

# Husbandry Practices To Maximize Food Safety: Chickens, Coops and Pest Monitoring



UC ANR Urban Agriculture Workshop Series: Food Safety  
Basics for Urban Farmers

May 4, 2018

Soil Born Farms – Rancho Cordova

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**University of California Cooperative Extension**

**UC Davis School of Veterinary Medicine**

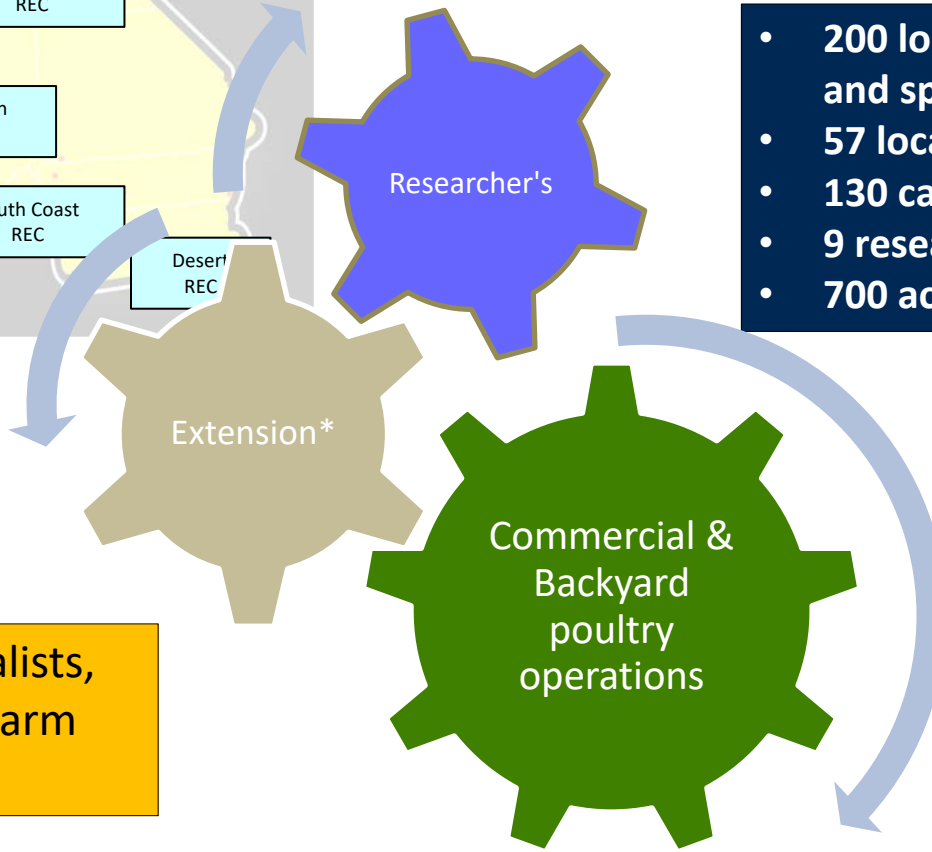
# What is Cooperative Extension?



## Mission Statement:

Statewide Network of researchers and educators focused on the creation and application of knowledge in agriculture

- 200 locally based CE advisors and specialists
- 57 local offices
- 130 campus based CE specialists
- 9 research and extension centers
- 700 academic researchers



\* Extension Specialists, Researchers and Farm Advisors

- <http://ucanr.edu/>

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**VETERINARY MEDICINE**

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**Extension:**  
Transferring Knowledge  
to California and Beyond



UC Davis School of Veterinary Medicine  
UC Agriculture & Natural Resources

## VETERINARY MEDICINE EXTENSION

Faculty at the UC Davis School of Veterinary Medicine with appointments in Cooperative Extension focus on research and outreach related to animal agriculture in California and beyond.

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[http://ucanr.edu/sites/Small\\_Farms/](http://ucanr.edu/sites/Small_Farms/)



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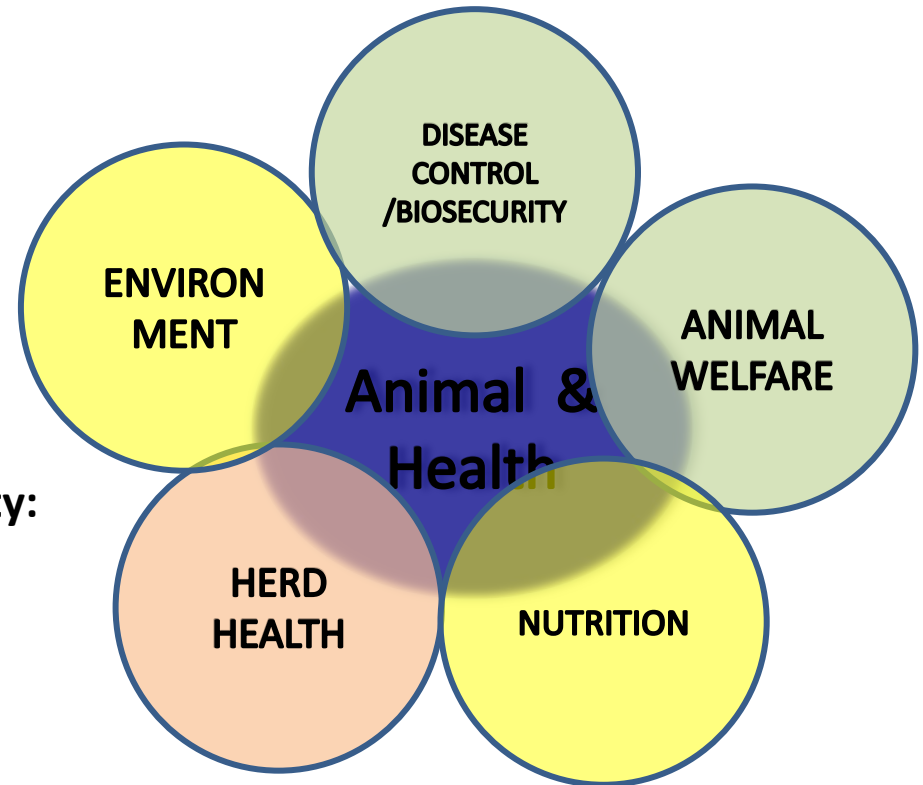
POULTRY PONDERINGS

<http://ucanr.edu/sites/poultry/>

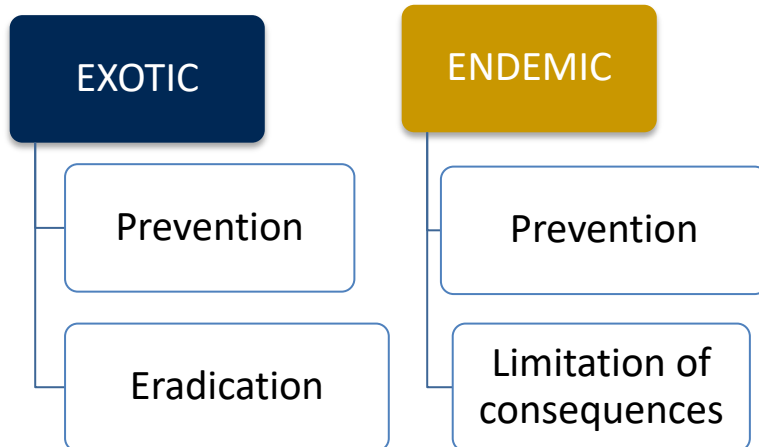
# What is Biosecurity?

