



University of Calgary

 UNIVERSITY OF CALGARY
VETERINARY MEDICINE

Mycoplasma bovis – Associated Disease

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Mycoplasma bovis – Associated Disease

History of BRD and the veterinarian's role

History of BRD: M bovis

Polyarthritis





Mycoplasma bovis – Associated Disease

Chronic Pneumonia

Pathology

Questions Arising

Theories on Pathogenesis

Suggested Research

Questions



Mycoplasma bovis – Associated Disease

Classically, bovine respiratory disease was bacterial¹.



¹ Yates



Mycoplasma bovis – Associated Disease

Respiratory Disease of Yearling Feedlot Cattle in Colorado²

Condition	Necropsy Proportion
Pneumonia	41.1%
Bronchitis	1.6%
Diphtheria	8.0%
Acute Interstitial Pneumonia	5.3%
Brisket Disease	6.0%
Pulmonary Edema	1.0%
Embolic Pulmonary Aneurysm	1.0%

Based on 407,000 placed yearlings
3,943 dead cattle
1,988 necropsied

² Adapted from Jensen, et al 1976, JAVMA

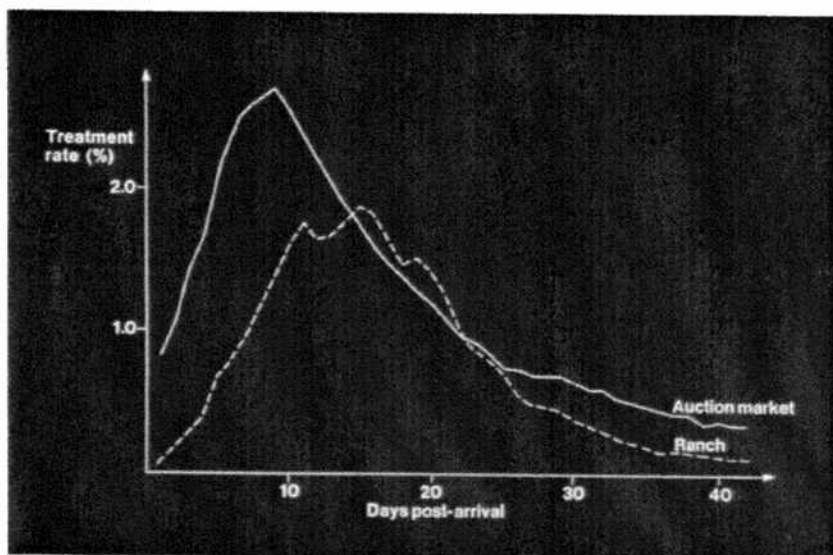


Mycoplasma bovis – Associated Disease

Video 1



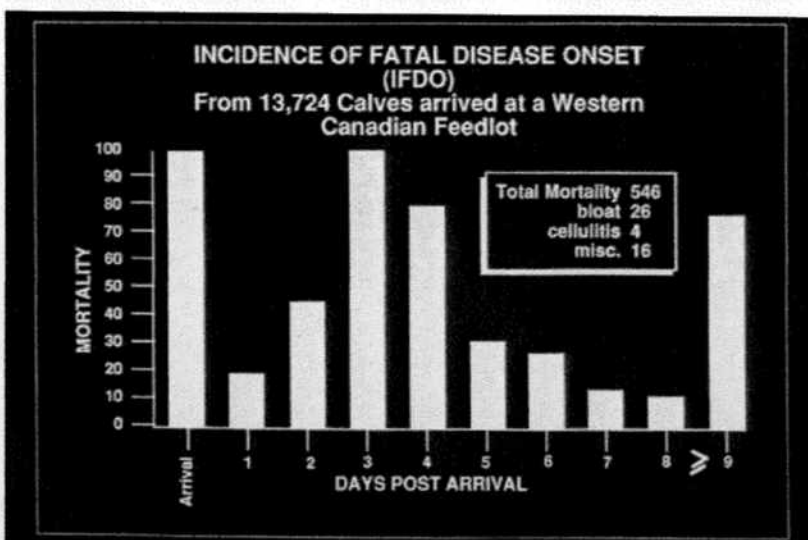
Bacterial Pneumonia; Epidemiological diagnosis



