

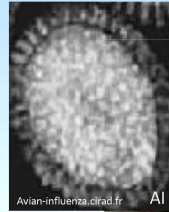


Poultry Diseases and Biosecurity

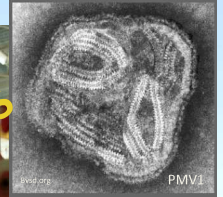
Emily J. Aston DVM, PhD

Postdoctoral Researcher in Poultry Immunogenetics
Department of Animal Science
University of California, Davis

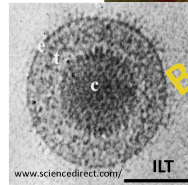
Healthy Animals, Healthy People, 2018
Sonoma County, CA



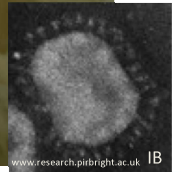
Avian-influenza.cirad.fr AI



PMV1



www.sciencedirect.com/ ILT



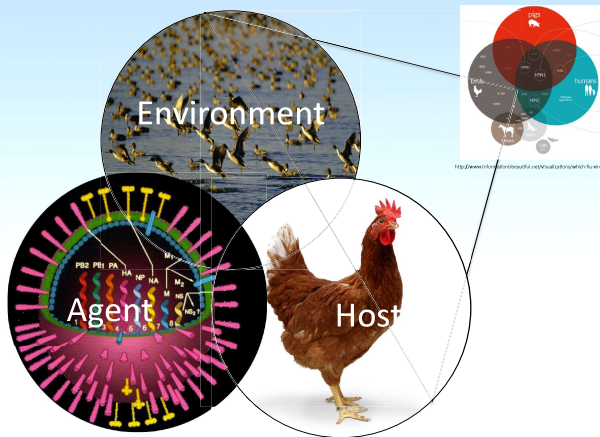
www.research.pirbright.ac.uk IB

MANAGEMENT ISSUES

BACTERIAL INFECTIONS

- Immunodeficiency
- Mycotoxins
- Stress
- Nutritional deficiencies
- CAV
- IBDV
- Marek's
- Etc...

Triad of disease

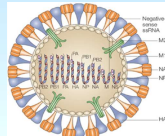


Presentation overview

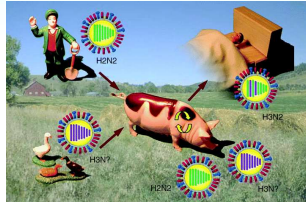
- A. Avian Influenza
- B. Newcastle Disease
- C. Salmonella
- D. Biosecurity

A. Avian Influenza

- Avian influenza (AI): Type of influenza caused by viruses adapted to birds
- Highly pathogenic (HP) AI causes greater risk
- Prone to mutations and recombination events
- Ducks and pigs play a role as mixing vessels
- Receptors (host range and tissue tropism):
 - $\alpha 2,3$ = sialic acid links (avian-type)
 - $\alpha 2,6$ = sialic acid links (human-type)
- Zoonotic potential



Clancy, S. (2008) Genetics of the influenza virus. Nature Education 1(1)



Cox et al. Scand J Immunol 59:1-15, 2004

Nomenclature

A/chicken/California/15 (H5N2)

↓ ↓ ↓ ↓

Type Affected specie Country/location Year

H_{1 to 18} N_{1 to 11}

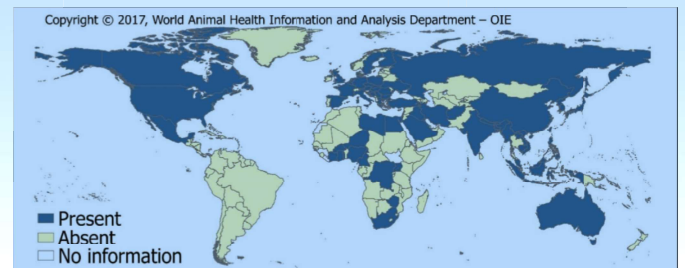
Hemagglutinin type

Neuraminidase type

Highly pathogenic (HP) vs. low pathogenic (LP)

