FYI!

Guidelines to Judicious Therapeutic Use of Antimicrobials in Poultry

The attached document is being submitted to the AAAP membership by Dr. Dennis Wages and the AAAP Drugs and Therapeutics Committee.

The document, which was developed by the AAAP Drugs and Therapeutics Committee and given full support by the AAAP Board of Directors, will be submitted to the American Veterinary Medical Association Steering Committee on Judicious Therapeutic Antimicrobial Use.

Guidelines to
Judicious Therapeutic Use of Antimicrobials in Poultry

Introduction: The guidelines to judicious therapeutic use in poultry are developed to provide information to the field veterinarian regarding intervention strategies for common bacterial diseases affecting both chickens and turkeys. Presented below are the Principles of Judicious Therapeutic Use of Antimicrobials as approved by the American Veterinary Medical Association Executive Board and are used as the framework for the recommended guidelines developed for poultry. This document is a working document and will be updated annually by the American Association of Avian Pathologists Committee on Drugs and Therapeutics with input by the National Chicken Council and National Turkey Federation.

American Veterinary Medical Association
Principles of Judicious Therapeutic Use of Antimicrobials

Position Statement

When the decision is reached to use antimicrobials for therapy, veterinarians should strive to optimize therapeutic efficacy and minimize resistance to antimicrobials to protect public and animal health.

Objectives

- Support development of a scientific knowledge base that provides the basis for judicious therapeutic antimicrobial use.
- Support educational efforts that promote judicious therapeutic antimicrobial use.
- Preserve therapeutic efficacy of antimicrobials.
- Ensure current and future availability of veterinary antimicrobials.

Strategies

- Facilitate development and distribution of appropriate antimicrobial use guidelines by practitioner species-interest groups.
- Improve scientifically based therapeutic practices through education.

Recognized Needs

- Improved monitoring and feedback systems for antimicrobial use and resistance patterns.
- Research to improve scientifically based therapeutic practices.

Judicious Use Principles

- Preventive strategies, such as appropriate husbandry and hygiene, routine health monitoring, and immunization, should be emphasized.
- Other therapeutic options should be considered prior to antimicrobial therapy.
- Judicious use of antimicrobials, when under the direction of a veterinarian, should meet all requirements of a valid veterinarian-client-patient relationship.
- Prescription, Veterinary Feed Directive, and extralabel use of antimicrobials must meet all the requirements of a valid veterinarian-client-patient relationship.
- Extralabel antimicrobial therapy must be prescribed only in accordance with the Animal Medicinal Drug Use Clarification Act amendments to the Food, Drug, and Cosmetic Act and its regulations.
- Veterinarians should work with those responsible for the care of animals to use antimicrobials judiciously regardless of the distribution system through which the antimicrobial was obtained.
- Regimens for therapeutic antimicrobial use should be optimized using current pharmacological information and principles.
- Antimicrobials considered important in treating refractory infections in human or veterinary medicine should be used in animals only after careful review and reasonable justification. Consider using other antimicrobials for initial therapy.[1]
- Use narrow spectrum antimicrobials whenever appropriate.
- Utilize culture and susceptibility results to aid in the selection of antimicrobials when clinically relevant.
- Therapeutic antimicrobial use should be confined to appropriate clinical indications. Inappropriate uses such as for uncomplicated viral infections should be avoided.
- Therapeutic exposure to antimicrobials should be minimized by treating only for as long as needed for the desired clinical response.
- Limit therapeutic antimicrobial treatment to ill or at risk animals, treating the fewest animals indicated.
- Minimize environmental contamination with antimicrobials whenever possible.

- Accurate records of treatment and outcome should be used to evaluate therapeutic regimens.

[1]In this context, this principle takes into account development of resistance or cross-resistance to important antimicrobials.

Glossary:

Antibiotic--a chemical substance produced by a microorganism, which has the capacity, in dilute solutions, to inhibit the growth of or to kill other microorganisms.

