

# Economics of *Mycoplasma bovis*

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## Economic costs attributed to *Mycoplasma bovis*

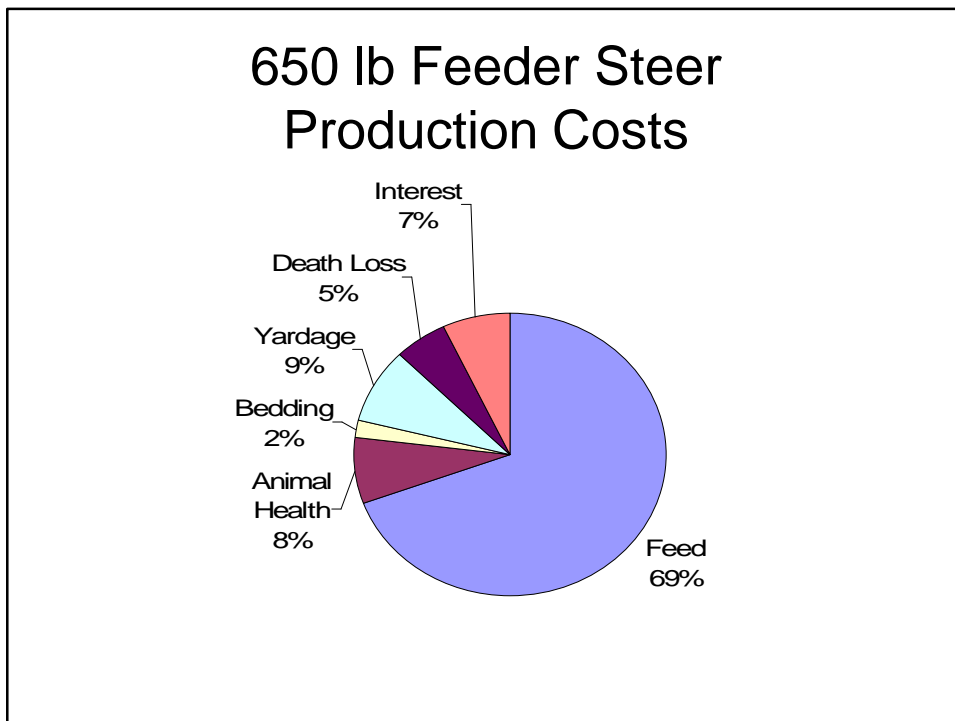
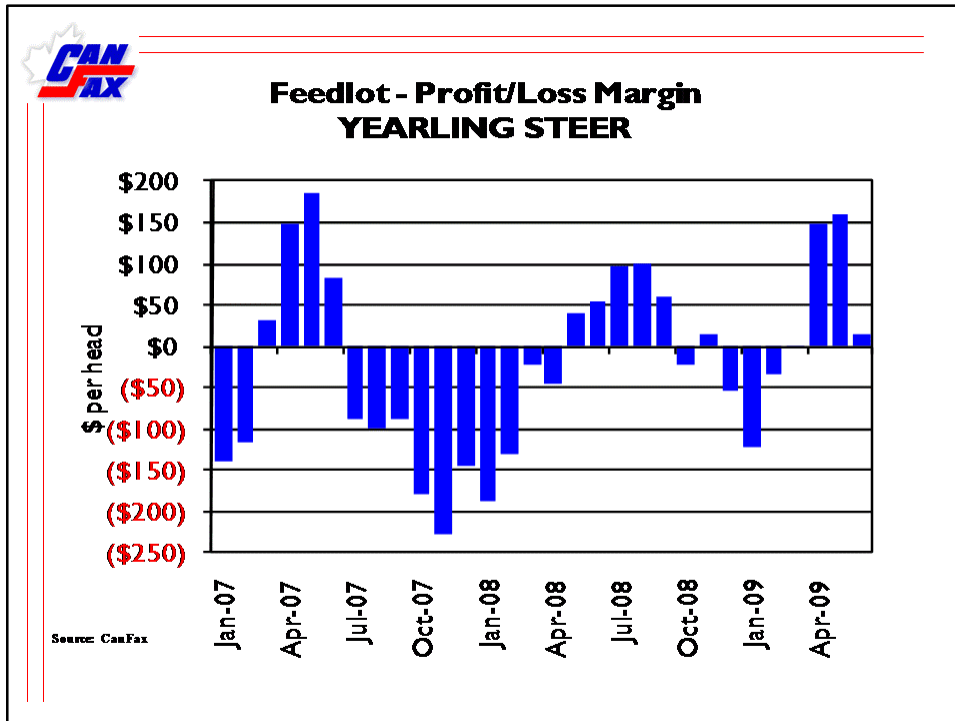
- Previously estimated to cost 144 million euros per year across Europe
  - Nicholas R, Baker S, Ayling R, Stipkovits L:  
Mycoplasma infections in growing cattle.  
Cattle Practice 8: 115-118, 2000.