From Kelly ca 1985



Bacterial Pneumonia; Epidemiological diagnosis



From Harland ca 1987

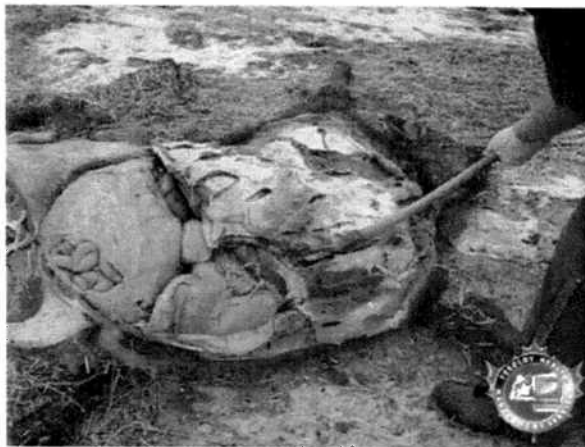


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Currently

- Necropsy examination has become a key skill for large animal practice.

Video 2



Mycoplasma bovis – Associated Disease

Example of Mortality by Presumptive Diagnosis for the 2006-2007 Feeding Year

Pneumonia:

Fibrinous Pneumonia	10
Broncho-pneumonia	6
Chronic Pneumonia	6
Viral Interstitial Pneumonia	5
Pneumonia (tentative)	4
Broncho-Interstitial Pneumonia	3
Embolic Pneumonia	2
AIP	2
Thoracic Neoplasia	1
Total	39 (0.22%)



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Example of Mortality by Presumptive Diagnosis for the 2006-2007 Feeding Year

Musculo-Skeletal

Polyarthritis	14
Arthritis	9
CPPS	7
Trauma	7
Cellulitis	3
Buller	2
Laminitis	1
Total	42 (0.24%)



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History

- *Mycoplasma spp.* have been implicated as feedlot pathogen since the 1980's²



² Jensen, Radosits, Adegboye, Gourlay, Martin



Mycoplasma bovis – Associated Disease

History

- “Outbreaks” of polyarthritis (without gross pathological findings of pneumonia) in feedlot calves in western Canada during the fall of 1986 (Radostits, 1988).
- Polyarthritis lesions attributed to *Mycoplasma spp.*
- Autogenous *Mycoplasma spp.* vaccines have had no significant effects on morbidity and mortality.



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Table 1. Morbidity summary by experimental group¹

	Experimental Group		
	P	V1	V2
Number of Animals	5,418	5,420	5,437
Initial BRD Treatment Rate	14.73%	15.55%	14.62%
First BRD Relapse Rate	27.94%	27.28%	25.41%
Second BRD Relapse Rate	37.67%	46.52%	37.62%
Third BRD Relapse Rate	45.24%	38.32%	43.42%
Initial Cripple Treatment Rate	0.59%	0.42%	0.33%

1. P = Placebo Group, V1 = Single Vaccine Group, V2 = Booster Vaccine Group

¹ From Feedlot Health Management Services, Okotoks, AB



Mycoplasma bovis – Associated Disease

Table 2. Mortality summary by experimental group¹

	Experimental Group		
	P	V1	V2
Number of Animals	5,418	5,420	5,437
Overall Mortality	1.57%	1.83%	1.62%
BRD Mortality	0.55%	0.57%	0.57%
Histophilosis Mortality	0.41%	0.54%	0.51%
Bloat Mortality	0.15%	0.09%	0.09%
Polyarthritis Mortality	0.13%	0.26%	0.18%
Miscellaneous Mortality	0.33%	0.37%	0.26%

1. P = Placebo Group, V1 = Single Vaccine Group, V2 = Booster Vaccine Group

¹ From Feedlot Health Management Services, Okotoks, AB



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History

- Sporadic polyarthritis outbreaks (population fatality rate of 0.25% – 0.75%) since 1986.



