## VACCINES AVAILABLE AND SYSTEMS FOR USAGE IN THE FIELD

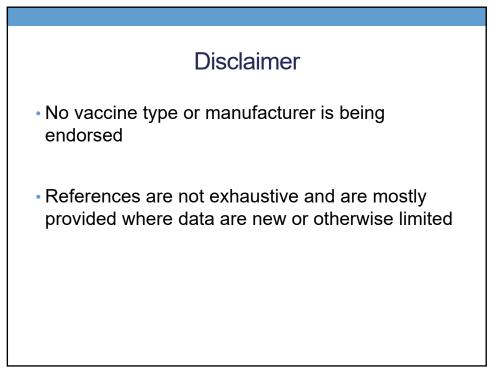
Erica Spackman, MS, PhD US National Poultry Research Center US Dept. of Agriculture Agricultural Research Service Athens, GA, USA

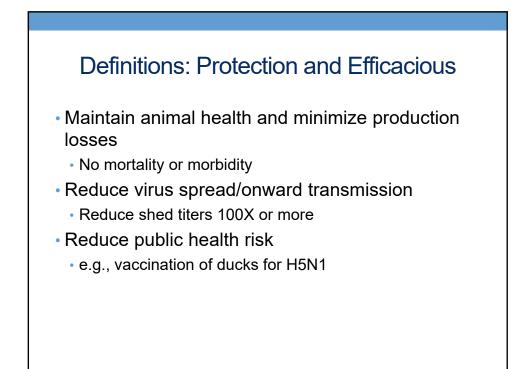


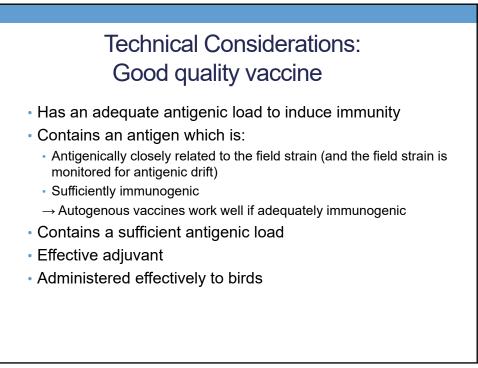






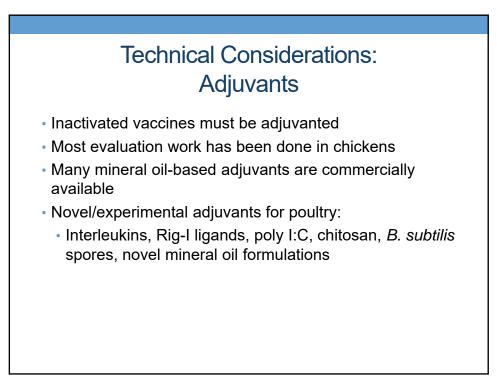


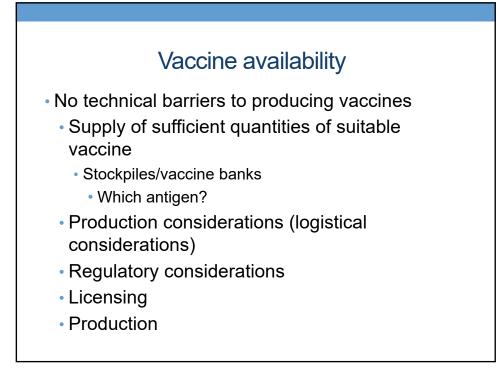


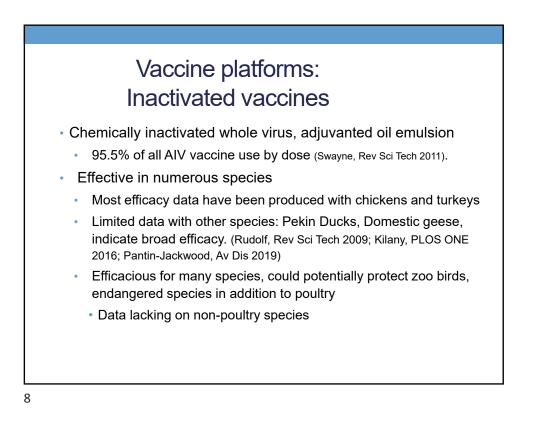


## Technical Considerations: Antigen selection/optimization

- Matching:
  - Antigenic cartography
  - Protective epitopes
  - Programs to monitor antigenic variants
- Breadth of response:
  - Mixing antigens: Prime/boost with different vaccines
  - Computationally optimized broadly reactive antigen (COBRA) induces a broader response (Bertran, Vaccine 2021)
- Immunogenicity:
  - Adjuvants

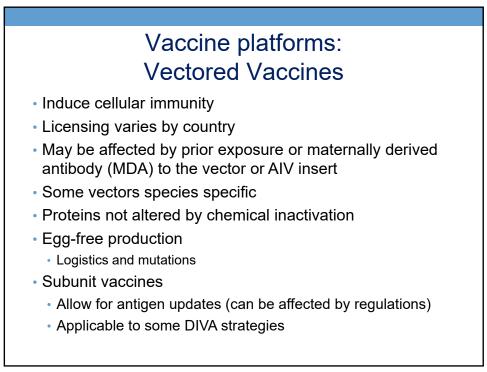






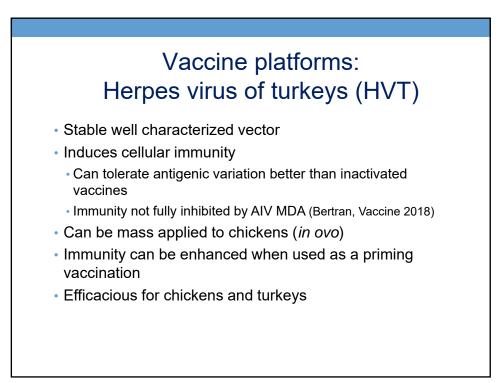
## Vaccine platforms: Inactivated vaccines

