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

UC ANR Urban Agriculture Workshop Series: Food Safety Basics for Urban Farmers
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Soil Born Farms – Rancho Cordova

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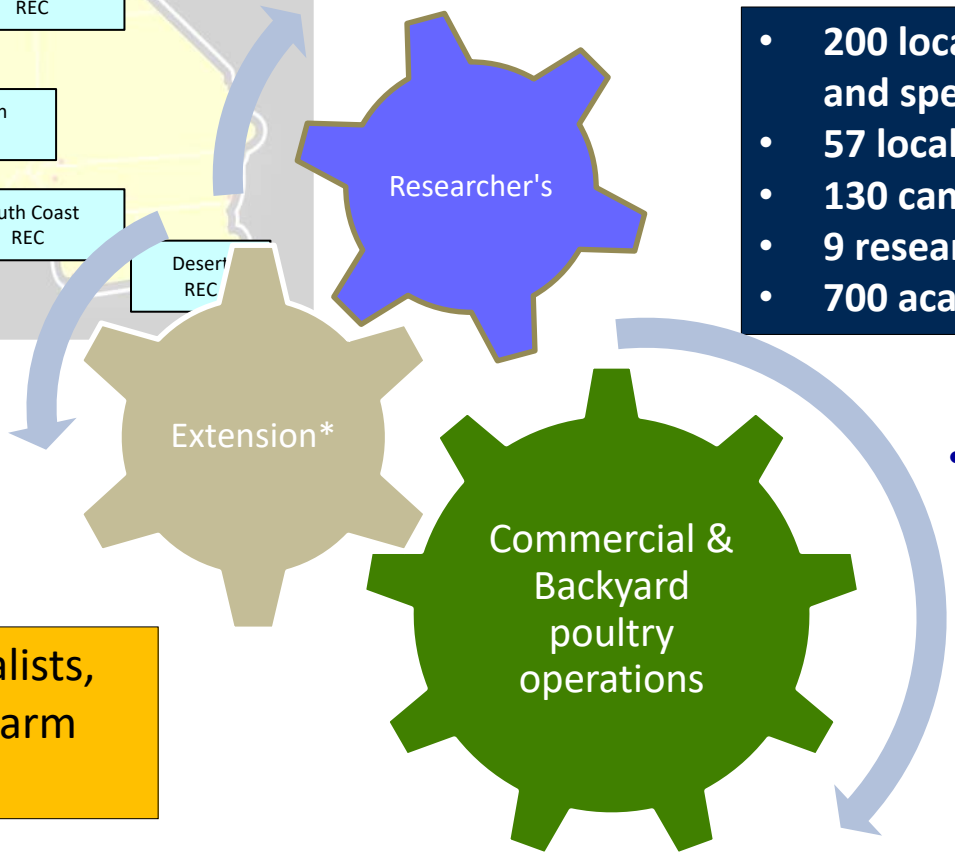
UCDAVIS VETERINARY MEDICINE

University of California
Agriculture and Natural Resources

What is Cooperative Extension?

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

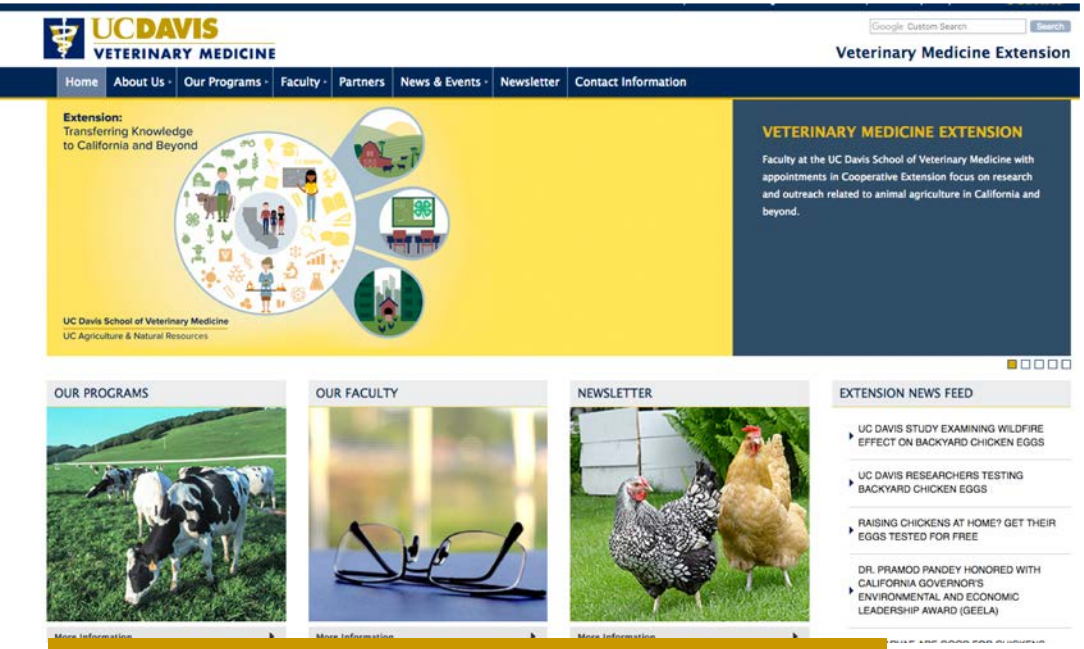
- **200 locally based CE advisors and specialists**
- **57 local offices**
- **130 campus based CE specialists**
- **9 research and extension centers**
- **700 academic researchers**



