MODULE 17: NATIONAL POULTRY IMPROVEMENT PLAN (NPIP)
This informational module has been approved expressly to serve as one unit of supplemental training for participants in USDA’s National Veterinary Accreditation Program. The module is intended to familiarize accredited veterinarians with animal health regulatory concepts and activities. Information in the module does not supersede the regulations. For the most up-to-date regulations and standards, please refer to the Code of Federal Regulations or contact your local Veterinary Services District Office.

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# National Poultry Improvement Plan

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Learning Objectives
Welcome to the National Poultry Improvement Plan (NPIP) module. After completion of this module, you will be able to
• describe the scope of the NPIP and how changes are made;
• define the different flock and State classification levels in the NPIP;
• find the specific monitoring and testing requirements in the Code of Federal Regulations for a specific type of production unit and disease classification; and
• locate the NPIP Program Standards Document, which contains testing procedures and additional resources (e.g., Official State Agencies, authorized laboratories) relative to the NPIP program.

Web links for additional information on topics presented in this module can be found in the Resources/Web Links section at the end of this document. Completion of this module is estimated to take 50 minutes but will vary depending on your familiarity with the information presented.

Introduction to NPIP
The National Poultry Improvement Plan is a voluntary partnership among the industry and State and Federal governments. Poultry producers have worked with USDA’s Animal and Plant Health Inspection Service (APHIS), various State governments, and State poultry associations and federations to create a system that has significantly reduced poultry disease, improved poultry and human health,* and created a continuing surveillance system for potential poultry health problems.

Through the NPIP, poultry producers earn certain classifications for their products (eggs and/or birds) based on meeting specific management and disease testing requirements. States administer the NPIP while the Federal government provides leadership and oversight. This voluntary partnership has become the recognized standard through which U.S. poultry producers demonstrate the disease status of their birds, day old chicks, and hatching eggs for shipment and sale.

Despite a decline in production due to highly pathogenic avian influenza (HPAI) during 2015, during 2016, the United States produced more than 100 billion eggs, making it the world’s second largest egg producer, preceded by China. Over three quarters of eggs produced are for human consumption, most of which are consumed in the United States. The remaining eggs are produced for the hatching market to provide replacement birds for laying flocks and broiler operations. During 2016, egg exports totaled 2.4 billion eggs.

*According to the CDC, in the United States during 1990–2014, 2,630 human illnesses caused by Salmonella infections were associated with live poultry contact. During 2000–2015, nearly 2,500 human illnesses were caused by foodborne infections (mostly Salmonella) from eggs or poultry.

Sources
History of the NPIP
During the early 1900s, bacillary white diarrhea, caused by *Salmonella enterica* subspecies *enterica* serotype *Pullorum* (*Salmonella Pullorum*), also known as pullorum disease, killed 80% or more of the chicks in affected flocks in the United States. In 1913, a test was developed that identified infected birds so they could be eliminated from the flock. Individuals in the poultry industry soon recognized the most effective way to control pullorum disease would be through a coordinated, nationwide effort.

This effort led to the development of the NPIP, which officially began in 1935. This national effort to improve poultry production initially focused on testing for pullorum disease and improved breed-based genetics. Today, the NPIP’s objective is “to provide a cooperative Industry-State-Federal program through which new diagnostic technology can be effectively applied to the improvement of poultry and poultry products throughout the country.”

Testing for pullorum disease and a similar disease, fowl typhoid (*Salmonella Gallinarum*), coupled with removal of reactors, has been a very successful, continuing segment of the NPIP. Both diseases have been eliminated from the U.S. commercial poultry industry. This testing remains a cornerstone of the NPIP today.

To learn more, visit the [NPIP website](#).

Expanded Testing for Vertically Transmitted Diseases
The NPIP has changed over the years to adjust to industry needs. The NPIP initially focused on breed-specific characteristics, but those have been dropped as the industry evolved to use more hybrid genetics. However, the disease focus on pullorum has remained constant. The testing portion of the NPIP continues to expand to meet the challenges faced by the poultry industry.

One of the challenges is vertically or transovarially-transmitted diseases (passed from the hen to the chick before the egg is laid). This may occur if a hen is subclinically infected while the egg is forming (Fig. 17-2). When the chicks hatch, they are already infected and can become a source of infection for others in the flock, repeating the cycle.

The best way to control these diseases is through active surveillance—testing and eliminating infected birds from the breeding flock. Providing only birds that test negative for these diseases to dealers and hatcheries selling hatching eggs, chicks, and poults helps to eliminate the source of infection for commercial poultry.

Pullorum disease, the disease the NPIP was founded on, is an example of a vertically transmitted disease. Fowl typhoid (*Salmonella Gallinarum*) is similar to pullorum disease in both transmission and clinical presentation.

Fowl typhoid was added in 1954. Over the years, other transovarially-transmitted fowl diseases have been included in the NPIP, such as *Mycoplasma gallisepticum* in 1965/1966, *Mycoplasma synoviae* in 1974, and *Mycoplasma meleagridis* in 1983/1984.

NPIP Continues to Evolve: Food Safety, Avian Influenza
Human outbreaks caused by *Salmonella* Enteritidis infections became recognized as a growing health problem during the 1970s and 1980s. Table eggs were implicated as a likely source in most of these outbreaks. The organism was found within the egg, not as a surface contaminant, making control at the flock level critical. *Salmonella* Enteritidis was added to the NPIP for table egg breeding stock in 1989 to protect poultry and public health.
In 1998, an avian influenza (AI) clean program for meat-type and egg-type chicken breeder flocks was added to the NPIP based on the recognized threat to the poultry industry and to enhance international markets for U.S. poultry breeding products. In 2002, the program was expanded to include meat-type turkey breeder flocks. In addition, routine serological surveillance was expanded to include participating breeder flocks of waterfowl, exhibition poultry, and game birds. This was the first non-vertically transmitted disease added to the NPIP since its creation.

In 2006, changes were made to the World Organisation for Animal Health (OIE) Code regarding notification for H5 and H7 low pathogenic avian influenza (LPAI). In response to these changes, the NPIP implemented a new H5/H7 LPAI monitoring and control program for commercial table-egg layers, broilers, and turkeys.

H5/H7 LPAI viruses have the potential to mutate into highly pathogenic variants during replication in gallinaceous poultry, such as chickens and turkeys. The H5/H7 AI monitoring plan supports the depopulation of infected flocks as an aggressive control measure to rapidly reduce circulating virus and protect the industry from widespread outbreaks.

**NPIP Implementation**

All of the regulations and requirements for the NPIP are detailed in *Title 9 of the Code of Federal Regulations* (9 CFR) Parts 56, 145, 146, and 147, and the NPIP Program Standards documents, *Subparts A–E* and *Subpart F*. The national NPIP office, located in Conyers, Georgia (Fig. 17-4), provides essential leadership for the voluntary NPIP, but the day-to-day administration and implementation of the NPIP at the producer level is handled by Official State Agencies (OSA). An OSA is the State authority recognized by the USDA to cooperate in the administration of the NPIP as defined in 9 CFR §145.1. As of June 2016, 50 Official State Agencies, including 49 U.S. States (all but Hawaii) and one U.S. Territory (Puerto Rico) have signed a memorandum of understanding (MOU) with USDA-APHIS to voluntarily participate in the NPIP. Each OSA that implements the NPIP must follow it as stated in the CFR and NPIP Program Standards document, but they can adopt and follow rules that are more stringent than those in the NPIP.

**Participation in the NPIP**

Individual producers voluntarily participate in the NPIP by enrolling with their Official State Agency. If a producer wants to ship poultry products across State lines, they are required to participate in the NPIP or meet specific State requirements.

To participate, a poultry producer must

• request enrollment;
• demonstrate the facilities and procedures meet the required standards;
• maintain appropriate records; and
• complete the required diagnostic testing and monitoring of their birds, eggs, and facilities.

The NPIP publishes a searchable directory of NPIP participants.

**NPIP Requirements**

The NPIP requires participants to

• maintain records of purchases and sales of eggs and birds;
• purchase hatching eggs and birds from other equivalent NPIP-certified flocks;
• follow specified sanitation procedures for the various types of poultry production units; and
• allow inspections of their records and their premises by State inspectors.
The NPIP provides a variety of classifications that producers can attain. The list of available classifications is based on the type of birds and the type of production unit. The requirements for most classifications involve testing a representative sample of the flock for a specific disease on a regular basis.

**All NPIP participants must meet the requirements to be U.S. Pullorum-Typhoid Clean.** Participants can choose to seek additional classifications.

### Knowledge Review #1

Which of the following statements about NPIP participation is false?

A. Participation is voluntary
B. Producers enroll with their Official State Agency
C. Participants must demonstrate their facilities and procedures meet the required standards
D. Participants must maintain pure bred birds in their flocks
E. The rules for NPIP, including participation, are contained in the *Code of Federal Regulations* and *NPIP Program Standards Document*

*Answers can be found at the end of this document.*

### NPIP Defined Poultry Types

Testing and monitoring requirements for the various classifications that participants can earn are based on the type of birds and the type of production unit. Below is a list of how the NPIP categorizes participants.

**9 CFR Part 145: NPIP for Breeding Poultry**

- **Subpart B:** Special Provisions for Multiplier’ Egg-Type Chicken Breeding Flocks and Products
- **Subpart C:** Special Provisions for Multiplier Meat-Type Chicken Breeding Flocks and Products
- **Subpart D:** Special Provisions for Turkey Breeding Flocks and Products
- **Subpart E:** Special Provisions for Hobbyist and Exhibition Waterfowl, Exhibition Poultry, and Game Bird Breeding Flocks and Products
- **Subpart F:** Special Provisions for Ostrich, Emu, Rhea, and Cassowary Breeding Flocks and Products
- **Subpart G:** Special Provisions for Primary† Egg-Type Chicken Breeding Flocks and Products
- **Subpart H:** Special Provisions for Primary Meat-Type Chicken Breeding Flocks and Products
- **Subpart I:** Special Provisions for Meat-Type Waterfowl Breeding Flocks and Products

*Multiplier breeding flocks include flocks intended for the production of hatching eggs used for the purpose of producing progeny for commercial egg or meat production or for other non-breeding purposes.

*Primary breeding flocks include flocks composed of one or more generations that are maintained for the purpose of establishing, continuing, or improving parent lines.

**9 CFR Part 146: NPIP for Commercial Poultry**

- **Subpart B:** Special Provisions for Commercial Table-Egg Layer Flocks
- **Subpart C:** Special Provisions for Meat-Type Chicken Slaughter Plants
- **Subpart D:** Special Provisions for Meat-Type Turkey Slaughter Plants
- **Subpart E:** Special Provisions for Commercial Upland Game Birds, Commercial Waterfowl, Raised-for-Release Upland Game Birds, and Raised-for-Release Waterfowl

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*Fig. 17-6. NPIP classifications are based on the type of birds and production unit. Photo source: iStockphoto.com*
Eligible Classifications Based on Poultry Type

The Subparts below list the classifications available for each type of bird. The details of obtaining and maintaining these classifications are found in 9 CFR Parts 145, 146, and 147. Individual Official State Agencies may have more rigorous requirements than those found in the NPIP.