## Economic costs attributed to *Mycoplasma bovis*

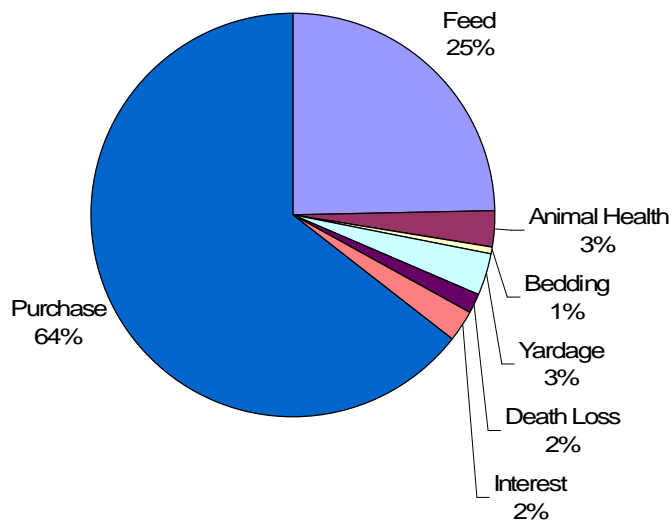
- In the USA, cost of *M. bovis* infections as a result of loss of weight gain and carcass value are estimated at \$32 million per year
- Losses due to bovine mastitis may be as high as \$108 million per year
  - Rosengarten R, Citti C: The role of ruminant mycoplasmas in systemic infection pp14-17, 1999.

## Feedlot Economics 101





## 650 Lb. Feeder Steer Production Costs Including Purchase Cost



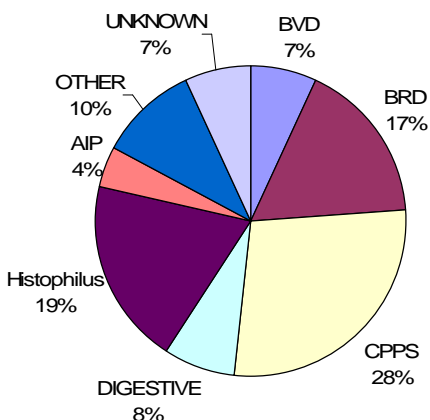
## Why is *Mycoplasma bovis* of economic importance to the cattle industry?

- Prevalence
- Associated with economically important disease conditions
- Production losses
- Chronicity
- Cost of treatment
- Case fatality rate

## Prevalence of Chronic Pneumonia/Polyarthritis Mortalities in Feedlot Calves

- 1998 Data (Metaphylaxis with oxytetracycline/tilmicosin)
- Overall mortality 1.82%
- CPPS in Fall placed calves 0.4% of population
  - Pollock, Campbell, Janzen et al
- 2008 Data (Metaphylaxis with tulathromycin)
- Overall mortality 1.2%
- CPPS in Fall placed calves 0.17% of population
  - (Jelinski, Dorin, Veterinary Agri Health, personal communication)