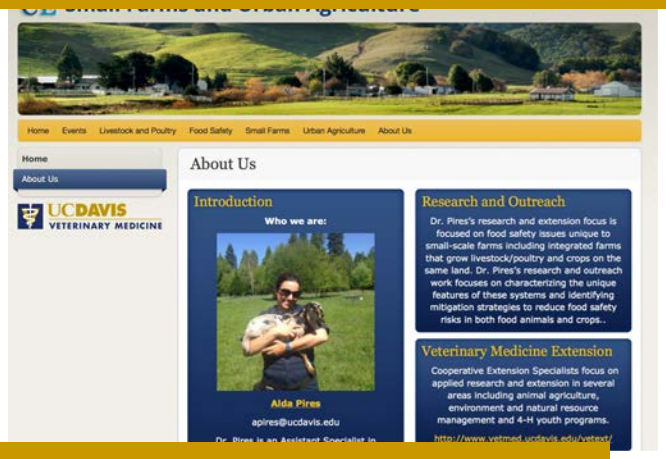
- **http://ucanr.edu/**

* Extension Specialists, Researchers and Farm Advisors

VET MED EXT Resources



http://www.vetmed.ucdavis.edu/vetext/



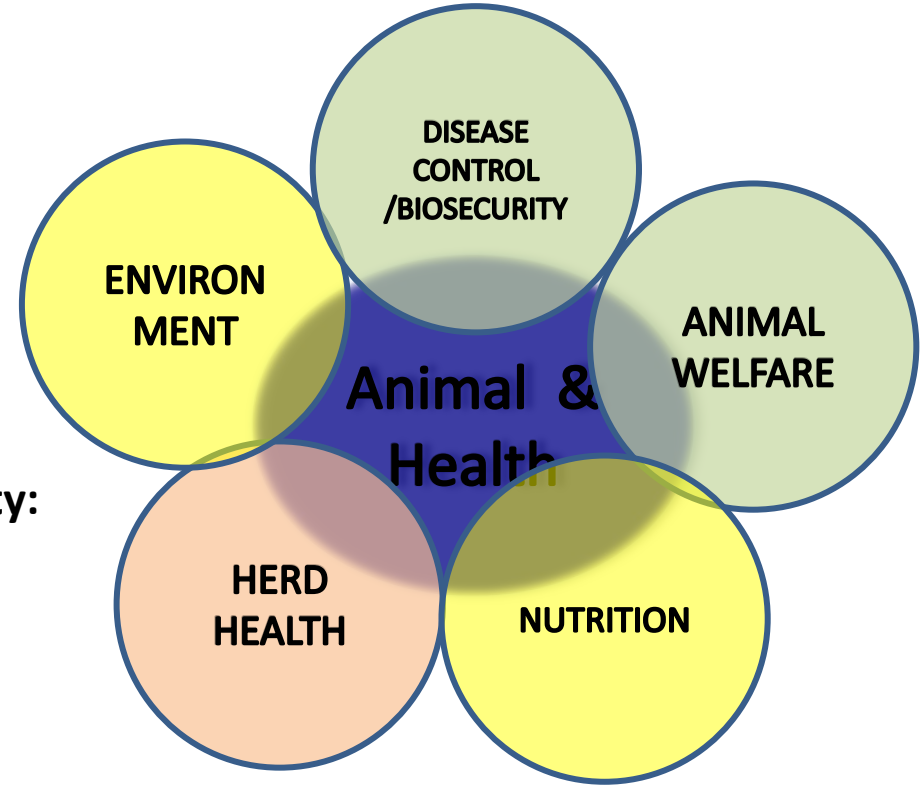
http://ucanr.edu/sites/Small_Farms_/

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

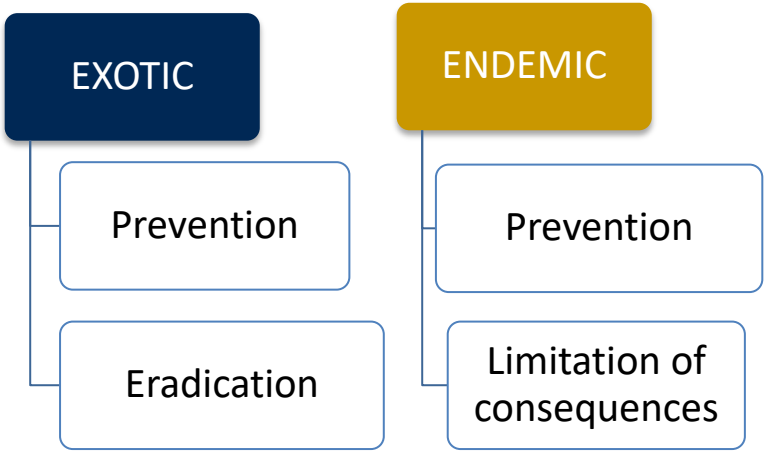
What is Biosecurity?

The protection of animals from disease causing agents

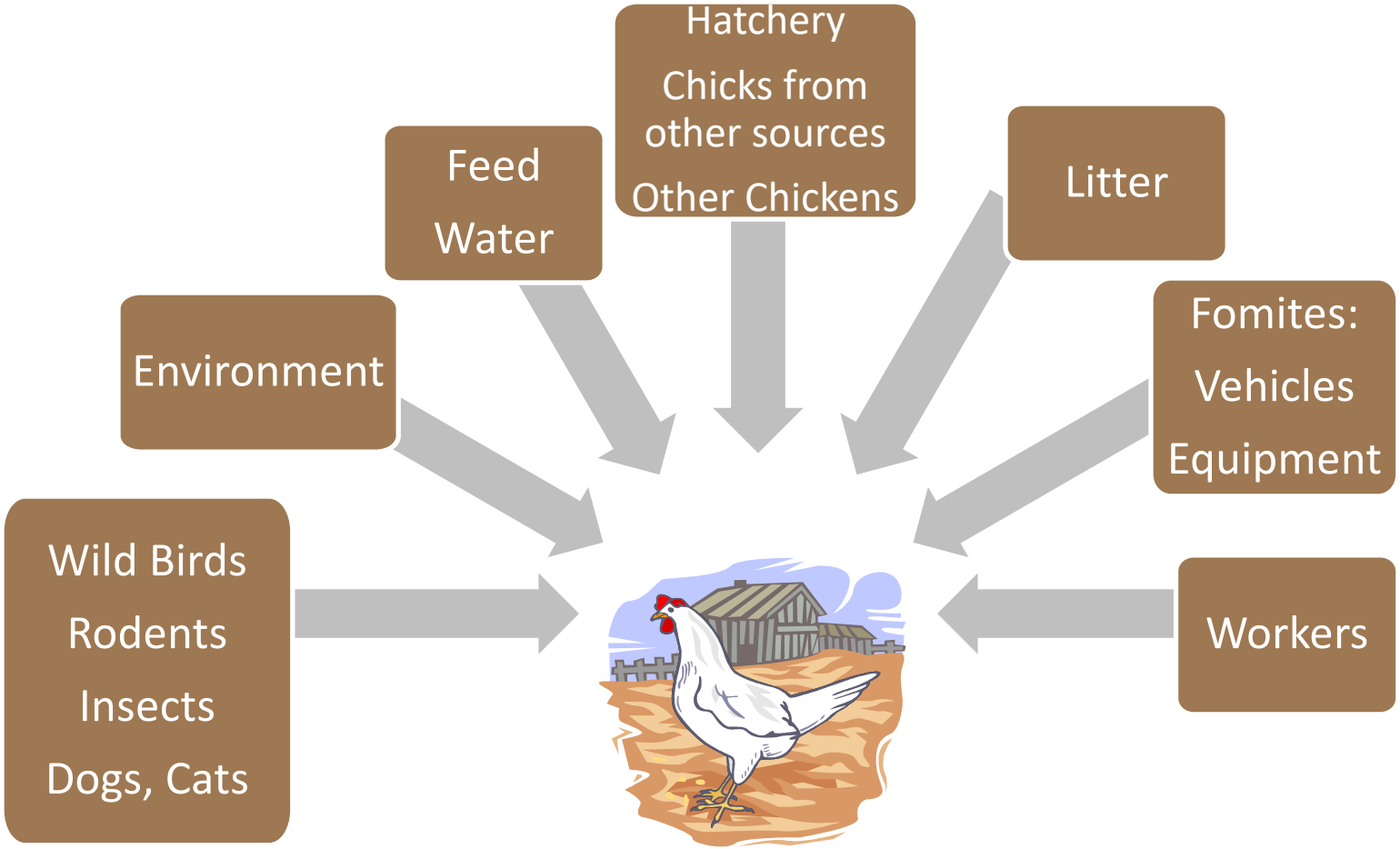
- Why?
  - Healthy Flocks
  - Safe Food
  - Well-being



