REO Virus Infections in Broiler Breeders and Progeny - Prevention Strategies

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Avian Reoviruses

...are ubiquitous viruses in nature, and are commonly isolated from a variety of tissues in poultry affected by multiple disease conditions such as viral arthritis/tenosynovitis, stunting syndrome, respiratory disease, enteric disease, and malabsorption syndrome.

Economic Losses

Cause by Avian Reovirus:

1. Poor feed conversion
2. Poor flock uniformity
3. Reduced weight gains
4. Unthriftiness
5. Mortality
6. Severe Lameness

Historical Perspective

- The initial avian reovirus was isolated in 1954 by Fahey and Crawley from the respiratory tract of chickens.
- Olsen et al. Isolated a reovirus from chickens with naturally occurring synovitis in 1957 that were unrelated to MG or MS.
- During the late 70's and early 80's a nonspecific malabsorption syndrome due to avian reovirus was described.

Incidence and Distribution

- Reovirus infections are prevalent worldwide in chickens and turkeys.
- Viral arthritis/tenosynovitis is found primarily in meat-type chickens and turkeys.
- Reoviruses are commonly found in the digestive and respiratory tracts of clinically normal chickens and turkeys.

Transmission

<table>
<thead>
<tr>
<th>Horizontal transmission</th>
<th>Vertical Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intestinal tract (fecal contamination)</td>
<td>1. Egg transmission low (&lt;2.0%)</td>
</tr>
<tr>
<td>2. Respiratory tract</td>
<td>2. Hens infected via oral, tacheal, and nasal inoculation were able to transmit reovirus to</td>
</tr>
</tbody>
</table>
## Avian Reovirus (Vaccine Strains)  

<table>
<thead>
<tr>
<th>Strain</th>
<th>Association</th>
<th>Live/Killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1133</td>
<td>Tenosynovitis</td>
<td>Live and Killed</td>
</tr>
<tr>
<td>UMI 203</td>
<td>Tenosynovitis</td>
<td>Live</td>
</tr>
<tr>
<td>2408</td>
<td>Malabsorption/Tenosynovitis</td>
<td>Killed</td>
</tr>
<tr>
<td>1733</td>
<td>Malabsorption/Tenosynovitis</td>
<td>Killed</td>
</tr>
<tr>
<td>CO8</td>
<td>Malabsorption Syndrome</td>
<td>Killed</td>
</tr>
<tr>
<td>305</td>
<td>Malabsorption/FHN/BBD</td>
<td>Killed</td>
</tr>
<tr>
<td>ss412</td>
<td>Malabsorption/proventriculitis</td>
<td>Killed</td>
</tr>
</tbody>
</table>

## Avian Reovirus (Live Vaccine)  

<table>
<thead>
<tr>
<th>Route of Administration</th>
<th>Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Subcutaneous (SQ)</td>
<td>Good</td>
</tr>
<tr>
<td>2. Wingweb</td>
<td>Good</td>
</tr>
<tr>
<td>3. Water</td>
<td>Good</td>
</tr>
<tr>
<td>4. In Ovo</td>
<td>Poor</td>
</tr>
</tbody>
</table>

## Diagnosis  

- Presumptive diagnosis may be made on the basis of signs and lesions.  
- Virus isolation in chicken embryo liver cells or FA test on infected tendon sheaths.  
- Histopathology of infected tendons.  
- Serology - AGP, IFA, VN and ELISA test.

## Avian Reovirus Serology (Broiler Breeder IDEXX ELISA System@1:500 dilution)  

<table>
<thead>
<tr>
<th>Age</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Wks</td>
<td>&lt;1000</td>
<td>1200</td>
<td>&gt;1600</td>
</tr>
<tr>
<td>16 Wks</td>
<td>&lt;3500</td>
<td>4000</td>
<td>&gt;5000</td>
</tr>
<tr>
<td>24 Wks</td>
<td>&lt;4500</td>
<td>5000</td>
<td>&gt;6500</td>
</tr>
<tr>
<td>38 Wks</td>
<td>&lt;3000</td>
<td>3500</td>
<td>&gt;4500</td>
</tr>
<tr>
<td>44 Wks</td>
<td>&lt;2750</td>
<td>3000</td>
<td>&gt;3500</td>
</tr>
<tr>
<td>58 Wks</td>
<td>&lt;1000</td>
<td>2000</td>
<td>&gt;2500</td>
</tr>
</tbody>
</table>

## Clinical Signs/Gross Lesions
Viral arthritis/tenosynovitis

1. Lameness
2. Joint swelling
3. Thickened/ruptured tendons

Malabsorption syndrome

1. Runting/Stunting
2. Poor pigmentation
3. Abnormal feathering
4. Skeletal abnormalities
5. Increased mortality
6. Enlarged proventriculus

Pathogenicity

Reoviruses have been identified as the etiology of other disease conditions such as:

1. Arthritis/tenosynovitis
2. Runting/stunting
3. Pericarditis/myocarditis/hydropericardium
4. Hepatitis
5. Bursal and thymus atrophy

Prevention Strategies

1. Good Husbandry Programs
2. Biosecurity Programs
3. Vaccination Programs

Vaccination (Broiler Breeders)

Purpose:

1. Prevent VA in the breeders
2. Prevent egg transmission to progeny
3. Produce maternal antibodies for the progeny

Vaccination Strategies (Broiler Breeders)

<table>
<thead>
<tr>
<th>Program</th>
<th>1st Live Wks</th>
<th>2nd Live Wks</th>
<th>3rd Live Wks</th>
<th>1st SQ/Water</th>
<th>2nd SQ/Water</th>
<th>3rd SQ/Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:</td>
<td>1-2</td>
<td>SQ/Water</td>
<td>3-8 W</td>
<td>1st/2nd</td>
<td>SQ/Water/Wingweb</td>
<td>2nd/3rd Wks</td>
</tr>
<tr>
<td>2:</td>
<td>Live</td>
<td>SQ/Water</td>
<td>6-8 W</td>
<td>1st Live</td>
<td>SQ/Water/Wingweb</td>
<td>2nd Live Wks</td>
</tr>
</tbody>
</table>

1st 14-20 Wks
Current Challenges

1. Sporadic outbreaks on broiler farms throughout the Southeast US.

2. Clinical signs include runting/stunting as early as 7-14 days of age, poor weight gains, poor feed conversions with significant feed passage.

3. Broiler Breeder ELISA titers for reovirus > 15-20,000.

4. Reovirus has been isolated by Dr. J.K. Rosenberger that may be different than the current vaccine types.

Summary

1. Reoviruses are ubiquitous in nature.

2. Healthy birds can harbor the reovirus without exhibiting clinical signs.

3. Good husbandry and biosecurity practices will help reduce the spread of reovirus from flock to flock.

4. A solid broiler breeder vaccination program is necessary to reduce losses due to reovirus in both broiler breeders as well as their progeny.