

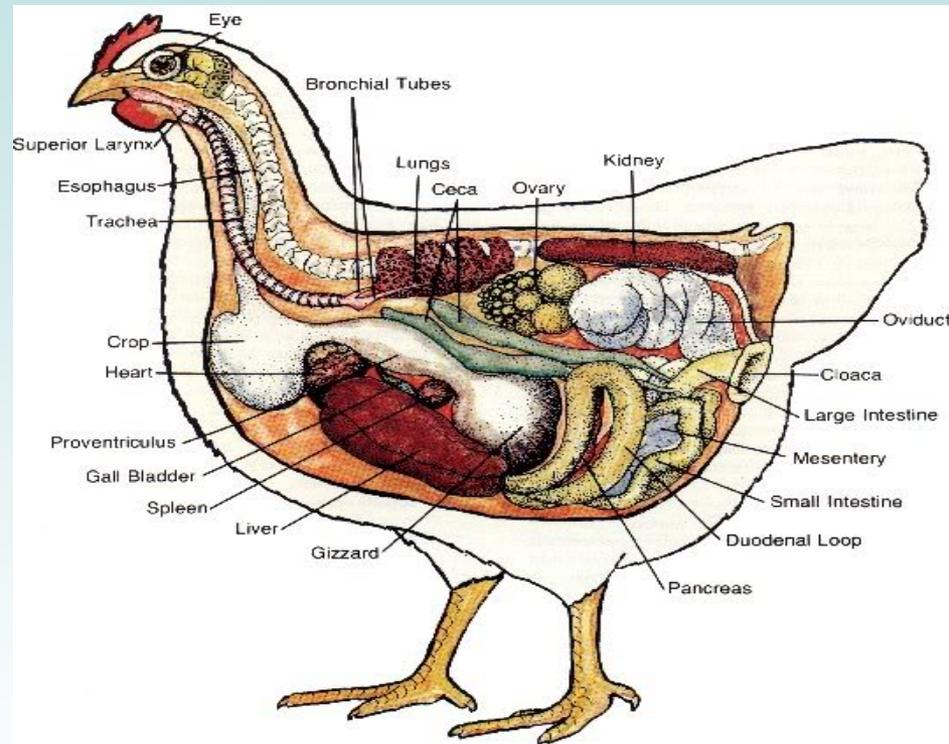
**Washington State  
Department of Agriculture  
Avian Health Program**

***Chickens 101 Training Course***

**The goal of this course is to provide you with a basic understanding of poultry.**



# Anatomy and Physiology of Poultry



# Birds vs. Mammal

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- Birds:
  - Feathers instead of fur
  - No teeth
  - Lay eggs
  - Float and fly
  - Excrete waste through one orifice only



Photo by Kimberly Engelkes



# Anatomy vs. Physiology

- Anatomy: The science and structure of animals
- Physiology: The science dealing with how an organism functions



# Body Systems of Poultry

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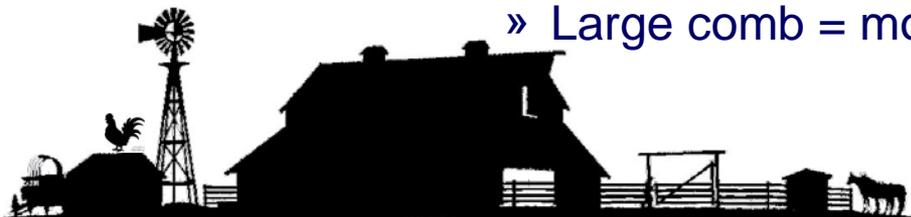
- Below are a few body systems of poultry:
  - Integumentary
  - Respiratory
  - Skeletal
  - Digestive