9 CFR Part 145 NPIP for Breeding Poultry

Subpart B: Multiplier Egg-Type Chicken Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. S. Enteritidis Clean
  - U.S. M. Synoviae Clean
  - U.S. M. Gallisepticum Clean Started Poultry
  - U.S. M. Synoviae Clean Started Poultry
  - U.S. Avian Influenza Clean

- **State**
  - U.S. Pullorum-Typhoid Clean State

Subpart C: Multiplier Meat-Type Chicken Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. Sanitation Monitored
  - U.S. M. Synoviae Clean
  - U.S. M. Gallisepticum Clean Started Poultry
  - U.S. M. Synoviae Clean Started Poultry
  - U.S. M. Synoviae Monitored
  - U.S. Avian Influenza Clean
  - U.S. Salmonella Enteritidis Monitored

- **State**
  - U.S. Pullorum-Typhoid Clean State
  - U.S. M. Gallisepticum Clean State, Meat-Type Chickens

Subpart D: Turkey Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. M. Meleagridis Clean
  - U.S. M. Synoviae Clean
  - U.S. Sanitation Monitored, Turkeys
  - U.S. H5/H7 Avian Influenza Clean

- **State**
  - U.S. Pullorum-Typhoid Clean State
  - U.S. Pullorum-Typhoid Clean State, Turkeys
  - U.S. M. Gallisepticum Clean State, Turkeys
  - U.S. M. Synoviae Clean State, Turkeys
  - U.S. M. Meleagridis Clean State, Turkeys

- **Compartments**
  - U.S. H5/H7 Avian Influenza Clean Compartment

Fig. 17-7. Subpart D describes classifications available to turkey breeding flocks and products. Photo source: Lara Durben, Minnesota Turkey Growers Association
Subpart E: Hobbyist and Exhibition Waterfowl, Exhibition Poultry, and Game Bird Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. M. Synoviae Clean
  - U.S. H5/H7 Avian Influenza Clean
  - U.S. Salmonella Monitored
- **State**
  - U.S. Pullorum-Typhoid Clean State

Subpart F: Ostrich, Emu, Rhea, and Cassowary Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. Avian Influenza Clean

Subpart G: Primary Egg-Type Chicken Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. S. Enteritidis Clean
  - U.S. M. Synoviae Clean
  - U.S. Avian Influenza Clean
- **Compartments**
  - U.S. Avian Influenza Clean Compartment

Subpart H: Primary Meat-Type Chicken Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. M. Gallisepticum Clean
  - U.S. M. Synoviae Clean
  - U.S. S. Enteritidis Clean
  - U.S. Salmonella Monitored
  - U.S. Avian Influenza Clean
- **Compartments**
  - U.S. Avian Influenza Clean Compartment

Subpart I: Meat-Type Waterfowl Breeding Flocks and Products

- **Flocks and products**
  - U.S. Pullorum-Typhoid Clean
  - U.S. H5/H7 Avian Influenza Clean
  - U.S. Salmonella Monitored
- **State**
  - U.S. Pullorum-Typhoid Clean State

9 CFR Part 146 NPIP for Commercial Poultry

Subpart B: Commercial Table-Egg Laying Flocks

- **Flocks and products**
  - U.S. H5/H7 Avian Influenza Monitored
- **State**
  - U.S. H5/H7 Avian Influenza Monitored State, Layers

Subpart C: Meat-Type Chicken Slaughter Plants

- **Flocks and products**
  - U.S. H5/H7 Avian Influenza Monitored
Subpart D: Meat-Type Turkey Slaughter Plants
- **Flocks and products**
  - U.S. H5/H7 Avian Influenza Monitored
- **State**
  - U.S. H5/H7 Avian Influenza Monitored State, Turkeys

Subpart E: Commercial Upland Game Birds, Commercial Waterfowl, Raised-for-Release Upland Game Birds, and Raised-for-Release Waterfowl
- **Slaughter plants and premises**
  - U.S. H5/H7 Avian Influenza Monitored

**Classification Testing Requirements**
To obtain one of the specific classifications in the NPIP, a participant’s flock must be tested in accordance with the requirements for that classification. Generally, a sample of specified size and of appropriate age birds in the flock must be blood tested with an approved test for the disease of interest. Ongoing flock testing at specified intervals is often required to maintain a specific classification.

Samples for testing must be collected by Authorized Agents,* Authorized Testing Agents,† or State Inspectors‡. Each Official State Agency is responsible for designating qualified persons as Authorized Agents or Authorized Testing Agents. Authorized Testing Agents are able to conduct the rapid whole-blood test for pullorum-typhoid that can be done at the production unit.

Official NPIP testing may only be done by an NPIP authorized laboratory. A directory is published that lists all authorized laboratories and which tests they may conduct.

Testing and test results must be reported to the Official State Agency by using the appropriate form (VS Form 9-2 Flock Selecting and Testing Report), signed by the Authorized Agent, Authorized Testing Agent, or State Inspector who was part of the testing process.

*An Authorized Agent is any person designated under §145.11(a) to collect official samples for submission to an authorized laboratory in accordance with 9 CFR Part 147.

†An Authorized Testing Agent is any person designated under §145.11(a) to collect official samples for submission to an authorized laboratory in accordance with 9 CFR Part 147 and to perform the stained antigen, rapid whole blood test for pullorum-typhoid.

‡A State Inspector is any person employed or authorized under §145.11(b) to perform functions under 9 CFR Part 145.

**Sample Size**
The number of birds to be tested varies, depending on the poultry type and classification. The sample must be collected as outlined in 9 CFR §145.14.

**Age**
Age requirements for the birds to be tested are as follows:
- Poultry must be at least 4 months old.
- Turkeys must be at least 12 weeks old.
- Game birds must be at least 4 months old or have reached sexual maturity, whichever comes first.
- Ostrich, emu, rhea, and cassowary must be at least 12 months old.

In some cases, if a flock originates from a “clean” flock and meets other specified requirements, blood testing may not be necessary.
Knowledge Review #2

Who can submit samples to authorized laboratories to meet the testing requirement for a specific NPIP classification?

- A. Any NPIP enrolled participant
- B. Any poultry producer
- C. Authorized Agents and Authorized Testing Agents
- D. Veterinarians
- E. Authorized Flock Managers

Answers can be found at the end of this document.

NPIP Classifications

The specific requirements for an NPIP classification vary, depending on the type of birds or production unit. Dealers and hatcheries that participate in the NPIP should be designated as a “National Plan Dealer” or “National Plan Hatchery.”

The next section briefly outlines the requirements for each classification, discusses each corresponding disease, and provides a Classification Brief handout. This information is an overview. For a definitive resource, refer to the appropriate sections of the NPIP (9 CFR Parts 56, 145, 146, and 147) or contact your Official State Agency.

U.S. Pullorum-Typhoid Clean

The U.S. Pullorum-Typhoid Clean classification is required to participate in the NPIP. There is one classification that covers both pullorum disease and fowl typhoid, caused by two different Salmonella bacteria.

Classifications

- U.S. Pullorum-Typhoid Clean
- U.S. Pullorum-Typhoid Clean State
- Available to: All types of breeding poultry defined in 9 CFR Part 145

Etiology: Pullorum Disease

Gram-negative bacteria—Salmonella enterica subspecies enterica serotype Pullorum. Pullorum disease has been eradicated from commercial domestic fowl in the United States.

Etiology: Fowl Typhoid

Gram-negative bacteria—Salmonella enterica subspecies enterica serotype Gallinarum. Fowl typhoid has been eliminated from commercial and backyard/hobby domestic fowl in the United States since the late 1980s.

Species Affected and Zoonotic Potential

Chickens: Natural host
Turkeys, other wild and domestic fowl: Susceptible
Humans: Salmonella Pullorum or Gallinarum rarely isolated; little public health significance

Routes of Transmission

Vertical: Transovarial through eggs of infected hens
Horizontal: Aerosol, fomites including contaminated environment, and feed and water (oral)
Clinical Signs: Pullorum Disease

**Young chicks and poults:** Primarily affected; birds hatched from infected eggs may be moribund or dead; other signs: rough appearance, huddling, labored breathing, and white diarrhea

**Adult chickens:** Less severely affected and may become carriers

**Turkeys:** Thirst, anorexia, listlessness, moving away from healthy birds, green to greenish-yellow diarrhea, death without clinical signs

Clinical Signs: Fowl Typhoid

**Young chicks and poults:** Moribund or dead shortly after hatching; other signs: depression, loss of appetite, somnolence, droopy wings, huddling, dehydration, thirst, ruffled feathers, weakness, yellow or green diarrhea with pasting of vent feathers (common), blindness or swelling of joints

**Adult chickens:** More frequently affected than in pullorum disease; can be subclinical; systemic infection causes death, anorexia, diarrhea, depression, ruffled feathers, pale shrunken combs, decreased egg production, and decreased fertility

**Turkeys:** Thirst, anorexia, listlessness, tendency to move away from healthy birds, and green to greenish-yellow diarrhea

Testing Requirements

Initial testing for *S. Pullorum* and *Gallinarum* in chickens is usually done with the rapid whole-blood test. A drop of whole blood is mixed with a stained antigen preparation on a glass plate (Fig. 17-13). The antigen used reacts to both anti-*S. Pullorum* and anti-*S. Gallinarum* antibodies. If antibodies are present in the blood, the antigen will be agglutinated and clumps will be visible. This is a rapid, easy-to-conduct test that can be performed on the farm by Authorized Testing Agents. Reactors on this test must be quarantined and/or submitted for additional testing by authorized laboratories.

Turkeys must have blood serum samples submitted to an authorized laboratory for testing; they are **not** eligible for the rapid whole-blood test.

Most States in the NPIP are now considered U.S. Pullorum-Typhoid Clean. This means that many multiplier flocks that originate from U.S. Pullorum-Typhoid Clean primary flocks may qualify for the classification without blood testing. When testing is required, it will generally only need to be done every 12 months.

Approved Tests

The following are official blood tests for pullorum and typhoid:

- Standard tube agglutination test;
- Microagglutination test;
- Enzyme-linked immunosorbent assay (ELISA);
- Rapid serum test; and
- Stained antigen, rapid whole-blood test (except turkeys).

