requirement. The clinical signs described should lead you to suspect this deficiency.

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