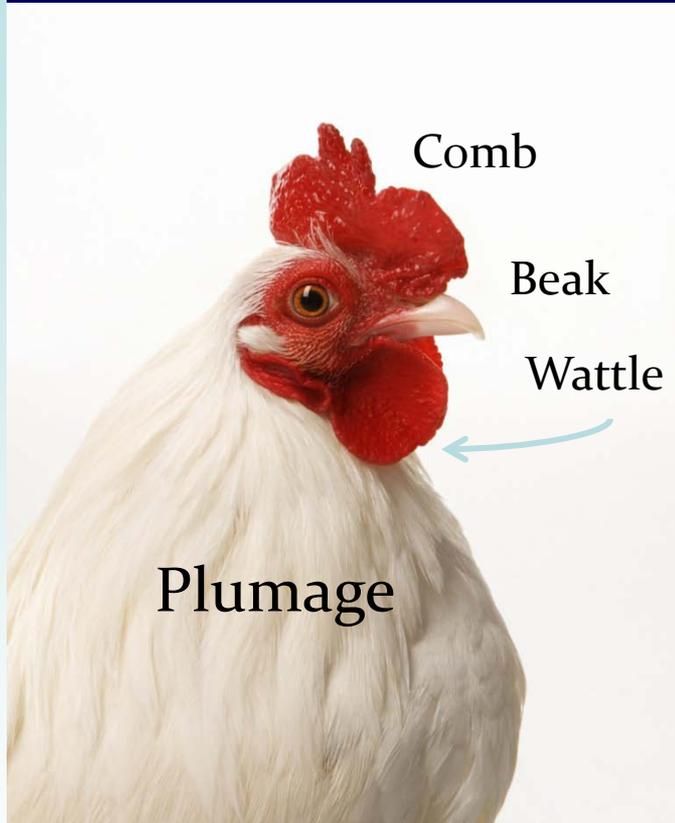
# Integumentary System

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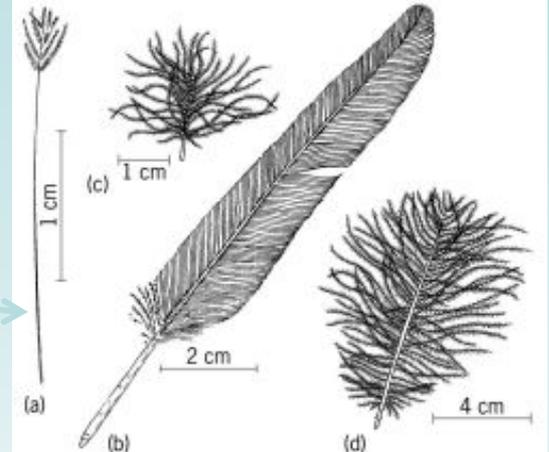
- The skin, feathers and beak
  - Protect the bird from external harm
- Skin
  - Plumage: outer covering of the bird's body
    - Feather, scales and filoplumes
      - Filoplumes: hair-like structures at the base of the feathers
  - Wattle: Red (usually) growth under the beak, works with the comb, growth located on top of their head
    - Wattle and comb circulate blood to regulate body temperature
      - The size of the comb is an indicator of the level of testosterone.
        - » Large comb = more testosterone present



# Integumentary System



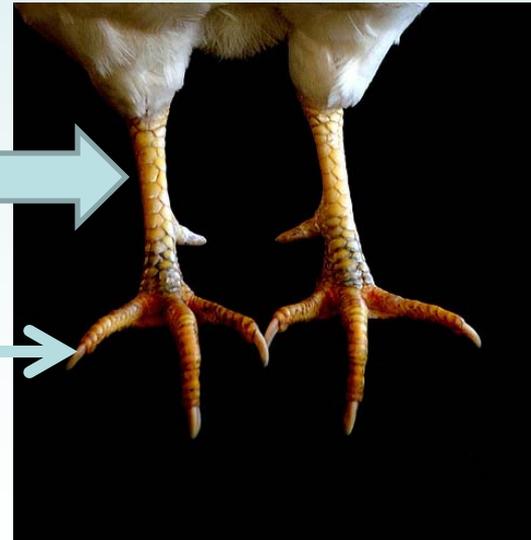
Filoplume



Scales



Nails



# Scale and Plumage

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- Scales
  - Located on feet and legs
- Plumage
  - Protects against cuts and bruises
  - Helps regulate body temperature
    - This is important because birds do not have sweat glands



# Respiratory System

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- Unlike mammals, birds lack a diaphragm to inflate and deflate the lungs
  - Birds have air sacs located in their neck and body cavity that inflate their lungs
  - Gas exchange occurs in the lungs and the air sacs function to move air in and out of the respiratory system
- Nares: Nostrils located on their beak



# Skeletal System

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- **Pneumatic (hollow) Bones**
  - Connect with respiratory system
  - Light bones allow for flight
- **Medullary Bone**
  - Contain a high amount of calcium
  - Calcium is stored in the bones to assist with producing the shell of the egg
- **Fused Bones**
  - Bones in the feet are fused
    - Causes birds to walk upright
  - Bones in the back are fused for flight

