

Bighorn sheep pneumonia: The Bad, the Good, and the Ugly



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Bighorn sheep pneumonia: The Bad

- Movi source (domestic sheep) **widespread**
- Bighorn sheep **foray** widely, seek out contact with DS; long incubation period
- Movi persists in some recovered **carrier animals**
 - Trigger recurrent lamb pneumonia
 - Carry Movi infection across metapopulations

More research needed!

Bighorn sheep pneumonia: The Good

- Movi **spillover DS** -> **BHS** slow, erratic
- Movi may **lose virulence** over time in BHS
- Bighorn populations sometimes **clear Movi**
- Post outbreak Movi **carrier BHS infrequent**
- Potential for **Movi elimination** from domestic sheep

More research needed!

Bighorn sheep pneumonia: The Ugly

- Bighorn sheep immune to one Movt strain are **not immune** to different Movt strains
- ‘Magic bullet’ approaches (**vaccines** and **antibiotics**) are unlikely to work for Movt
- The domestic sheep industry is still skeptical of the role of DS as a source of Movt for BHS

More research needed!

Research **progress** and **needs**:

Animal-side Movi testing

Goal: Rapid animal-side test for Movi carriers

- Lab-based **proof of concept completed**
- Migrate to lateral flow device?
 - Industry partner needed
 - **Feasibility study cost: \$5-10K**
- Alternative approach: field PCR
 - **Pilot study cost: \$5-10K**

MaxSignal® Salmonella Test Strip Kit



Research **progress** and **needs**: Movi carriage in domestic sheep



Goal: Eliminate Movi from domestic sheep flocks

- Reduce / eliminate risks to bighorn sheep
- (Reduce losses due to pneumonia)
- (Improve efficiency of sheep production)

Research **Progress**: Eliminate Movi from domestic sheep flocks?

- Antibiotics to clear Movi carriage
 - Pilot study: little efficacy
 - Larger studies planned in 2017-8; pharmaceutical companies to provide drugs
- Test and segregate/cull Movi carrier ewes
 - Worked well in 2016 study
 - Limitation: many flocks have too many carriers to cull
- Segregate lambs at weaning (~8 weeks)
 - Test in progress 2017
 - Limitation: one early infected lamb can infect the group

Research Needs: Eliminate Movi from domestic sheep flocks?

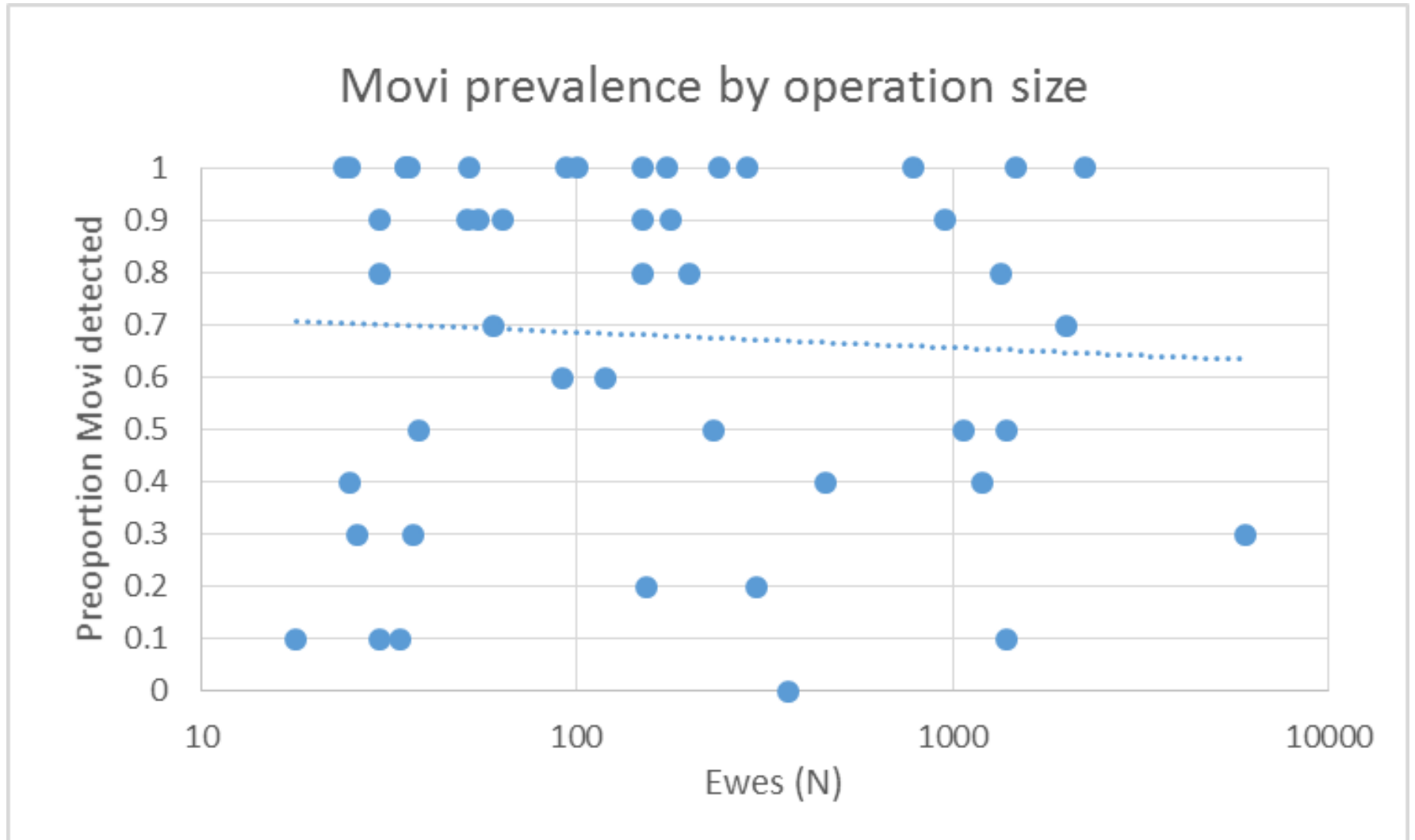
- ‘Adopt-a-flock’
 - Identify domestic sheep producers in high risk locations willing to work on Movi elimination
 - **Partner and provide support:** Movi testing, improving segregation (fencing, etc.), replacement of culled carrier ewes