Antimicrobial--an agent that kills bacteria or suppresses their multiplication or growth. This includes antibiotics and synthetic agents. This excludes ionophores and arsenicals.

Narrow Spectrum Antimicrobial--an antimicrobial effective against a limited number of bacterial genera often applied to an antimicrobial active against either Gram-positive or Gram-negative bacteria.

Broad Spectrum Antimicrobial--an antimicrobial effective against a large number of bacterial genera; generally describes antibiotics effective against both Gram-positive and Gram-negative bacteria.

Antibiotic Resistance--a property of bacteria that confers the capacity to inactivate or exclude antibiotics or a mechanism that blocks the inhibitory or killing effects of antibiotics.

Extralabel--Extralabel use means actual use or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling. This includes, but is not limited to, use in species not listed in the labeling, use for indications (disease or other conditions) not listed in the labeling, use at dosage levels, frequencies, or routes of administration other than those stated in the labeling, and deviation from the labeled withdrawal time based on these different uses.

Immunization--the process of rendering a subject immune or of becoming immune, either by conventional vaccination or exposure.

Monitoring--monitoring includes periodic health surveillance of the population or individual animal examination.

Therapeutic--treatment, control, and prevention of bacterial disease.

Veterinarian/Client/Patient Relationship (VCPR) -- A VCPR exists when all of the following conditions have been met:

1. The veterinarian has assumed the responsibility for making clinical judgments regarding the health of the animal(s) and the need for medical treatment, and the client has agreed to follow the veterinarian's instructions.

2. The veterinarian has sufficient knowledge of the animal(s) to initiate at least a general or preliminary diagnosis of the medical condition of the animal(s). This means that the veterinarian has recently seen and is personally acquainted with the keeping and care of the animal(s) by virtue of an examination of the animal(s) or by medically appropriate and timely visits to the premises where the animal(s) are kept.

3. The veterinarian is readily available for follow-up evaluation, or has arranged for emergency coverage, in the event of adverse reactions or failure of the treatment regimen.

Veterinary Feed Directive (VFD) Drug--The VFD category of medicated feeds was created by the Animal Drug Availability Act of 1996 to provide an alternative to prescription status for certain therapeutic animal pharmaceuticals for use in feed. Any animal feed bearing or containing a VFD drug shall be fed to animals only by or upon a lawful VFD issued by a licensed veterinarian in the course of the veterinarian's professional practice.

Therapeutic Antimicrobials* Available for Use in Poultry

FDA Approved for oral and/or injectable

***Antimicrobials:** In this document antimicrobials will be defined as any substance given to poultry for the treatment and/or control of bacterial disease within the bird in water or as an injection.

Antibiotic Class	*Generic Name*	*Route*
Aminoglycosides:	streptomycin	oral
	gentamicin	injectable
	neomycin	oral
Aminocyclitols:	spectinomycin	oral
β-Lactams:	ceftiofur	injectable
Decapeptides:	bacitracin	oral
Fluoroquinolones:	enrofloxacin	oral
	sarafloxacin	oral
Lincosamides:	lincomycin	oral
Macrolides:	erythromycin	oral
	tylosin	oral
Penicillins:	potassium-penicillin G	oral
Sulfonamides:	sulfadimethoxine	oral
	sulfaquinoxaline	oral
Tetracyclines:	chlortetracycline	oral
	oxytetracycline	oral
	tetracycline HCl	oral
Combinations:	lincomycin/ spectinomycin	oral

Dosages of the above products should be according to the manufacture's labeled recommendations or based on the clinical experience of attending veterinarian.

Classification of Antimicrobials Based on Importance and Use in Both Humans and Poultry

Class I: Important in human medicine; to be held in reserve for treatment in poultry; **enrofloxacin, sarafloxacin;**

Class II: Human medicine use where alternatives exist; exposure in poultry is moderate; **erythromycin, penicillin, gentamicin, sulfonamides, ceftiofur, tetracycline class;**

Class III: No or minimal use in human medicine or low exposure in poultry; **bacitracin, streptomycin, tylosin, lincomycin, spectinomycin, neomycin;**

The following are general use guidelines for antimicrobial intervention in poultry to be used to aid the veterinarian in making informed decisions regarding therapeutic antimicrobial use.