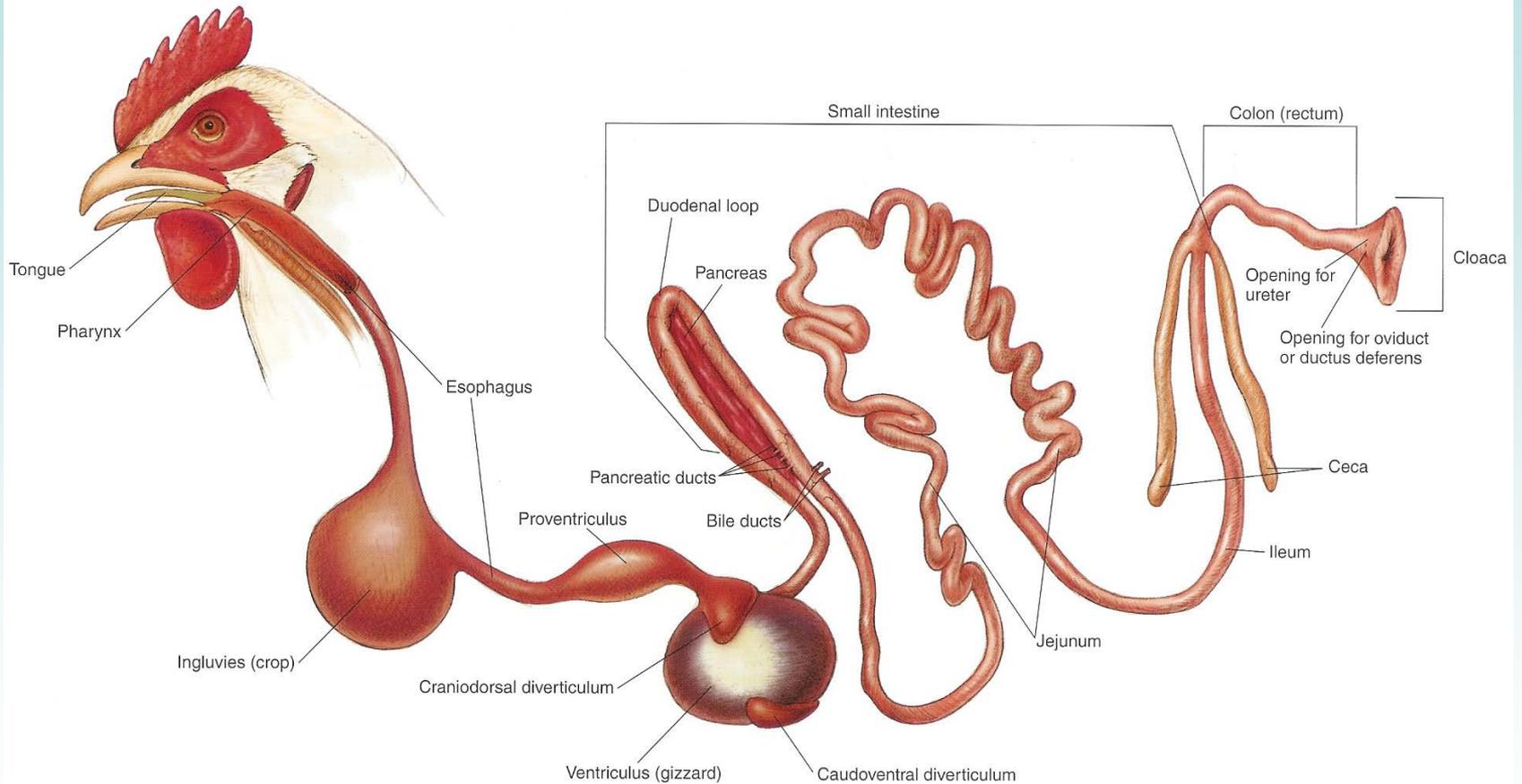


# Digestive System

- **Mouth**
  - Tongue
  - Beak
  - Taste buds
- **Esophagus**
  - Flexible tube that connects the mouth to the crop
- **Crop**
  - Moistens and temporary storage of food
- **Proventriculus**
  - Stomach
  - Uses acids to breakdown food
- **Gizzard**
  - Grinds up food particles
- **Small intestines (3 sections)**
  - Duodenum
  - Ileum
  - Jejunum
    - Absorbs nutrients from food
- **Ceca**
  - Ferments left over food and absorbs water
- **Colon (large intestine)**
  - Absorbs water
- **Cloaca**
  - Expels feces and urine through the vent



