Vaccination and Immunization

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Background

- Biomune Company 2002
- Lenexa KS (Kansa City)
- Autogenous vaccines / bacterins
  - Custom made, emergency type vaccines
  - First Salmonella (Layermune SE) bacterin
- 53 USDA licensed poultry vaccines today
- Purchased by CEVA in 2005
  - 100% animal health
  - Global Animal Health Company
    - Dogs/cats, equine, sheep, bovine, swine, poultry, pet birds
    - Vaccines, therapeutics, drugs, pheromones
  - www.ceva-us.com
  - 1989-2001 – Primary Breeder Companies (H & N International, Hendrix)
  - 2002-present – CEVA Biomune
  - Harrisburg, PA, george.boggan@ceva.com

Today’s discussion

- Vaccination vs. Immunization
- Purpose of vaccination
- Mechanics of immunization
- Types of Vaccines/ Vaccine choices
- Building a vaccination/ immunization program
- Vaccine equipment and administration

Vaccination: a game of deception

- Vaccination is the deliberate and controlled exposure of an animal to something (antigen) that is perceived to be a disease causing agent.
- Purpose: to “fool” or deceive the bird’s immune system into believing it is under attack by the actual disease causing organism
- Result of successful vaccination is immunization.
  1. clears offending intruder from the body
  2. a protective army of antibodies and other immune components
  3. quick acting memory system

“Anyone can vaccinate chickens but: only the growers that do it right immunize them.”
Gil Warner

Vaccination (mechanical process)
Immunization (immune response)
Flock protection

1st Immunization “primer”
Primary and Anamnestic Responses

1. Primary response
2. Total Antibody
3. Secondary response
4. Total Antibody

Types of Antigens
- Fooling the bird’s Immune system
  1. Live organisms that mimic the disease causing organisms
  2. Killed preparations of the actual disease causing agent.
  3. Organisms that have been modified by man
     - laboratory attenuated
     - genetically modified

Types of Antigens: live
- Live organisms that appear similar to the organisms that cause disease
  1. Marek’s disease
  2. HVT - similar virus of turkey origin
  3. Pigeon Pox virus
  4. Infectious Bursal Disease (Leekert strains)
  5. Newcastle Disease (B1, Lasota)
  6. Infectious Bronchitis (mass, comm. strains)

Types of Antigens: killed
- Killed vaccines and Bacterins
  1. Safe (no introduction of live organisms)
  2. Actual disease pathogens can be used (SE, AI)
  3. When used in conjunction with live will maximize the immune response

Classical Live Vaccines
- Advantages:
  1. capable of infecting and multiplying
  2. inexpensive to produce, store, apply
  3. stimulate an immune response with memory

- Disadvantages:
  1. mild disease/ reaction possible
  2. immune response not long lasting
  3. exposure of live organisms (seed the environment)
  4. care in application (must be kept alive)
Killed Vaccines:

**Disadvantages of a killed antigen vaccine**

1. Requires a carrier (reactive)
2. Must be injected (bird handling)
3. Does not replicate (no immune memory)
4. Usually requires two doses and live priming for best results

Protection guard for thigh vaccination

Laboratory created vaccines:

- **Attenuated:**
  - CEO LT virus
- **Chemically mutated:**
- **Gene deleted:**
- **Recombinant vaccines**

Organisms modified in the laboratory

- **Chemically mutated:**
- **Gene Deleted Vaccines**
  - Vaccine organisms that have either had genes changed in some manner or completely deleted to make them harmless but effective
  - Advantages:
    - Very safe
    - Very effective when right gene selections are made
Available Poultry Vaccines (USA)...

Viral vaccines:
1. Marek’s *
2. Infectious Bursal Disease*
3. Newcastle Disease*
4. Infectious Bronchitis
5. Infectious Laryngotracheitis*
6. Fowl Pox/ Pigeon Pox*
7. Asian Encephalomyelitis*
8. Chicken Anemia Virus

Protozoal Vaccines
1. Coccidiosis
* vaccines available as both conventional and in recombinant presentations

Typical Pullet Vaccination Program PA:...

<table>
<thead>
<tr>
<th>Age</th>
<th>Vaccination</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Marek’s vaccination</td>
<td>Sub Q</td>
</tr>
<tr>
<td>18 days</td>
<td>Infectious Bursal Disease</td>
<td>Leukert strain</td>
</tr>
<tr>
<td>21 days</td>
<td>NCBI Bronchitis</td>
<td>B1/Mass</td>
</tr>
<tr>
<td>25 days</td>
<td>Infectious Bursal Disease</td>
<td>Intermediate</td>
</tr>
<tr>
<td>32 days</td>
<td>Infectious Bursal Disease</td>
<td>Intermediate</td>
</tr>
<tr>
<td>35 days</td>
<td>Infectious Bursal Disease</td>
<td>Intermediate</td>
</tr>
<tr>
<td>42 days</td>
<td>AE/POX</td>
<td>AE/ fowl and pigeon pox</td>
</tr>
<tr>
<td>56 days</td>
<td>Laryngotracheitis</td>
<td>TC/CEO</td>
</tr>
<tr>
<td>63 days</td>
<td>NCBI Bronchitis</td>
<td>Lasota/ Mass Holland</td>
</tr>
<tr>
<td>98 days</td>
<td>Killed SE/ NCD/IB</td>
<td>injection</td>
</tr>
</tbody>
</table>