Antimicrobials in Class III used at labeled instructions should be considered first if farm history, in vitro sensitivity and clinical judgment warrants.

Extra label use of Class III antimicrobials should be considered if labeled use of Class III antimicrobials have failed, farm history and/or in vitro sensitivity dictates, or based on clinical experience of the attending veterinarian. Extra label drug use will be performed with a valid veterinarian-client-patient relationship.*

***(See AVMA principles for judicious therapeutic use of antimicrobials before initiating extra label use)**

When farm history, in vitro sensitivity and/or clinical judgment warrants the use of antimicrobials in Class II, their use should be in accordance with labeled instructions before considering any extra label use.

In the event that antimicrobials in Classes II or III have been carefully considered and all other intervention strategies have failed, labeled use of antimicrobials in Class I should be considered carefully based on all appropriate information.

With any treatment regimen within Classes II or III, using narrow spectrum antimicrobials is recommended to avoid over use of broad-spectrum antimicrobials.

Bacteriostatic drugs should be considered carefully when treating chronic infection due to decreased primary defense mechanisms in the birds. Overall effectiveness of bacteriostatic drugs in chronic infections may be decreased. Likewise, when immunosuppressive agents such as infectious bursal disease and chicken anemia virus are involved, bacteriostatic

antimicrobials may not be clinically effective.

When using the tetracycline class of antibiotics and erythromycin in proportioners, the addition of citric acid to lower stock solution pH may increase the stability and availability of these antimicrobials.

When using sulfonamides and penicillin in proportioners, the addition of ammonia to raise the pH of the stock solution may increase the stability and availability of these antimicrobials.

When multiple houses are present on the farm with disease, each flock within each house should be evaluated individually as to the current disease status. Only those birds in the house affected should be treated. Mortality and morbidity should be evaluated closely to determine treatment protocols. The least number of diseased and "at risk" birds should be treated on a farm.

Colibacillosis in Chickens:

Colibacillosis in chickens is frequently manifested as a septicemia resulting in a subacute serositis characterized by fibrinoheterophilic infiltration producing a fibrinous pericarditis, perihepatitis, airsacculitis and pneumonia.

Diagnostics: Morbidity and mortality should be used as keys for diagnostic surveillance. Morbidity of >1% and/or mortality of 1 bird per thousand should initiate diagnostic efforts in cases of colibacillosis. If typical lesions are observed at necropsy, prior to initiation of treatment, culture and in vitro sensitivity should be performed at this time. Likewise, appropriate samples should be collected to determine the complete etiology to prevent its reoccurrence (see prevention strategies). Sensitivity tests should be performed before treatment is initiated unless previous sensitivity patterns have demonstrated historic susceptibility to a certain class of antimicrobials. However, in vitro sensitivity monitoring is encouraged to maintain current antimicrobial susceptibility patterns.

Non-Antimicrobial Interventions: The environment should be optimized to reduce morbidity and mortality. Optimum temperature should be achieved based on age and activity of the birds and ventilation should be maximized accordingly. Every effort should be made to reduce ammonia and/or dust concentrations in the house to minimize the negative impact on primary defense mechanisms in the birds. Likewise, ventilation should be optimized for litter moisture control to reduce bacterial exposure. Broilers, in partial house brooding environments, can be moved from brooding chamber provided there is adequate heat and ventilation. To assess the progression of colibacillosis within a flock, culling procedures may be used to better evaluate the impact of this disease.

Antimicrobial Treatment Intervention: Based on in vitro sensitivity, flock or farm history and clinical judgment by the veterinarian, antimicrobial intervention may be warranted. Previously noted antimicrobial classifications and general use guidelines should be considered before antimicrobial intervention.