U.S. Mycoplasma Gallisepticum Clean or Monitored

Classifications

- **U.S. M. Gallisepticum Clean**
  - **Available to:** All types of poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary, and Meat-Type Waterfowl Breeders
- **U.S. M. Gallisepticum Clean State**
  - **Available to:** Turkey Breeding Flocks and Multiplier Meat-Type Chickens
- **U.S. M. Gallisepticum Clean Started Poultry**
  - **Available to:** Multiplier Egg and Meat-Type Chicken Flocks
- **U.S. M. Gallisepticum Monitored**
  - **Available to:** Multiplier Meat-Type Chicken Flocks
Etiology
*Mycoplasma gallisepticum* is a bacterial organism that does not have a cell wall.

Species Affected and Zoonotic Potential

**Chickens:** Susceptible

**Turkeys:** More severely affected

**Other bird species:** May be susceptible

**Humans:** No public health significance

Routes of Transmission

**Vertical:** Transovarial through eggs of infected hens

**Horizontal:** Aerosol and droplet (direct) contact with conjunctiva or upper respiratory tract of susceptible birds

Clinical Signs

**Chickens:** Chronic respiratory disease including nasal discharge, tracheal rales, conjunctivitis, airsacculitis, reduced feed consumption, and lowered egg production, especially when co-infected with *E. coli*

**Turkeys:** More severely affected; infectious sinusitis, respiratory distress, and depression; high carcass condemnations due to airsacculitis

Testing Requirements

U.S. M. Gallisepticum Clean classification involves blood testing a specified sample of birds as stated in 9 CFR for each classification.

Egg and meat-type multiplier flocks may have their started poultry* labeled as U.S. M. Gallisepticum Clean Started Poultry if their multiplier and primary flocks are classified as U.S. M. Gallisepticum Clean and they meet specific sanitation and isolation rules.

U.S. M. Gallisepticum Monitored classification for meat-type chickens has less stringent testing requirements.

*Started poultry are young poultry (chicks, pullets, cockerels, capons, poult, ducklings, goslings, keets, etc.) that have been fed and watered and are less than 6 months of age.

Approved Tests

Blood samples sent to authorized laboratories can be tested with the following tests or a combination of two or more of these tests:

- Serum plate agglutination;
- Hemagglutination inhibition (HI);
- ELISA; and
- Polymerase chain reaction (PCR).

U.S. Mycoplasma Synoviae Clean or Monitored

Classifications

- U.S. M. Synoviae Clean
  - Available to: All poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary, and Meat-Type Waterfowl Breeders
- U.S. M. Synoviae Clean State
  - Available to: Turkeys
- U.S. M. Synoviae Clean Started Poultry
  - Available to: Multiplier Egg and Meat-Type Chicken Flocks
- U.S. M. Synoviae Monitored
  - Available to: Multiplier Meat-Type Chicken Flocks
Etiology
*Mycoplasma synoviae* is a bacterial organism that does not have a cell wall.

**Species Affected and Zoonotic Potential**

**Chickens and turkeys:** Primarily affected  
**Other fowl:** Variety have reportedly been infected  
**Humans:** No public health significance

**Routes of Transmission**

**Vertical:** Less common; transovarial through eggs of infected hens; birds are infected for life and become carriers.  
**Horizontal:** Primary; aerosols or direct contact

**Clinical Signs**

**Chickens:** Infectious synovitis, swollen joints (mainly hock and foot pads, but all can be involved) (Fig. 17-17), breast blisters, lameness, limited movement, retarded growth, ruffled feathers, shrunken pale comb, and subclinical upper respiratory infections  
**Turkeys:** Same type of signs as chickens with lameness most prominent; subclinical upper respiratory infections

**Testing Requirements**

U.S. M. Synoviae Clean classification involves testing a specified sample of birds as stated in 9 CFR for each classification.

Egg and meat-type multiplier flocks may have their started poultry labeled as U.S. M. Synoviae Clean Started Poultry if their multiplier and primary flocks are classified as U.S. M. Synoviae Clean, and they meet specific sanitation and isolation rules.

U.S. M. Synoviae Monitored classification for meat-type chickens has less stringent testing requirements.

**Approved Tests**

Blood samples sent to authorized laboratories can be tested with the following tests or a combination of two or more of these tests:

- Serum plate agglutination;  
- Hemagglutination inhibition;  
- ELISA; and  
- PCR.

**U.S. Mycoplasma Meleagridis Clean**

**Classifications:**

- U.S. M. Meleagridis Clean  
- U.S. M. Meleagridis Clean State  
- Available to: Breeding Turkeys only

**Etiology**

*Mycoplasma meleagridis* (turkey specific) is a bacterial organism that does not have a cell wall.

**Species Affected and Zoonotic Potential**

**Turkeys:** Susceptible  
**Humans:** No public health significance
Routes of Transmission

Vertical: Primary; transovarial through eggs of infected hens
Horizontal: Direct from tom to hen through sexual contact; aerosol or fomite transmission significant routes during outbreaks

Clinical Signs

Turkey poults: Significant airsacculitis often without respiratory signs; embryonic death with some decrease in hatchability; may become severe if co-infected with *E. coli*

Adult turkeys: Unapparent; occasional leg deformities noted

Testing Requirements

U.S. M. Meleagridis Clean classification involves testing a specified sample of birds as stated in 9 CFR for each classification.

Approved Tests

Approved tests from authorized laboratories include the following:
- Serum plate agglutination;
- Microagglutination;
- Hemagglutination inhibition;
- Serum plate dilution;
- ELISA; and
- PCR.

U.S. Salmonella Enteritidis Clean and Monitored

Classifications
- U.S. S. Enteritidis Clean
- Available to: Primary Egg and Meat-Type Chicken Breeding Flocks and Products, Multiplier Egg-Type Chicken Flocks
- U.S. S. Enteritidis Monitored
- Available to: Multiplier Meat-Type Chicken Breeding Flocks and Products

Etiology

Gram-negative bacteria—*Salmonella enterica* subspecies *enterica* serotype Enteritidis

Species Affected and Zoonotic Potential

Chickens: Hens can lay infected eggs
Humans: Major public health concern due to foodborne illnesses resulting from the ingestion of raw or undercooked eggs, egg products, or meat from infected hens

Routes of Transmission

Vertical: Transovarial through eggs of infected hens
Horizontal (chickens): Direct contact with infected birds or contaminated egg shells, ingestion of contaminated feed or rodent excrement (oral), or through environmental sources (fomite)
Horizontal (humans): Ingestion of raw or undercooked eggs, egg products, or meat from infected hens (oral)

Clinical Signs

Young birds: Uncommon but may exhibit closed eyes, drooping wings, ruffled feathers, anorexia, emaciation, diarrhea, or sudden death
Adult birds: Uncommon but may exhibit anorexia, diarrhea, and reduced egg production
Humans: Fever, diarrhea, abdominal cramps, vomiting, and possible bloody stools
Testing Requirements
The testing and monitoring requirements for this classification are more complex than for the other classifications and vary for each bird type. Refer to the CFR for specifics.

Approved Tests
Approved tests from authorized laboratories include the following:
- Pullorum antigen;
- Federally licensed Salmonella Enteritidis ELISA; and
- Bacterial culturing.

U.S. Sanitation Monitored / U.S. Salmonella Monitored

Classifications
- U.S. Sanitation Monitored
  - Available to: Multiplier Meat-Type Chicken Flocks and Breeding Turkeys
- U.S. Salmonella Monitored
  - Available to: Primary Meat-Type Chicken Flocks, Waterfowl, Exhibition Poultry, Game Bird Breeding Flocks and Products, and Meat-Type Waterfowl Breeding Flocks and Products

“This program is intended to be the basis from which the breeding-hatching industry may conduct a program for the prevention and control of Salmonellosis. It is intended to reduce the incidence of Salmonella organisms in hatching eggs and baby poultry through an effective and practical sanitation program at the breeder farm and in the hatchery. This will afford other segments of the poultry industry an opportunity to reduce the incidence of Salmonella in their products.”

Source: 9 CFR §145.33(d), §145.43(f), §145.52(f), and §145.93(d).

Testing Requirements
See appropriate sections of 9 CFR for testing requirements.

Avian Influenza

Classifications
- U.S. Avian Influenza Clean
  - Available to: Primary and Multiplier Egg and Meat-Type Chicken Flocks, Ostrich, Emu, Rhea, and Cassowary Breeding Flocks and Products
- U.S. H5/H7 Avian Influenza Clean
  - Available to: Turkeys, Waterfowl, Exhibition Poultry, Game Birds, and Meat-Type Waterfowl
- U.S. H5/H7 Avian Influenza Monitored
  - Available to: Commercial Table-Egg Laying Flocks and Meat-Type Chicken and Turkey Slaughter Plants, Commercial Upland Game Birds, Commercial Waterfowl, Raised-for-Release Upland Game Birds, and Raised-for-Release Waterfowl
- U.S. Avian Influenza Clean Compartment
  - Available to: Primary Egg and Meat-Type Chicken Flocks
- U.S. H5/H7 Avian Influenza Clean Compartment
  - Available to: Primary Turkey Flocks

Etiology
Avian influenza is caused by influenza A viruses from the Influenzavirus A genus of the family Orthomyxoviridae. Influenza A viruses of avian origin are classified as either “low pathogenic” or “highly pathogenic” (HPAI) based on their genetic features and the severity of the disease they cause in poultry. The
H5 and H7 LPAI viruses are of particular importance because replication in non-host species, such as poultry, has resulted in mutation to HPAI; early detection and response are crucial to surveillance programs among commercial poultry.

**Species Affected and Zoonotic Potential**

*Wild birds:* Waterfowl and shore birds often carry the virus asymptomatically and serve as reservoirs for domestic birds.

*Domestic birds:* Chickens, turkeys, ducks, geese, etc.

*Humans:* Infection with avian influenza A viruses is rare, and usually limited to people who have significant direct contact with infected poultry and other birds or are exposed in areas such as live poultry markets that are contaminated by birds. However, avian influenza viruses that developed the capacity to spread easily from person to person have caused historic pandemics.

*Other mammals:* Avian-origin influenza A viruses have been isolated in a variety of mammals, such as pigs, cats, palm civets, and marine mammals. As with humans, most avian influenza A viruses currently do not spread efficiently from one mammal to another (same or different species).

**Human Health Significance**

Differences in infectivity, pathogenicity, virulence, and transmissibility of a specific avian influenza virus affects how severe or concerning it is to the human population. The severity of avian influenza virus infection in birds does not necessarily reflect the severity of infection in humans, as evidenced by the lack of symptoms in birds infected with Asian lineage H7N9 LPAI viruses in contrast with the serious illness and deaths seen in humans with the same infection. For a more comprehensive review of this important disease, please review *NVAP Module 18: Avian Influenza and Newcastle Disease*.

