

# Bighorn Sheep & Domestic Sheep and Goats

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



# 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 Mov1 causes disease in bighorn sheep?

- Recent studies indicate Mov1 is a pathogen common to pneumonic bighorn sheep herds
- However, in some apparently healthy bighorn sheep herds Mov1 exposure has also been detected
- New pneumonia outbreaks have been documented after introduction of Mov1 into previously Mov1-free herds



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

# 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

# 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	<i>Mannheimia</i> , <i>Bibersteinia trehalosi</i> , <i>Movi</i> , <i>Arcanobacterium</i> , <i>Corynebacterium</i>
<i>Movi</i> -free Domestic sheep (4)	1/4	25%	1	<i>Mannheimia</i> , <i>Bibersteinia trehalosi</i> (@day 90)
Domestic Goat (13)	2/16	12.5%	4	<i>Mannheimia</i>
Horse (3)	1/6	17%	1	<i>Pasteurella (Mannheimia)</i> , <i>Streptococcus</i>
Cattle (6)	1/9	11%	2	<i>Mannheimia</i>

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

Death in BHS occurred between 8 days and 3 months

# Could Mov1 come from somewhere else?

- Mov1 doesn't survive well in the environment; it needs a live host to survive and be transmitted to other animals
- To date Mov1 has only been found to infect sheep and goat species
- Therefore, plausible sources of Mov1 include:
  - Wild or domestic small ruminants (sheep and goats)



# How can the risk of Movt be reduced or eliminated?

- Current research: Can Movt be eliminated from infected sheep flocks or goat herds?
  - There is no vaccine for Movt and antibiotics are not effective at eliminating Movt
  - 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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