Low-Path H5N8 Avian Influenza Virus

Stanislaus Co. Outbreak
April, 2014
Overview

- H5N8 detection
- Genome sequencing and relationship other AIVS
- Containment (epidemiology)
- Eradication (depopulation)
- Surveillance and outreach
- Lessons learned
April 2014 - H5N8 Incident

- April 14th - Japanese Quail layer flock show increased mortality, birds submitted to CAHFS
- April 18th – CAHFS reports + H5 and negative H7
- April 19th – pharyngeal swabs positive for influenza A virus at NVSL
- Subsequent testing was + for H5 subtype and negative for H7 and N1 subtypes
- H5N8 virus identified – 99.1% similar to green-winged teal in WI 2010. H5 98.2% similar to CA mallard 2013 and N8 95.7% similar to Alaska mallard 2006.
- Chicken pathogenicity testing is compatible with LPAI
Full Genome Sequencing

- Performed by Dr. Webby’s group at St.Jude, TN
- Compare CA H5N8 to Korea H5N8
- Look for short stalk in N8:
  - Indication that quail virus would adapt to chicken
- Comparison to near-by wildlife strains
3 Reasons for current Concern
- LPAI H5N8 assessment -

1) Influenza virus is a RNA virus
   - Mutates 100,000 x as fast as a DNA virus (antigenic drift)
   - **Concern**: could mutate from LPAI to HPAI

2) antigenic shift
   - Quail (=swine) have human and avian receptors for Influenza virus
   - **Concern**: could produce hybrid virus (antigenic shift)

3) premise history
   - Housing conditions and species (ducks) including nearby wild bird habitat
   - **Concern**: might not be our last response to Al
Avian Influenza

- Waterfowl natural reservoir
- 30% of waterfowl may excrete virus (no clinical signs)
  - Migratory birds play key role in transmission
  - Eradicable disease?
Survival in Environment

- **Environmental surface:**
  - porous: <12 hours
  - Non porous: 24-48 hours
  - Dust: 2 weeks

- **Environmental liquids:**
  - 22°C (71.6°F) water: 4 days
  - 0°C (32°F) water: >30
  - Frozen: indefinite
  - H5N1: 37°C (98.6°F) water: 6 days

- **Heat:**
  - 56°C (132.8°F) in 30 min
  - 70°C in <1min

One gram of contaminated manure can contain enough HPAI virus to infect 1 million birds.
Containment

On 4/18, a FADD CDFA veterinarian began the outbreak investigation. All farms epidemiologically linked to infected premises were put under quarantine and additional samples were taken to the CAHFS Laboratory. Biosecurity was implemented at the perimeter of index farm and contact premises. Poultry farms in the area were alerted to increase biosecurity and monitor flocks.
Mapping following initial detection
Eradication

On 4/21 depopulation via euthanasia began and was completed on 4/25

• Difficult work
• Devastating to CDFA and USDA employees and the owner

Epidemiology and area surveillance delayed ...

→ Critical to initiate as soon as resources are available
→ Potential for exponential spread
H5N8 Incident Depopulation

- 55,556 Japanese quail layers
- 37,419 Japanese quail brooders
- 21,003 Pekin duck layers
- 958,940 Japanese quail eggs
- 426,875 Pekin duck eggs
- 23,160 frozen Japanese quail for falconers
2014 AI 1 farm:

Destroyed:
- 21,003 ducks
- 92,975 quail
- 426,875 duck eggs
- 958,940 quail eggs
- 23,160 frozen quail

Last outbreak in poultry (END 02-03):
- > 18,000 quarantines
- All pet and hobby flocks in 2,500 homes depopulated
- 22 commercial flocks depopulated
- Direct response cost: $160 million
- US Trade loss: $167 million
- Eggs not laid: 52 million; $27 million
- Lost Feed Sales: $17 million
- Poultry labor lost wages: $3.5 million

Difficult, but...

Critical to maintain infrastructure to prevent this!!
Decontamination

- Egg processing area and Hatchery emptied, cleaned and disinfected
- Litter composted under CDFA disease control oversight on site
- Houses (11) cleaned & disinfected – left empty for 30 days
- Environment tested for disease before restocking
- Once restocked, surveillance samples in 30 days
Surveillance

- **High Risk Zone:** 3 kilometers (1 mi 427 yd)
  - Commercial premises: Tested twice at least 10 days apart
  - Non-commercial premises: Door-to-door outreach and test poultry
  - Epidemiologically linked premises: Outreach and test poultry

- **Buffer/Surveillance Zone:** 3-10 kilometers (10 km = 6 mi 376 yd)
  - Commercial premises: Tested twice at least 10 days apart
  - Epidemiologically linked premises: Outreach and test poultry
  - Backyard premises: Outreach and testing
  - Feed stores, 4-H, FFA, other: Outreach, education, etc.

- **Surveillance Zone:** 20 kilometers, and beyond
  - Epidemiologically linked premises: Outreach and test poultry
  - Other premises: Outreach, education and testing if requested
Lessons Learned

- **Areas for improvement**
  - The most current response models utilized by other states and approved by USDA for NAI events for reference.
  - Personnel designated to complete critical tasks not diverted to other activities. (ICS)
  - Tactical epidemiology of IP and contact premises needs to have high priority.
  - Surveillance planning needs to happen quicker.
  - Communication on Disposal issues with other agencies
“Hotwash” – Lessons Learned

- ICS should be located in District affected with incident
- USDA/State depository for similar disease events
- Certain key positions need to be activated immediately
  - Contact premises epi is high priority
  - Surveillance planning activated early
- Containment is main focus initially
- Logistics staffing immediately needed
- IAP needs to be lowest common denominator software
- Capture both overarching objectives and operational period objectives
Premises Data Validation
Dedicated Laboratory Liaison position
ICS 215 form more workable if in Excel workbook format
Outreach and education excellent effort
  • Involve local entities
  • Information needs to be concise
Modernize END Survey Epi form
Needed more staff dedicated to epi
Reduce repetition of information in ICS meetings
Geographic boundaries rather than circle lines
Real time documentation important
“Hotwash” – Lessons Learned (cont.)

- Depop and Disposal
  - Improve communications on affected premises site
  - Feed needs to continue to avoid welfare issues
  - Disposal Specialist in Plans
  - Designated depop “lead” for each house
  - Team breaks on regular interval
  - Designated on-site logistics person to get supplies
  - Design a more efficient depop bucket on wheels
  - CO2 worked well on quail and ducks
  - Depopulation SOPs generated
“Hotwash” – Lessons Learned (cont.)

- CAHFS
  - Workload projections changed and resulted in overestimating workload needs/flow patterns
  - Establish cost of testing early-on so future costs can be projected
  - Exercise different scales of response
  - BSL Suite available immediately
  - PCR equipment maintained/calibrated and ready
  - Communication good with task force – existing relationships
Overarching Objective for CA LPAI

- Contain H5N8 LPAI virus to affected premises and prevent transmission to commercial or backyard poultry operations
Thank you!

Sarah Mize, DVM, MPVM
Avian Specialist (FADD 2009)
CA Dept. Of Food and Agriculture