# Digestive System



# Commercial Broiler Breeds

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- Broiler
  - Hybrids or combinations of different breeds
    - Developed for specific characteristics
      - Grow faster and larger
      - Large breast meat yield
      - More efficient feed conversion
      - More disease resistance
    - Used by commercial broiler producing companies
    - Weakness: Do not lay as many eggs as layer breeds



# Commercial Broiler Breeds

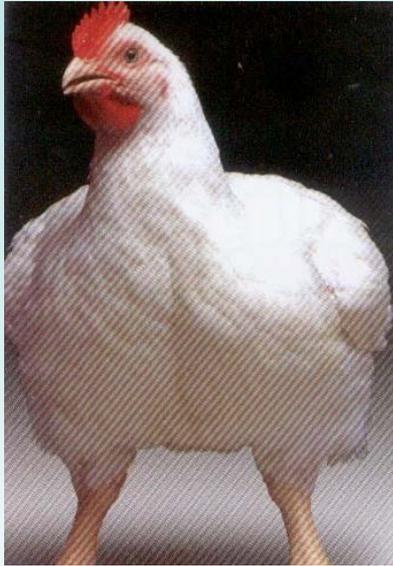
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- Cornish Cross
  - White Cornish x White Plymouth Rock
    - Reach 4 - 5lbs in 6 weeks
    - Reach 6 - 10lbs in 8 - 12 weeks
  - White Cornish
    - Broad and meaty
  - White Plymouth Rock
    - Docile and good dual purpose breed (layer and broiler)



# Commercial Broiler Breeds

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Cornish Hen



Cornish Cross



White Plymouth Rock



# Commercial Layer Breeds

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- Layer
  - Genetically selected for high egg production
  - Small bodied birds
  - Two types
    - Birds that lay white eggs and birds that lay brown eggs
    - White ear lobes = White eggs
    - Red ear lobes = Brown eggs



# Commercial Layer Breeds

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- White Leghorns
  - Very good layers of white eggs
- Rhode Island Red
  - Very good layers of brown eggs



# Examples of Non-Commercial Breeds

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- Laying breeds
  - **Ameraucana:** Lays blue eggs
  - **Araucana:** Lays blue to bluish green eggs
  - **Maran:** Lays large dark brown eggs
    - Dual purpose bird
  - **Plymouth Rock:** Dual purpose bird
  - **Welsummer:** Lays dark, deep red eggs
- Meat breeds
  - **Brahma:** One of the largest breeds, good winter layer
  - **Delaware:** Good for small scale operations
  - **Jersey Giant:** Good disposition for backyard flocks
  - **Orpington:** Good dual purpose bird
  - **Wyandotte:** Good dual purpose bird, and does well in the cold



# Examples of Non-Commercial Breeds

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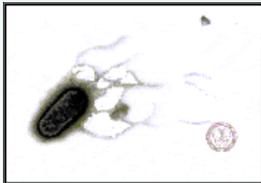
- Ornamental breeds
  - **Cochin:** Good winter layer and popular show bird
  - **Langshan:** Good dual purpose bird that lays brown eggs
  - **Polish:** A favorite as a pet chicken, and known for its topknot of feathers
  - **Silkie:** Unique looking, ideal as a pet chicken, and excellent broody hen



# Pathogens

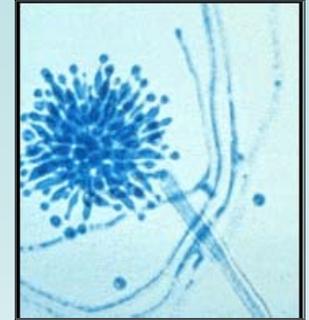
- Bacteria

- Salmonella Pullorum
- Mycoplasma Gallisepticum
- Botulism



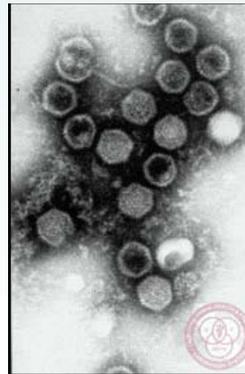
- Fungi

- Aspergillosis



- Viruses

- Avian Influenza
- Fowl Pox
- Infectious Bronchitis
- Infectious Bursal Disease



# Pathogens

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## – Parasites

- Internal

- Worms

- » Round Worms

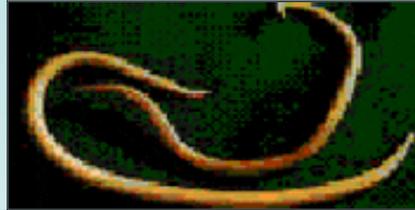
- Protozoa

- » Coccidia

- External

- Lice

- Mites



# Salmonella Pullorum

- **Background**

- Infections occur in chickens, turkeys, and game birds
- Spread through parent to chick

