Why is now the ideal time to expand on-farm OPPv eradication

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Co-chair ASI Animal Health Committee
OPPv infection targets milk production and lungs. Disease-free animals live longer & are more productive & profitable.
OPPv Eradication program in Minnesota has been successful and key components elucidated

- After almost 5 years, now have been able to determine what steps and processes are necessary and effective and likewise those that are not!
- Historically think back to where we were in the early part of 2000s regarding our knowledge of how to effectively control and eliminate scrapie
- Consider what we know now and how well application of that knowledge works!
- While OPPv is caused by a virus (unlike scrapie which is caused by a prion) of which there are multiple strains that are able to change their behavior, we have science and practical application of that science on real farms that has taught us that eradication is possible when specific steps are followed.
New Control Strategy
— The Essence of MN Eradication Trial —

OLD SCHOOL:
Remove lambs at birth, before suckling, and raise as orphans. Test entire flock annually and cull positives, or (ideally) keep negatives as a separate flock.

NEW SCHOOL:
• No orphaning or annual testing of initial adult flock.
• Test potential replacements at 4-6 months of age.
• Remove positives.
• Segregate negative replacements from adult flock forever.
The devil is in the details....

• Interested producers can implement this program but they need technical assistance and guidance from those who know.

• As the national sheep organization, we can assist with this implementation by
  ◇ Developing and distributing accurate educational information
  ◇ Providing the training and tools to assist producers to eradicate OPPv while maintaining their genetics
  ◇ Providing technical assistance regarding exact management steps to follow toward achieving eradication
Program Specifics

• "Based on the research that shows 75-90% of new infections happen when young ewes are added to the infected older flock through aerosol exposure"

• Early weaning is to prevent aerosol exposure from infected older ewes, ideally wean at 6-8 weeks.

• Test extra ewe and ram lambs as historically 10-25% will be positive and need to be moved out of replacement group. Use Elitest ELISA for this testing.

• Retest 2-3 mos after removal of positives. Repeat as necessary, i.e. Repeat until entire management groups achieves 2 consecutive 100% negative tests

• Minimum of 10 feet separation or solid partition
• Keep these replacement lambs separate for their entire productive life, i.e. this becomes your OPPv-free group/flock which is kept a minimum of 10 feet apart from the original base infected ewes and rams.

• This group allows you to conserve your genetics while eradicating the virus from that group.
Timeline to achieve whole negative flock status:

This can be done in a year if a producer chooses to test entire flock every 3-4 months, cull or separate and retest until at least 2 whole flock negative tests are achieved. Testing intervals of 3 months are preferred. The positive sheep can still be kept as long as they are separate from the negative tested flock. The replacement ewe lamb strategy will take longer. Depends on the producers goals to keep genetics, cash flow, facilities available, etc.

If a producer chooses to follow the replacement ewe lamb protocol, it depends on how many replacements are kept to bring the new flock up to desired numbers. Rob Goerger has taken 4 years (could have been done faster but some oops happened by letting some positives slip through) as he chose to be careful to choose only high producing replacement ewe lambs.
If you consider keeping 30% of your ewe flock numbers as ewelamb replacements every year then it would take you 3 years to become whole flock negative and maintain ewe numbers to initial level.
Every flock will have a different variation on the basic protocol depending on their management, facilities, goals, money available, etc. But the basic principal is the same:

Retest often to prevent the virus from spreading.

Use the Elitest as the only serological test as we have history on how to use it in eradication plans.

Concentrate on removing the virus - not controlling it or you will be right back where you started in a few years.

Purchasing new animals: always a challenge for multiple reasons but testing new animals twice 60 (at least) days apart prior to adding to home flock recommended. Ditto with animals coming home from shows.
Program Specifics

- Can retain base ewes and rams but they are only to be bred to each other not the new test negative flock and remember 10 ft. separation is required at all times.

