Poultry Diseases and Biosecurity

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Triad of disease

Environment

Agent

Host

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):
  - α2,3+ sialic acid links (avian-type)
  - α2,6+ sialic acid links (human-type)
- Zoonotic potential

Nomenclature

A/chicken/California/15 (H5N2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Affected species</th>
<th>Country/location</th>
<th>Year</th>
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H1 to 18  N1 to 11

Hemagglutinin type

Neuraminidase type

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

- LPAI can become HPAI while circulating in chickens
  - HPAI: severe clinical signs and high mortality in birds
  - LPAI (H5-H7): little or no clinical signs in birds

HPAI in the world Jan 2013 - Jul 2018

- 2014-2015 HPAI outbreak in US
- 50 million birds died/culled
- 12% layers, 8% turkeys
- $2.6 billion
**Waterfowl flyways and their role**

[Map image showing various flyways]

**AI signs and lesions**

- Incubation period is highly variable from 3 up to 21 days
- Clinical signs are extremely variable between LP and HP

**LPAC:**
  - Mild to severe respiratory signs (coughing, sneezing, rales, lachrymation)
  - Decreased egg production
  - Decreased water and feed consumption
  - Diarrhea

**HPAC:**
  - 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 20 2018 – Backyard exhibition chickens – 147 cases (San Bernardino, Riverside, Los Angeles, Ventura Counties)

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
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)
**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.
- 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

**Paratyphoid Salmonella**

- Motile Salmonella, they have a flagellum.
- 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*

**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.) ZOONOSIS
Multistate Outbreaks of Salmonella infections linked to contact with live poultry in backyard flocks

- Several types: Seftenberg, Montevideo, Infantis, Enteritidis, Indiana and Linfield
- 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

Biosecurity tools in poultry flocks?

- Biological: Vaccination
- Physical: Fencing
- Chemical: Disinfectants (footbaths, hand washing), Drugs

Who currently uses any of these tools?

Three components of biosecurity

- Isolation
- Traffic control
- Cleaning and disinfection
1. Isolation

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)

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Survey:

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

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Do You Use a Lab/Vet to Diagnose Mortality
- Yes: 37%
- No: 63%

Do You Have Specific Footwear for Working Around Your Chickens
- Yes: 29%
- No: 71%

Can Wild Birds Enter Your Coop
- Yes: 12%
- No: 88%

- 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
2. Traffic control

Backyard Flock Biosecurity

- Don’t show off chickens in the yard or pen, including other plants.
- Use dedicated footwear and a foot bath. Meet diseases with hands under water in water containers.
- Keep feeders and waterers clean and covered.
- Protect yourself. Use hand sanitizer and put on clean clothes after handling chickens.
- Know your chickens. Recognize unusual behavior.
- Control traffic. Keep out visitors.

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

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

Submission Process
Available on the web:
http://cahfs.ucdavis.edu
or
Google - CAHFS
Questions?

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