- **Symptoms**

- Characterized by white diarrhea & high mortality rate in birds

- Sick birds are sleepy and weak
- Chicks huddle near heat source
- Chicks that survive become carriers

- **Prevention**

- Purchase birds and hatching eggs from National Poultry Improvement Plan (NPIP) participants



# Mycoplasma Gallisepticum(MG)

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- **Background**

- Affects primarily chickens and turkeys, but can effect game birds and waterfowl
- Can be transmitted through the egg
  - Can be coughed into the air, contaminating feed, water & the environment
  - Infection my be dormant until the birds are stressed

- **Symptoms**

- Coughing
- Sneezing
- Nose and eye discharge
- Drop in egg production and consumption of food

- **Prevention**

- Purchase birds and hatching eggs from MG-free breeders (usually NPIP participants)



# Botulism

- **Background**

- Caused by ingesting the toxins of *Clostridium botulism*
- *C. botulism* can be found in dead poultry, and rotting feed and food

- **Symptoms**

- Symptoms occur within a few hours to a few days
- Drowsiness
- Weakness

- Loss of control of legs, wings, neck
- Ruffled feathers
- Diarrhea (broilers)

- **Prevention**

- Prevent access to *C. botulism*
- Dispose of dead birds properly
- Do not feed birds spoiled food or feed



# Aspergillosis

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- **Background**

- Occurs in chickens, turkeys and game birds
- Chicks and poults may become infected during hatching
  - Due to inhaling spores from contaminated machines or litter
- In older birds, infection may be caused primarily by inhalation of contaminated dust

- **Symptoms**

- Gasping

- Accelerated and labored breathing
- Diarrhea
- Anorexia
- Dehydration
- Increased thirst
- High mortality

- **Prevention**

- Keep feed and litter dry so mold doesn't grow
- Clean out feeders regularly
- Avoid wet litter under the feeders and waterers
- Provide good ventilation in the poultry house



# Avian Influenza (AI)

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- **Background**

- 2 types of AI
  - Low-Path
  - High-Path
- Low-path AI is commonly found in wild waterfowl
- AI viruses are further divided into 15 hemagglutinin (H1-15) and 9 neuraminidase (N1-9) subtypes
- Most AI viruses (H1-15 subtypes) are of LP
  - However, some H5 and H7 subtypes can mutate into high-path in domestic chickens, turkeys, and game birds

- **Symptoms**

- Low-Path
  - Coughing
  - Sneezing
  - Depression
  - Inflammation of the sinuses
  - Nasal and eye discharge
  - Decrease egg production
- High-Path
  - Sudden mortality
    - Mortality can reach up to 100%
  - Respiratory signs may be present, but not always
  - Bluish wattle and comb
  - Discoloration of feet and legs
  - Blood-tinged mouth and nose discharges.



# Avian Influenza (AI)

- **Prevention**

- Keep wild waterfowl away from your birds
- Separate the species of birds (i.e. separate the chickens from the ducks)
- Clean and disinfect equipment that has been used around other birds
- Have your birds routinely tested for AI
- Purchase birds from NPIP AI Clean flocks

- Separate new birds from your flock for at least 3 weeks



Photo by Joan McClenny



# Fowl Pox

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- **Background**

- Slow spreading virus
- Affects chickens, turkeys and other species of birds
- Can be transmitted through mosquitoes
- Two forms of Fowl Pox
  - Cutaneous
  - Diphtheritic

- **Symptoms**

- Cutaneous
  - Mild reduction in weight gain

- Temporary loss of egg production
- Lesions on the head, neck, legs and feet
- Low mortality
- Diphtheritic
  - Lesions in the upper respiratory system, digestive tract, nasal cavity
  - May lead to nasal or eye discharge
  - Low mortality