The protection of animals from disease causing agents

- Why?
  - Healthy Flocks
  - Safe Food
  - Well-being

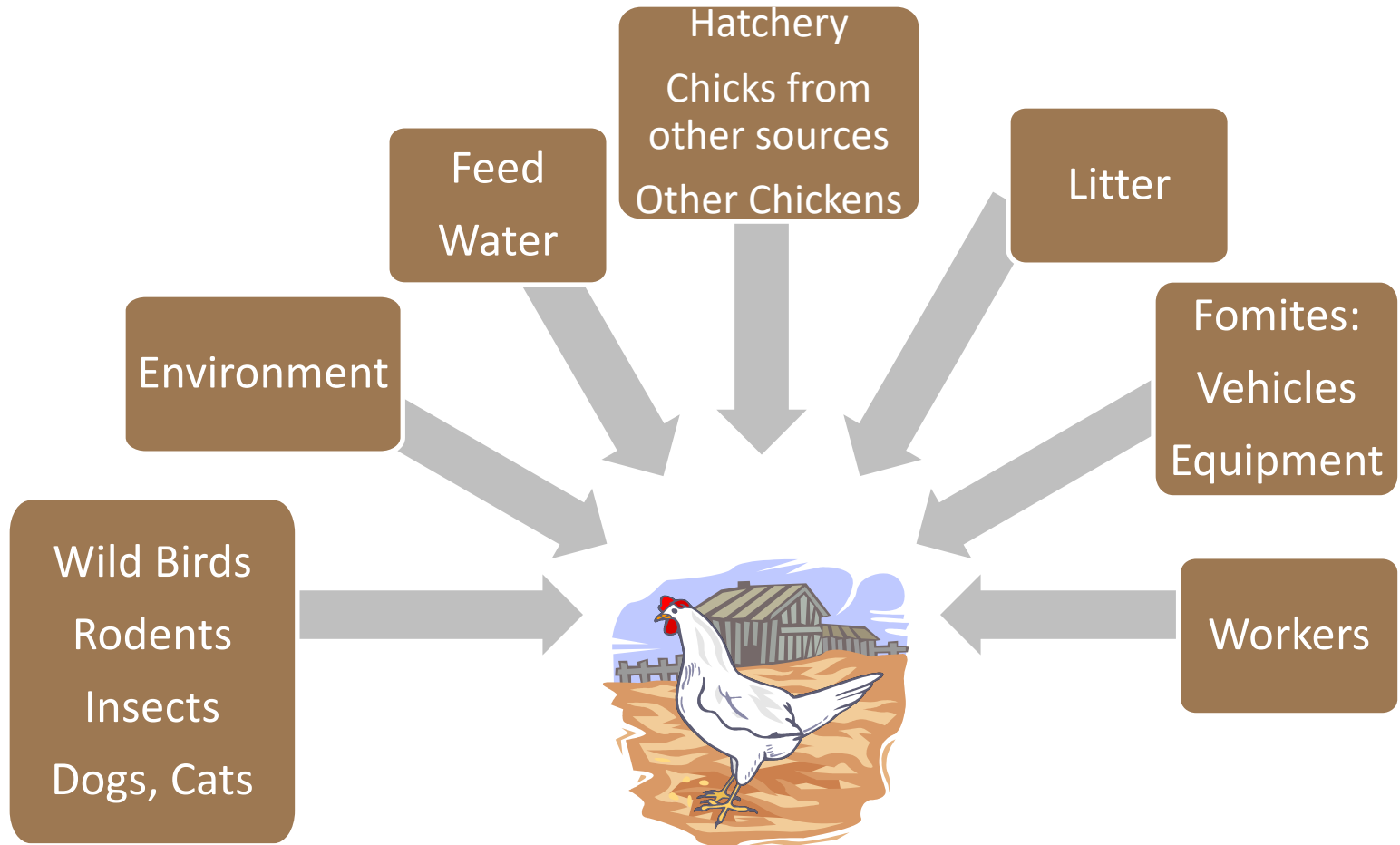


Classification of diseases based on Biosecurity:





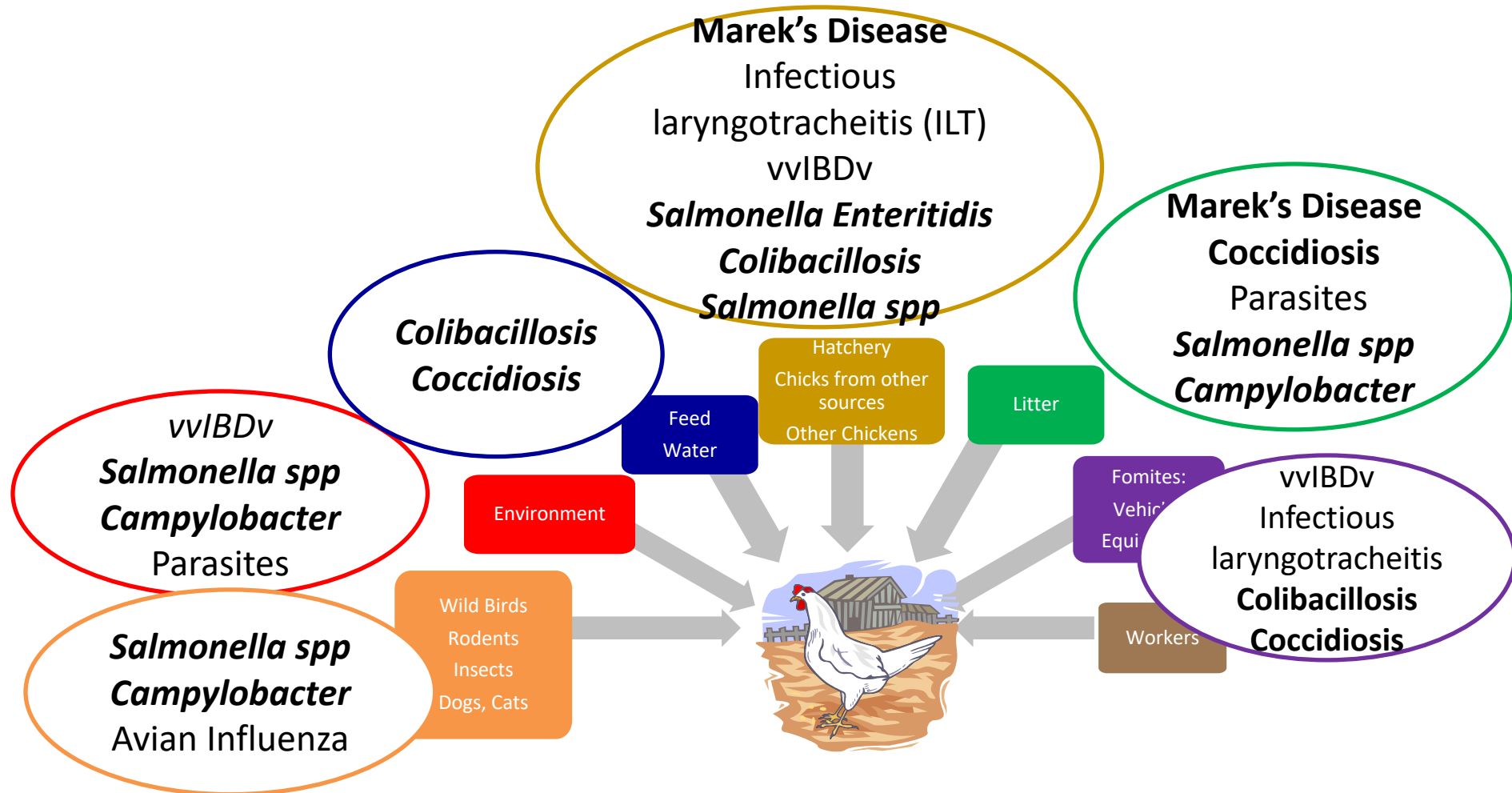
# Biosecurity



**Introduction of Diseases and Transmission**

**There are multiple hosts and multiple routes of infection**

# Biosecurity & Diseases



Examples of diseases that can be introduced in low biosecurity flocks

# So How Do We Prevent Exposure to Those Diseases? There Is No Silver Bullet...

- Need to use a **combination** of management practices to maximize efforts.
- But keep in mind that it is impossible to eliminate risk completely

Most poultry diseases do not have a cure making prevention key!



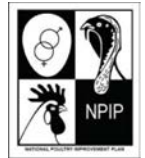


# Chick Sources & New Birds

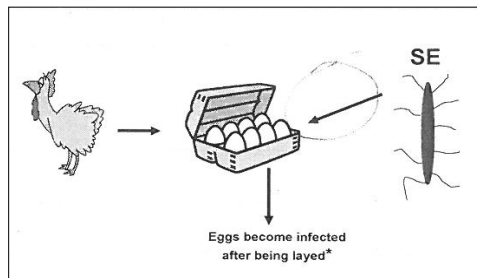
- Obtain your **eggs, one-day old chicks** or **grown birds** from a reputable source: hatcheries or companies that are part of **National Poultry Improvement Program (NPIP)\***
- Encourage the hatchery to vaccinate chicks against MDV (one-day old)



- **Stock free of diseases:**
  - Pullorum-Typhoid \*
  - ***Salmonella Enteritidis*\***
  - Mycoplasma spp (synoviae, gallisepticum, meleagridis)\*
  - Avian Influenza\*
  - Marek's disease
  - ***Salmonella spp***

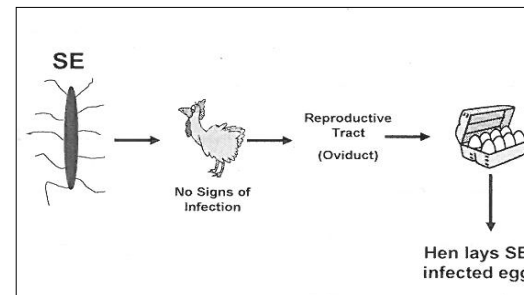


## Horizontal Transmission



(FDA)

## Vertical Transmission



(FDA)

**Disease transmission into eggs**

# Chick Sources & New Birds

- **Isolate** new birds from other birds for **30 days** and observe signs of illness
- **Recognize signs of illness**
  - Sneezing, coughing, and/or runny nose
  - Diarrhea
  - Inactivity
  - Tremors, drooping wings, etc
- **Separate sick birds from healthy birds**





# Quarantine Pen

- Quarantine new birds for at least 30 days.
- Isolate sick appearing (i.e. lethargic, droopy eyes) birds away from the flock.
- Instructions on how to build this specific sick pen available at:  
• <http://ucanr.edu/sites/poultry/files/236853.pdf>



# Housing: Coops

- Space available
  - **Barn/Coop**
  - Pasture
- Appropriate shelter
- Ventilation (respiratory diseases)
- Feeding Facilities
- Watering facilities
- Separation of animals by age groups
- Protection from **predators/wildlife**
- **Cleaning and sanitation** of the barn and equipment



# Housing: Coops

- Trees can offer shade (?)
- **Roofing**
- **Materials** easy to clean and disinfect (plastic or wood painted)
- **Fencing** (dimensions; chicken wire)
- **Nest Box** (dimensions, bedding)



- **Limit contact with wildlife**
  - Wild birds (Avian Influenza)
  - Rodents (*Salmonella*)
- **Predators**
- Easy to clean and disinfect
- **Safe Eggs**





# Wildlife



Knowing what you are up against can help you determine what tools and strategies to use and therefore maximize your efforts.

# Pasture poultry

- Building an eggmobile



[http://ucanr.edu/sites/poultry/UC\\_Davis\\_Pasture\\_Poultry\\_and\\_Innovation\\_Farm/Links/](http://ucanr.edu/sites/poultry/UC_Davis_Pasture_Poultry_and_Innovation_Farm/Links/)  
(Slide courtesy of Dr. Maurice Pitesky)



# Shade/Shelter Structures



- Birds can go underneath for shade.
- Offers protection from predators.
- For instructions on how to build, visit:
- <http://ucanr.edu/sites/poultry/files/236853.pdf>

# Predator Repellent Tape



- Relatively inexpensive from \$7 (150ft) to \$27 (100ft).
- Easy to use/install.
- Attach to 6-8in. string and hang around farm.
- Hang strategically in trees, at eye level for ground predators and around enclosures.
- Can potentially scare your birds so they should be placed farther away from flock.
- Humane; flashes in all directions in the sun and makes a noise as it flaps in the wind.
- Need to move it to different locations regularly so wildlife won't get acclimated.
- Reviews vary.