- LP AI can become HPAI while circulating in chickens
- According to OIE (World Organization for Animal Health (OIE) *Terrestrial Animal Health Code*)
 - HPAI: severe clinical signs and high mortality in birds
 - LP AI (H5-H7) : little or no clinical signs in birds

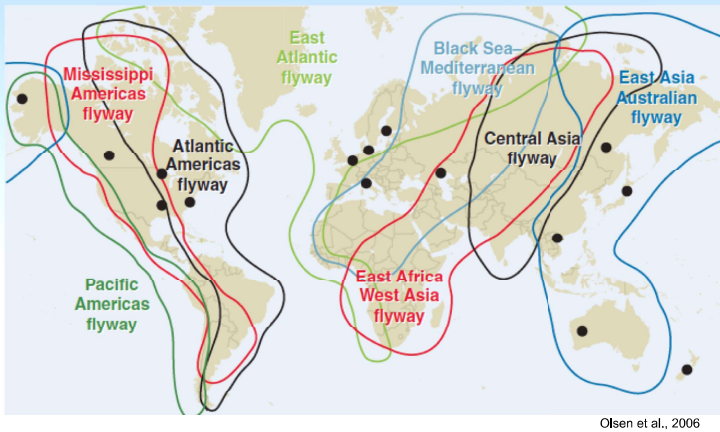
HPAI in the world Jan 2013 - Jul 2018



www.oie.int

2014-2015 HPAI outbreak in US
50 million birds died/culled
12% layers, 8% turkeys
\$2.6 billion

Waterfowl flyways and their role



AI signs and lesions

- Incubation period is highly variable from 3 up to 21 days
- Clinical signs are extremely variable between LP and HP
- **LP AI:**
 - Mild to severe respiratory signs (coughing, sneezing, rales, lachrymation)
 - Decreased egg production
 - Decreased water and feed consumption
 - Diarrhea



• HPAI:

- Death without signs
- Nervous signs
- Cessation of egg production in 6 days
- Necrosis, edema and hemorrhages in the comb and wattles
- Pneumonia
- Cutaneous hemorrhages in the skin of the shanks

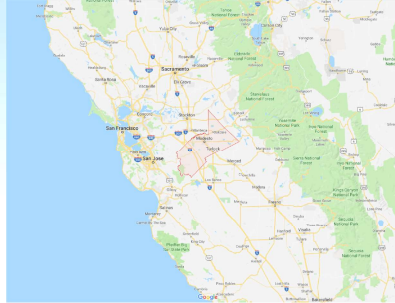


*Turkeys and quails seem to be more susceptible



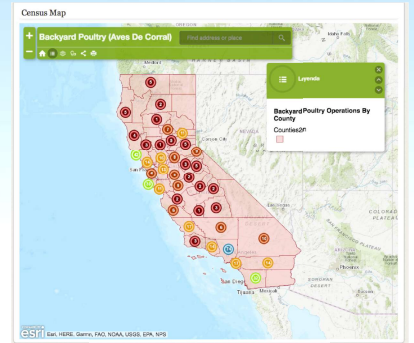
LPAI H7N3 Outbreak in California

- Stanislaus County
- 4 flocks (3 commercial, 1 non-commercial)
 - Commercial organic turkey flocks
 - Small mixed poultry organic flock
- 10-km surveillance zone



B. Newcastle Disease (ND)

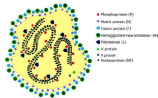
- ND has historically affected flocks in Southern CA
- 1971 – 1,341 flocks – 12 mill birds destroyed – \$56 million eradication costs
- 2002-2003 – started in BYF, spread to commercial birds - 3.6 mill birds destroyed - \$161 million eradication costs
- May-Sep 2018 – Backyard exhibition chickens – 147 cases (San Bernardino, Riverside, Los Angeles, Ventura Counties)