Suggested Antimicrobials for Colibacillosis Intervention:

Class III: streptomycin, neomycin*

Class II: chlortetracycline, oxytetracycline, tetracycline HCl, sulfonamides (Care should be taken when considering sulfonamide use in broilers due to the potential for residues)

Class I: enrofloxacin, sarafloxacin (Federal Law prohibits extra label use of the fluoroquinolones in food animals)

*Neomycin usage in chickens will be under the guidelines outlined in the Animal Medicinal Drug Use Clarification Act (AMDUCA) guidelines

Any antimicrobial selected for use, if not labeled specifically to treat *E. coli* infections in chickens, is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: per labeled instructions or based on the veterinarian's clinical judgment

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history records for future reference.

Other Treatment Considerations:

Conditions associated with *E. coli* for which treatment may not be appropriate include: hepatic granulomas, inflammatory process, salpingitis, sinusitis, osteomyelitis, meningitis, omphalitis after placement, and panophthalmitis.

Prevention Strategies:

E. coli is generally considered an opportunistic or secondary bacterial invader. The focus should be placed on prevention strategies. Non-infectious causes of secondary colibacillosis include chilling, heat stress, and increased ammonia levels. Every effort should be made to optimize the birds' environment at all times including a thorough cleaning and disinfection of the house after flock processing.

Immunosuppressive agents such as chicken anemia virus, infectious bursal disease, Marek's disease, and leukosis must be considered as primary factors involved in predisposing chickens to colibacillosis. Serology, virus isolation and identification are warranted. Based on any positive diagnostics tests, appropriate vaccination/control strategies should be implemented.

The most common primary respiratory agents involved in colibacillosis in chickens are field and/or vaccine strains of Newcastle disease and infectious bronchitis viruses. Serological evaluation and subsequent identification of these viruses must be included in a diagnostic work-up of a colibacillosis flock. Any positive identification of the above agents warrants careful consideration and evaluation of current vaccination strategies. Other agents involved in chickens that may result in colibacillosis include avian influenza virus and *Mycoplasma* spp.

Turkey Colibacillosis:

Colibacillosis in turkeys occurs commonly as an acute septicemia and/or a subacute serositis. The acute septicemic form results in a sudden increase in mortality with splenomegaly being the predominant post mortem lesion. Subacute serositis characterized by fibrinous pericarditis, perihepatitis, airsacculitis and pneumonia is similar to that which occurs in chickens.

Diagnostics: Morbidity and mortality parameters should be used as keys for diagnostic surveillance. Morbidity of >1/2% and/or mortality greater than or equal to 1 bird per thousand should initiate diagnostic efforts in cases of colibacillosis. When typical lesions are observed at necropsy, prior to treatment intervention, culture and in vitro sensitivity should be performed at this time. Likewise, appropriate samples should be collected to determine the complete etiology of primary agents involved to prevent reoccurrence of colibacillosis (see prevention strategies). Sensitivity tests should be performed before treatment initiated unless previous sensitivity patterns and farm or flock history have demonstrated susceptibility to certain classes of antimicrobials. In vitro sensitivity monitoring is encouraged to maintain current antimicrobial susceptibility patterns.

Non-Antimicrobial Interventions: Environmental management is an important component to colibacillosis control with or without antimicrobial intervention. Correcting any heat or cold stress and minimizing the effects of increased ammonia levels will aid in controlling mortality associated with colibacillosis. Ventilation should also be optimized for litter moisture control to reduce bacterial exposure. If poults are breaking with *E. coli* in the brooder house, movement of the birds to the grow-out houses may be considered if optimum temperature and ventilation is present. To assess the progression of colibacillosis in a flock, culling procedures may be used to better evaluate the impact of this disease in a flock.