# Coyote/Fox Decoy



Also, remember  
fencing!

- \$30-\$67.
- Also, easy to use/install.
- Humane.
- Must be moved around to be effective (consider changing position daily); birds can start to catch on.
- May be why some reviews are poor, not being used properly.
- Need about one decoy per  $\frac{1}{4}$  acre.

# Electric Fence

- Portable electric fence help with husbandry and predator control
- Will have to make sure it has good charge and that it is working regularly.
- Walk along the fence once a week.
- Keep the pasture low around the fence to keep the fence circulation going.



(Slide courtesy of Dr. Maurice Pitesky)

# Restrict Access to Feed

- If rodents and other wildlife can't access feed, they will go somewhere else.
- Bungee cord makes the lid hard to take off.
- Make sure to clean up spilled
- No waste feeder: Didn't see waste but birds may have a hard time adjusting to the design if you start with this design mid-flock.



(Facebook pic, 2016)



(My Pet Chicken Blog, 2016)



(Slide courtesy of Dr. Maurice Pitesky)



# Rodents



<http://ipm.ucanr.edu/>

- **Rats and Mice** carry diseases that can affect livestock, poultry, pets and humans (*Salmonella*, *Leptospira*, rat bite fever, etc.)
- **Mice and rats** have different behaviors
- Rats (Norway Rat & Roof Rats, different habitats) are more cautious, more opportunistic and have a larger geographical range of land
- **Spilled feed** will attract rats, mice, insects and birds
- **Management of Rats & Mice:** Sanitation, Building Construction and Population Control

# Rodents



- **To get rid of rats/mice, remove food, water, and shelter, and seal entryways**
  - Feed pets only the amount of food they will eat at a single feeding or bring food inside at night.
  - Keep garbage, trash, and garden debris in receptacles with tight-fitting lids.
  - **Habitat Control:** Thin dense vegetation (shrubs, climbing hedges, tree limbs)
  - Seal all cracks and openings (house, barns, coops, etc.)
  - Put **traps or bait stations** every **25 to 50 feet** around the perimeter of the house
  - Put traps along **beams, walls** and **ceiling routes** and at each **door**



# Pests Control

The image displays two screenshots of the UC IPM (University of California Integrated Pest Management) website. The top screenshot shows the 'Homes, Gardens, Landscapes, and Turf' section, featuring a search bar, a navigation menu, and a list of pests including ants, bed bugs, and bees. The bottom screenshot shows the 'Birds, mammals, and reptiles (Vertebrate pests)' section, featuring a search bar, a navigation menu, and a list of pests including bats, mice, and rattlesnakes. Both screenshots include a sidebar with a 'HOME' button and a list of links for various pest management topics.

UC IPM Statewide Integrated Pest Management Program

What is IPM? Identify & Manage Pests Research Publications Training & Events Links About Us Contact Us Subscribe

HOME

ON THIS SITE

What is IPM?

Home & landscape pests

Agricultural pests

Natural environment pests

Exotic & invasive pests

Weed gallery

Natural enemies gallery

Weather, models & degree-days

Pesticide information

Research

Publications

Events & workshops

Online training

Links

About us

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Homes, Gardens, Landscapes, and Turf

Pests of homes, structures, people and pets

Stinging and biting pests | Food, Click on the **QT** next

Pests that sting, bite, or

- Ants **QT** (menu)
- Bed Bugs **QT**
- Bee and Wasp Stings
- Bee Swarms
- Brown Recluse and Other Recluse Spiders
- Conenose Bugs
- Delusory Parasitosis
- Fleas | **QT**
- Flies
  - Eye Gnats

HOME

ON THIS SITE

What is IPM?

Home & landscape pests

Agricultural pests

Natural environment pests

Exotic & invasive pests

Homes, Gardens, Landscapes, and Turf

Birds, mammals, and reptiles (Vertebrate pests)

Click on the **QT** next to a pest name for a brief overview of how to manage a pest.

- Bats
- Birds on Tree Fruits and Vines
- Cliff Swallows
- Mice
  - Deer Mouse
  - House
- Rattlesnakes
- Rats | **QT**
- Skunks

Wood-destroying, food, fabric, and nuisance pests

- Ants **QT** (12 entries)
- Cockroaches | **QT**
- Horsehair Worms

- UC IPM: <http://ipm.ucanr.edu/PMG/menu.house.html#STING>
-

# Litter & Bedding

- Bedding materials: wood shavings, pine sawdust, rice hulls, straw, etc.
- Fecal material + bedding => **litter**
- Litter management
  - If the litter is too wet it might smell ammonia
  - If the litter is too dry it can aerosolize
- **Decontamination: Cleaning and Disinfection**



- **Remove fecal material, feathers and spilled-feed on daily basis**
- If sufficient land rotate them scratch the soil and let the sun act
- The litter can be **composted**
  - Types of composting systems
  - Food Safety Risks in Vegetable Gardens
- **Create an annual clean and disinfection time**



# Litter & Bedding

- **Importance of Decontamination:**  
Reduce the organic material and contamination of the environment with pathogens



## Marek's disease

- MDV infects cells of the feather follicle
- Endemic in the global poultry environment



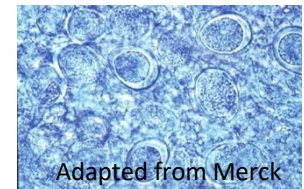
## *Salmonella* spp

- Many serotypes, GI tract & Eggs
- Healthy animals
- Many hosts (birds, rodents, pets, cows, horses, etc.)
- Survive in the environment for long periods (months)



## Coccidia

- Host and site specific (GI)
- Occurs under conditions of warmth and humidity (e.g., wet litter).
- One sporulated oocyst can produce 100,000 offspring!
- Oocyst very resistant (can survive 18 months in the environment)







# Equipment

## Equipment

- Sources of infection
- Clean and disinfect equipment and don't share equipment & feed from neighbors



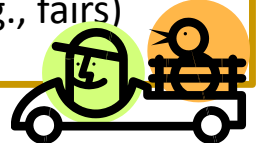
## Protective Equipment

- Designated clothes and footwear
- Footbath (?) or bucket with a scrub brush for the soles of the shoes



## Vehicles

- Clean and disinfect your vehicle after returning from events (e.g., fairs)



