Avian Influenza and the Virus

• Small RNA Virus (Orthomyxovirus, influenza virus type A) with protein projections on the surface:
  • 16 hemagglutinin subtypes (i.e., H1-H16) - MUTATIONS
  • 9 neuraminidase subtypes (i.e., N1-N9)
• 8 gene segments: Can REASSORT between different LP & HPAI viruses
Avian Influenza and the Virus

• Vary in disease production (chickens):
  • Low pathogenicity (LPAIV): local replication - mild respiratory disease and egg drop; e.g. H9N2 LPAIV but can be any H1-16
  • High pathogenicity (HPAIV): systemic - deadly disease (some H5 & H7); e.g., H5N1 HPAIV
• Can infect a variety of poultry and wild birds, depending on virus strain
• Migratory aquatic birds are the reservoir of LPAIV but historically not HPAIV
All Avian Influenza Viruses are not the same

- Hemagglutinin (16) and neuraminidase (9)
- Pathogenicity (Lethality): (Low & High Pathogenicity)
  - H5 and H7 LPAI virus → H5 and H7 HPAI virus
- Virus genetics: 1996 – Goose/Guangdong Eurasian lineage emerged
  - Unique biology – infect domestic ducks, geese, chickens, turkeys, etc. and many wild bird species
  - Unique hemagglutinin genetics: Clade - 2.3.4.4b
  - Changing: Mixed with genes from LPAI virus of wild birds to produce hybrid viruses (reassortants)
Surveillance Programs

• What is surveillance? Determining where is the avian influenza virus:
  • Bird population (wild waterfowl and other wild birds, zoo birds, commercial poultry, live poultry market system [LPM], backyard flocks, gamebirds and other types of domestic birds)
  • Physical location - geographic distribution, flyways, ecosystems
  • Production systems – meat production, egg production, hobby, LPM etc.
  • Bird species and/or type
  • Time - seasonality

• What are the samples: Cloacal and oral swabs, tissues from dead birds, environmental samples and blood samples
Surveillance Programs

• What are the tests?
  • Genetic test to detect the avian influenza virus
  • Specific antibodies that indicated a past infection by an influenza virus

• Who does the testing?
  • Sample collection: farmer/grower/owner, wildlife biologist, poultry veterinarian or staff member
  • Testing: State veterinary diagnostic laboratory (NAHLN), National Veterinary Services Laboratory, Specialized University Laboratory

• Why do surveillance? Identifies risk, informs for mitigations, informs control and elimination