Antimicrobial Treatment Intervention: Based on in vitro sensitivity, flock or farm history and clinical judgment by the attending veterinarian, antimicrobial intervention may be indicated. Previously noted antimicrobial classifications and general use guidelines should be considered before antimicrobial intervention.

Suggested Antimicrobials for Colibacillosis Intervention in Turkeys:

Class III: streptomycin*, neomycin;

Class II: chlortetracycline, oxytetracycline, tetracycline HCl, sulfadimethoxine, sulfaquinoxaline;

Class I: enrofloxacin, sarafloxacin

* Streptomycin use in turkeys will be under the guidelines in AMDUCA
Any antimicrobial selected for use, if not specifically labeled to treat *E. coli* infections in turkeys is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instruction or based on clinical judgment of the attending veterinarian

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: Conditions associated with *E. coli* infections for which treatment may not be appropriate include: arthritis, hepatic granulomas, meningitis, salpingitis, panophthalmitis, omphalitis after placement, and osteomyelitis.

Prevention Strategies:

Acute colisepticemia in turkeys accompanied by sudden increase in mortality usually suggests a primary enteric infection. The most common enteric insult in turkeys 5 weeks of age or older is infection with hemorrhagic enteritis virus (HE). This exposure can come from either a field or vaccine strain of HE virus. Consideration of maternal antibodies, type of vaccine used and timing of the vaccination can prevent the occurrence of colibacillosis under these conditions. Vaccine strategies for HE control should be evaluated.

Other agents involved in predisposing turkeys to the acute septicemic form of *E. coli* include turkey coronavirus, poult enteritis mortality syndrome, rotavirus, astrovirus, enterovirus, *Eimeria* spp. *Cryptosporidium* spp, *Spironucleus*, and *Hexamita*. After diagnostic evaluation of the primary agent, appropriate preventative measures should be initiated to prevent the reoccurrence of colibacillosis caused by the above agents.

The subacute serositis form of colibacillosis is most commonly associated with a primary respiratory insult and be initiated by both non-infectious and infectious causes. Non-infectious causes include chilling, heat stress, and increased ammonia levels. Every effort should be made to optimize the birds environment at all times including a thorough cleaning and disinfection of the house after flock processing.

Infectious agents associated with this form are: Newcastle disease virus, *Bordetella avium*, *Mycoplasma* spp., pneumovirus, avian influenza, and *Ornithobacterium rhinotracheale*. Serologic evaluation of the flock and/or isolations of these primary causative agents and implementation of appropriate vaccination and other prevention strategies will minimize the reoccurrence of colibacillosis in turkeys.

Fowl Cholera in Chickens (Pasteurellosis)

Fowl cholera, caused by *Pasteurella multocida* in chickens is most commonly observed in pullets and broiler breeders. It causes a septicemia and lung disease in the acute disease. In the subacute and chronic disease it causes localized lesions producing meningitis, arthritis, and swollen wattles with cellulitis.

Diagnostics: Because of the acute nature of this disease, diagnostic evaluation should be performed at the first onset of clinical signs, morbidity and mortality. At necropsy, prior to initiation of treatment, samples should be collected from organs involved. Most typically, brains, wattles, livers, joints, and bone marrow should be swabbed and samples collected for bacterial isolation and sensitivity testing. Antibiotic sensitivity profiling should be maintained and used for reference and comparison on any future outbreaks occurring on the same farm.

Non-Antimicrobial Intervention: As with many bacterial infections, the environment should be optimized to minimize mortality and morbidity. Strict biosecurity should be implemented to prevent spread to other houses on the same farms. Optimal dead bird disposal should be considered to prevent rodents, wild animals and domestic animals access to mortality.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention is warranted due to the potential acute nature of this disease.

Suggested Antimicrobials for Fowl Cholera Intervention:

Class III:	No antibiotics effective
Class II:*	tetracycline class, sulfaqinoxaline, sulfadimethoxine, erythromycin;

* Any extra label use of this class of drugs should be under the guidelines in the AMDUCA.
* No extra label use of fluoroquinolones for fowl cholera in chickens

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: In the chronic form of this disease, i.e. over two weeks in duration, response to antimicrobial therapy is limited and must be critically evaluated before initiation.