## Feeders & Cages

- Can be easily cleaned
- Spilled feed should be cleaned up



## Visitors

- Keep visitors to a minimum
- Provide PPE
- Signs to notify non-essential visitors to stay out



# Decontamination Cleaning & Disinfection

Pre-Cleaning Removal of debris (aka remove the dirt)

Apply soap (aka wet the dirt with a foamy soap)

Wash the dirt away

Let the surface drain and dry

Apply disinfectant (Right disinfectant, concentration, consistency, time)

80%

20%

- Maintain Clean & Sanitary Environment

# Personnel & Visitors

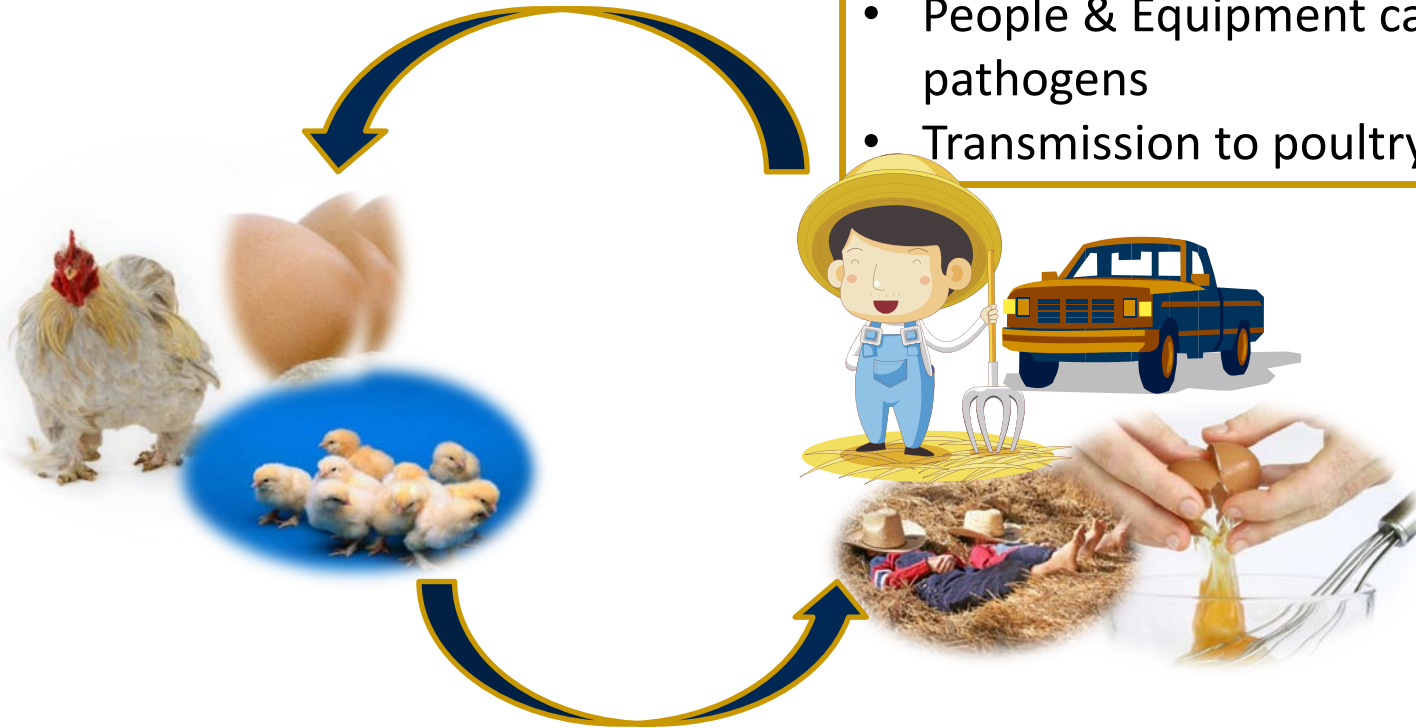
## Sanitary Practices & Food Safety

When handling birds & eggs:

- Wash your hands with soap & water before and after contact with your birds



- People & Equipment can carry pathogens
- Transmission to poultry



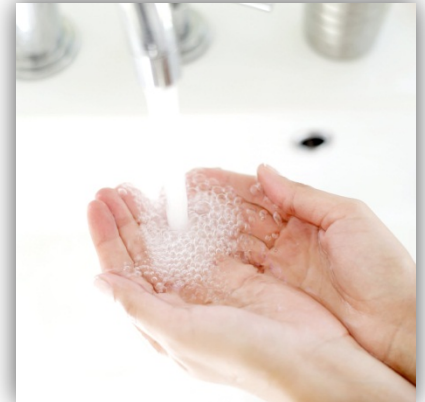
- *Salmonella*, *Campylobacter*, Colibacillosis (Foodborne Pathogens)
- Avian Influenza

# On-Farm Food Safety

## Live Poultry

### How to reduce the risk of *Salmonella* infections by direct contact:

- Good practices of decontamination & cleaning
- Wash your hands with soap & water after touching poultry or any materials in contact
- Use hand sanitizer if water and soap are not available
- Adults should supervise young children when handling, feeding chicken and hand washing
- Clean any equipment or materials associated with raising poultry outside the house (don not use kitchen sink, bath tub, etc.)



# Foodborne Diseases

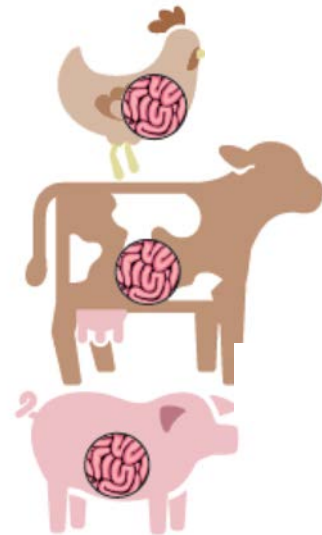
## *Animals on Diversified Farms*

- Certain **animals** are **reservoirs** for certain pathogens
- What can **affect animals shedding** in their feces
  - Age (e.g. young animals)
  - Husbandry practices (e.g. stocking density)
  - Diet (e.g. distillers grain)
  - Season (summer)
  - Environmental conditions
- **Good Husbandry Practices** (prevention)

*Salmonella*  
*Campylobacter*

*E. coli* O157:H57  
*Salmonella*  
*Campylobacter*

*Salmonella*  
*Campylobacter*



Adapted from CDC,NARMS



# Foodborne Diseases

## *Animals on Diversified Farms*

- All manures can carry pathogens (causing human illness)
- There is an increased **risk of pathogen spread** via food products (e.g., vegetables, fruits and nuts) when **manure is applied to crop fields**



# Foodborne Diseases

## *Manure & Risk Reduction*

### Soil

- Enteric Pathogens can persist for long periods in the soil:
  - ***Salmonella*** can persist in the litter applied to fields almost **4 months**, can survive up to **2 years**
  - ***Campylobacter*** can persist for about **25 days**
- Factors affecting the survival in the soil : livestock species, pathogen, manure type, composition (e.g., humidity, dry matter), soil type, environmental conditions (e.g. season, ambient temperature, rainfall, sunlight, etc.)