**Routes of Transmission**

*Vertical:* Virus can be isolated from eggs; not a significant source of spread as most infected eggs do not survive

*Horizontal (birds):* Direct contact with infected birds, consumption of the virus—often from feces or a contaminated water source (oral), fomites, and by aerosol droplets from respiratory secretions

*Horizontal (humans):* Direct contact with infected poultry and their secretions; consumption of contaminated raw or undercooked meat and egg products (oral)

**Clinical Signs**

Avian influenza is a highly contagious disease. Clinical signs can be highly variable and testing is integral to the diagnosis as there are no symptoms specific to avian influenza.

*LPAI infections:* Infected birds typically asymptomatic; mild respiratory disease or decreased egg production

*HPAI infections:* High morbidity, high mortality with few other signs depending on bird species and virus subtype

*Waterfowl and shore birds:* Often asymptomatic, serve as reservoirs for domestic birds

*Chickens and turkeys:* Respiratory and systemic signs and symptoms including coughing, sneezing, nasal discharge (+/- blood-tinged), dyspnea, cyanosis, depression, ataxia, torticolli, watery diarrhea, decreased food and water consumption, and blood-tinged oral discharges; decreased egg production; thin-shelled or misshapen eggs; and swelling of the head, eyelids, comb, wattles, and hocks

*Turkeys:* Hemorrhagic lesions on the comb and wattles

*Humans:* Severity varies with the virus, ranges from conjunctivitis or mild respiratory disease to severe disease and death

**Testing Requirements**

See appropriate sections of 9 CFR for testing requirements.
The USDA will take rapid actions to eliminate H5/H7 avian influenza because of the trade consequences and the possibility of LPAI H5 or H7 strains mutating or reassorting into HPAI, as well as reducing potential risks to human health.

Avian influenza (H5 and H7 LPAI and all HPAI) is a reportable disease. All licensed veterinarians must report cases to their State Animal Health Official (SAHO) or Assistant Director (AD). Official State Agencies are mandated with developing a diagnostic surveillance program for H5/H7 LPAI for all poultry in their State, and veterinary diagnostic laboratories play an important role in rapid detection and reporting.

A significant aspect of the avian influenza response plan is the availability of indemnity payments to cover the cost of destruction and disposal of birds or eggs infected or exposed to H5/H7 avian influenza, as well as the costs of cleaning and disinfection. To encourage participation and thereby improve monitoring, flock owners may be reimbursed up to 100% of the costs if they participate in the appropriate NPIP avian influenza classification. For NPIP participants (and some other producers—see 9 CFR Part 56) that do not participate in NPIP Avian Influenza Clean, H5/H7 Clean, or H5/H7 Monitored classifications, payments of up to 25% of total costs may be reimbursed."

"As the NPIP is voluntary, producers that participate in other parts of the NPIP may choose not to participate in avian influenza classifications, or they may be exempt if they do not meet flock size requirements. Those participants who are exempt from avian influenza classifications are still eligible for 100% indemnity.

Approved Tests
- Detection of antibody in blood:
  - ELISA;
  - Agar gel immunodiffusion (AGID);
- Detection of virus:
  - Real time reverse transcriptase polymerase chain reaction (RRT-PCR); and
  - USDA-licensed type A Influenza Antigen Capture Immunoassay (ACIA; for use in sick and dead birds).

Any influenza A detection in poultry must be confirmed by the National Veterinary Services Laboratories (NVSL).

Knowledge Review #3

Which of the following bacteria under the NPIP are significant public health concerns?
A. Salmonella enterica serotype Pullorum
B. Salmonella enterica serotype Gallinarum
C. Salmonella enterica serotype Enteritidis
D. Mycoplasma gallisepticum
E. Mycoplasma synoviae

Answers can be found at the end of this document.
Knowledge Review #4

Which of the following statements about NPIP Classifications is false?

A. Testing requirements can be found in 9 CFR.
B. There is an Avian Influenza (Clean, H5/H7 Clean, or Monitored) classification available for all types of poultry.
C. Poultry must be aged at least 4 months and turkey must be aged at least 12 weeks.
D. Most classifications available are for vertically transmitted diseases.
E. The U.S. Pulmonary-Typhoid Clean classification is required for all types of poultry under the NPIP except ostrich, emu, rhea, and cassowary.

Answers can be found at the end of this document.

NPIP Forms

The NPIP office, based in Conyers, Georgia, has the responsibility, as outlined in the MOU between the States and the Federal Government, to provide forms and material as aids for the proper administration of the NPIP within the States. Forms will only be issued to NPIP Official State Agencies. Below is a listing of relevant forms and a description of their purpose and use. Some of these forms are now available for completion online. Users must request access through the NPIP database that can be found on the NPIP website.

VS Form 9-2—Flock Selecting and Testing Report

Authorized Agents, Authorized Testing Agents, and State Inspectors use this form when breeding flocks are selected and tested. This form will satisfy the requirements in 9 CFR §145.3. It identifies the flock as to the owner, hatchery affiliation, stock, type, purpose, and classification. It provides space for the number of birds tested and the results of the test.

The contact representative for the OSA can use the data contained in this form to summarize the State’s participation and create the annual participation report to the NPIP office on VS Form 9-4.

VS Form 9-3—Report of Sales of Hatching Eggs, Chicks, and Poults

This form is designed to cover certain interstate sales made by hatcheries, dealers, and independent flock owners participating in the NPIP. The use of this form provides the originating OSA an opportunity to verify the product being shipped. It will also notify the OSA in the destination State as to movements of products into their State and the product’s classification.

Items 1–10 should be completed by the producer or shipper.

The individuals in each State who approve VS Form 9-3 are responsible for ensuring that the flock currently meets the relevant classifications. If the form information is incomplete, they cannot verify or sign the form. If the shipment is time-sensitive, this can have significant consequences. A list of Authorized Signers for the VS 9-3 Form can be found on the NPIP website.

Forms Used Primarily by Official State Agencies

VS Form 9-4—Summary of Breeding Flock, Slaughter Plant, and Commercial Flock Participation

Form 9-4 contains a summary of blood testing and of flock participation by classes and breeding status. It is distributed to the OSA from the NPIP office at the end of the testing year (June 30). One report is required for each class of poultry participating in the NPIP in each State. If VS Forms 9-2 and 9-3 are used and the completed records are available, Form 9-4 is easily completed. Official State Agencies upload the report to the NPIP database in July so that the NPIP office can submit the data to the United States Animal Health Association (USAHA).

VS Form 9-5—Report of Hatcheries, Dealers, and Independent Flocks Participating in the NPIP

Form 9-5 is to be used when a change in participation occurs in a State (e.g., new participant, removal of a participant, a change in disease program classification, address, etc.). These forms are helpful in obtaining accurate information for the interactive NPIP participant directory on the NPIP website.
VS Form 9-7—Investigation of Salmonella Isolations in Poultry

The NPIP requires an investigation of every isolation of *Salmonella Pullorum* and *Salmonella Gallinarum*. The OSA is encouraged to make field investigations of isolations of other *Salmonella* serotypes that cause significant losses. Form 9-7 provides a uniform method of compiling and analyzing information that can subsequently be used to study trends and economic importance. This form is arranged in sections so that the investigation may be completed in stages by different inspectors, depending on the location of the flock or hatchery. When several States are involved in a pullorum-typhoid infection, the completed form will be made available to each of the States involved so that they are all aware of the investigation outcome.

VS Form 9-8—Flock Inspection and Check-Testing Report

Form 9-8 was designed to help the State inspector record the flock inspections that are made as indicated in 9 CFR §145.12(b). It allows the State to keep a record of the flock owners, their addresses, and the type of birds kept.

VS Form 9-9—Hatchery Inspection Form

Form 9-9 allows the State Inspector to maintain a record of annual hatchery inspections and current names and addresses of the hatcheries, their status, types of equipment, and the relative degrees of compliance. It also provides an inventory of the supply flocks supplying eggs to the hatcheries and their classifications. This form is provided to States that conduct an official hatchery inspection program in conjunction with 9 CFR §145.12.

NPIP Administration

USDA-APHIS-VS employs a Senior Coordinator who functions as the senior administrator for the NPIP. The Senior Coordinator is supported by additional staff. There is also an NPIP General Conference Committee consisting of one at-large member and six regional representatives that provide oversight and industry representation in the NPIP administration. The General Conference Committee is the official advisory committee to the U.S. Secretary of Agriculture on matters pertaining to poultry health.

The NPIP office provides the coordination between Official State Agencies. This office also supplies official NPIP forms, collects and reports data on participants and testing, oversees the authorized laboratories, and schedules and plans the Biennial Conferences and National OSA Meetings.

Official State Agencies are responsible for the day-to-day implementation of the NPIP with participants. State Inspectors inspect participant facilities and review their records.

Authorized Agents and Authorized Testing Agents collect and submit samples for testing to authorized laboratories and report testing results to Official State Agencies.

NPIP participants maintain their facilities and records, conduct necessary sanitation, and initiate needed testing.

Changes to the NPIP Regulations

The planned mechanism whereby the NPIP regulations are changed is through the NPIP Biennial Conferences. Each State is allowed one delegate to the conference for each aspect of the poultry industry represented in their State as defined by 9 CFR Part 145 Subparts B, C, D, E, F, G, H, I and Part 146 Subparts B, C, D, and E. A State could have 12 voting delegates at the NPIP Conference if each subpart is represented in their State.

Proposals to change the NPIP may be submitted by anyone (delegate or non-delegate) at least 150 days in advance of the Biennial Conference. All proposals are first reviewed at the conference by a relevant committee(s). Committees are made up of all delegates representing a particular portion of the industry (e.g., turkeys). Each committee reviews the proposed changes relevant to their portion of the NPIP and makes recommendations to the entire conference to adopt or not adopt. The entire body of delegates at the conference then acts on all proposals. Delegates approve proposed changes to the NPIP by a simple majority vote.
Proposals approved at the NPIP Conference will be recommended to the USDA for incorporation into the NPIP. The USDA maintains the right to accept or reject the recommendations from the Conference. The USDA may also make changes during the period between conferences if delay would have serious consequences on the poultry industry. The General Conference Committee represents the States during the interim between NPIP Conferences and provides input to USDA if changes are needed in the period between conferences.

**Knowledge Review #5**

Suggested changes to the NPIP are considered at the Biennial Conference. Who votes on the proposed changes at the NPIP Biennial Conference?

A. Any NPIP participants
B. NPIP participants present at the conference
C. Delegates elected by NPIP participants within each subpart
D. Delegates representing the industry segments in individual States
E. Only the General Conference Committee votes on proposals

Answers can be found at the end of this document.

