Ovine Progressive Pneumonia (OPP) ERADICATION TRIAL UPDATE — MLWP 2015 Shepherd’s Holiday —

Judy Lewman and Holly Neaton DVM with Susan McClanahan DVM, MN Board of Animal Health

Lewman Photos

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Lewman Photos
“Economically, OPP is one of the most important diseases affecting sheep in North America.”

Ellen B Belknap, DVM, MS, Auburn University
Sheep and Goat Medicine 2002

“Chronic progressive pneumonia is unquestionably of considerable economic importance.”

G T Creech, Senior Veterinarian, Pathological Division
Bureau of Animal Industry (USDA, prior to ARS)
Yearbook of Agriculture 1942
OPP is common in Minnesota

USDA NAHMS Study

Nearly half of all flocks infected
Infected sheep can appear completely normal . . . the only way to know their OPP status is to test them.
‘Elitest’ University of Minnesota imported in 2013, first in the U.S.

‘Elitest’ only ELISA test for OPP validated to World Organization for Animal Health (OIE) standards

‘Elitest’ developed in 1999 by a collaborative effort of labs in the U.K., Spain, Italy, and Belgium

‘Elitest’ used for years in OPP/MVV programs worldwide, now including Ontario and Minnesota
New Eradication Strategy

Eliminate OPP — WITHOUT orphaning!
New Eradication Strategy

Parent Flock
(positive & negative dams remain together – lambs raised naturally, tested 2–4 months post-weaning)

Minimum 10’ Separation At ALL Times!

Young Replacements
(all test-negative)
USDA–MARC scientists verified that the \textit{TMEM154} gene affects breed susceptibility to OPPV (2012).

MARC also found (2013) that at least one OPPV strain has adapted to infect sheep regardless of their DNA.

So, while proven to be less susceptible, \textit{TMEM154} “1,1” and “4,4” animals are \textit{NOT} resistant to OPPV.

Our initial test of 15 flocks revealed >50% “1,1” rams, yet all but two flocks were infected with OPPV.

During the trial, two “1,1” rams seroconverted at 3 and 4 years of age after exposure to positive ewes.

We’re now looking at DNA of older productive ewes remaining in infected flocks (ram testing on hold).
Working Together

USDA

OPPP
CONCERNED
SHEEP
BREEDERS
SOCIETY

MINNESOTA LAMB & WOOL PRODUCERS

MINNESOTA BOARD OF ANIMAL HEALTH

University of Minnesota
Driven to Discover™
Working Together, cont.

- Trial coordinated by OPP Society volunteers in collaboration with MN Board of Animal Health (BAH)
- USDA or BAH collect samples and verify inventory
- U of M Veterinary Diagnostic Laboratory provides ‘Elitest’ for the Trial at a discounted price of $4
- Producer pays $2 per test ($4 if “extra”) + vet fees
- Minnesota Lamb & Wool Producers donate $2 per test + $12 for DNA testing (1 test per 25 ewes)
- Contributions to date: Producers 57% / MLWP 43%
- OPP information resource: www.OPPsociety.org
## 6 Flocks Remain in the Trial

<table>
<thead>
<tr>
<th>Baseline OPPV %</th>
<th>Status Following Most Recent Test (replacements born in 2013, 2014 and 2015)</th>
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<tbody>
<tr>
<td>93%</td>
<td>12.5% pos: adequate neg replacements; ALL pos now culled</td>
</tr>
<tr>
<td>64%</td>
<td>5.5% pos: multiple groups; building one neg group at a time</td>
</tr>
<tr>
<td>61%</td>
<td>100% neg: 17% of current ewes “salvaged” from originals</td>
</tr>
<tr>
<td>35%</td>
<td>17.5% pos: struggling but determined; 2015’s just 11% pos</td>
</tr>
<tr>
<td>*21%</td>
<td>8.6% pos: adequate neg replacements; ALL pos now culled</td>
</tr>
<tr>
<td>*14%</td>
<td>4.3% pos: adequate neg replacements; will soon cull all pos</td>
</tr>
</tbody>
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Baseline represents highest OPPV% in lamb or adult subset from each flock
*Several culled on symptoms and/or serology prior to initial screening test

Test results through 4 Dec 2015
Producer Feedback

• Once OPP status of the original flock was known, producer observed that all bottle lambs were from test-positive ewes; no milk replacer needed for lambs raised by test-negative dams

• A good ID system is essential; need tags with high retention (consider Shearwell, 99% ret)

• Don’t forget to test late-born lambs! In one flock, just 2% (1 of 42 lambs) were positive at 11 months of age; 14 more lambs, born late and not tested until much older, were 43% positive when finally tested at >2 years of age
Lessons Learned

• OPP can be eliminated without orphaning or severe culling if producer follows trial protocol.
• The ‘Elitest’ ELISA can likely identify an infected animal within weeks following transmission.
• More frequent testing could speed eradication; every 4–6 months optimal with ‘Elitest’.
• A good ID system is essential; need tags with high retention (consider Shearwell, 99% ret).
• Important to remove infected animal(s) as soon as status is known, even if only one!
• Poor management and/or Mother Nature can override a desirable genotype!
Take Home Messages

• OPP virus only lives in the sheep and is passed via nasal discharge/coughed particles and possibly blood via shared needles, etc.