Mycoplasma bovis – Associated Disease

History

- Since 1995 recognition of a grossly recognizable lung lesion attributable to *Mycoplasma spp.*



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Undifferentiated Chronic Pneumonia and Polyarthritis in an Alberta Feedyard¹

Condition	Feeding Year		
	2005-2006	2006-2007	2007-2008
Chronic Pneumonia alone	0.17	0.15	0.07
Chronic Pneumonia and Polyarthritis syndrome	0.05	0.02	0.02
Total Population Percentage	0.22%	0.17%	0.09%

¹ Courtesy of Veterinary Agri-health Services, Airdrie, AB



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Polyarthrititis

■ **Progression of clinical disease.**

- Cases initially treated as Undifferentiated Fever (UF) or No Fever (NF)
- Joints become visibly enlarged
- Severe lameness ensues
- Become “poor-doers”
- Recumbency develops
- Euthanized



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Polyarthrititis; continued...

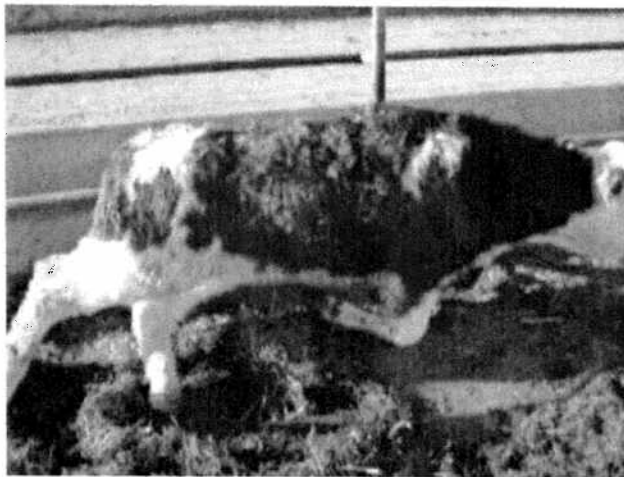
Video 3



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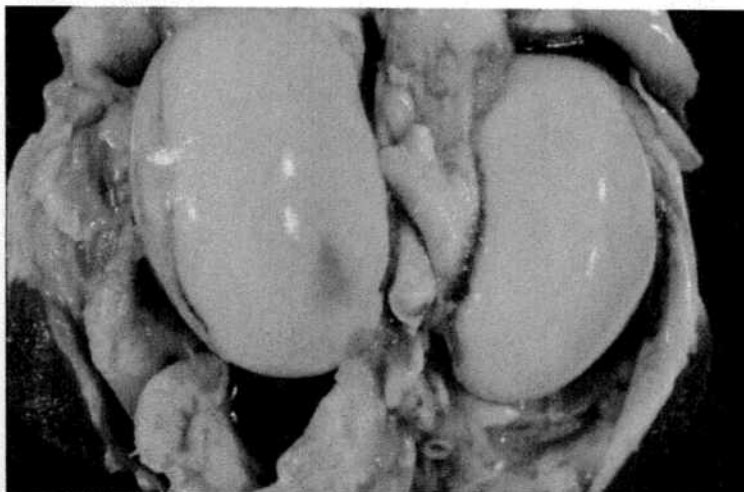
Polyarthritits; continued...