**Summary**

The NPIP is a voluntary Industry-State-Federal cooperative effort, managed by the USDA-APHIS-VS NPIP office. Official State Agencies are responsible for the day-to-day administration of the NPIP. The core of the NPIP is the different classifications that participants may earn by complying with the specified requirements. Various classifications are available, depending on the type of poultry and the type of production unit (e.g., primary vs. multiplier, egg-type vs. meat-type vs. exhibition).

The NPIP has been responsible for the eradication of pullorum disease and fowl typhoid from domestic poultry in the United States. The multiple NPIP disease control efforts have improved animal health, reduced significant economic losses, and prevented human disease. Ongoing surveillance efforts are focused on detecting cases of *Salmonella*, *Mycoplasma*, and avian influenza, hopefully in time to limit the disease spread.

The NPIP has been a positive force in the poultry industry and for the Nation as a whole. The ability and willingness to change has been an important part of its past success and will likely be essential to meet the new challenges of tomorrow.
Additional resources were provided throughout this module and are repeated here in alphabetical order.

CDC-NPIP Salmonella and Baby Poultry Educational Poster

Electronic Code of Federal Regulations (e-CFR)
http://www.ecfr.gov

Guidelines for Salmonella Nomenclature
https://www.cdc.gov/nationalsurveillance/pdfs/nationalsalmsurveilloonview_508.pdf

National Poultry Improvement Plan (NPIP), USDA-APHIS-VS 1506 Klondike Road, Suite 101, Conyers, Georgia 30094, Office Phone: (770) 922-3496
http://www.poultryimprovement.org

NPIP Authorized Laboratories
http://www.poultryimprovement.org/documents/AuthorizedLaboratories.pdf

NPIP Participants
http://www.poultryimprovement.org/statesContent.cfm

NPIP Program Standards Document Subparts A–E

NPIP Program Standards Document Subpart F
http://www.poultryimprovement.org/documents/SubpartF-Compartmentalization.pdf

Official State Agencies
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Knowledge Review Answers

Knowledge Review #1

Which of the following statements about NPIP participation is false?

A. Participation is voluntary
B. Producers enroll with their Official State Agency
C. Participants must demonstrate their facilities and procedures meet the required standards
D. Participants must maintain pure bred birds in their flocks
E. The rules for NPIP, including participation, are contained in the Code of Federal Regulations and NPIP Program Standards Document

The correct answer is D. While there were some breed specific aspects to the NPIP when it started, there are no breed associated requirements now.

Knowledge Review #2

Who can submit samples to authorized laboratories to meet the testing requirement for a specific NPIP classification?

A. Any NPIP enrolled participant
B. Any poultry producer
C. Authorized Agents and Authorized Testing Agents
D. Veterinarians
E. Authorized Flock Managers

The correct answers is C. Only Authorized Agents and Authorized Testing Agents are able to submit samples to authorized laboratories for NPIP Classification testing. Though not listed here, State Inspectors are also able to submit samples. Veterinarians must be authorized and designated to each of these roles by the OSA.

Knowledge Review #3

Which of the following bacteria under the NPIP are significant public health concerns?

A. *Salmonella enterica* serotype Pullorum
B. *Salmonella enterica* serotype Gallinarum
C. *Salmonella enterica* serotype Enteritidis
D. *Mycoplasma gallisepticum*
E. *Mycoplasma synoviae*

The correct answers are C. *Salmonella Enteritidis* can cause significant gastrointestinal disease in humans. The other agents are generally of minor or no public health concern. Avian influenza A viruses also have the potential to cause mild conjunctivitis to severe disease and death in people.
Knowledge Review #4

Which of the following statements about NPIP Classifications is false?

A. Testing requirements can be found in 9 CFR.
B. There is an Avian Influenza (Clean, H5/H7 Clean, or Monitored) classification available for all types of poultry.
C. Poultry must be aged at least 4 months and turkey must be aged at least 12 weeks.
D. Most classifications available are for vertically transmitted diseases.
E. The U.S. Pullorum-Typhoid Clean classification is required for all types of poultry under the NPIP except ostrich, emu, rhea, and cassowary.

The correct answer is **E**. U.S. Pullorum-Typhoid Clean is required of all types—there is no exclusion for certain species.

Knowledge Review #5

Suggested changes to the NPIP are considered at the Biennial Conference. Who votes on the proposed changes at the NPIP Biennial Conference?

A. Any NPIP participants
B. NPIP participants present at the conference
C. Delegates elected by NPIP participants within each subpart
D. Delegates representing the industry segments in individual States
E. Only the General Conference Committee votes on proposals

The correct answer is **D**. Delegates to the NPIP Conference represent the NPIP participating States. Each State is entitled to a delegate for each subpart for which they have NPIP participants.
NPIP ELIGIBLE CLASSIFICATIONS FOR BREEDING POULTRY

Subpart B: Multiplier Egg-Type Chicken Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. S. Enteritidis Clean
- U.S. M. Synoviae Clean
- U.S. M. Gallisepticum Clean Started Poultry
- U.S. M. Synoviae Clean Started Poultry
- U.S. Avian Influenza Clean

State
- U.S. Pullorum-Typhoid Clean State

Subpart C: Multiplier Meat-Type Chicken Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. Sanitation Monitored
- U.S. M. Synoviae Clean
- U.S. M. Gallisepticum Clean Started Poultry
- U.S. M. Synoviae Clean Started Poultry
- U.S. M. Gallisepticum Monitored
- U.S. M. Synoviae Monitored
- U.S. Avian Influenza Clean
- U.S. Salmonella Enteritidis Monitored

State
- U.S. Pullorum-Typhoid Clean State
- M. Gallisepticum Clean State, Meat-Type Chickens

Subpart D: Turkey Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. M. Meleagridis Clean
- U.S. M. Synoviae Clean
- U.S. Sanitation Monitored, Turkeys
- U.S. H5/H7 Avian Influenza Clean

State
- U.S. Pullorum-Typhoid Clean State
- U.S. Pullorum-Typhoid Clean State, Turkeys
- U.S. M. Gallisepticum Clean State, Turkeys
- U.S. M. Synoviae Clean State, Turkeys
- U.S. M. Meleagridis Clean State, Turkeys

Compartment
- U.S. H5/H7 Avian Influenza Clean Compartment

Subpart E: Hobbyist and Exhibition Waterfowl, Exhibition Poultry, and Game Bird Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. M. Synoviae Clean
- U.S. H5/H7 Avian Influenza Clean
- U.S. Salmonella Monitored

State
- U.S. Pullorum-Typhoid Clean State

USDA-APHIS-VS National Veterinary Accreditation Program - National Poultry Improvement Plan
NPIP ELIGIBLE CLASSIFICATIONS FOR BREEDING POULTRY

Subpart F: Ostrich, Emu, Rhea, and Cassowary Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. Avian Influenza Clean

Subpart G: Primary Egg-Type Chicken Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. S. Enteritidis Clean
- U.S. M. Synoviae Clean
- U.S. Avian Influenza Clean

Compartment
- U.S. H5/H7 Avian Influenza Clean Compartment

Subpart H: Primary Meat-Type Chicken Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. M. Gallisepticum Clean
- U.S. M. Synoviae Clean
- U.S. S. Enteritidis Clean
- U.S. Salmonella Monitored
- U.S. Avian Influenza Clean

Compartment
- U.S. H5/H7 Avian Influenza Clean Compartment

Subpart I: Meat-Type Waterfowl Breeding Flocks and Products

Flocks and Products
- U.S. Pullorum-Typhoid Clean
- U.S. H5/H7 Avian Influenza Clean
- U.S. Salmonella Monitored

State
- U.S. Pullorum-Typhoid Clean State
Avian Influenza

**Etiology**
Avian influenza (AI) is caused by influenza A viruses from the *Influenzavirus* A genus of the family *Orthomyxoviridae*. In addition to avian influenza A viruses, this genus includes the closely related human, equine, swine, and canine influenza A viruses.

Influenza A viruses are broadly categorized based on a combination of two groups of proteins on the surface of the influenza A virus: hemagglutinin or “H” proteins, of which there are 16 (H1–H16), and neuraminidase or “N” proteins, of which there are 9 (N1–N9) of avian origin. Many different combinations of “H” and “N” proteins are possible. Each combination is considered a different subtype, and related viruses within a subtype may be referred to as a lineage (e.g., Asian lineage H5N1 is different from North American H5N1). Avian influenza is classified as either “low pathogenic” (LPAI) or “highly pathogenic” (HPAI) based on the genetic features of the virus and the severity of the disease they cause in poultry.

To date, only H5 and H7 have been characterized as highly pathogenic. However, any AI virus that meets the genetic characteristics of an HPAI virus is considered reportable as HPAI per the World Organisation for Animal Health (OIE), even if the clinical disease is mild. The H5 and H7 LPAI viruses are of particular importance because replication in non-host species, such as poultry, has resulted in mutation to HPAI; early detection and response are crucial to surveillance programs among commercial poultry.

**Species Affected and Zoonotic Potential**
Avian influenza is a highly contagious disease. Clinical signs can be highly variable and diagnostic testing is integral to the diagnosis as there are no symptoms specific to avian influenza. Infection of poultry with HPAI can kill up to 90–100% of the flock and shed a high amount of virus into the environment, leading to onward spread of the virus. Such events are devastating to the poultry industry and result in significant impacts to trade.

Avian-origin influenza A viruses can also infect other mammals such as pigs and cats, and rarely, humans. The severity of zoonotic avian influenza varies with the virus. Although many human infections are limited to conjunctivitis or mild respiratory disease, some viral strains can cause severe disease and death.

Generally, the health risk posed to people is low where avian influenza A viruses lack the ability to spread efficiently among mammals; however, historic pandemics have been caused by avian influenza viruses that developed the capacity to spread easily from person to person.

**Geographic Distribution**
Wild aquatic birds worldwide, such as waterfowl, gulls, and shorebirds, are the natural host for influenza A viruses, but not usually HPAI, and serve as reservoirs from which new viruses can be generated and transmitted to poultry. Surveillance programs and biosecurity contribute to the ability of a country to declare freedom from virulent viruses such as HPAI in poultry.

**Transmission**
Avian influenza A viruses can enter the body by inhalation, ingestion, or through other mucous membranes, such as the conjunctiva. Feces, saliva, and respiratory secretions from infected birds contain large amounts of virus. On a farm, AI viruses can spread between birds in aerosols (when birds are in close contact) and by the fecal-oral route. Between farms, AI viruses can be spread readily on fomites.

HPAI viruses can also be found in poultry meat and eggs; however, proper cooking will inactivate the virus and make products safe for consumption. LPAI viruses have not been identified in meat.
Avian Influenza (cont’d)

The incubation period is typically 1–14 days. For trade purposes, the OIE recognizes the incubation period to be 21 days. More virulent HPAI viruses typically kill birds within a few days of exposure.