• 70–90% of transmission is from old infected ewes to young ewes entering breeding flock

• Weaning early is beneficial to prevent transmission

• Showing sheep increases risk of transmission

• Eradicating OPPV saves money/makes money
OPP Eradication Trial — The People Who Make it Happen —

USDA–APHIS–VS and MN Board of Animal Health
Susan L McClanahan, DVM, MN BAH, Field Staff Trial Coordinator

- Chad Carlson, Ag Advisor, MN BAH
- Jason Cater, DVM, MN BAH
- Michael Curley, DVM, MN BAH
- Arnold Jostock, DVM, MN BAH
- Steven D Just, DVM, USDA–APHIS–VS
- Randall Lindemann, DVM, MN BAH
- Kelly Neisen, CVT, USDA–APHIS–VS
- Will Wiebe, AHT, USDA–APHIS–VS

Minnesota Veterinary Diagnostic Laboratory
Dr James E Collins
Londa M Kroone, Senior Laboratory Technician
Dr Devi P Patnayak, Associate Clinical Professor, Serology Section Head
Mary Thurn, IT
Janelle Wachter, Administration Section Head
OPP Eradication Trial 2016 — 6 Flocks Remain —

24 to 400 ewes (three flocks >100 ewes)
>2,500 samples tested to date
variety of breeds/facilities
diverse management styles

• Froehlich Family
• Rob Goerger
• Dan Hammond

• Dean Olson
• Bob Padula
• Karen Stormo
Looking for Trouble

>90% of infected sheep exhibit no obvious signs

--- DIAGNOSTIC AID ---

OPP researcher Dr. Mike Heaton uses these photos to show the contrast in normal and diseased animals from the USMARC flock. He has found that >90% of the sheep that show OPP at necropsy have no obvious clinical signs.

THE EFFECTS OF OPPV INFECTION ON ADULT SHEEP AT THE USDA MEAT ANIMAL RESEARCH CENTER (USMARC)

Uninfected ewe (left) and OPPV-infected ram (right). Insets: microscopic and structural appearance of the lung and mediastinal lymph node in uninfected (left) and OPPV-infected adults. The key features of OPPV infection at necropsy are the interstitial pneumonia characterized by the blotchy grayish-lavender color, increased size, firm texture, and lack of deflation of the lungs. Also characteristic of OPPV infection is the cigar-sized enlargement of the mediastinal lymph node. M.P. Heaton and W.W. Laegreid. 2006. USMARC, Clay Center, NE unpublished results.
OPP Pilot Program
— Open to All Since 2006 —

• No fee to enroll; BAH or USDA visits flock annually to check inventory and bleed sheep

• Producer delivers blood samples to local DVM

• Producer pays test fees plus local DVM charge to prepare and submit samples to U of M lab

• Flock listed online as test-negative once 3 annual 100% negative tests have been attained

• To apply, or more info: www.bah.state.mn.us
OPP Pilot / Eradication Trial Advisory Group

- James Baglien*, purebred producer (OR)
- Randall C. Cutlip*, Research Leader (retired), USDA-ARS-National Animal Disease Center (IA)
- Clark BreDahl*, columnist for 'The Shepherd' magazine, purebred and commercial producer (IA)
- James E. Collins, University of Minnesota Veterinary Diagnostic Laboratory (MN)
- Bill Duffield*, purebred producer (ON, Canada)
- John Dvorak, Past President, Minnesota Lamb & Wool Producers Association (MN)
- Richard A. Ehrhardt, Small Ruminant Extension Specialist, Michigan State University (MI)
- Charles N. Gaiser, Sheep and Goat Epidemiologist, USDA-APHIS-Veterinary Services (NC)
- Linda Glaser, Senior Veterinarian, Minnesota Board of Animal Health (MN)
- Bill Hartmann, Minnesota State Veterinarian, Board of Animal Health (MN)
- Michael P. Heaton, Molecular Geneticist, USDA-ARS-Meat Animal Research Center (NE)
- Lynn M. Herrmann-Hoesing, Research Microbiologist, (formerly) USDA-ARS-ADRU, WA (WA)
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- Donald P. Knowles, Research Leader, USDA-ARS-Animal Disease Research Unit (WA)
- Londa M. Kroone, Senior Technician, Minnesota Veterinary Diagnostic Laboratory (MN)
Advisory Group, continued

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- Cindy Wolf*, Veterinarian, Assistant Clinical Professor, U of M, commercial & purebred producer (MN)

* indicates OPP Society member