Video 4



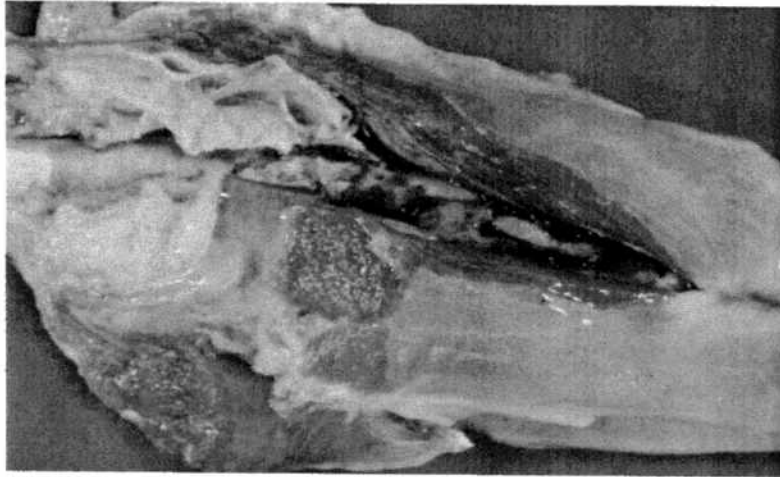
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Polyarthritits; gonitis most obvious



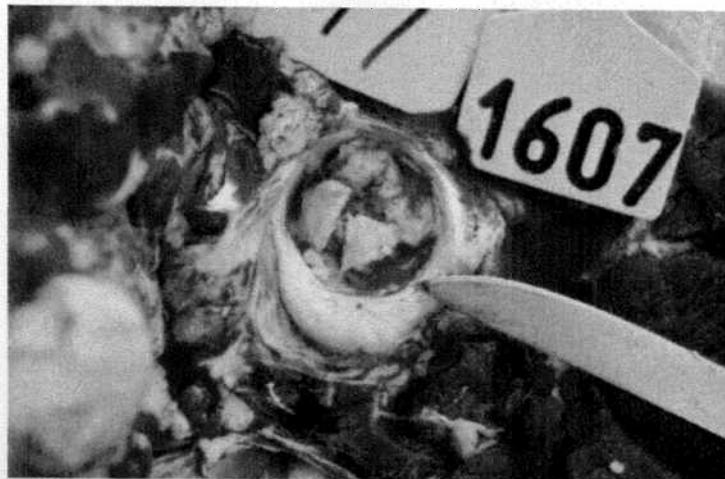
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Polyarthritits; tendon sheath involved



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Polyarthritits; coxo-femoral arthritis



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Polyarthrititis; continued...

■ **Pathology**

- Fibrinous synovitis
- Tenosynovitis
- Erosion of cartilage
- Osteomyelitis



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Chronic Pneumonia

■ **Clinical presentation**

- Extensive treatment for Sick on arrival, UF or NF
- Based on anorexia or “looking poor”
- Dying or euthanized in chronic pen 40 – 100 days on feed (DOF)
- May be “found dead” in “home” pen



Mycoplasma bovis – Associated Disease**Chronic Pneumonia;** continued...**■ Clinical Presentation (non-specific)**

- Not “sick” eg. no Leukotoxin causing a toxemia
- Auscultation reveals “thoracic dead space”
- Moderately febrile
- Tonsillar swab reveals diverse microbiology

**Mycoplasma bovis – Associated Disease****Chronic Pneumonia;** continued...

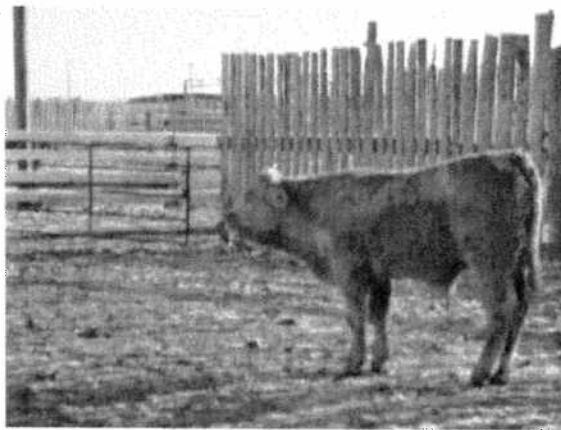
- Dyspnea may develop.