- **Prevention**

- Fowl Pox vaccination



# Infectious Bronchitis (IB)

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- **Background**

- A virus that occurs in chickens
- Rapidly spreads and highly contagious
- Spread through respiratory discharge and
  - Airborne droplets
  - Ingestion of contaminated feed and water

- **Symptoms**

- Chicks
  - Coughing
  - Sneezing

- Nasal discharge
- Weakness
- Depression
- Huddling near heat source

- Adult birds

- Coughing
- Sneezing
- Drop in egg production
- Soft-shelled or misshapen eggs

- **Prevention**

- Vaccines can be used



# Infectious Bursal Disease (IBD)

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- **Background**

- Occurs primarily in chickens
- Clinical signs and mortality are more severe in birds 3-6 weeks old
- Birds less than 3 weeks old do not show symptoms
- Shed in feces

- **Symptoms**

- Tremors or unsteadiness
- Depression
- Anorexia
- Ruffled feathers
- A droopy appearance
- Diarrhea
- Dehydration
- Vent pecking
- Low mortality

- **Prevention**

- Vaccines are available



# Roundworms

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- **Background**

- There are many different types of roundworms that can infect poultry
- Younger birds are more likely to become ill
- But can affect birds of any age
- Spread through feces
- Earthworms are common carriers of some roundworms

- **Symptoms**

- Thin
- Poor feather quality
- Pale inside of mouth
- Diarrhea or droppings pasted to their feathers near their vent
- Birds can die from severe infections
- If one or two birds are showing signs of roundworm, then the whole flock should be treated

- **Prevention**

- Use feeders and waterers designed to minimize contamination



# Round Worms

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- Don't allow birds to eat off of the ground
- Use deep litter in the coop so the birds do not eat feces
- Clean out coop frequently to remove feces

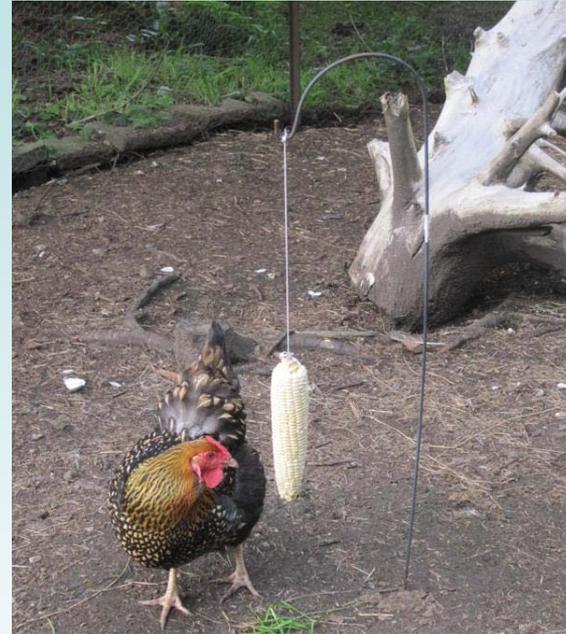


Photo by Sue Young



# Coccidia

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- **Background**

- Protozoal disease of poultry
- Caused by the protozoa *Eimeria*
- 9 species of *Eimeria* in chickens & 7 in turkeys
- Wide range of symptoms depending on the type of *Eimeria*
- Shed in feces which can contaminate feed, water, dust, soil and litter

- **Symptoms**

- Diarrhea (may have mucous or blood present)

- Inflammation of the small intestines
- Decreased growth rate
- Decreased egg production
- Dehydration
- Listlessness
- Weakness

- **Prevention**

- Purchase feed with Anticoccidial Compounds
  - Does not affect all types of *Eimeria*
- Vaccines are available



# Lice

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- **Background**

- There are over 40 species of lice that are specific to domestic poultry
- Examine the vent area, underside of the wings, the head, and legs to locate the lice
- Most lice are straw-colored

- **Prevention**

- Pesticide treatments
  - Use a treatment that is approved for use on birds
- Lice do not live in the environment, so remove infected feathers from the premises
- Inspect birds on a monthly or bi-weekly basis



# Mites

- **Background**

- Mites feed on blood, feathers, skin, or scales
- Some mites are known or suspected of causing other diseases
- There are many different types of mites that affect poultry
- A few are:
  - Chicken Mite-Red Mite
    - Can cause anemia and death (especially in young birds)
  - Northern Fowl Mite
    - Heavy infestations appear as blackened feathers
    - After handling the bird, the mites may transfer to humans

- Depluming Mites

- Live on feathers or in the quills
- Resulting in loss of feathers, causing inability to regulate temperature

- Scaly Leg Mites

- Affected skin becomes thickened and crusty
- Without treatment the bird can become crippled.

