MG and MS Control in Layers

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Hy-Line International
Respiratory Diseases of Poultry

**Bacterial Diseases**
- M. gallisepticum
- M. synoviae
- Coryza - Avibacterium
- Ornithobacterium
- E. coli
- Aspergillosis (mycotic)

**Viral Diseases**
- Newcastle
- Bronchitis
- Laryngotracheitis
- Influenza
- Metapneumovirus
- Pox (wet form)
Respiratory diseases often share symptoms and lesions and are difficult to distinguish clinically.

Often occur in confusing combinations.

Often interact with environmental stressors (dust and ammonia) to create more severe disease and secondary bacterial infections.

Within a disease, different strains can vary significantly in pathogenicity.
Each disease is a unique disease and needs to be considered as such. Need to have good diagnostics to determine what the problems are so they can be addressed individually.

- Postmortem lesions and histopathology
- Isolate and identify agent
- PCR/molecular methods
- Serology – look for change in antibody titers between pre and post-problem samplings
Mycoplasma gallisepticum (MG)
Mycoplasma bacteria

- very small fragile bacteria, no cell wall
- survives only 2-3 days maximum outside the bird
- chronic carriers are a source of infection to new birds
- continuous cycle of infection on multiple-aged farms, cannot be easily broken
Multi-Age Housing Harbors M.G.
Clinical Signs of M.G.

- Drops in egg production (despite vaccination)
- Can show few outward clinical signs
  - generally silent in adult layers
  - maybe mild respiratory noise
- Can interact with viral respiratory diseases or even vaccines to produce severe chronic respiratory disease
- Possible soft shells or pimpling
 Typical MG Production Drop (8 eggs/hen)
MG Diagnosis

- **Serology**
  - Serum plate agglutination
  - Hemagglutination inhibition (HI)
  - ELISA

- **Isolation and identification**
  - Requires special media and techniques

- **PCR (polymerase chain reaction)**
  - Detects DNA specific to MG organism
Plate Agglutination Test

- Separate tests for MG and MS
- Read as positive or negative – not quantitative
- Very sensitive test used as screening test
- Positive reactors need confirmation by other method

False Positive Reactions:
- Serum was frozen
- Recent vaccination with oil emulsion vaccine
- Other septicemias
Production drops
+ seroconversion (turning negative to positive at time of production drops)
+ typical respiratory lesions
+/- culture or PCR identification
= MG diagnosis
MG Transmission

- **Horizontal**
  - Bird-to-bird
  - Pheasants, turkeys, peafowl, quail, ducks, geese, house finches, goldfinches
  - Airborne dust and droplets, 400 meters
  - Mechanical vectors

- **Vertical**
  - Hatching egg transmission
  - 5% average rate from infected breeders
  - Infected chicks at hatch
House finch
Transmission of MG / MS

Horizontal
Spreads quickly and infects all birds in the flock

Vertical
Vertical transmission rate is only 1 to 5%
Control of Mycoplasma

- Obtain chicks from mycoplasma-free breeding stock
- Biosecurity
- Eradication
- Medication
- Vaccination
Medication

- Reduces the clinical signs but **will not** eliminate the organism from the flock
- Tetracyclines – Aureomycin at 200-400 grams per ton through acute stage
- Tylosin - 50 grams per ton continuously until after peak egg production, then none or 25 grams per ton for the life of flock
- Fluoroquinolones
- Tiamulin
Vaccination for Mycoplasma

- MG vaccine will not prevent infection with field strain
- MG bacterins – several manufacturers
  - Often combined with Newcastle-bronchitis
- Live MG vaccines
  - Poulvac Myco F – Zoetis
  - AviPro MG F - Lohmann
  - Mycovac L – Merck
  - TS-11 – Merial
- Recombinant Vectormune Pox-MG - Ceva
<table>
<thead>
<tr>
<th></th>
<th>F strain</th>
<th>TS-11</th>
<th>Mycovac-L</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Zoetis / LAH</td>
<td>Merial</td>
<td>Merck 6/85</td>
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<tr>
<td>Application route</td>
<td>coarse spray water (eyedrop)</td>
<td>eyedrop</td>
<td>fine spray eyedrop</td>
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<tr>
<td>Serology on plate test</td>
<td>100% positive</td>
<td>1/3 to 2/3 positive</td>
<td>all negative</td>
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<tr>
<td>Spread potential</td>
<td>limited</td>
<td>limited</td>
<td>no</td>
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<tr>
<td>Longevity of protection</td>
<td>lifelong</td>
<td>to mid-lay</td>
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<tr>
<td>Exclusion of field strain</td>
<td>yes, over time</td>
<td>to mid-lay</td>
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<tr>
<td>Safe for turkeys</td>
<td>?</td>
<td>yes</td>
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Lessons on live MG vaccines

- Not all live MG vaccines are equally protective – mild types allow mid-lay breaks

- Eyedrop is more effective than spray, probably because of the dose delivered
  - Eyedrop = 1 dose
  - Spray = 1/1000 dose (Branton)
  - Response directly related to dose (Branton)

- MG can be mixed with TC or CEO LT eyedrop

- Commercial F strain vaccine safety is not a significant concern
Mycovac-L

TS-11

F strain

MG Bacterin
Vectored Vaccines

- HVT Marek’s vaccine or fowl pox virus (the vector) that carries genes for immunogenic proteins for other diseases (IBD or ILT)
- As vector virus replicates, it produces these other foreign disease proteins that the immune system reacts against
- Get “free” Newcastle, IBD, or ILT immunity without concern about live virus reaction, shedding, vaccination uniformity or timing
Genetic Engineering of Vector Vaccine

MG

vector

recombinant

Pox

MG

Pox

MG

MG
Keys to Use of Vector Vaccine

- Want the birds to get as much reaction as possible to the vector virus
- Should be the first and only use of the vector virus in the flock
  - Don’t mix HVT/IBD or HVT/ILT vector with any other HVT product (regular or vector)
  - Don’t use day-old pox and then a vectored pox later in life
- HVT vector needs to be combined with SB-1 or Rispens for good Mareks protection
Recombinant Vaccines Available in U.S.

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<th>HVT-vector</th>
<th>Pox-vector</th>
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<td>Merial Trovac-AIV H5</td>
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<tr>
<td></td>
<td>Merck Innovax SB-ND</td>
<td>Merial Trovac Pox-NDV</td>
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Vectormune Pox-MG

- Genetic recombinant vaccine by Ceva
- Fowl pox virus carrying MG genes that produce proteins that stimulate MG immune response – but MG serology all negative
- Use like a normal pox vaccine, but get “free” MG immunity with no risk of MG reaction or spread
- Must be the flock’s first exposure to pox
- Weak protection in field experience
Research from the University of GA to be published in Avian Diseases

“In this trial, MG-Bac and F-strain vaccination both resulted in significant protection of the respiratory and reproductive systems; the rFP-MG vaccine did not show protection in any of the parameters evaluated in this study…”

Evaluated air sac lesions and ovarian regression grossly, and trachea and oviduct lesions microscopically
Conclusion for MG

- Use live F-strain vaccine
- Eyedrop in growing (6-16 weeks)
Mycoplasma synoviae (MS)

- Common in layers, especially in multi-age complexes
- Strains vary in pathogenicity, but usually considered non-pathogenic
- In Europe, has been implicated in causing egg shell roughness
- In US, shown to contribute to respiratory disease and peritonitis
MS Vaccination Options

- MS bacterin – Zoetis
- MS live vaccine – Bioproperties
  - Similar to MG TS-11
- Seldom used in commercial layers