Research **progress**: Understanding Movi in domestic sheep

Goal: Understand what drives Movi carrier
ewe frequency

- Movi carrier ewe frequency within flocks is **stable** over months to years
- Movi carrier ewe frequency **varies widely** from flock-to-flock

Movi carrier ewe frequency is independent of flock size

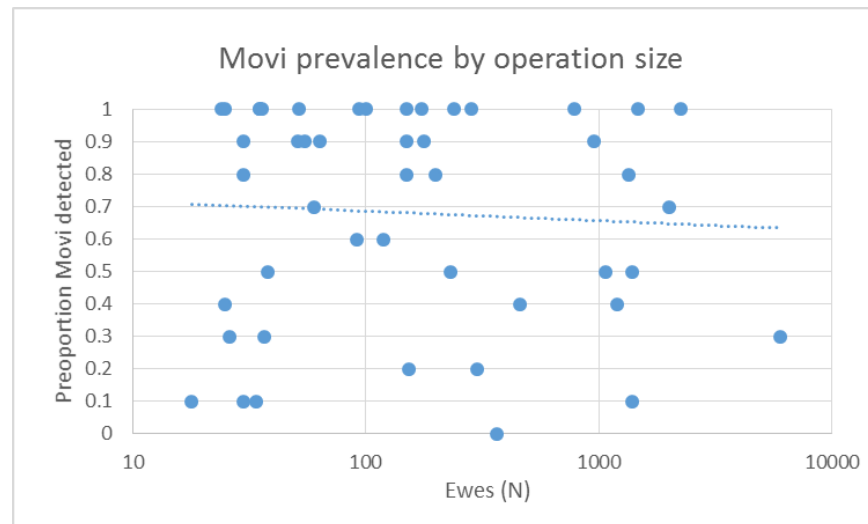


Movi prevalence in positive flocks is **stable** across time

- Flock #1 (50-60 ewes)
 - Jun 2016 12%
 - Sep 2016 3% (1 repeat + ; culled)
 - Mar 2017 5% (2 repeat +; culled)
- Flock #2 (50-60 ewes)
 - Aug 2016 100%
 - Oct 2016 82%
 - Jun 2017 resampling pending

Goal: Identify management factors that reduce Movi carrier ewe frequency

- Resource: USDA Sheep2011 data and samples (450 operations)



Research **needs**: Understanding Movi in domestic sheep

- Determine Movi carrier ewe frequency in more Sheep2011 flocks and test for association with management factors
 - 300 flocks @ \$100 = **\$30K** needed to complete
 - Pilot study data analysis (60 flocks) expected July, 2017

Research progress and need:

Modeling Movi spillover

USDA funded project: modeling pathogen spillover at the Wildlife:Livestock interface

Year 1: General principles

Year 2: Movi in bighorn and domestic sheep

- Expand upon the current ‘risk of contact’ model
- Identify and prioritize most effective approaches
- Year 2 funding starting October 2017 is in jeopardy
- \$60K to fully fund; \$50,000

Thanks!