Clinical Signs
Clinical signs of avian influenza are highly variable. LPAI viruses typically cause asymptomatic infections, mild respiratory disease, or decreased egg production. Clinical signs of HPAI may include respiratory signs (nasal discharge, coughing, sneezing, dyspnea), watery diarrhea, and neurological signs such as ataxia and torticollis. Affected birds are typically severely depressed and inappetent with ruffled feathers. Some birds have swelling or cyanosis of the head, comb, wattles, or legs, and the skin may darken from subcutaneous hemorrhages. Egg laying often drops dramatically, and the eggs may be soft-shelled or misshapen. Production records may show that water and feed consumption has decreased in the flock.

HPAI is a systemic disease affecting many tissues with high morbidity and mortality. Some birds die suddenly without other clinical signs and with few or no lesions at necropsy.

Prevention and Control
Due to the nature of the disease and the devastating impact that an HPAI infection can have on flocks and the poultry industry, it is important to institute measures to prevent the introduction of avian influenza into poultry operations. Because poultry can be infected by contact with newly introduced birds or fomites, as well as by contact with wild birds, particularly waterfowl, management measures must be targeted at reducing these risks. Measures such as managing flocks as all-in/all-out, preventing contact with wild birds or their water sources, and not returning birds to the farm from live bird markets or other slaughter channels are methods which help reduce the risk of disease introduction. Strict hygiene and biosecurity measures are necessary to prevent virus transmission on fomites.

Outbreaks can be controlled by rapid depopulation of infected and exposed flocks, proper disposal of carcasses and contaminated materials, and strict biosecurity measures. Farms should be quarantined, and movement controls and surveillance should be established. Infected premises must be thoroughly cleaned and disinfected.

Testing Requirements
All of the avian influenza classifications require initial testing (blood or egg yolk for laying flocks) and ongoing monitoring at 90 or 180 day intervals.

The USDA will take rapid actions to eliminate H5/H7 avian influenza because of the trade consequences and the possibility of low pathogenic strains of H5 or H7 avian influenza mutating or reassorting into HPAI, as well as reducing potential risks to human health. Avian influenza is a reportable disease (H5/H7 LPAI and any HPAI virus). All licensed veterinarians must report cases to the responsible State regulatory authority. Official State Agencies are mandated with developing a diagnostic surveillance program for H5/H7 low pathogenic avian influenza for all poultry in their state. Diagnostic laboratories play an important role in detection and reporting of this significant disease.

A significant aspect of the avian influenza response plan is the availability of indemnity payments to cover the cost of destruction and disposal of birds or eggs infected or exposed to H5/H7 avian influenza as well as the costs of cleaning and disinfection. To encourage participation and thereby improve monitoring, flock owners may be reimbursed up to 100% of the costs if they participate in the appropriate NPIP avian influenza classification. For flocks that do not participate in NPIP Avian Influenza Clean, H5/ H7 Clean, or H5/H7 Monitored classifications, payments of up to 25% of total costs may be reimbursed.

Approved Tests
The official antibody detection tests (blood sample) are the agar gel immunodiffusion (AGID) test and the enzyme-linked immunosorbent assay (ELISA); for virus detection, the main surveillance tool is based upon Real Time Reverse Transcriptase Polymerase Chain Reaction (RRT-PCR). A USDA licensed type A Influenza Antigen Capture Immunooassay (ACIA) is also available to detect virus in sick and dead birds. Any influenza A detection in poultry must be confirmed by the National Veterinary Services Laboratories.

Reference
Avian Influenza, CFSPH (Nov 2015), http://www.cfsph.iastate.edu/Factsheets/pdfs/highly_pathogenic_avian_influenza.pdf
Fowl Typhoid (Salmonella enterica serotype Gallinarum)  
Pullorum Disease (Salmonella enterica serotype Pullorum)

NPIP Classifications
- U.S. Pullorum-Typhoid Clean
- U.S. Pullorum-Typhoid Clean State
- Availability: All types of breeding poultry defined in 9 CFR Part 145; this classification is required to participate in NPIP. There is one classification that covers both pullorum disease and fowl typhoid, caused by two different Salmonella bacteria.

Etiology
Fowl typhoid is caused by Salmonella enterica subspecies enterica serotype Gallinarum of the family Enterobacteriaceae. Pullorum disease, formerly called bacillary white diarrhea, is caused by Salmonella enterica subspecies enterica serotype Pullorum. Both bacteria are Gram-negative, non-motive, facultative anaerobes. Fowl typhoid and pullorum disease are combined into a single NPIP classification.

Species Affected and Zoonotic Potential
Chickens are the natural host of Salmonella Gallinarum and Pullorum, but turkeys and most other domestic and wild fowl are susceptible. Salmonella Gallinarum and Pullorum have been rarely isolated from humans and are of little public health significance.

Geographic Distribution
Fowl typhoid and pullorum disease occur worldwide. Both diseases have been eradicated from commercial poultry flocks in the United States and many other countries. Both may still be present in U.S. backyard flocks. Fowl typhoid is common in Mexico, Central and South America, Africa, and the Indian subcontinent.

Transmission
Salmonella Gallinarum and Pullorum can be transmitted horizontally through infected birds and vertically through egg transmission. Vertical transmission is the most significant mode of transmission. Vertical transmission occurs through eggs by contamination of the ovum following ovulation or by localization of the organism in the ovaules before ovulation. As many as one third of the eggs laid by an infected hen may be infected.

Horizontal transmission may occur in the hatchery through contact with infected chicks or pouls. Transmission may also occur through feces and contaminated feed, water, or litter. Fomites including people, equipment, insects, wild animals, and rodents may also transmit S. Gallinarum and Pullorum.

S. Pullorum is maintained in a flock when asymptomatic but infected hens spread it vertically to their chicks, which subsequently spread the disease horizontally.

Clinical Signs—Pullorum Disease

Young chicks and pouls: Pullorum disease is typically a disease of young birds. Birds hatched from infected eggs may be moribund or dead in the incubator shortly after hatching. Other signs include sudden death, or death preceded by a rough appearance, huddling, labored breathing, and the characteristic white diarrhea. The highest mortality usually occurs during the second week after hatching with a decline during the third and fourth weeks.

Adult chickens: In mature or semi-mature flocks, birds may have anorexia, diarrhea, depression, and dehydration. Adults are less severely affected by pullorum disease and may simply become carriers.

Turkeys: Signs of pullorum disease or fowl typhoid in turkeys include thirst, anorexia, listlessness, a tendency to move away from healthy birds, and green to greenish-yellow diarrhea. Deaths may occur without clinical signs.

Clinical Signs—Fowl Typhoid

Young chicks and pouls: Fowl typhoid, like pullorum disease, is often a disease of chicks and pouls. Birds hatched from infected eggs may be moribund or dead shortly after hatching. Signs of fowl typhoid are very similar to those of pullorum disease. Clinical signs of fowl typhoid can include depression, loss of appetite, somnolence, droopy wings, huddling, dehydration, thirst, ruffled feathers, and weakness. Yellow or green diarrhea with pasting of the vent feathers is common, and there may be blindness or swelling of the joints. Birds that survive may be underweight and poorly feathered, and may not mature into productive adults.
Fowl Typhoid (Salmonella enterica serotype Gallinarum)
Pullorum Disease (Salmonella enterica serotype Pullorum) (cont’d)

**Affected**

**Not Affected**

**HUMAN HEALTH SIGNIFICANCE**

**WATERFOWL, EXHIBITION AND GAME BIRDS**

**OSTRICHES, EMUS, RHEAS, AND CASSOWARIES**

**TURKEYS**

**MEAT-TYPE CHICKENS**

**EGG-TYPE CHICKENS**

**Approved Tests**
The official blood tests for pullorum and typhoid are standard tube agglutination test, microagglutination test, enzyme-linked immunosorbent assay (ELISA), rapid serum test, and the stained antigen, rapid whole-blood test (except for turkeys).

**Reference**
- Fowl Typhoid Factsheet, CFSPH (June 2009) http://www.cfsph.iastate.edu/Factsheets/pdfs/fowl_typhoid.pdf

**Prevention and Control**
Prevention of the disease is best obtained through management practices aimed at preventing the introduction into the flock. Disease control is done by testing and eliminating carriers. Eggs and birds should be obtained from flocks free of disease. Proper sanitation and biosecurity measures must be implemented to reduce the risk of disease introduction through contaminated feed and other outside sources.

**Testing Requirements**

Initial testing for S. Pullorum and Gallinarum in chickens is usually done with the rapid whole-blood test. A drop of whole blood is mixed with a stained antigen preparation on a glass plate. The antigen used reacts to both anti-S. Pullorum and anti-S. Gallinarum antibodies. If antibodies are present in the blood, the antigen will be agglutinated and clumps will be visible. This is a rapid, easy-to-conduct test that can be performed on the farm by Authorized Testing Agents. Reactors on this test must be quarantined and/or submitted for additional testing by authorized laboratories.

Turkeys must have blood serum samples submitted to an authorized laboratory for testing; they are not eligible for the rapid whole-blood test.

Most States in the NPIP are now considered U.S. Pullorum-Typhoid Clean. This means that many multiplier flocks that originate from U.S. Pullorum-Typhoid Clean primary flocks may qualify for the classification without blood testing. When testing is required, it will generally only need to be done every 12 months.

**Adult chickens:** In growing or adult birds, fowl typhoid is a more significant disease than pullorum disease. In chickens, an acute outbreak of fowl typhoid might begin with a drop in feed consumption, droopy birds with ruffled feathers, and pale, shrunken combs. Other signs include decreased egg production or fertility.

**Turkeys:** Signs of fowl typhoid and pullorum disease in turkeys include thirst, anorexia, listlessness, a tendency to move away from healthy birds, and green to greenish-yellow diarrhea. Death may occur without clinical signs.
Mycoplasma Gallisepticum

NPIP Classifications

- **U. S. M. Gallisepticum Clean**: Available to all types of poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary, Meat-Type Waterfowl Breeders
- **U. S. M. Gallisepticum Clean State**: Available to Turkey Breeding Flocks and Multiplier Meat-Type Chickens
- **U. S. M. Gallisepticum Clean Started Poultry**: Available to Multiplier Egg and Meat-Type Chicken Flocks
- **U. S. M. Gallisepticum Monitored**: Available to Multiplier Meat-Type Chicken Flocks

Etiology

*Mycoplasma gallisepticum* causes chronic respiratory disease of chickens and infectious sinusitis in turkeys. Mycoplasma bacteria do not have a cell wall and are quite small in size.

Species Affected and Zoonotic Potential

*M. gallisepticum* primarily occurs in chickens and turkeys, with turkeys more severely affected. The disease has also been isolated from naturally occurring infections in pheasants, chukar partridges, and peafowl. The disease has been confirmed in house finches and songbirds in the Eastern United States and Canada. *M. gallisepticum* infections are limited to avian hosts and the disease is not of public health significance.