Total of 9 different field vaccinations

Typical Vaccination Programs
- **LIVE** vaccine programs
  - Easy to administer
  - Relatively inexpensive
  - Least protective when used alone
- **KILLED** vaccine program
  - More labor intensive
  - More reactive in the birds
  - Provides greater level of protection
- **COMBINATION** program (live and killed)
- **RECOMBINANT** and NEW TECHNOLOGY Vaccines
  - Greater flexibility/ more options
  - Greater safety
  - Strong protection

Routes of Vaccine administration

**Live vaccines:**
1. Typically administration strives to mimic the route of natural infection:
   - Respiratory viruses – sprayed, eye drooped, or water vaccinated (NCD, IB, LT, MG)
   - GI viruses and bacteria - work best by ingestion (IBD, live Salmonellas)
   - Marek’s – early exposure mandates hatchery administration
   - Pox carried by biting insects/ requires wing stab application
   - Recombinant vaccines administration determined by carrier organism

**Killed vaccines**
1. Always injected because of carriers and antigen concentration
11/30/15

Hatchery Vaccination
*In ovo* 18 days incubation

- Day of age subcutaneous (Marek’s)

Hatchery Vaccination
Day of age subcutaneous neck injection

Turkey poult and layer pullet chicks

Hatchery Vaccination
Day of age subcutaneous neck injection

Hatchery Spray application

- Multiple sprays
Hatchery Gel-drop application

Field vaccines and applications
- Vaccination via Drinking Water
- Live Salmonella
- Live E-coli
- Newcastle disease
- Infectious Bronchitis
- Infectious Bursal Disease
- Infectious Laryngotracheitis
- REO, CAV
- HEV (turkeys)

Water Vaccination: Things to remember
- Live delivery of the vaccine
  - Water quality is very important (not all drinking water is created equal)
  - Time before consumption – At young ages, amount of water to fill water lines greater than consumption of vaccine water in 2 hours
- Water intake is highly variable depending on:
  - Temperature of the house
  - Age of the birds
  - Strain of birds
  - Water system in the house

Water Vaccination Steps
1. Clean the water lines
2. Water withdrawal time
3. Calculate and fill lines before lights on in AM
4. Use an approved dye, stabilizer, and distilled water
5. Flush the lines/ then fill
6. Turn the lights on
7. Lower the water lines
8. Have a half hour of stock solution left when lights turned on

Water vaccination

Dyed Vaccine Water at end of line:
- Blue dye

HEV vacc cont.
- Blue dye
Field Spray

- Spray
- Live Salmonella, ND/IBV, IBD, ILT
  - Field spray is a very effective vaccine application technique, but it's an art – can be very subjective
  - Many different types of spray vaccination equipment
  - Spray droplet size and uniformity is critical, 50-100 micron sized droplets good for most vaccines (IBV, NCD, IBD) 100 micron+ for live Salmonella and cocci
  - Preferred to vaccinate early in morning
  - Use practice run(s) to determine volume of water needed
  - Mix vaccine on farm just prior to vaccination. Use distilled water and mix thoroughly
  - Turn fans off and lights low as possible (or off!!)

Check list: Spray vaccination

- Turn off Ventilation
- Dim lights / off
- Select correct nozzle for droplet size
  - Ingestion vs. Inhalation
- Use distilled water for stock
- Figure amount of water
  -- number of birds
  -- droplet size
  -- pressure
  -- length of house
  -- walking speed
Field Spray

- Spray con’t
  - Spray over all chickens heads. More than one pass may be necessary
  - Turn fans back on
  - Rinse vaccination equipment [nozzle, lines, vaccine vessel] with clean water
  - Use water sensitive paper to evaluate spray coverage
  - Estimate spray droplet size: 25-50 micron = wet fog, 50-100 micron = misty rain, 200-400 micron = light rain. 50 micron diameter droplets are visible
  - Reaction
  - Trial and error……its an art!

Back pack sprayers

Spray vaccination

Spray
Spray Vaccination Stabilizers

- Distilled water recommended
- May have low pH
- Stabilizers in tap water appear to be superior to distilled or de-ionized water for spray vaccination

Wing-Web check list

- Inject from under-side of wing
- No feathers
- Only mix enough for 2 hours until next refill
- Half life of live vaccines diminish over time
- Keep vaccine clean and free from dust
- Check takes 7-10 post vaccination

Vaccination Clinic

Field Wing Web Stab

Wing web stab
Check takes 7-10 post vacc

“Takes”

Thank you