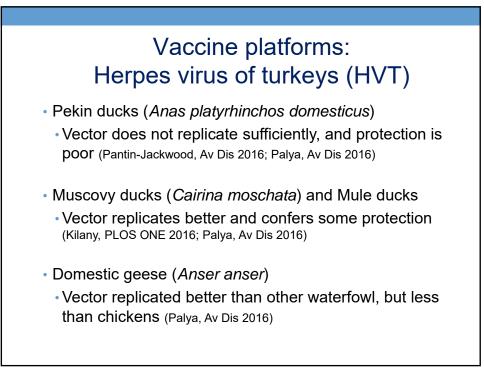
- · Primarily induces humoral immunity
- · Requires:
  - Strain that replicates to high titers in eggs
  - Low pathogenic cleavage site
- Inactivated vaccines relatively expensive to administer
- Regulatory withdrawal time for meat birds in some countries
- Inactivated vectored APMV-1
  - Bi-valent AIV NDV with HA insert

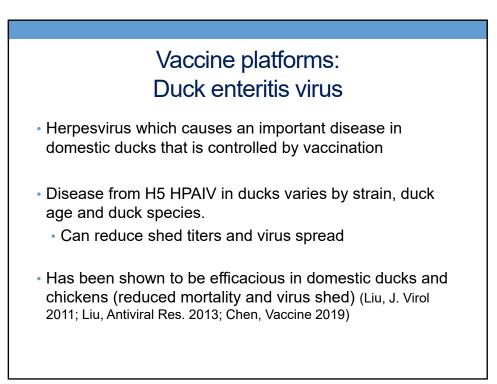


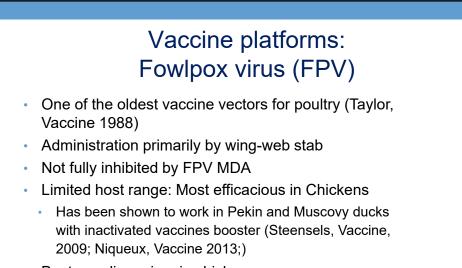
## Vaccine platforms: Common vectors and sub-unit vaccines

- Replicating Vectors
  - Herpes virus of turkeys (HVT)
  - Fowlpox virus (FPV)
  - Avian paramyxovirus type-1 (APMV-1) Newcastle disease vaccines
- Non-replicating vectors
  - Alphavirus virus-like particles (VLP)
  - Baculovirus VLP
  - Inactivated APMV-1
- Nucleic acid
  - Self amplifying-RNA (sa-RNA)
  - DNA & mRNA

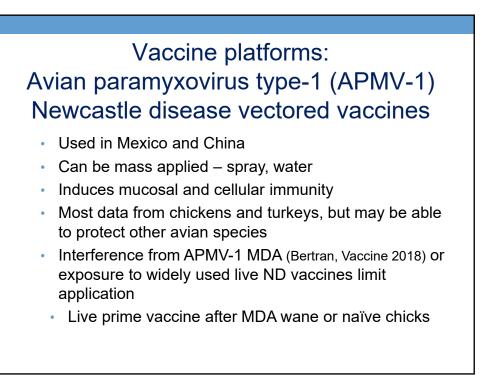




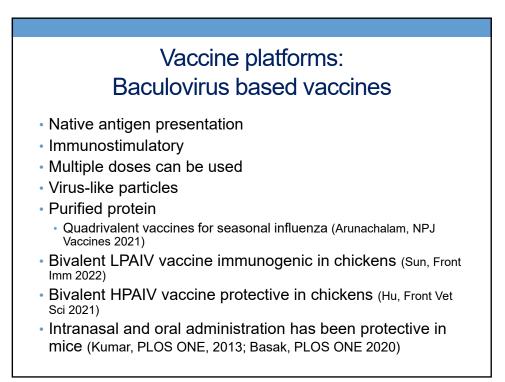




Best as a live prime in chicks



Vaccine platforms:
Alphavirus virus-like particle
Alphavirus virus-like particle
<ul> <li>Non-replicating vector, virus-like particles without packaging machinery</li> </ul>
<ul> <li>Multiple doses can be used (does not interfere with itself)</li> </ul>
<ul> <li>Data are much more limited than older vaccines, but appears to be efficacious in numerous species:</li> </ul>
Chickens (Bertran, Vaccine 2017; Ladman, Av Path, 2019)
• Turkeys (Santos, Vaccine 2017; Kapczynski, Vet Imm 2017)
Pekin ducks (Pantin-Jackwood, Av Dis 2019)
<ul> <li>Licensed in US</li> </ul>





- Viral (non-segmented, positive sense ssRNA, e.g., alphavirus) replicase drives amplification of RNA and subsequent translation of the antigen
- More efficient than DNA or mRNA
  - Lower dose vs mRNA vaccine (1/64) was protective for mice challenged with influenza (Vogel, Gene & Cell Ther. 2017)

May be encapsulated for better stability