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

Etiology and types

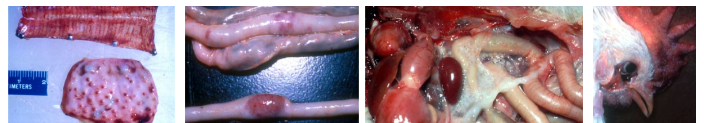
- Respiratory, digestive and nervous disease caused by a Paramyxovirus
- Affects many domestic and wild avian species
- Poultry are extremely susceptible and many countries are endemic (Central America, some regions of South America, Africa, Asia)
- Difficult to recognize due to the different clinical presentations depending on the different virus types
- Pathotypes: (Beard and Hanson, 1984)
 - Velogenic NDV:** acute respiratory and neurologic disease with high mortality
 - Mesogenic NDV:** milder version with mortality just in young chicks
 - Lentogenic NDV:** mild or inapparent respiratory infections (Live vaccines B1, La Sota, Clone 30, VG GA etc.)
- Zoonotic potential just limited to conjunctivitis and influenza like symptoms in humans



Clinical signs



Gross lesions

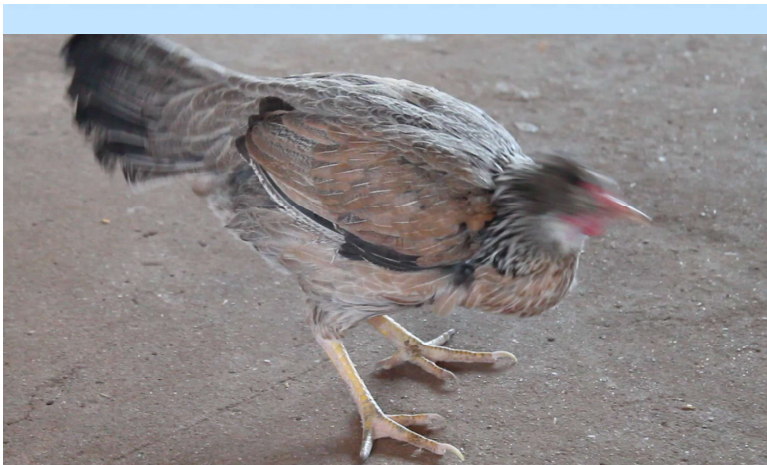


vNDV + flock



Clinical progression

- Respiratory
- Severe depression and mortality
- Recovered birds show nervous signs
- This progression changes if birds are vaccinated
- 80 to 100% mortality in a non vaccinated flock in a week (village poultry)



Control / Prevention

- BIOSECURITY impedes the introduction of the disease to your flock
- Live vaccination (**LaSota** or **B1**) when close contact to waterfowl, endemic zones, or outbreaks are occurring in the same geographical zone
- LIVE VACCINES APPLIED OCULAR AND NOT WATER, SPRAY OR INJECTED
- Vaccinating with mild strains (lentogenic) protect against exotic strains (velogenic) (1 virus type)



Dr. Mark Bland

Control / Prevention

- Vaccines are not a substitute for BIOSECURITY and if not used in concert vaccines will not work
- Vaccines (if applied correctly) reduce shedding and eliminate virus more rapidly after infection
- <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/veterinary-biologics>
- Vaccines will mask infection, so not recommended if far from the outbreak zone

C. Salmonellosis

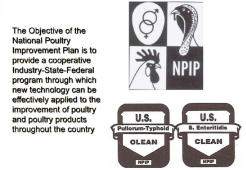
Any infection of poultry with bacteria from the genus *Salmonella* which may result in disease or be of public health significance

- *S. Pullorum* & *S. Gallinarum*:

- Host-specific
- Egg and horizontally transmitted
- Non-motile

- Non-host adapted *Salmonella spp.*

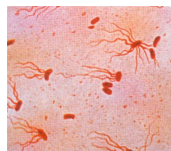
- Not host-specific
- Egg and horizontally transmitted
- Motile



NPIP small flocks

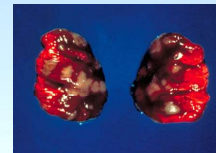
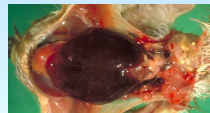
Paratyphoid Salmonella