# ***Manure & Risk Reduction***

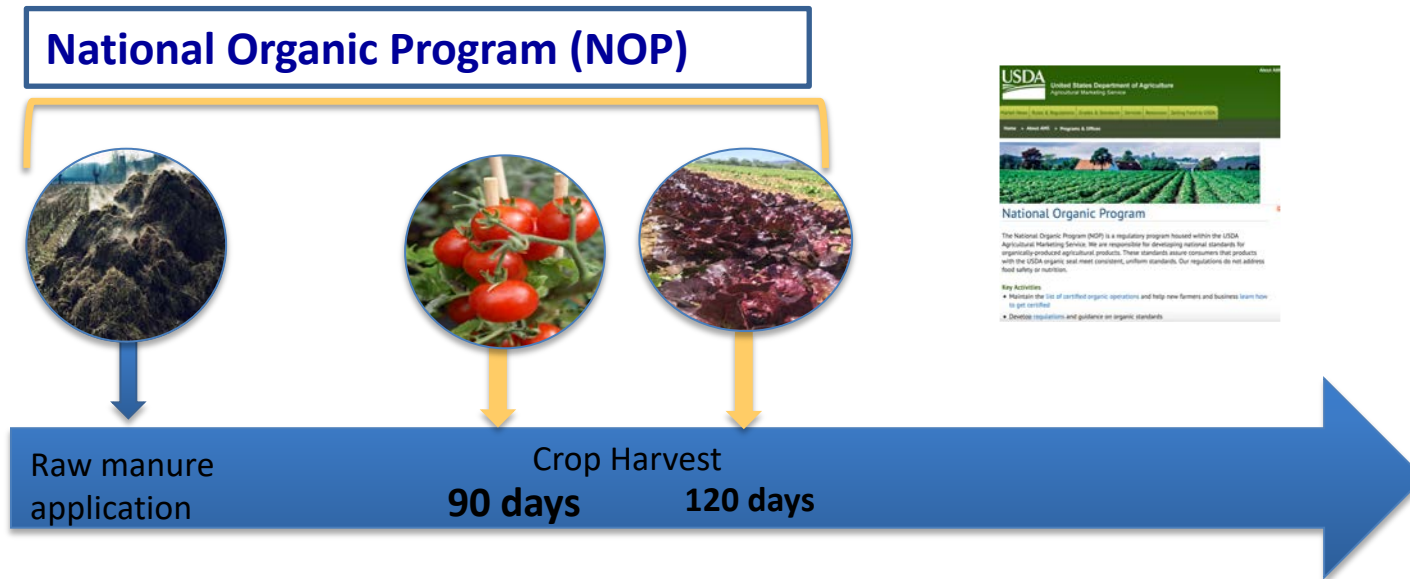
## **Good Agricultural Practices (GAPs)**

- Selection
- Treatment : **composting**, Heat treatment
- **Application timing**
- **Application methods**
- Handling and Storage
- Record keeping



# ***Manure & Risk Reduction***

- The prevention of microbial contamination of crops has been **based on time-interval criteria** between the **application of raw manure** and **crop harvesting**





# Wildlife Intrusions

- Wildlife animals can carry pathogens in their feces:
  - Rodents (gopher, ground squirrels, mice, rats)
  - Birds (wild turkeys)
  - Deer (ex: strawberry outbreak in Oregon)
  - Feral pigs (Salinas spinach outbreak 2006 )
- Contamination can occur directly or indirectly (water & soil)

Zoonoses and Public Health

## ORIGINAL ARTICLE

### ***Salmonella* Oranienburg Isolated from Horses, Wild Turkeys and An Edible Home Garden Fertilized with Raw Horse Manure**

M. T. Jay-Russell\*, J. E. Madigan, Y. Bengson, S. Madigan, A. F. Hake, J. E. Foley and B. A. Byrne

School of Veterinary Medicine, University of California, Davis, CA, USA

#### Impacts

- Routine faecal screening for *Salmonella* as part of the veterinary hospital's infection control protocol facilitated identification of salmonellosis infections on a ranch in coastal Northern California.
- The *S. Oranienburg* clinical strain was found in multiple locations including faeces from symptomatic and asymptomatic healthy pet dog, wild turkeys, stored manure, water troughs and the family's edible home garden.
- Viable *S. Oranienburg* persisted an estimated 210 days in soil fertilized with raw horse manure.



## Food Safety News

Breaking news for everyone's consumption

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### Did Deer Cause Oregon's Strawberry Outbreak?

BY GRETCHEN GOETZ | AUGUST 9, 2011

Strawberries sold at roadside and farmer's markets last month in Oregon have been implicated in an outbreak of *E. coli* O157:H7 infection that has caused one death and sickened as many as 15 others, the Oregon Department of Public Health announced Monday.

The outbreak sent four people to the hospital and two suffered hemolytic uremic syndrome. One, an elderly woman from Washington County, died from kidney failure caused by the disease.

So far, health investigators think deer may be to blame for the *E. coli* contamination. Deer tracks and deer feces were observed in several strawberry fields at the suspect farm, according to health investigators.