Prevention: Vaccination strategies must be evaluated. It is recommended that the organisms be serotyped to determine if a vaccination break has occurred or for the inclusion of any new serotype in future vaccination programs. Live and killed vaccines, alone or in combination usually provides adequate control of this disease. Improved rodent control should be considered. A thorough cleaning and disinfection should be performed between flocks.

Fowl Cholera in Turkeys: (Pasteurellosis)

Fowl cholera in turkeys occurs in both market birds and breeders. Acute, sub-acute and chronic forms of the disease are not uncommon in turkeys. Acute septicemia followed by infections in the joints, lungs and eyes are observed.

Diagnostics: Because of the acute nature of this disease, diagnostic work-ups should be performed when morbidity is present or a clinical diagnosis has been performed. Prior to initiation of treatment, culture and sensitivity should be performed to provide the appropriate antimicrobial therapy. Typically lung, liver and/or bone marrow can be sampled for culture and sensitivity.

Non-Antimicrobial Intervention: Environment should be optimized. Strict biosecurity measures should be in place to prevent spread within a farm. Dead bird disposal should be performed to minimize access to domestic and wild animals and rodents.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention is warranted do to the potential acute nature of this disease.

Suggested Antimicrobials for Fowl Cholera Intervention:

Class III: No antibiotics effective

Class II:* tetracycline class, sulfaqinoxaline, sulfadimethoxine, erythromycin;

Class I: enrofloxacin

Any antimicrobial selected for use, if not specifically labeled to treat cholera infections in turkeys is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: In the chronic form of this disease, response to antimicrobial therapy is limited and must be critically evaluated before initiation.

Prevention: Vaccination strategies must be evaluated. In breeders, it is recommended that the organisms be serotyped to determine if a vaccination break has occurred or for the inclusion of any new serotype in future vaccination programs In market turkeys, vaccination strategies may be implemented. A thorough cleaning and disinfection of the affected house is recommended. Rodent control should be evaluated.

Necrotic Enteritis in Chickens:

Necrotic enteritis is caused by *Clostridium perfringes*. It causes an acute to chronic enteritis with necrosis of the upper small intestines.

Diagnosis: Necropsy lesions are typical and can be used to diagnose this condition. Cultures are not routinely performed because this organism is difficult to isolate in anaerobic culturing. If culture is performed, an antibiotic sensitivity can be useful in determining appropriate antimicrobial therapy.

Non-Antimicrobial Intervention: Environment should be optimized. Maintain proper ventilation and litter moisture.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention is warranted.

Suggested Antimicrobials for Necrotic Enteritis Intervention:

Class III: bacitracin, penicillin, lincomycin

Class II: erythromycin

Any antimicrobial selected for use, if not specifically labeled to treat necrotic enteritis in chickens is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: Currently, antimicrobial therapy is the treatment of choice for necrotic enteritis.

Prevention: Identifying the predisposing factors is an important component in preventing necrotic enteritis. The anticoccidial program should be evaluated with shuttle and rotational programs considered. A thorough cleaning and disinfection of the affected house is recommended.

Necrotic Enteritis in Turkeys:

Necrotic enteritis is caused by *Clostridium perfringes*. It causes an acute to chronic enteritis with necrosis of the upper small intestines.

Diagnosis: Necropsy lesions are typical and can be used to diagnose this condition. Cultures are not routinely performed because this organism is difficult to isolate in anaerobic culturing. If culture is performed, an antibiotic sensitivity can be useful in determining appropriate antimicrobial therapy.