- Motile Salmonella, they have a flagella!
- Major public health significance- cause of **foodborne illness**.
- Poultry products are associated with Salmonella outbreaks in humans, these products need to be eaten well cooked
- Poultry are asymptomatic intestinal carriers and may not show disease unless immunosuppressed
- > 2300 serovars of *Salmonella enteritica*. About 10% of these have been isolated from poultry species.
- Most common paratyphoid infections in poultry of public health concern are due to:
 - *S. Enteritidis*
 - *S. Typhimurium*
 - *S. Heidelberg*
 - *S. Hadar*
 - *S. Senftenberg*



www.Textbookofbacteriology.net

Lesions when occur

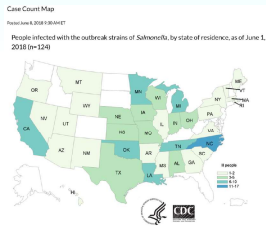


Prevention

- Start with *Salmonella* free flocks, test or ask testing when buying them
- Biosecurity: sanitation, disinfection, wild bird and rodent control
- Vaccines
- Surveillance, sampling
- NO COMMINGLING WITH BIRDS (SLEEPING, KISSING, ETC.) ZONOSIS

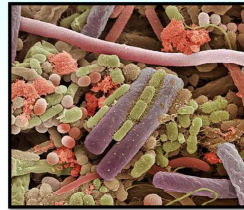
Multistate Outbreaks of Salmonella infections linked to contact with live poultry in backyard flocks

- Several types: Seftenberg, Montevideo, Infantis, Enteritidis, Indiana and Lichfield
- 124 CASES, 36 STATES
- 31% is younger than 5 yrs
- Linked to chicks and ducklings from several hatcheries, websites, relatives and supply stores



D. Biosecurity

- Measures to reduce or eliminate the introduction of viruses, bacteria or parasites in the poultry environment

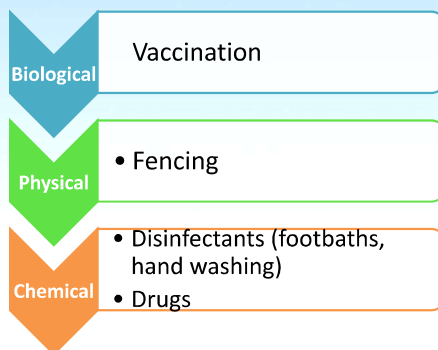


Bacterial population on the tongue



House dust:
Cat fur and human hair – plastic and cloth fibers – pollen – insects, etc.

Biosecurity tools in poultry flocks?



- Who currently uses any of these tools?

Three components of biosecurity

- Isolation
- Traffic control
- Cleaning and disinfection

1. Isolation



<http://calag.ucanr.edu/Archive/?article=ca.v067n04p203>

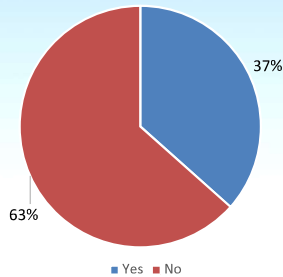
Are backyard birds free of contact with poultry pathogens?

- A. Yes
- B. No

- **Research:** Backyard flock biosecurity and antibodies against respiratory diseases (Derksen et al., 2017)

Survey:

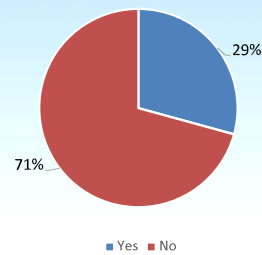
Do You Use a Lab/Vet to Diagnose Mortality



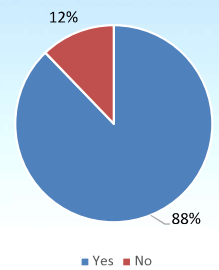
- Working with diagnostic laboratories is crucial and demonstrates your commitment to animal health