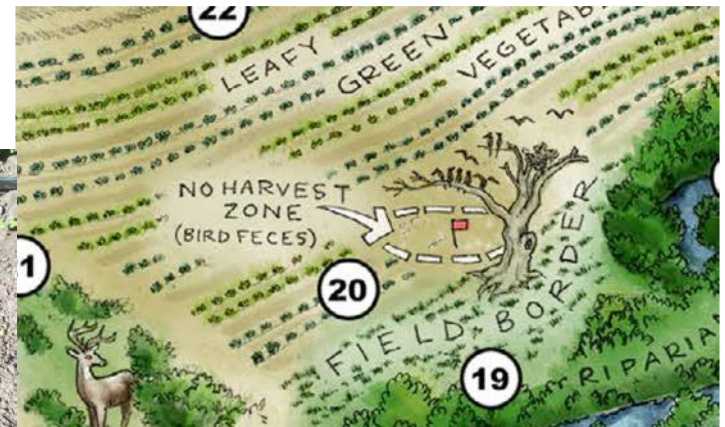
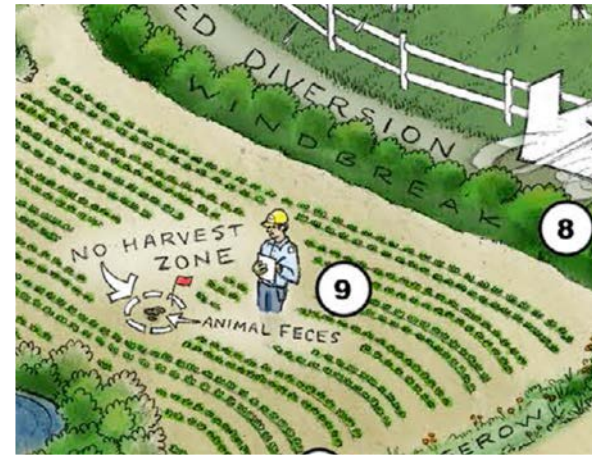
Tracing the berries to that farm was no easy task. Between July 10 and 29, at least 10 and as many as 16 people fell ill in Oregon with *E. coli* O157:H7 infections. It was not until last week – when genetic





# ***Manure & Risk Reduction***

- Contaminated crops by wildlife intrusions



(Adapted from Co-Managing Farm Stewardship with Food Safety GAPS Conservation Practices, Wild Farm Alliance, 2016)

# Thank you for your attention!




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**Urban Agriculture & Food Safety, UC Cooperative Extension**  
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# Biosecurity Tips

UC CE Poultry University of California Cooperative Extension

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Avian Diseases

Disease Prevention

Welcome, poultry enthusiasts!

<http://ucanr.edu/sites/poultry/>



Be a bird watcher and keep your birds healthy.

Recognizing the warning signs of infectious poultry diseases such as avian influenza (bird flu) can help protect your birds. Be sure to follow simple hygiene steps such as keeping cages and equipment clean and not sharing supplies with other poultry owners. Healthy flocks rock!

USDA United States Department of Agriculture

USDA is an equal opportunity provider and employer.

Learn more at <http://healthybirds.aphis.usda.gov>

[http://www.aphis.usda.gov/animal\\_health/birdbiosecurity/](http://www.aphis.usda.gov/animal_health/birdbiosecurity/)

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

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CDFA Home > AHFSS Home > AHB > Avian Health Program > Biosecurity for Poultry

**BIOSECURITY FOR POULTRY**



Click on pictures to learn more biosecurity for your backyard poultry

To report sick birds call toll free....Sick Bird Hotline 1-866-922-BIRD (2473)

**POULTRY**

If you deal directly with poultry or pet birds, protecting your birds against disease should be a priority. Developing and implementing an effective biosecurity plan is essential toward that goal.

**RESOURCES**


- CDFA Biosecurity for Backyard Birds
- USDA Biosecurity for Backyard Birds
- Poultry News
- NPIP (California)

**BIOSECURITY FOR...**

- Equine
- Bovine
- Swine, Sheep & Pigs
- Exhibition
- For Professionals

**CONTACT US**

California Department of Food and Agriculture  
Animal Health and Food Safety Services,  
Animal Health Branch  
1220 N Street  
Sacramento, California 95814  
Telephone: (916) 900-5002  
Fax: (916) 900-5333  
E-mail: [ahbfeedback@cdfa.ca.gov](mailto:ahbfeedback@cdfa.ca.gov)



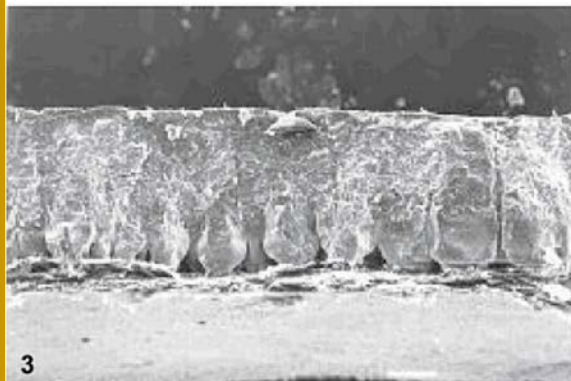
[http://www.cdfa.ca.gov/AHFSS/Animal\\_Health/Avian\\_Health\\_Program.html](http://www.cdfa.ca.gov/AHFSS/Animal_Health/Avian_Health_Program.html)

# Housing: Coops

A safe egg starts in the coop

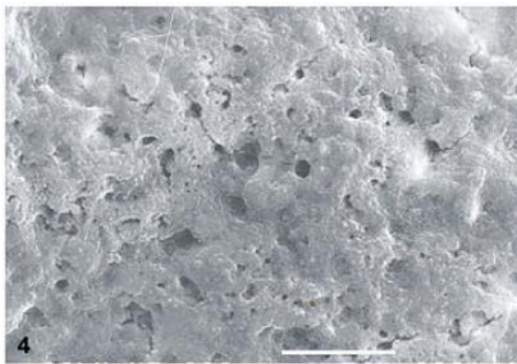


## The Porous Shell



3

Figure 3 - Lateral view of the eggshell (bar: 100 $\mu$ m).



4

Figure 4 - Outer shell pores (bar: 5 $\mu$ m).





# Housing: Coops

## Nest Box Details

- Prevent defecation:
  - Higher than the ground
  - Lower than roosts
  - Tapered top



(Slide courtesy of Dr. Dan Famini)



# Coops

## Nest Box Details

- **Prevent breakage**
  - 1 foot square
  - Away from high traffic areas
  - 1 box: 5 hen maximum ratio
  - 2 inches clean, dry bedding



# On-Farm Food Safety

## Backyard Egg Collection

- **Collecting and cleaning** usually separate steps
- Eggs should be sorted immediately after collection
  - Discard: Fecal contamination, white/yolk contamination, cracks, weak shells



(Slide courtesy of Dr. Dan Famini)

# On-Farm Food Safety

## Backyard Egg Collection

- Dry brush any feathers, shavings, dry dirt, etc.
- Eggs with mild dirt, to be cleaned later, stored separately from visually clean eggs
- Refrigerate all eggs immediately after collection



(Slide courtesy of Dr. Dan Famini)

# Backyard Egg Cleaning

- Wet washing = facilitating bacterial movement across the shell
- Specific protocols required to prevent bacterial introduction
- Immersion into water NOT allowed



# Backyard Egg Cleaning

- Cleaning is not required for small producers but cleanliness is
  - “free from foreign material and from stains or discolorations that are readily visible”
- Cleaning and sanitizing is mandated for any egg sales
- For personal consumption no cleaning may be most appropriate guidance
  - If proper husbandry
  - If proper handling
  - If no evidence of soiling