Non-Antimicrobial Intervention: Environment should be optimized. Maintain proper ventilation and litter moisture.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention is warranted.
Suggested Antimicrobials for Necrotic Enteritis Intervention:

Class III: bacitracin, penicillin, lincomycin

Class II: erythromycin

*Any antimicrobial selected for use, if not specifically labeled to treat necrotic enteritis in turkeys is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: Currently, antimicrobial therapy is the treatment of choice for necrotic enteritis.

Prevention: Identifying the predisposing factors is an important component in preventing necrotic enteritis. The anticoccidial program should be evaluated with seasonal rotational programs considered. A thorough cleaning and disinfection of the affected house is recommended.

Staphylococcus Infections in Chickens:

Staphylococcus spp. infection in chickens causes primarily an arthritis most commonly observed in the hock joints and footpads. It can also be associated with osteomyelitis and swollen head associated cellulitis.

Diagnosis: Necropsy lesions are typical and can be used to diagnose arthritis in chickens. However, cultures should be performed to confirm the etiology as other bacteria may be associated with arthritis. When culture is performed, an antibiotic sensitivity should be used in determining appropriate antimicrobial therapy.

Non-Antimicrobial Intervention: Flock outbreaks are uncommon in chickens. Culling procedures to assess the progression of the disease in a flock before antimicrobial therapy is initiated should be performed.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention may be warranted.

Suggested Antimicrobials for Staphylococcus Intervention:

Class III: penicillin, lincomycin

Class II: erythromycin

Any antimicrobial selected for use, if not specifically labeled to treat *Staphylococcus* spp. in chickens is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: Often, *Staphylococcus* spp. infections causes low morbidity in a flock and treatment is not cost effective. The use of culling procedures will help assess the progression of this disease within a flock and determine intervention strategies.

Prevention: Identifying the predisposing factors is an important component in preventing *Staphylococcus* spp. infections. Predisposing factors such as litter quality, viral arthritis enteric disease, and upper respiratory infections can lead to *Staphylococcus* spp. infections. Identifying any predisposing factors and implementing preventative vaccination and management practices is imperative to prevent future infections.

Staphylococcus Infections in Turkeys:

Staphylococcus spp. infection in turkeys causes primarily an arthritis most commonly observed in the hock joints and footpads. It can also be associated with osteomyelitis.

Diagnosis: Necropsy lesions are typical and can be used to diagnose this condition. However, cultures should be performed to confirm the etiology, as other bacteria may be associated with arthritis. When culture is performed, an antibiotic sensitivity should be used in determining appropriate antimicrobial therapy.

Non-Antimicrobial Intervention: Flock outbreaks are uncommon in turkeys. Culling procedures to assess the progression of the disease in a flock before antimicrobial therapy is initiated should be performed.

Antimicrobial Intervention: Based on in vitro sensitivity, flock and farm history and the clinical judgment of the veterinarian antibiotic intervention may be warranted.

Suggested Antimicrobials for Staphylococcus Intervention:

Class III: penicillin, lincomycin

Class II: erythromycin

Any antimicrobial selected for use, if not specifically labeled to treat *Staphylococcus* spp. in turkeys is extra label use and must be used as outlined in AMDUCA.

Treatment Duration: Per labeled instructions or based on the veterinarian's clinical judgment.

Treatment Assessment: During and after therapeutic intervention, the flock should be carefully evaluated as to the success of the treatment. These evaluations can be performed by the attending veterinarian or by service personnel under the veterinarian's direction. Accurate records should be maintained on all treatment outcomes and included in the farm history and records for future reference.

Other Treatment Considerations: Often, *Staphylococcus* spp. infections causes low morbidity in a flock and treatment is not cost effective. The use of culling procedures will help assess the progression of this disease within a flock and determine intervention strategies.

Prevention: Identifying the predisposing factors is an important component in preventing *Staphylococcus* spp. infections. Predisposing factors such as litter quality, trauma, hemorrhagic enteritis, other enteric disease, and upper respiratory infections can lead to

Staphylococcus spp. infections. Identifying any predisposing factors and implementing preventative vaccination and management practices is imperative to prevent future infections.