Classification of diseases based on Biosecurity:



Biosecurity

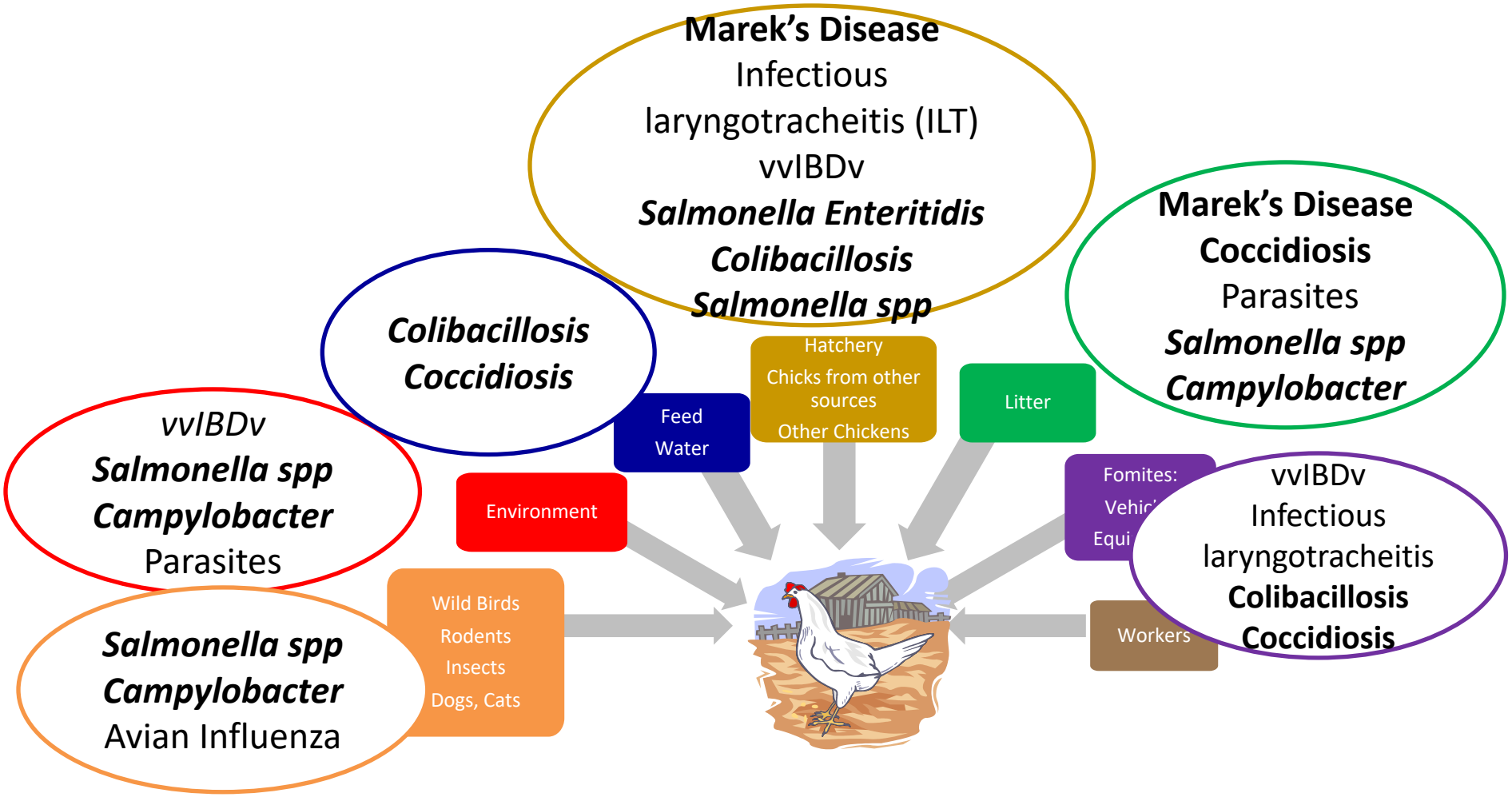


Introduction of Diseases and Transmission

There are multiple hosts and multiple routes of infection

(Slide courtesy of Dr. Maurice Piteskey)

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!

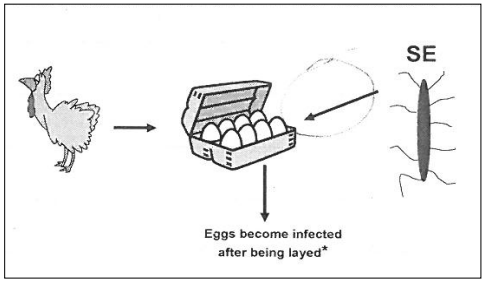
(Slide courtesy of Dr. Maurice Pitesky)

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)

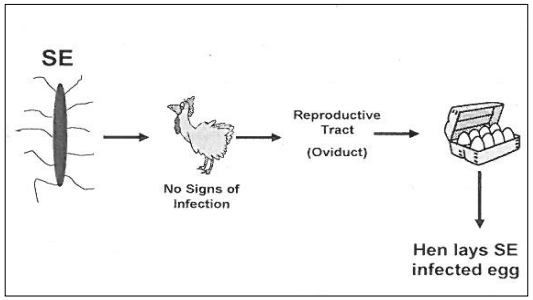
- **Stock free of diseases:**
  - Pullorum-Typhoid *
  - ***Salmonella Enteritidis****
  - Mycoplasma spp (synovidae, gallisepticum, meleagridis)*
  - Avian Influenza*
  - Mareck's disease
  - ***Salmonella spp***

Horizontal Transmission



(FDA)

Vertical Transmission



Disease transmission into eggs (FDA)

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**

Picture courtesy of Dr Silvia Carnaccini

Adapted from Merck

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

(Slide courtesy of Dr. Maurice Pitesky)