Derksen et al., 2018

Do You Have Specific Footwear for Working Around Your Chickens

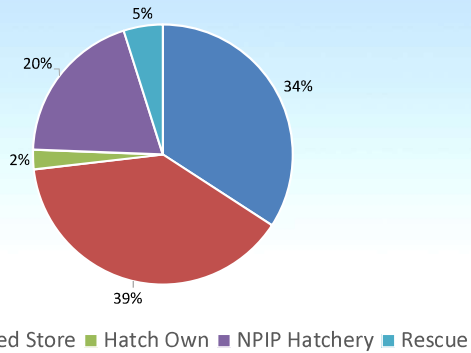


Can Wild Birds Enter Your Coop



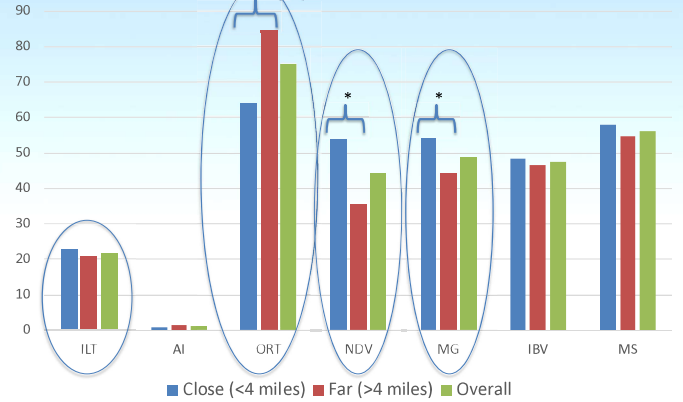
- Dedicated footwear reduces the risk of certain diseases such as MG, MS and *Salmonella*
- Reduced interaction with wild birds decreases the incidence of NDV and MG antibodies

What is the Source of Your Birds



- Some of the chicken sources are not trained in disease prevention
- Importance of NPIP

Seroprevalence: percentage of antibody positive birds



2. Traffic control

Backyard Flock Biosecurity

- **Don't** allow other animals in the coop or run, including other chicks.
- **Use** dedicated footwear and a foot bath. **Most** diseases are transferred by footwear contamination.
- **Keep** feeders and waterers clean and covered.
- **Protect** yourself. Use hand sanitizer and put on clean clothes after handling chicks.
- **Know** your chickens. Recognize unusual behavior.
- **Control traffic.** Keep all visitors out.

Unless It Lives in the Pen, DON'T Let It In!

Extension www.AlabamaAvianInfluenza.com

3. Cleaning and disinfection



Practical biosecurity for BYF owners

- Obtain your chicks from a reputable source
- Encourage the hatchery to vaccinate chicks against MDV
- Do not allow chickens to enter to your home as 'visitors'
- Avoid commingling
- Do not have more chickens than the ones you can handle
- Use clothes specifically for working with chickens, especially shoes
- Wash hands thoroughly before and after working with chickens
- Every time you introduce new birds quarantine them
- Separate sick birds from healthy birds
- If sufficient land rotate them, scratch the soil and let the sun act.
- Foot baths (Difficulties)
- Veterinarians are high risk for disease transfer
- You need to be meticulous in following procedural biosecurity...
- Create an annual clean and disinfect time

CAHFS Laboratory System



Standard submission form

California Animal Health & Food Safety Laboratory
University of California, Davis
http://cahfs.ucdavis.edu
Standard Submission Form

Veterinarian's Name: _____ Owner's Name: _____
 Clinic Name: _____ Ranch: _____
 Address: _____ Address: _____
 City: _____ State: _____ City: _____ State: _____
 Phone: _____ Fax: _____
 Your reference # _____ Email Sample _____
 Date sample taken _____ Date shipped _____
 FAL Small Large Other

Cattle Turkey Location of Animal(s) _____
 Swine Chicken Avian/Other (specify) _____
 Sheep Rabbit Production Class _____
 Goat Poultry (specify) _____
 Equine Other _____ Duration of illness _____
 (This is an optional, but it is the best measure) () () () () What is the age of the case? _____

Signature of Submitter: _____ Date: _____

Submission Process

Available on the web:

<http://cahfs.ucdavis.edu>

or

Google - CAHFS

Questions?

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