Other Bacterial Diseases:

The diseases listed previously in this document represent the most common bacterial infections in poultry where therapeutic antimicrobial intervention in water is warranted. However, there are other bacterial or bacteria-like infections that occasionally occur that may warrant antimicrobial therapy.

Erysipelas: Erysipelas is not common today in confinement poultry, however, infections occasionally occur. Due to the acute nature of this disease, antimicrobial therapy is warranted. Penicillin is the antimicrobial of choice for erysipelas control.

Mycoplasma gallisepticum (MG): MG infections in chickens are routinely controlled by serological testing, agent isolation and eradication procedures. Rarely, there are cases where the flock may be treated to minimize MG shedding and reduce condemnations. In these instances, general use principles and guidelines should be incorporated into antimicrobial strategy. Tylosin, tetracyclines, and erythromycin are antimicrobials in which their spectrum includes MG. In turkeys, MG is controlled by similar strategies as in chickens. To minimize condemnations and reduce MG shedding, treatment may be warranted. Tylosin, tetracyclines and erythromycin can be considered in the treatment of MG. Extra-label use of any class of antimicrobials must be in accordance with AMDUCA guidelines. Due to the nature of MG infections (where infected birds act as reservoirs of infections), treatment of active infections should be carefully considered. Strict biosecurity must be initiated to minimize the spread of this disease.

Mycoplasma synoviae (MS): Similar control measures and strategies should be considered for MS as are considered for MG infections. Tetracyclines and erythromycin are effective in treating MS infections.

Salmonellosis: *Salmonella* spp. infections are occasionally observed, primarily occurring in young turkeys in the brooder house. The vertically transmitted (egg transmitted) salmonellas are controlled through serologic monitoring of breeders and slaughter of carrier birds. Paratyphoid diseases are usually a result of fecal contamination in eggs and subsequent exposure to poults, and occasionally chicks. These infections are usually self-limiting and therapeutic intervention is usually not warranted. Prevention of infections through proper egg collection techniques is recommended to prevent exposure. When paratyphoid infections occur and mortality and morbidity are observed, lincomycin, lincomycin/spectinomycin combination, neomycin and tetracyclines can be used on a limited basis after culture and sensitivity have been performed. Extra label use of antimicrobials for paratyphoid infections must be in accordance with AMDUCA

guidelines.

Feed Grade Antimicrobial Therapeutics: An effective follow-up therapy to water antimicrobial use is the use of feed grade antimicrobials. Veterinarians are limited in their use based on guidelines published in the Feed Additive Compendium. Limited cross clearance approvals preclude feed grade antimicrobials to be routinely used as intervention strategies. However, if feed grade antimicrobials are considered, the appropriate feed grade antimicrobial should be used per the Feed Additive Compendium. The veterinarian can refer to specific bacterial disease treatment strategies earlier in this document to assess the potential benefit of feed grade antimicrobials for follow-up therapy.

Injectable Antimicrobial Therapeutics: Injectable antimicrobials are used predominately at day of age and/or in-ovo to control omphalitis in chicks and poults. In-ovo administration to prevent infection when the yolk is withdrawn into the body cavity can be an important intervention strategy at targeting bacterial contamination early. However, veterinarians should strive to maximize sanitation at the hatchery and egg collection levels to minimize the use of antimicrobials at day of age and in-ovo. Injections strategies should be used to support ongoing hatchery sanitation and proper egg collection techniques and not be used in lieu of these procedures. Current antimicrobials cleared for use in day old chicks or poults are extra label in-ovo and AMDUCA guidelines should be followed.

Injectable antimicrobials are occasionally used in an extra label manner for acute outbreaks in diseases in breeders, especially turkeys. Fowl cholera and erysipelas can be treated in this manner. Antimicrobials used in this manner include ceftiofur, long acting oxytetracycline, and penicillin. With extra label administration in breeders, AMDUCA guidelines must be followed.