Geographic Distribution

*M. gallisepticum* is present in commercial chickens and turkeys worldwide. In the United States, the incidence of the disease has greatly decreased due to the control programs implemented through the NPIP. The NPIP has been particularly effective controlling the disease in primary and multiplier flocks; however, outbreaks continue in meat flocks and the disease is endemic in some multiple-age commercial laying flocks.

Transmission

Horizontal transmission of the disease can easily occur through droplets and aerosol contact with the conjunctiva or upper respiratory tract of susceptible birds. Vertical transmission through the eggs of naturally infected hens is of particular concern for multiplier and breeder flocks.

Clinical Signs

Chickens may exhibit nasal discharge, tracheal rales, conjunctivitis, reduced feed consumption, and lowered egg production. The disease in chickens is often referred to as chronic respiratory disease. Turkeys are typically more severely affected than chickens and show sinusitis, respiratory distress, and depression. Morbidity is typically very high in both chickens and turkeys. Carcass condemnations due to airsacculitis can be very high resulting in significant economic losses in addition to those associated with lowered egg production or feed efficiency.

Prevention and Control

Because *M. gallisepticum* can be transmitted vertically through eggs, any control measure must involve starting with stocks known to be free of the infection and then employing good biosecurity practices to prevent the introduction of the disease. In the United States, the *M. gallisepticum* control programs established by the NPIP have been successfully used in breeder and multiplier flocks. In other types of flocks, control of *M. gallisepticum* remains challenging due to a variety of factors including the use of multiple age facilities, increased population densities, and increased concentration of poultry operations. Antimicrobial therapy and vaccination may be appropriate in some situations to reduce morbidity and mortality.

Diagnosis

Definitive diagnosis of *M. gallisepticum* is based on isolation and/or identification of the organism. Serology is useful for monitoring flocks in disease control programs. A positive serologic test accompanied by a history and signs consistent with *Mycoplasma gallisepticum* infection is sufficient for a presumptive diagnosis of the disease pending isolation and/or identification of the organism.

Testing Requirements

U.S. M. Gallisepticum Clean classification (except for those raising ratites or Meat-Type Waterfowl Breeders) involves testing a specified sample of birds as stated in 9 CFR for each classification.

Egg and meat-type multiplier flocks may have their started poultry labeled as U.S. M. Gallisepticum Clean Started Poultry if their Multiplier and Primary flocks are classified as U.S. M. Gallisepticum Clean, and they meet specific sanitation and isolation rules.

U.S. M. Gallisepticum Monitored classification for meat-type chicken producers has less stringent testing requirements.
Mycoplasma Gallisepticum (cont’d)

Approved Tests
A variety of approved tests (serum plate agglutination, hemagglutination inhibition, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR), or a combination of two or more of these) may be used by authorized laboratories when testing blood samples for *M. gallisepticum*.

Reference
**Mycoplasma Synoviae**

**NPIP Classifications**
- **U.S. M. Synoviae Clean**: Available to all poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary and Meat-Type Waterfowl Breeders
- **U.S. M. Synoviae Clean State**: Available to Turkeys
- **U.S. M. Synoviae Clean Started Poultry**: Available to Multiplier Egg and Meat-Type Chicken Flocks
- **U.S. M. Synoviae Monitored**: Available to Multiplier Meat-Type Chicken Flocks

**Etiology**
*Mycoplasma synoviae* causes acute to chronic synovitis and subclinical respiratory infections in chickens and turkeys. Mycoplasmas are bacteria that do not have a cell wall and are quite small in size.

**Species Affected and Zoonotic Potential**
This is a disease primarily of chickens (infectious synovitis) and turkeys, but a variety of other fowl have been reported to be infected. *M. synoviae* has no public health significance.

**Geographic Distribution**
*M. synoviae* is found worldwide.

**Transmission**
The disease is primarily transmitted horizontally from bird to bird through aerosols or direct contact. The organism enters through the respiratory tract. Vertical transmission through eggs may also occur. Birds remain infected for life and serve as carriers.

**Clinical Signs**
Chickens and turkeys may have subclinical upper respiratory infections. Aitrsacculitis may lead to condemnations at the processing plant.

**Chickens**: The first clinical signs of infectious synovitis in chickens are a pale comb, lameness, and retarded growth. As the disease progresses, the birds have ruffled feathers and the comb shrinks. Joint swelling and breast blisters are common. Hock joints and foot pads are the principal joints involved; however, in some birds all joints may be involved.

**Turkeys**: exhibit the same type of signs of infectious synovitis, with lameness as the most prominent sign.

**Prevention and Control**
Because *M. synoviae* is vertically-transmitted, the only effective means of control is through selecting birds from *M. synoviae*-free flocks and testing for and eliminating carriers. Prevention consists of using *M. synoviae*-free stock and maintenance of strict biosecurity measures to prevent infection of the flock. Antibiotics are helpful in treating infected flocks.

**Diagnosis**
Definitive diagnosis of *M. synoviae* is made through the isolation and identification of the organism. Serology accompanied with clinical signs and a history indicative of *M. Synoviae* infection may be helpful in reaching a presumptive diagnosis.

**Testing Requirements**
Testing requirements, approved tests, and available classifications for *M. synoviae* are similar to those for *M. gallisepticum*. U.S. M. Synoviae Clean classification (except those raising ratites) involves testing a specified sample of birds as stated in 9 CFR for each classification.

Egg and Meat-Type Multiplier Flocks may have their started poultry labeled as U.S. M. Synoviae Clean Started Poultry if their Multiplier and Primary flocks are classified as U.S. M. Synoviae Clean, and they meet specific sanitation and isolation rules.

U.S. M. Synoviae Monitored classification for meat-type chicken producers has less stringent testing requirements.

**Approved Tests**
A variety of approved tests (serum plate agglutination, hemagglutination inhibition, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR), or a combination of two or more of these) may be used by authorized laboratories when testing blood samples for *M. synoviae*.

**Reference**
**CLASSIFICATION BRIEF**

**Mycoplasma Meleagridis**

**NPIP Classifications**
- U. S. M. Meleagridis Clean
- U. S. M. Meleagridis Clean State
- **Availability:** Only for Breeding Turkeys

**Etiology**
*Mycoplasma meleagridis* is a turkey-specific bacterial pathogen that causes airsacculitis. Mycoplasmas are bacteria that do not have a cell wall and are quite small in size.

**Species Affected and Zoonotic Potential**
*M. meleagridis* is a disease specific to turkeys. It has no public health significance.

**Geographic Distribution**
*M. meleagridis* is found worldwide.

**Transmission**
Vertical transmission through eggs is the primary route of transmission. Hens may be infected as embryos, through a genital infection, or through insemination with infected semen. Horizontal infection may occur through direct or indirect means at any stage during a bird’s life. Direct airborne transmission usually results in a respiratory infection; however, a small number of birds develop genital infections with resultant venereal transmission. Indirect infections may occur as a result of contamination by fomites during practices such as sexing, vaginal palpation, artificial insemination, and vaccination.

**Clinical Signs**
Infected poults rarely show respiratory signs despite high rates of airsacculitis. In adult birds, the infection is rarely apparent. *M. meleagridis* causes some late embryonic death resulting in decreased hatchability. The largest losses from this pathogen are those associated with carcass condemnation due to airsacculitis.

**Prevention and Control**
Because this disease is vertically transmitted, the focus of disease eradication and control is on the breeding stock. Testing and eliminating genital carriers of the disease is an effective method for eliminating the disease from flocks, due to the variety of ways the disease is transmitted and because infected birds rarely show signs. Maintaining good biosecurity on farms is essential to keeping flocks free of *M. meleagridis*. The NPIP has a program for certifying that turkey flocks are free from *M. meleagridis*.

**Diagnosis**
Isolation and identification of the organism is needed for definitive diagnosis of the disease. A presumptive diagnosis may be made with serology and clinical signs; however, airsacculitis may be caused by a number of agents including synergistic infections of *M. meleagridis* with other organisms.

**Testing Requirements**
Because of host specificity of *M. meleagridis*, the U.S. M. Meleagridis Clean classification is available only to turkeys and involves testing a specified sample of birds as stated in 9 CFR for each classification. An initial sample of 100 birds from a flock must be tested when the birds are more than 12 weeks of age. Monitoring must be done at 4–6 week intervals beginning at 28–30 weeks of age with samples of 30 from male flocks and 60 from female flocks.

**Approved Tests**
There are a variety of approved tests that authorized laboratories may use, including serum plate agglutination and microagglutination; supplemental tests may include hemagglutination inhibition test, serum plate dilution, microagglutination, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR).

**Reference**
**Salmonella Enteritidis**

**NPIP Classifications**
- **U.S. S. Enteritidis Clean**: Available to Primary Egg and Meat-Type Chicken Breeding Flocks and Products, Multiplier Egg Type Chicken Flocks
- **U.S. S. Enteritidis Monitored**: Available to Multiplier Meat-Type Chicken Breeding Flocks and Products

**Etiology**
*Salmonella* Enteritidis is a gram-negative rod shaped bacteria belonging to the family *Enterobacteriaceae*. The complete scientific name is *Salmonella enterica* subspecies *enterica* serotype Enteritidis, but it is commonly referred to as *Salmonella* Enteritidis.

**Species Affected and Zoonotic Potential**
*Salmonella* Enteritidis rarely causes significant disease in poultry. *Salmonella* Enteritidis is of primary concern in chickens, especially laying birds, which can lay infected eggs. Humans can become infected when they ingest raw or undercooked eggs or egg products, meat from infected hens, or other contaminated food products.

**Geographic Distribution**
*Salmonella* Enteritidis is distributed worldwide.

**Transmission**
*Salmonella* Enteritidis can be transmitted horizontally and vertically. Horizontal transmission can occur via contact with infected birds, ingestion of contaminated feed, or through environmental sources. Rodents can be significant sources of environmental contamination. Vertical transmission of the organism occurs through eggshell contamination and also through transovarial transmission.

**Clinical Signs**
Clinical signs are generally uncommon in poultry. Very young birds may die rapidly with no signs. Signs can be seen in very young poultry. Humans may experience fever, diarrhea, abdominal cramps, vomiting, and possible bloody stools.

**Prevention and Control**
Prevention and control of *Salmonella* Enteritidis requires a multifaceted management plan. Eggs and chicks should be purchased from *Salmonella*-free breeding flocks. Hatching eggs should be disinfected and hatched according to strict biosecurity practices. Good sanitation and biosecurity practices must be implemented and maintained in poultry houses to prevent the introduction and spread of the disease.

The NPIP has instituted sanitation and testing standards for breeder flocks aimed at preventing the transmission of *Salmonella* Enteritidis laying stock.

