Mycoplasma ovis
What is it and why do we care?

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M. A. Highland, DVM, PhD, Dipl. ACVP
Veterinary Medical Officer-Researcher
USDA-ARS-Animal Disease Research Unit
Pullman, WA
What is *Mycoplasma ovis*?

- *Eperythrozoon ovis* (“Epe”) – prior to 2004
- Hosts: domestic sheep and goats, deer, reindeer
- Infects the surface of RBCs (resembles basophilic stippling)
Mycoplasma ovis

• Worldwide distribution
  – Australia*, NZ, Turkey, Norway, Japan
  – Reports of infection/disease in U.S. rare

• Transmission
  – Biting insects and ticks; needle reuse
  – Transplacental transmission – no data in literature
**Mycoplasma ovis**

- **Clinical symptoms**
  - Jaundice +/- red urine (hemolysis), weight loss, ill-thrift (decreased weight gain, stunted growth), bottle jaw, neurological signs (anemia/hypoxia), diarrhea*

- Resemblance to:
  - Enteric parasites (barber pole worm)
  - Vitamin/mineral deficiency (copper, thiamine, E/selenium)

- Often **subclinical**......consequence of this?
  - Meat and fiber production effects in the United States?
  - Carcass condemnation (jaundice)?
**Mycoplasma ovis**

- **Diagnosis**
  - Blood smear (easily mistaken for stippling)
  - Complete blood count: ANEMIA
  - Serum chemistry: +/- hypoglycemia
    - Depends on how long blood sample sits and bacterial load
  - PCR
    - DNA isolated from whole blood, plasma, serum
**Mycoplasma ovis**
(ongoing research - data analysis stage)

ARS-Range Sheep Production Efficiency Research Unit
U.S. Experiment Sheep Station

- Large number of accessible sheep for blood collection
- Ability to repeat sample and follow animals lifelong
- Production records and genetic information

Repeat sampled ewes and lambs over 3 years (3x per year)

- Analyzing for impacts of infection on ewe and lamb production (Dr. Bret Taylor)
- Passive transfer does occur, although inefficient (~42% ewe prevalence, 5.1% pre-suckle lamb prevalence)
Mycoplasma ovis
(Ongoing research - data analysis stage)

NAHMS sera samples from 2001 and 2011
• Distribution and prevalence in the U.S.
• Operation impacts on prevalence

(NAHMS sample data analysis: Dr. Natalie Urie)
Thanks to.....

ADRU-ARS-USDA and WSU
- Don Knowles
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- Bret Taylor
- Animal Care Staff

USDA-APHIS (NAHMS)
- Katherine Marshall
- Natalie Urie.......
MYCOPLASMA OVIS IN U.S. SHEEP FLOCKS:
SEROPREVALENCE AND ASSOCIATED RISK FACTORS

NATALIE URIE
VETERINARY EPIDEMIOLOGIST
MONITORING AND MODELING
USDA, APHIS, VS
JANUARY 2018
NAHMS National Studies

Key Information

<table>
<thead>
<tr>
<th>Commodities are surveyed on a rotating basis</th>
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<td>Study objectives are set in partnership with industry and other stakeholders</td>
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<td>All studies depend on voluntary participation</td>
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<td>All studies utilize a statistically valid nationally representative sample</td>
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NAHMS National Studies


Beef Cow-Calf  Goats  Catfish  Beef feedlot  Swine  Layers  Ranched Bison  Equine  Beef Cow-Calf

Poultry  Sheep  Small-Scale Operations  Farmed Cervids  Dairy

### NAHMS Serum Samples Tested

<table>
<thead>
<tr>
<th>Study Year</th>
<th># Sheep</th>
<th># Operations</th>
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<tbody>
<tr>
<td>2001</td>
<td>7,161</td>
<td>623</td>
</tr>
<tr>
<td>2011</td>
<td>12,512</td>
<td>559</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>19,673</strong></td>
<td><strong>1,182</strong></td>
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Sheep-Level *Mycoplasma ovis* Seroprevalence

Combined 2001 and 2011 Seroprevalence: 30.0%

- **Herded/open range**: 32.2% (2001) to 37.3% (2011)
- **Fenced range**: 29.3% (2001) to 33.2% (2011)
- **Farm flock**: 25.2% (2001) to 30.4% (2011)
- **Overall**: 27% (2001) to 32% (2011)
Operation-Level Seroprevalence

Operations that had at least 1 *M. ovis* positive sample
- 2001: 77.7%
- 2011: 88.2%
**Overall: 82.7%**

Mean within-flock seroprevalence
- 2001: 34.6%
- 2011: 34.7%
**Overall: 34.6%**
Preliminary Risk Factors Associated with\textit{M. ovis} Detection

Flock size
Region
Year of blood collection
Requirement of preventive health practices
Public land grazing
Vaccinations
Operations with NO preventive health practices for new additions were \textbf{2.1 times} more likely to have \textit{M. ovis}.
M. ovis Detection by Grazing on Public Land

\[ P = 0.0230 \]

Operations that placed sheep to graze on public land were **3.5 times** more likely to have M. ovis
*M. ovis* Detection by Vaccination Practices

\[ P = 0.0243 \]

Operations that administered vaccines were \textbf{1.7 times} more likely to have *M. ovis*

**This does not mean that vaccines spread or cause *M. ovis.***
Preliminary Risk Factors Associated with *M. ovis* Within-Flock Seroprevalence

- Flock size
- Region
- Year of blood collection
- Any ewes that aborted during the study years
- Disinfection of sheering equipment between sheep
M. ovis  Within-Flock Seroprevalence by Abortion Presence

\[ P = 0.0437 \]

Operations WITH abortions had a 1.12 times higher within-flock M. ovis seroprevalence
M. ovis Within-Flock Seroprevalence by Sheering Disinfection Practices

Operations that ALWAYS disinfected shearing equipment had a **1.7 times** higher M. ovis seroprevalence

**This does not mean that disinfecting shearing equipment spreads or causes M. ovis**
Thank you to:

US Sheep Producers
USDA Agricultural Research Service
American Sheep Industry Association