Bighorn Sheep & Domestic Sheep and Goats

The relationship between domestic sheep and goats & pneumonia in bighorn sheep, and the pathogens involved.

FWP photo

What is Movi and how does it work?

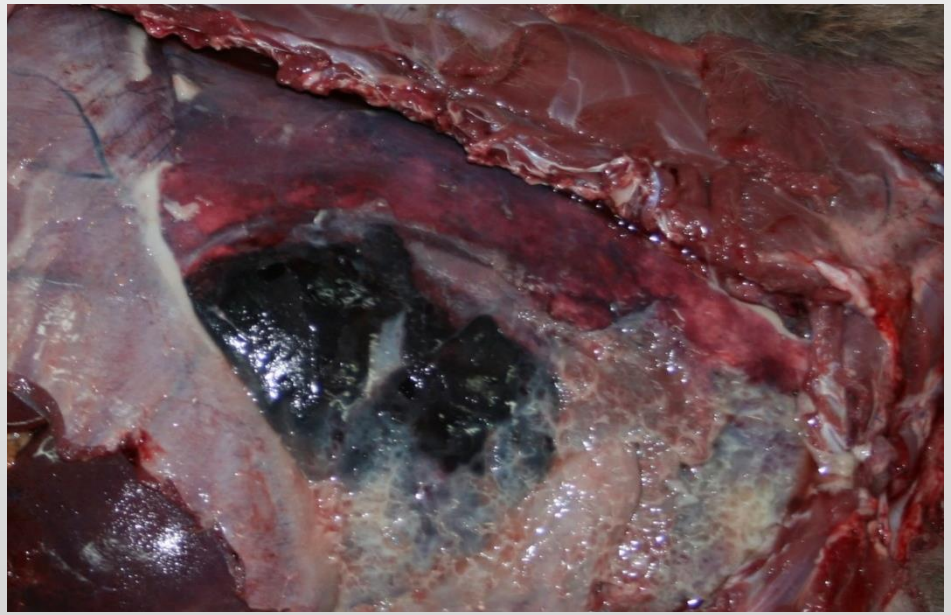
- Movi is a shorthand name for the bacteria most associated with bighorn sheep pneumonia
  - The scientific name is *Mycoplasma ovipneumoniae*
- How does it work?
  - Movi infection interferes with the normal defense mechanisms of the lungs
- Does Movi cause pneumonia?
  - Movi itself can cause pneumonia of varying severities, although typically mild. Movi allows other bacteria to invade the lungs and cause severe or fatal damage
- How bad are pneumonia outbreaks of bighorn sheep?
  - Pneumonia outbreaks have been reported to kill over 90% of bighorn sheep within a herd
  - Some surviving bighorns may become chronic Movi carriers. This is suspected to be a source of Movi in lambs and may result in lamb pneumonia/ear infections, which can lead to poor lamb recruitment.

Is Movi the only concern for bighorn sheep health?

- No, Movi is not the only concern. Other viruses, bacteria or parasites can spread between bighorn sheep, domestic sheep, and other domestic livestock
  - Other pneumonia pathogens (*Mannheimia haemolytica* and others)
  - *Johne's disease bacteria (Mycobacterium paratuberculosis*)
  - Lungworms (*Muellerius* spp)
  - Pinkeye, contagious ecthyma, and possibly other pathogens.
- However, epidemic pneumonia is the disease recognized to threaten the viability of entire bighorn populations

How do we know Movi causes disease in bighorn sheep?

- Recent studies indicate Movi is a pathogen common to pneumonic bighorn sheep herds
- However, in some apparently healthy bighorn sheep herds Movi exposure has also been detected
- New pneumonia outbreaks have been documented after introduction of Movi into previously Movi-free herds



Lungs from a Montana bighorn sheep that died from pneumonia. The dark areas are dead/non-functional areas of the lung

Besser and others, J Clin Micro 2008; Prev Vet Med 2013

Does Movi cause disease in domestic sheep and goats?

- Movi related pneumonia has been documented in domestic sheep
  - This typically affects lambs
  - Herd level effects of Movi are not well understood
- Severe disease has occasionally been documented in domestic goats
  - Movi can cause severe goat pneumonia outbreaks
- Movi can impact lamb growth
  - 0.45 kg / carcass
  - Increased pre-weaning average daily gain (ADG) in Movi-free lambs

Rifatbegovic and others, Vet Rec 2015; Kirton and others, NZ Vet J, 1976; Besser, ms in preparation

How often do domestic sheep and goats carry Movi?

- Many domestic sheep flocks may carry Movi
  - A nation-wide study of domestic sheep showed Movi infection in about 90% of 450 flocks. About 60% of animals in infected flocks carried Movi (USDA CEAH - http://tinyurl.com/gvhwkvk)
- Movi infection in domestic goat herds appears to be variable and is not well understood.
  - Domestic goats are capable of carrying Movi
  - Current research is being conducted to evaluate how frequently Movi is found in domestic goat herds and under what conditions.

Captive interspecies commingling studies evaluating transmission of Movi and other pathogens to bighorn sheep

Species commingled (# animals)	Bighorn sheep (died/total)	% death	# of studies	Bacteria
Domestic Sheep (39)	41/43	95%	7	*Mannheimia, Bibersteinia trehalosi, Movi, Arcanobacterium, Corynebacterium*
Movi-free Domestic sheep (4)	1/4	25%	1	*Mannheimia, Bibersteinia trehalosi* (@day 90)
Domestic Goat (13)	2/16	12.5%	4	*Mannheimia*
Horse (3)	1/6	17%	1	*Pasteurella (Mannheimia), Streptococcus*
Cattle (6)	1/9	11%	2	*Mannheimia*

(Foreyt: 1982, 1989, 1990, 1994, 1996, 1998, 2009; Onderka1988; Besser2012&2016)

Death in BHS occurred between 8 days and 3 months

Could Movi come from somewhere else?

- Movi doesn’t survive well in the environment; it needs a live host to survive and be transmitted to other animals
- To date Movi has only been found to infect sheep and goat species
- Therefore, plausible sources of Movi include:
  - Wild or domestic small ruminants (sheep and goats)

How can the risk of Movi be reduced or eliminated?

- Current research: Can Movi be eliminated from infected sheep flocks or goat herds?
  - There is no vaccine for Movi and antibiotics are not effective at eliminating Movi
  - Promising methods for domestic sheep in current testing:
    - Test animals and cull or segregate carriers
    - Wean and segregated lambs by 8 weeks of age
  - Biosecurity required to prevent re-introduction

How can I minimize the risk of pathogen transmission between domestic sheep, domestic goats and bighorn sheep?

- Keeping domestic livestock and wild animals from commingling or sharing feed and water sources is a good practice.
- Work to prevent contact between bighorn sheep and domestic sheep or goats
- Tall fences reduce (but don’t totally eliminate) risk
  - Double fencing with a gap between the fences that keeps direct contact from occurring is more effective.
- Properly trained guard dogs may help
- If your animals stray, work to corral them and get them back home as quickly as possible
- Call your local FWP office if:
  - You see bighorns with or near your domestic sheep
  - Your animals stray and you need assistance

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