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**

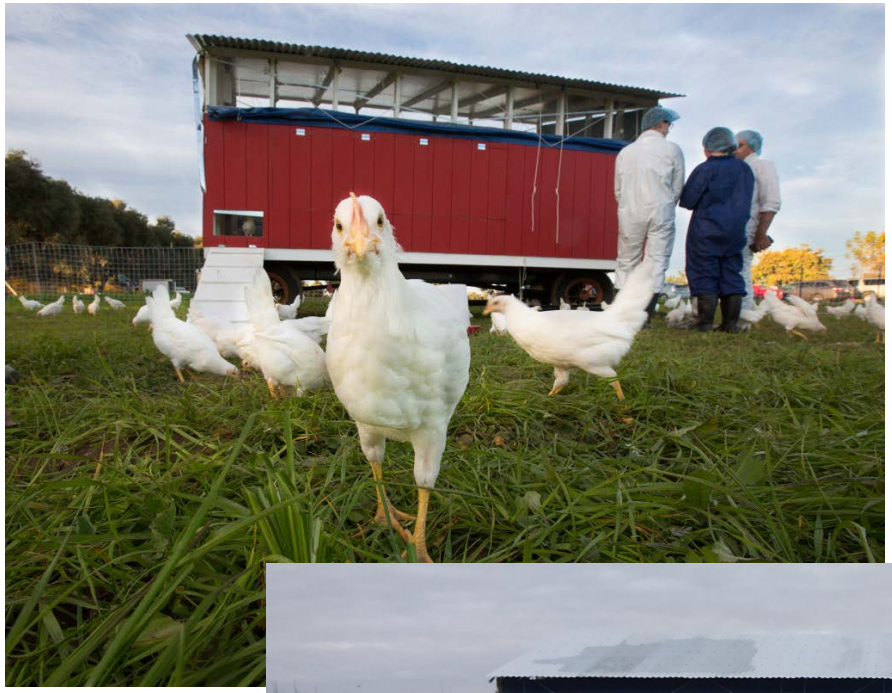
Wildlife

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

(Slide courtesy of Dr. Maurice Pitesky)

Pasture poultry

- Building an eggmobile



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**

(Slide courtesy of Dr. Maurice Pitesky)

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 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 wont get acclimated.
- Reviews vary.

(Slide courtesy of Dr. Maurice Pitesky)

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 ¼ acre.

(Slide courtesy of Dr. Maurice Pitesky)

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

Roof Rat

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

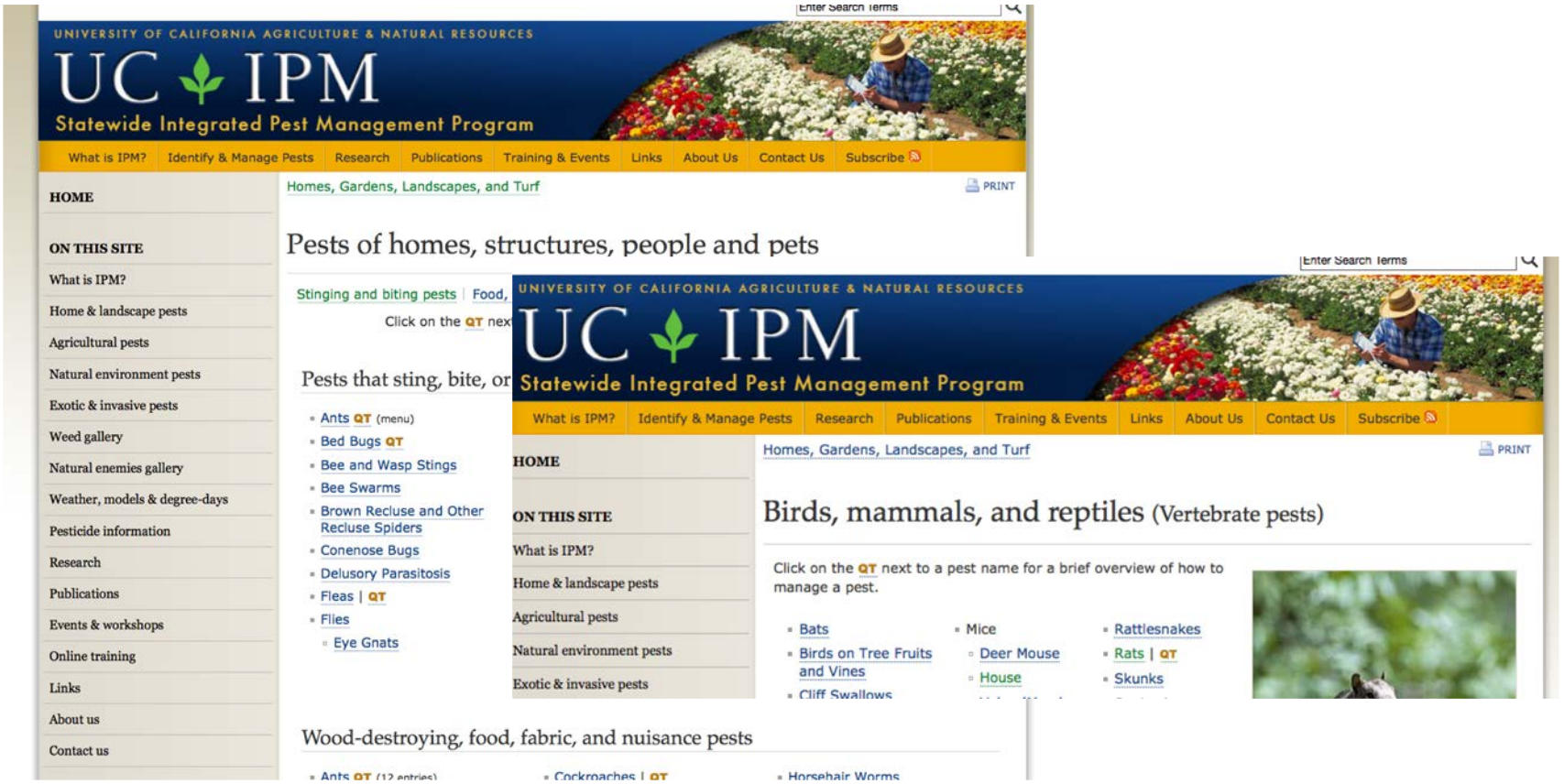
- Rats (Norway Rat & Roof Rats, different habitats) are more cautious, more opportunistic and have a larger geographical range of land
- **Spilled feed** will attract rats, mice, insects and birds

- **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



- **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 =>l**itter**
- 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

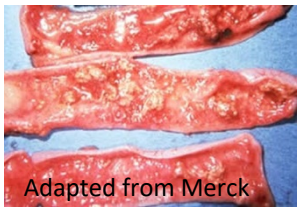
- MDV infects cells of the feather follicle
- Endemic in the global poultry environment

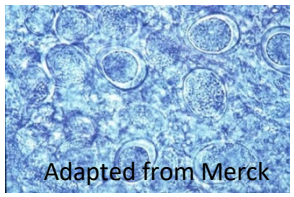
Salmonella spp

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

Coccidea

- 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)