Video 5

Mycoplasma bovis – Associated Disease**Chronic Pneumonia;** continued...

- Coughing rarely is part of the presentation.

Video 6

**Mycoplasma bovis – Associated Disease****Chronic Pneumonia;** continued...

- **Pathology**
 - Chronic suppurative pneumonia
 - 60 – 80% of lung affected (Jensen)
 - Infection is mostly of mixed species (Haines, Janzen)

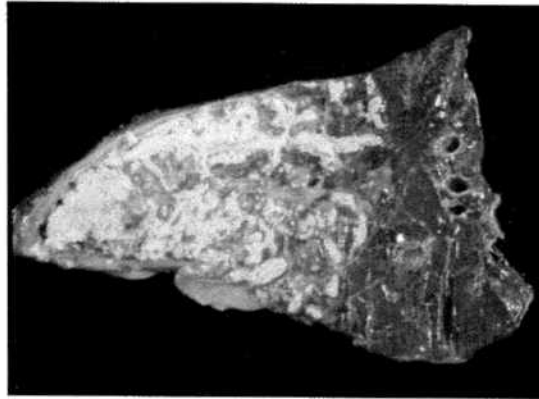


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Chronic Pneumonia; continued...

■ **Pathology**

Pathology here similar to an image published by Jensen.



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Fig. 5. Frontal section of the bronchopneumonic lobe of a bovine lung infected with Mycoplasma bovis. The image shows the characteristic features of chronic pneumonia, including consolidation, hyperemia, and thickening of the alveolar walls. (H&E, 100x)

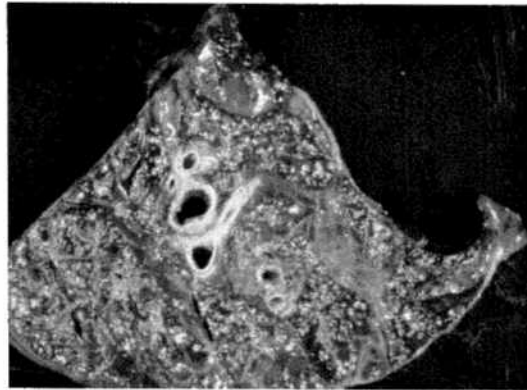
²Jensen, et al, 1976



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Question 1

Are *Mycoplasma spp.* primary pathogens or simply the “last pathogens remaining” – for pneumonia, arthritis or both?



Mycoplasma bovis – Associated Disease

Question 2

How much does *Mycoplasma bovis* – associated disease resemble the disease produced by *Mycoplasma mycoides mycoides*?



Contagious pleuro pneumonia

From Coetzer



Loss of pulmonary infrastructure with *M mycoides mycoides*.



Mycoplasma bovis – Associated Disease

Chronic Pneumonia; continued...



From Feedlot Health Management Services



Mycoplasma bovis – Associated Disease

Theories

1. The *Mycoplasma spp.* are increasing in pathogenicity.
2. Interaction with bovine diarrhea virus (BVDV) causes an increase in the pathogenicity of *Mycoplasma spp.* (Haines, 2001).
3. Enzootic Pneumonia in neonatal beef calves often has a "*Mycoplasma* component" to it.



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Theories

4. Controlling bacterial pneumonia with “new generation” antimicrobials increases the incidence/prevalence of *Mycoplasma spp.* pneumonia.
5. Is *M. bovis* a “complicator” of bacterial pneumonia or does *M. hemolytica* “complicate” a bronchiolitis initiated by *M. bovis*?



Mycoplasma bovis – Associated Disease

Primary research with *Mycoplasma spp.* in beef cattle. Respiratory disease is required.

- Pathogenesis of the *Mycoplasma bovis* – associated disease needs to be described.
- Large scale field trials with “new generation” vaccines.
- Can the ecology of the organism be influenced by management?



Mycoplasma bovis – Associated Disease

References

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Questions?