- **Prevention**

- Insecticides can be used
  - Powders, sprays or dusts



# Preventing Disease on the Farm

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- Biosecurity is the main way of preventing the introduction of diseases onto your farm
  - Biosecurity reduces the risk of pathogens from forming, which prevents the spread of diseases from one flock to another
  - Preventing illness in birds and other animals, is very similar to preventing illness in humans
    - Good hygiene is imperative



# Benefits of Biosecurity

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- Biosecurity reduces the number of pathogens on a farm
- Biosecurity also :
  - Increases productivity and production
  - Decreases the use of medication (antibiotics)
  - Enhances the value of the flock



# Biosecurity Steps

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- Keep your birds in a protected area
  - Keep them fenced in to prevent animals and people from entering the pen
  - A hard roof or tarp will prevent wild birds from entering the pen
    - Keep wild waterfowl droppings out of the coop
- Fresh water should be available at all times
  - Nipple drinkers or rabbit type drinkers reduce the spread of disease



# Biosecurity Steps

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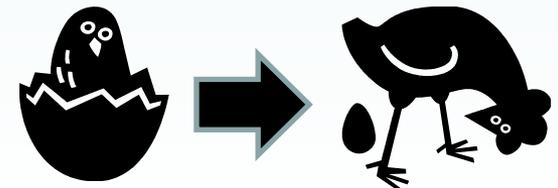
- When visitors visit your farm, provide them with boots or disposable booties
  - This will prevent the transmission of disease on your farm
  - Clean and disinfect the boots when they leave and dispose of disposable booties
- Do not let people that own birds enter your bird area.



# Biosecurity Steps

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- Clean and sanitize equipment and supplies
  - Sanitizing equipment and supplies reduces pathogens
    - This is especially important when vehicles, equipment or supplies have been near other birds (i.e. fairs, auctions, etc.)
- Wear coveralls or special clothing when working with your birds.
  - Clean your clothes after working with your birds
- Work from youngest to oldest birds
  - Young birds are highly susceptible of being infected with a pathogen



# Biosecurity Steps

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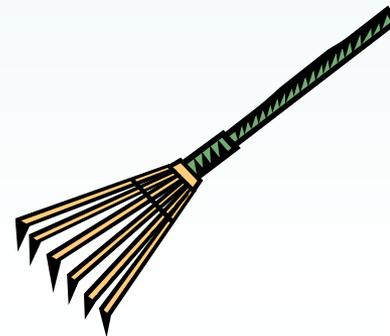
- Eliminate excess trees, grass, and debris around the chicken pen
  - These items can harbor rodents and other animals that can spread disease in your flock, or harm your birds
  - Control rodents in order to reduce the spread of disease in your flock
- Keep feed in a sealed container
  - Keeping feed away from rodents and other birds is essential when trying to keep your flock healthy



# Biosecurity Steps

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- Stir or rake bedding (litter) often so manure is evenly spread throughout and moisture is absorbed
  - This will reduce flies and odors
- Sick and dying birds should be separated from the flock immediately
- Thoroughly clean and disinfect poultry housing between flocks to ensure that there aren't pathogens present



# Report a Sick Bird

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Contact the WSDA Avian Health Program if  
your birds are sick

**1-800-606-3056**

[lbadoe@agr.wa.gov](mailto:lbadoe@agr.wa.gov)

Or

Contact your local veterinarian



# Helpful Contacts

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**Dr. Lyndon Badcoe (WSDA)**

Avian Health Veterinarian

(360) 725-5763

[lbadcoe@agr.wa.gov](mailto:lbadcoe@agr.wa.gov)

**WSU Avian Health Laboratory**

(253) 445-4537



# References

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- Slides were adapted from the following resources:
  - The Poultry and Egg Institute “Poultry & Egg Production Curriculum”
    - <http://www.poultryegginstitute.org/training/index.cfm>
  - Merck Veterinary Manual
    - <http://www.merckvetmanual.com>
  - Roundworms in Poultry - Dr. Jeanne Marie Smith
    - <http://animalscience.ucdavis.edu/phi/PHI/ROUNDWORMS%20PHI%20Handout%20from%20Dr.%20Smith.pdf>