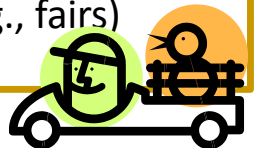


Adapted from omafra.gov

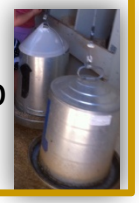
Equipment

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

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



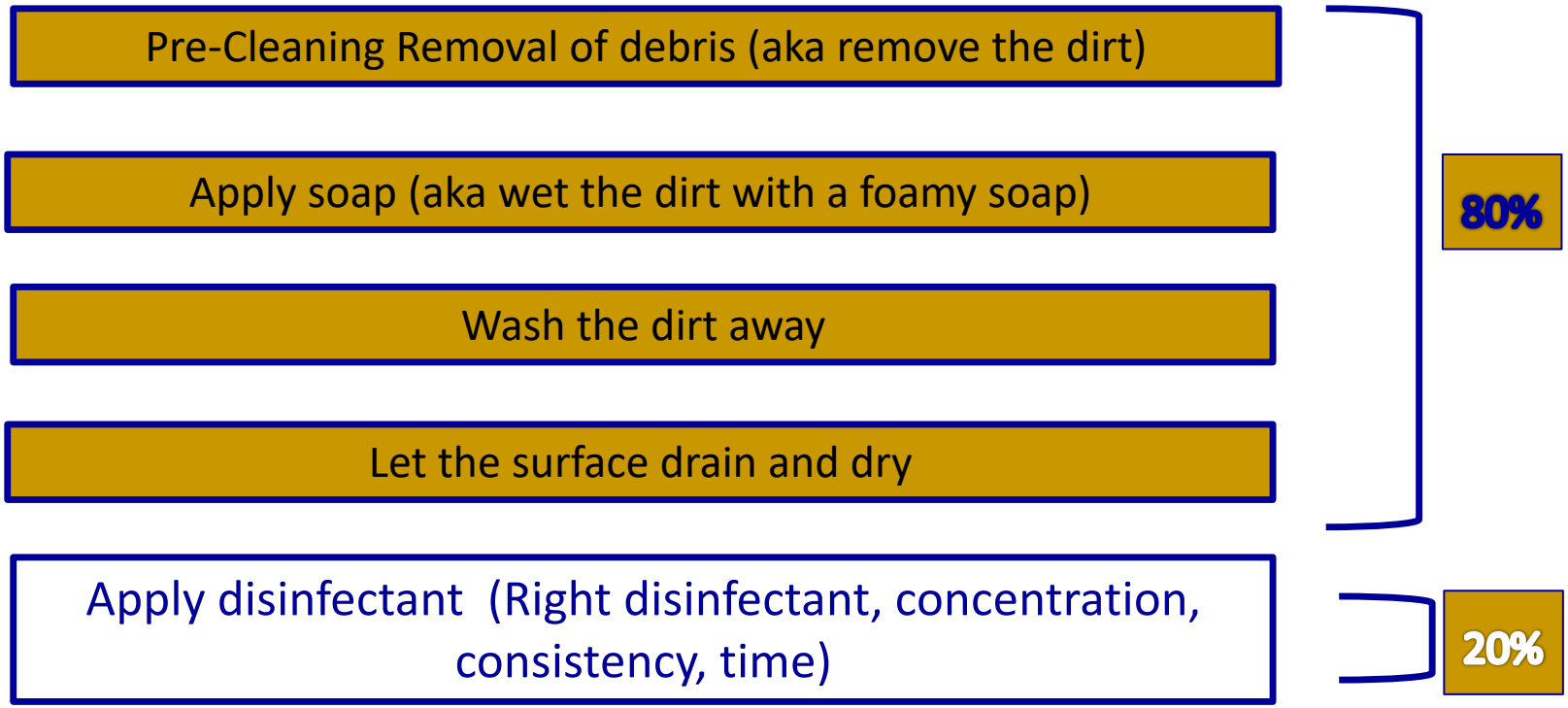
Feeders & & Cages
- Can be easily cleaned
- Spilled feed should be cleaned up



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

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

Decontamination
Cleaning & Disinfection



- Maintain Clean & Sanitary Environment

(Slide courtesy of Dr. Maurice Piteskey)

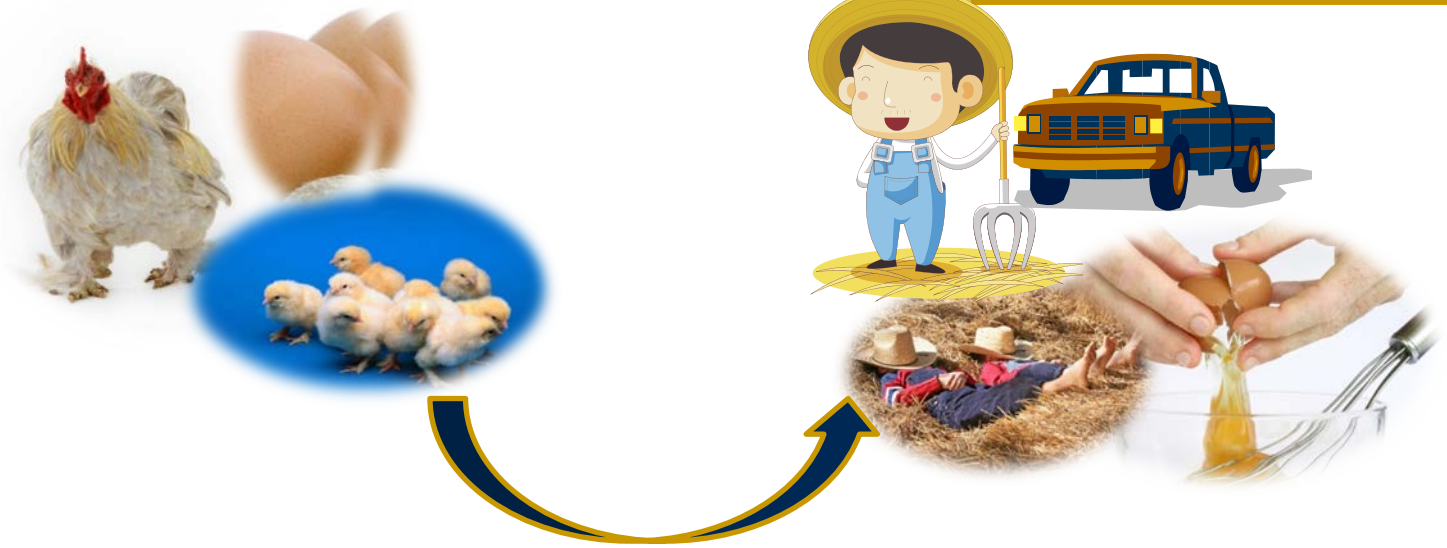
Personnel & Visitors

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.)