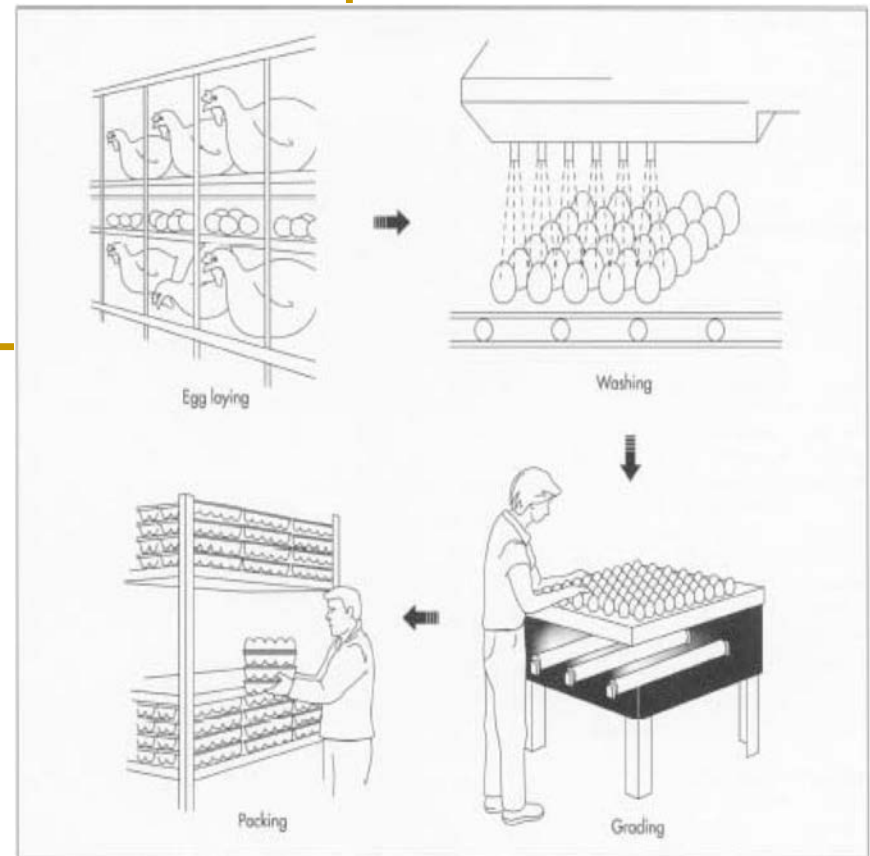




# On-Farm Food Safety

## Egg Cleaning

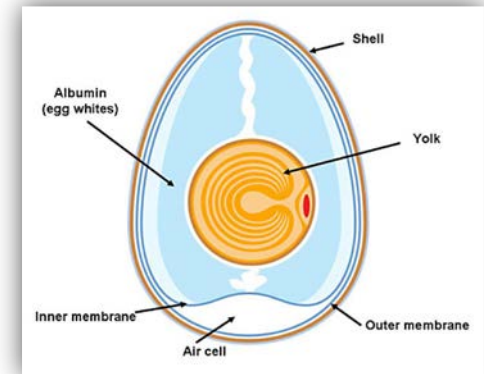
- Typical sequence of egg cleaning
  - Washing
  - Rinsing
  - Sanitizing
  - Drying



# On-Farm Food Safety

## Egg Cleaning - Washing

- The power of warmth
  - Always use water that is 20 F degrees warmer than the egg
- Too big a difference can cause cracks
- This causes the membranes to swell against the shell
  - Decreased opportunity for bacteria to cross



(Slide courtesy of Dr. Dan Famini)

# On-Farm Food Safety

## Egg Cleaning - Washing

- Constantly running water
- Water must be potable
- Water must not have significant iron
  - Low iron in eggs is a defense against bacterial growth
  - No more than 2ppm
  - Well water or pipe concern



# On-Farm Food Safety

## Egg Cleaning - Washing

- Any chemicals must be Generally Recognized as Safe (GRAS) by FDA
  - And approved for food surfaces
  - Unscented, dye-free dishwashing detergent a valid consideration for backyard flocks



# On-Farm Food Safety

## Egg Cleaning - Rinsing

- Same principles still apply
  - Safe water
  - 20 F degrees warmer
  - Constantly running water





# On-Farm Food Safety

## Egg Cleaning -Sanitizing

- Dilute chlorine bleach most common agent
  - Between 65 and 200 ppm
    - $\frac{1}{2}$  tablespoon bleach per gallon water = 100 ppm
- May be an issue for certified organic operations
- May be unsettling for owners seeking an “natural” product

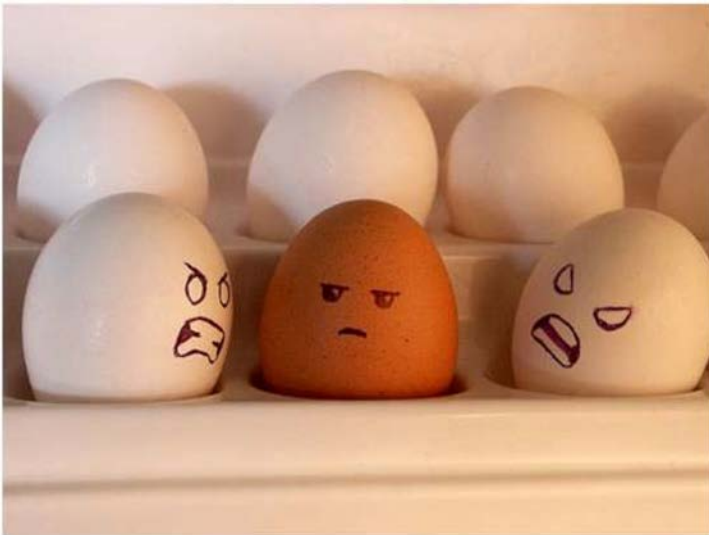


(Slide courtesy of Dr. Dan Famini)

# On-Farm Food Safety

## Egg Cleaning - Drying

- Ensure eggs are dried then returned to refrigerator
  - Typical egg cartons or refrigerator storage areas would trap any surface moisture



(Slide courtesy of Dr. Dan Famini)

# On-Farm Food Safety

## Egg Cleaning

- Bloom = waxy cuticle naturally found on all eggs
  - Decreases exchange of gas, etc across shell
  - Slows loss of quality
- **Act of cleaning +/- sanitizing removes bloom**
  - Commercially replaced by fine oil spray
    - Equipment not practical for backyard producers
    - Also unsettling concept for some owners