- Repeat early lamb weaning, Elitest, immediate separation of positive testing lambs, can add the negative testing lambs to the negative flock group to grow those numbers. Some report weaning more and heavier lambs from this group versus infected group.

- Experienced shepherds have chosen to phase out the original infected flock after short number of years of rebuilding sheep numbers with same genetic base but without OPPv infection.
Key Piece to achieve eradication

- The Blood Test called the Elitest ELISA
- Key strength - detects new infection MUCH more quickly than other available tests (w/1 14-51 days of new infection occurring)
- Currently only run at the University of Minnesota Veterinary Diagnostic Laboratory, but could be imported & run elsewhere, cost $6.25/sample
- Initial test development was begun in this country and furthered in UK and Europe
- Currently also used in Canada
- Not USDA validated, but meets OIE standards
Some details regarding Elitest

- Is machine read, result is called an Optical Density (OD)
- OD ÷ cutoff = signal/noise ratio (S/N)
- Why? Because these ratios are best way to track results over time since Elitest cutoffs vary each time test is run
- Interpretation:
  - S/N > 1.0 is positive
  - S/N > 3.5 positive with greater specificity
  - 0.8-1.2 borderline, i.e. hovering around cutoff
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Blood Sampling for OPPv Elitest ELISA run at UMN VDL

- Single use 20 or 18 gauge 1” sleeved vacutainer needles
- +/- clipper if very long woolled
- Red top or tiger top tubes
- Vacutainer needle hubs
- Sharps container
- Pencil or Sharpie and legible handwriting or label printer
- Extra ear tags, don’t sample an untagged sheep
- Test submission form
- Understanding of neck and jugular vein anatomy
- Good way to restrain the sheep to be bled
- Not a regulatory test so anyone can obtain the sample
REQUEST ASI to assist Expansion of OPPv Eradication Effort by funding to support:

- Provide one day-long regional training workshops for interested producers along with their local veterinarians

- Development and distribution of uniform educational materials including webinar, on ASI website, at sheep events

- Program Coordinator to work with participating flocks and provide ‘liaison-ing’, flock plans, schedule testing, answer questions and offer assistance wherever needed
Producer signs an agreement to participate in voluntary eradication program.

Producer co-invests in EID tags, +/-wand reader and mobile printer to generate tube labels.

Training includes: how to bleed sheep
  use of EID system
  handling/prep/submission of bar-coded samples
  use of simple spreadsheets
  management protocol for successful eradication

From there forward, producer works as team with local veterinarian following written materials for self-guided eradication protocol.

USDA and/or State Veterinarian's staff visit flock at least once per year to assist with sample collection and verify inventories.
FAQs

• Costs
  – Individual animal ID recommend Shearwell
  – Sampling
  – Processing
  – Shipping
  – Lab Costs
  – Separation

• Timeline to Whole Negative Flock Status

• Can I still buy outside sheep

• Can I still show some of my sheep

• Can a producer learn to bleed their own sheep

• Bleeding supplies needed

• Where & How to send samples

• What assistance will my state or local USDA office provide
• Takes 14-51 days from time of infection to turn positive on Elitest

• Blood testing time of year recommendations, avoid just before and during breeding season (hormonal interaction with results) and immediately after vaccination
Thank-you Judy Lewman and Dr. Holly Neaton for your tireless leadership on learning how to understand how to eradicate OPPv at the farm level.
Take Home Messages

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

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

• Early Weaning is beneficial to prevent transmission

• Showing sheep may increase risk of transmission

• Eradicating OPPv saves money/makes money
Lessons Learned

• OPP can be eliminated without orphaning or severe culling if producer follows trial protocol

• The ‘Elitest’ ELISA can 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% retention)

• 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!
TMEM154

Diplotype “1,1” is less susceptible but NOT resistant!
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% ID retention).

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 (yikes!)
Eliminating OPPv will allow productive ewes to reach their full potential . . .
... with plenty of milk for all!