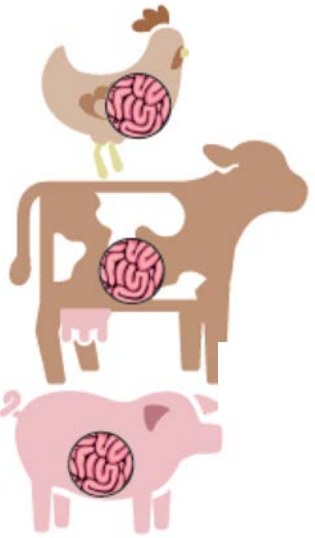
Foodborne Diseases
Animals on Diversified Farms

- 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.)

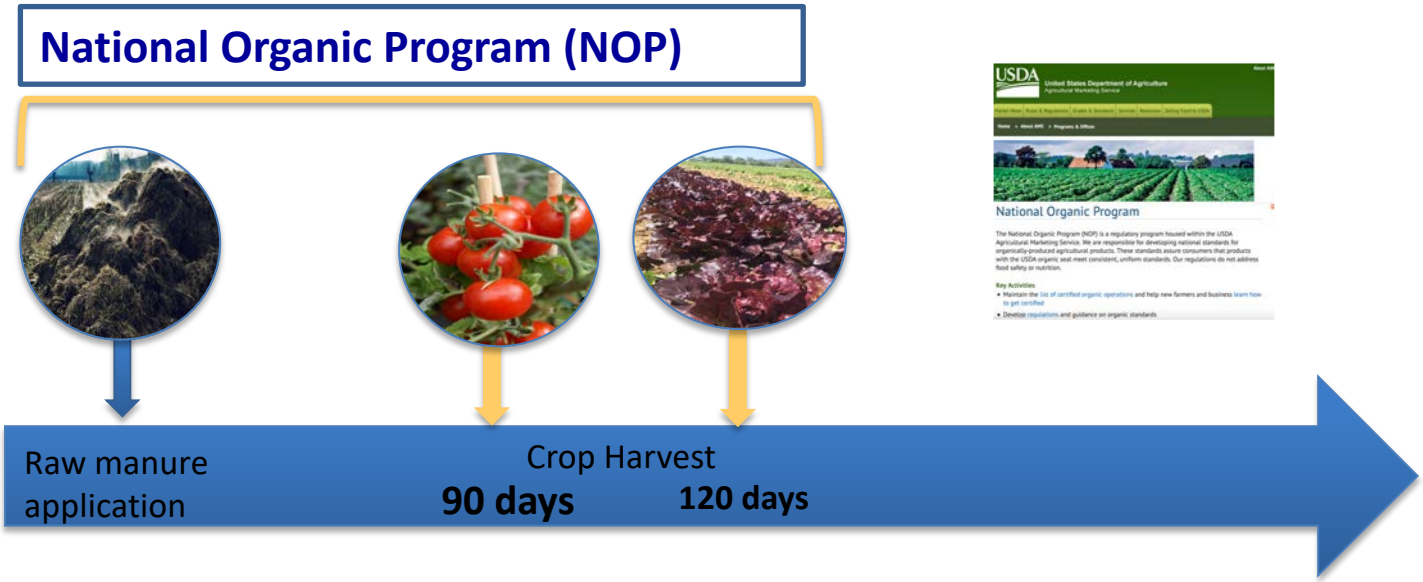
Manure & Risk Reduction

Good Agricultural Practices (GAPs)

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

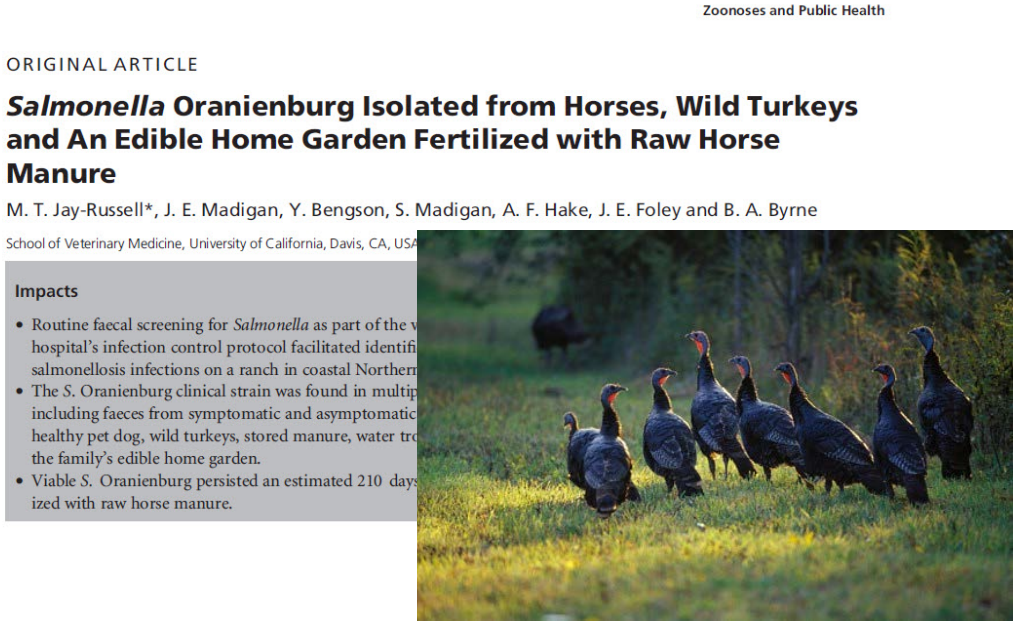
Manure & Risk Reduction

- 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 car 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 v
  hospital's infection control protocol facilitated identifi
  salmonellosis infections on a ranch in coastal Northern
- The *S.* Oranienburg clinical strain was found in multip
  including faeces from symptomatic and asymptomatic
  healthy pet dog, wild turkeys, stored manure, water tr
  the family's edible home garden.
- Viable *S.* Oranienburg persisted an estimated 210 days
  ized 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.

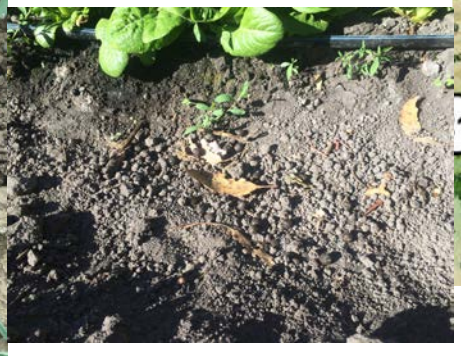
The outbreak sent four people to the hospital and two suffered hemolytic uremic syndrome. One, an elderly woman from Washington County, died from kidney failure caused by the disease.