**Diagnosis**
Diagnosis is based on isolation and identification of the organism. Serologic testing may aid in the diagnosis of the disease, but a preliminary diagnosis should be confirmed by isolation of the organism.

**Testing Requirements**
The testing and monitoring requirements for this classification are more complex than for the other classifications and vary for each type of bird. Specific requirements vary between U.S. S. Enteritidis Clean and U.S. S. Enteritidis Monitored classifications. Refer to 9 CFR for specifics.

**Approved Tests**
Official blood tests include testing with either pullorum antigen or a Federally licensed *Salmonella* Enteritidis enzyme-linked immunosorbent assay. Bacterial culturing and sampling must be done in specified ways.

**Reference**
- Merck Veterinary Manual on-line edition
U.S. Sanitation Monitored / U.S. Salmonella Monitored

**NPIP Classifications**

- **U.S. Sanitation Monitored**: Available to Multiplier Meat-Type Chicken Flocks and Breeding Turkeys
- **U.S. Salmonella Monitored**: Available to Primary Meat-Type Chicken Flocks, Waterfowl, Exhibition Poultry, Game Bird Breeding Flocks and Products, and Meat-Type Waterfowl Breeding Flocks and Products

“This program is intended to be the basis from which the breeding-hatching industry may conduct a program for the prevention and control of Salmonellosis. It is intended to reduce the incidence of Salmonella organisms in hatching eggs and chicks through an effective and practical sanitation program at the breeder farm and in the hatchery. This will afford other segments of the poultry industry an opportunity to reduce the incidence of Salmonella in their products.” (9 CFR 145.33(d) / 145.43(f))

**Zoonotic Potential**

Humans can become infected when they ingest raw or undercooked eggs or egg products, meat from infected hens, or other contaminated food products.

**Testing Requirements**

To be eligible for this classification, animal protein containing feed must be produced under the Animal Protein Products Industry Salmonella Education/Reduction Program. Specific sanitation and isolation procedures must be followed. The flocks also must maintain an ongoing environmental sampling and bacterial culturing program. The rules are similar to those for the Salmonella Enteritidis classification.

The U.S. Salmonella Monitored Program for Primary Meat-type Birds is a much stricter program than the U.S. Sanitation Monitored Program for Multiplier Meat-type Birds and allows for “Salmonella negative” claims for flocks that are in compliance with all requirements of the program.

See 9 CFR for specific testing requirements.
### U.S. Pullorum-Typhoid

<table>
<thead>
<tr>
<th>Name</th>
<th>Classifications</th>
<th>Available to</th>
<th>Etiology</th>
<th>Routes of Transmission</th>
<th>Species Affected</th>
<th>Clinical Signs</th>
<th>Zoonotic Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. Pullorum-Typhoid</strong></td>
<td></td>
<td>All breeding poultry</td>
<td><em>Salmonella enterica</em> subspecies <em>enterica</em> serotype <em>Pullorum</em></td>
<td>Transovarial, aerosol, fomites, oral</td>
<td>Chicken</td>
<td>Primarily young chicks/poults moribund/dead; Adults less severe but carriers</td>
<td>Rarely isolated; little significance</td>
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<td></td>
<td>Required for NPIP</td>
<td>Wild, domestic fowl</td>
<td><em>Salmonella enterica</em> subspecies <em>enterica</em> serotype <em>Gallinarum</em></td>
<td>Transovarial, aerosol, fomites, oral</td>
<td>Chicken</td>
<td>Young chicks/poults moribund/dead after hatching; Adults more frequently affected</td>
<td>Rarely isolated; little significance</td>
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<tr>
<td></td>
<td></td>
<td>Turkeys</td>
<td>Thirst, anorexia, green/yellow diarrhea, sudden death</td>
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<td></td>
<td></td>
<td>Wild, domestic fowl</td>
<td>Thirst, anorexia, green/yellow diarrhea, sudden death</td>
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</tbody>
</table>

**Clinical Signs**
- Young chicks/poults moribund/dead after hatching;
- Adults more frequently affected
- Thirst, anorexia, green/yellow diarrhea, sudden death
- Not described

**Zoonotic Potential**
- Rarely isolated; little significance
- Rarely isolated; little significance
- Not described
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<td>Primary Egg and Meat-Type Chicken Breeding Flocks, Products; Multiplier Egg-Type Chicken Flocks</td>
<td><em>Salmonella enterica</em> subspecies enterica serotype Enteritidis</td>
<td>Chickens: Direct contact, oral, fomites, transovarial</td>
<td>Chickens</td>
<td>Young: Uncommon; sudden death possible Adults: Uncommon</td>
<td>Major public health concern; foodborne</td>
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<td><strong>Salmonella Enteritidis</strong></td>
<td></td>
<td>Multiplier Meat-Type Chickens, Breeding Flocks, Products</td>
<td></td>
<td>Humans: Oral</td>
<td>Humans</td>
<td>Fever, diarrhea, abd cramps, vomiting, +/- bloody stools</td>
<td></td>
</tr>
<tr>
<td><strong>U.S. Sanitation Monitored</strong></td>
<td></td>
<td>Multiplier Meat-Type Chickens; Breeding Turkeys</td>
<td><em>Salmonella organisms</em></td>
<td>&quot;This program is intended to be the basis from which the breeding-hatching industry may conduct a program for the prevention and control of Salmonellosis. It is intended to reduce the incidence of <em>Salmonella</em> organisms in hatching eggs and baby poultry through an effective and practical sanitation program at the breeder farm and in the hatchery. This will afford other segments of the poultry industry an opportunity to reduce the incidence of Salmonella in their products.&quot;</td>
<td>U.S. Salmonella Monitored</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Species Affected</td>
<td>Available to</td>
<td>Clinical Signs</td>
<td>Routes of Transmission</td>
<td>Etiology</td>
<td>Zoonotic Potential</td>
<td></td>
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<tr>
<td>Mycoplasma gallisepticum</td>
<td>Chickens</td>
<td>All poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary</td>
<td>Chronic respiratory disease, lowered egg production</td>
<td>Aerosol, direct contact primary, transovarial</td>
<td>Mycoplasma gallisepticum</td>
<td>None</td>
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<td></td>
<td></td>
<td></td>
<td>More severely affected, infectious sinusitis, respiratory distress, condemned carcasses due to air sacculitis</td>
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</tr>
<tr>
<td></td>
<td>Turkeys</td>
<td></td>
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</tr>
<tr>
<td>Mycoplasma Synoviae</td>
<td>Chickens</td>
<td>All poultry in 9 CFR Part 145 except Ostrich, Emu, Rhea, Cassowary</td>
<td>Infections synovitis; subclinical respiratory infections; lameness most prominent in turkeys</td>
<td>Aerosols, direct contact primary, transovarial</td>
<td>Mycoplasma synoviae</td>
<td>None</td>
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<tr>
<td></td>
<td>Turkeys</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Other fowl</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mycoplasma meleagridis</td>
<td>Turkeys</td>
<td>Breeding turkeys only</td>
<td>Unapparent; occasional leg deformities</td>
<td>Transovarial primary; sexual contact; aerosols, fomites</td>
<td>Mycoplasma meleagridis</td>
<td>None</td>
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</tbody>
</table>

**Zoonotic Potential**: None
## Avian Influenza

<table>
<thead>
<tr>
<th>Name</th>
<th>Classifications</th>
<th>Available to</th>
<th>Etiology</th>
<th>Routes of Transmission</th>
<th>Species Affected</th>
<th>Clinical Signs</th>
<th>Zoonotic Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clean</strong></td>
<td>Primary and Multiplier Egg and Meat-Type Chickens, Ostrich, Emu, Rhea, Cassowary Breeding Flocks/Products</td>
<td></td>
<td>Influenza A virus</td>
<td>Birds: Oral, aerosol, fomites; vertical but not significant</td>
<td>Waterfowl, shore birds</td>
<td>Asymptomatic carriers</td>
<td>Differences in infectivity, pathogenicity, virulence, transmissibility of virus affects how severe or concerning it is to the human population; severity not affected by high or low pathogenic classification; pandemic potential</td>
</tr>
<tr>
<td><strong>H5/H7 Clean</strong></td>
<td>Turkeys, Waterfowl, Exhibition Poultry, Game Birds, Meat-Type Waterfowl</td>
<td></td>
<td>Humans: Direct contact, oral</td>
<td>Humans</td>
<td>Humans</td>
<td>Varies by virus but conjunctivitis, respiratory disease, death</td>
<td></td>
</tr>
<tr>
<td><strong>H5/H7 Monitored</strong></td>
<td>Commercial Egg Laying Flocks, Meat-Type Chicken and Turkey Slaughter Plants, Commercial Upland Game Birds, Commercial Waterfowl, Raised-for-Release Upland Game Birds, Raised-for-Release Waterfowl</td>
<td></td>
<td>Pigs, cats, palm civets, and marine mammals</td>
<td></td>
<td>Pigs, cats, palm civets, and marine mammals</td>
<td>Varies by species; not spread efficiently among mammals</td>
<td></td>
</tr>
<tr>
<td>U.S. Avian Influenza Clean Compartment</td>
<td>Primary Egg and Meat-Type Chickens</td>
<td></td>
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<tr>
<td>U.S. H5/H7 Avian Influenza Clean Compartment</td>
<td>Primary Turkey Flocks</td>
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</table>
### Approved Tests

<table>
<thead>
<tr>
<th>Approved Tests</th>
<th>Pullorum-Typhoid Clean</th>
<th><em>Salmonella Enteritidis (SE)</em></th>
<th><em>Mycoplasma Gallisepticum</em></th>
<th><em>Mycoplasma Synoviae</em></th>
<th><em>Mycoplasma Meleagridis</em></th>
<th>Avian Influenza†</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELISA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (Ab)</td>
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<tr>
<td>Hemagglutination inhibition (HI)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Microagglutination</td>
<td>X</td>
<td></td>
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<tr>
<td>Polymerase chain reaction (PCR)</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X (RRT)</td>
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<tr>
<td>Rapid serum</td>
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<td></td>
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<tr>
<td>Serum plate agglutination</td>
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<td></td>
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<td>X</td>
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<tr>
<td>Serum plate dilution</td>
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<td></td>
<td>X</td>
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<tr>
<td>Stained antigen, rapid, whole blood</td>
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<tr>
<td>Standard tube agglutination</td>
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<tr>
<td>Agar gel immunodiffusion (AGID)</td>
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<td>X</td>
</tr>
</tbody>
</table>

ELISA – Enzyme-Linked Immunosorbent Assay
RRT – Real-time Reverse Transcriptase
*Salmonella Enteritidis testing is more complex; official blood test with either pullorum antigen or federally licensed SE ELISA; feed tests and environmental sampling
†USDA-licensed type A Influenza antigen capture immunoassay for sick and dead birds