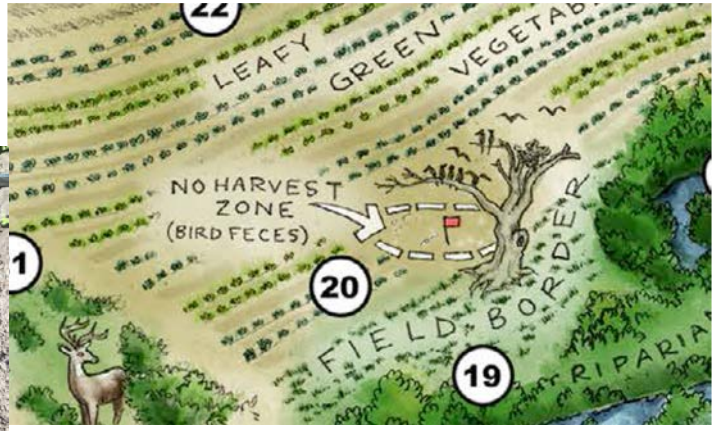
So far, health investigators think deer may be to blame for the E. coli contamination. Deer tracks and deer feces were observed in several strawberry fields at the suspect farm, according to health investigators.

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

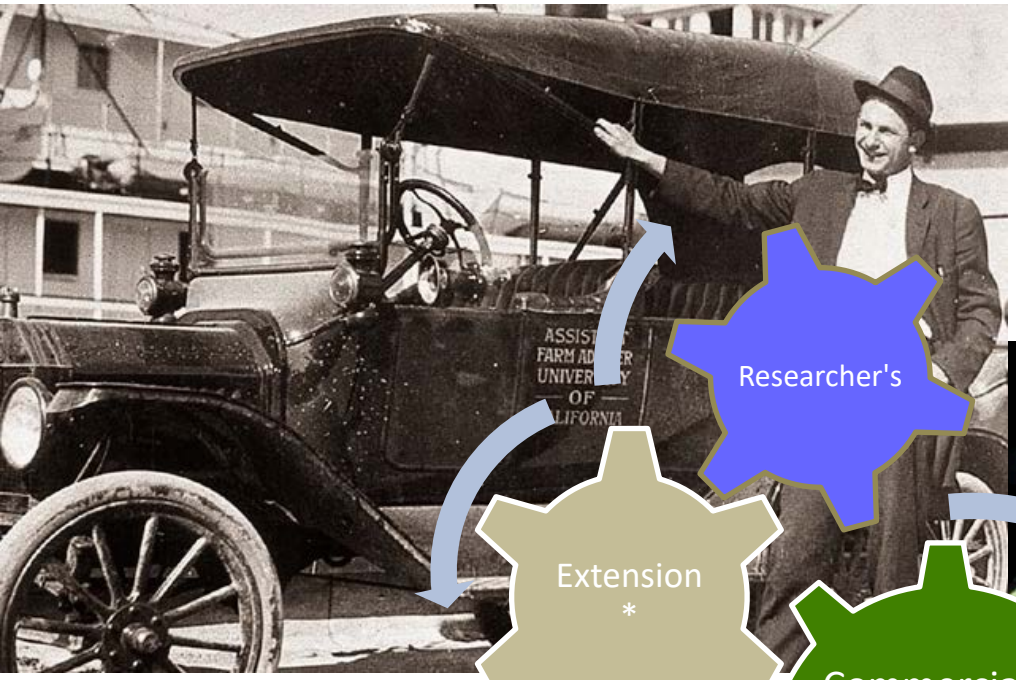
- Contaminated crops by wildlife intrusions





(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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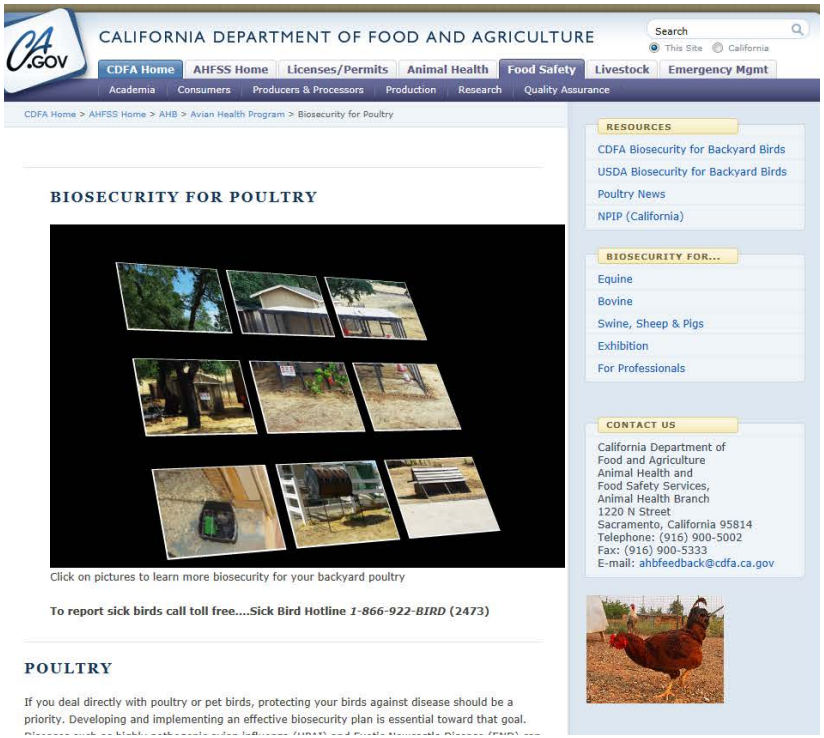
Biosecurity Tips

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

http://www.aphis.usda.gov/animal_health/birdbiosecurity/



http://www.cdfa.ca.gov/AHFSS/Animal_Health/Avian_Health_Program.html

Housing: Coops

A safe egg starts in the coop

The Porous Shell

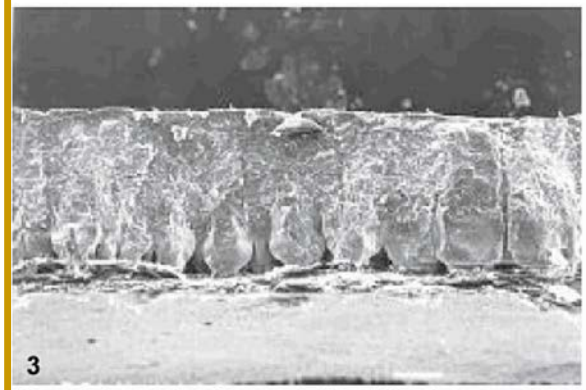


Figure 3 - Lateral view of the eggshell (bar: 100µm).

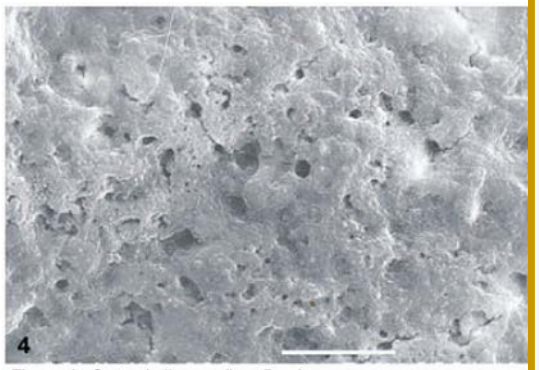


Figure 4 - Outer shell pores (bar: 5µm).

Slide courtesy of Dr. Dan Famini

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

Slide courtesy of Dr. Dan Famini

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

Slide courtesy of Dr. Dan Famini

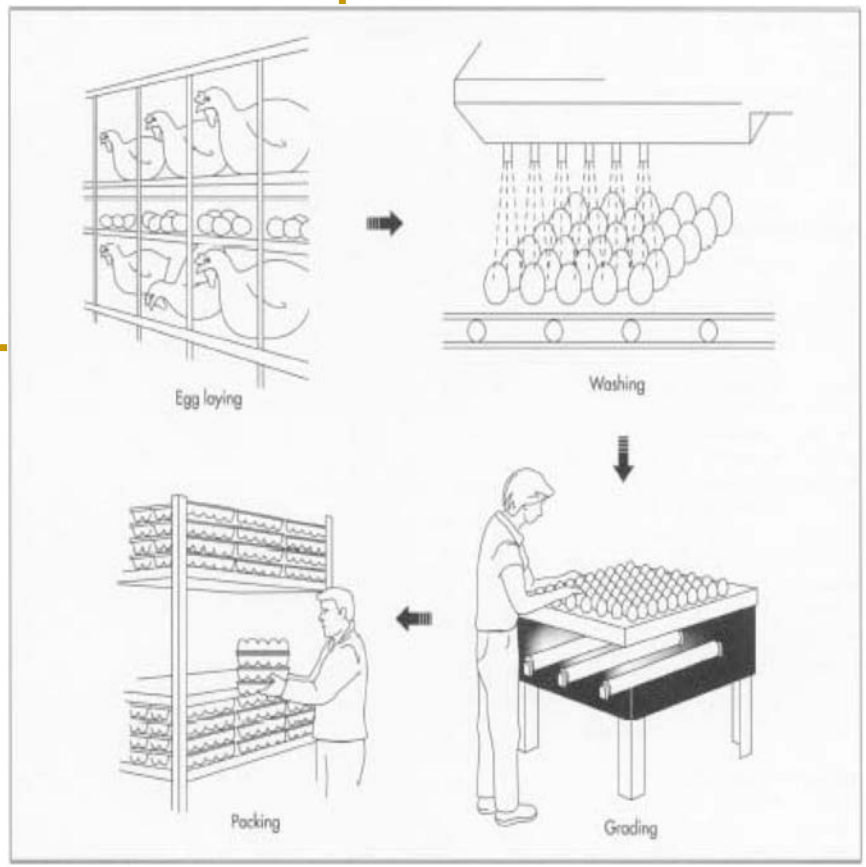
Backyard Egg Cleaning

- 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

Slide courtesy of Dr. Dan Famini

On-Farm Food Safety
Egg Cleaning

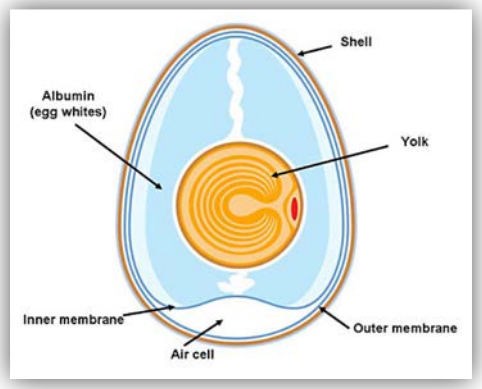
- Typical sequence of egg cleaning
  - Washing
  - Rinsing
  - Sanitizing
  - Drying



(Slide courtesy of Dr. Dan Famini)

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

(Slide courtesy of Dr. Dan Famini)

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

FDA
GENERALLY RECOGNIZED AS SAFE
GRAS

(Slide courtesy of Dr. Dan Famini)

On-Farm Food Safety
Egg Cleaning - Rinsing

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

(Slide courtesy of Dr. Dan Famini)

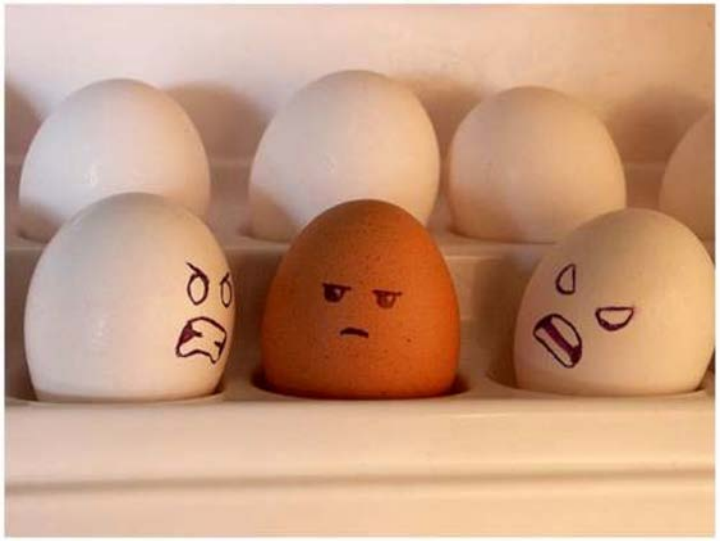
On-Farm Food Safety
Egg Cleaning -Sanitizing

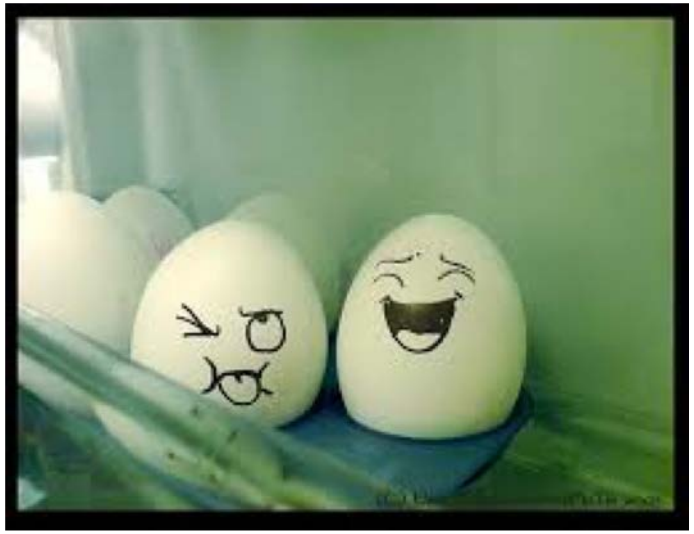
- Dilute chlorine bleach most common agent
  - Between 65 and 200 ppm
    - ½ tablespoon bleach per gallon water = 100 ppm
  - May be an issue for certified organic operations
  - May be unsettling for owners seeking an “natural” product

(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

(Slide courtesy of Dr. Dan Famini)