## Causes of mortality based on gross necropsy in 3 Sask. feedlots (n=277)



Mycoplasma bovis is a component cause of the two most important production limiting diseases of the beef and dairy industry

- RESPIRATORY DISEASE
- MASTITIS

## Bovine Respiratory Disease

- Most important disease of feedlot cattle
  - Kelly and Janzen, 1986; Smith, 2000
- Causes mortality, reduced ADG, increased days on feed, poor carcass quality
  - Wittum et al, 1996; Gardner et al, 1999
- Presence of subclinical lesions at slaughter is a predictor of decreased ADG
  - Wittum et al, 1996; Bryant et al, 1999

## Effects of BRD on production

- Lesions at slaughter associated with reduced ADG, increased days on feed
- Hidden costs of reduced growth rates due to BRD amounted to \$3.41 per calf with clinical or subclinical BRD
  - Thompson et al, 2006

## Costs associated with *M. bovis* in dairy herds

- 1-8% of herds have at least one cow with *Mycoplasma mastitis* (Fox et al, 2004)
- Milk production losses
  - Are there subclinical losses?
- Culling of cows
- Respiratory disease in young calves
  - Mortality
  - Morbidity
- Treatment costs

## Raising dairy heifers is a significant economic cost

- 3<sup>rd</sup> highest expense after feed and labour
- Approximate costs of \$1700-\$1900/heifer in ODFAP study (2000)
- Dependent on value of labour
- Mortality rates are often between 8-11% (Godden)



## Respiratory disease in dairy calves and production losses

- Large number of studies
  - (Waltner-Toews et al, 1986)
  - (Van Donkersgoed et al, 1993)
  - (Warnick et al, 1994, 1995, 1997)
- Higher mortality in calves experiencing BRD
- Premature culling
- Dystocia at first calving
- Lower milk production during first lactation
- Longevity after first calving



What proportion of BRD cases  
which recover can be attributed to  
*Mycoplasma bovis*?

- Very difficult question to answer
- Most cases of BRD do not have extensive diagnostics performed
- Chronic cases are easier to clinically differentiate as potential *Mycoplasma bovis* diagnoses
- Is it in the same proportions as seen in the mortalities?
- Seroepidemiological evidence is not clear

## Prevalence of *M. bovis*

- Organism is isolated frequently from calves
  - Found in normal and pneumonic lungs
- Allen et al, Can J Vet Res 1992:
  - Nasopharyngeal swabs and BA lavage from 59 BRD cases and 60 control calves entering an Ontario research feedlot
  - When a BRD case was selected, the case and a control calf would be sampled and then subsequently followed up with other samples

## Prevalence of *M. bovis* in feedlot calves

	Nasopharyngeal Samples		BAL Samples	
	Cases	Controls	Cases	Controls
Day 1	80%	40%	60%	48%
Day 12	98%	92%	100%	80%

Allen et al, Can J Vet Res 1992

## Seroepidemiological evidence in Feedlot Cattle

- Rosendal and Martin, Can J Vet Res, 1986
- 322 heifers and steers from 5 Ontario feedlots
- Serum taken at arrival and 28 days later
- Titers to *M. bovis* increased at all 5 locations
- *Mycoplasma dispar* titers were significantly associated with a higher risk of treatment for BRD

## Seroepidemiological evidence

- Martin et al, Can J Vet Res 1989
- Prevalence of titers to *M. bovis* at arrival to feedlot was approximately 70%
- Approximately 45% of calves seroconverted to *M. bovis* by day 28
- Cases had significantly higher titers at arrival
- Concluded that there was a lack of evidence to support an etiological role for *M. bovis*

## Seroepidemiological evidence

- Martin et al, Can Vet J; 1999
- Case control study sampling feedlot calves in Alberta and Ontario
- 5% of calves were seropositive for *M. bovis* at arrival
- Only 14% of calves seroconverted to *M. bovis*
- Suggested *M. bovis* was not widespread and not associated with BRD

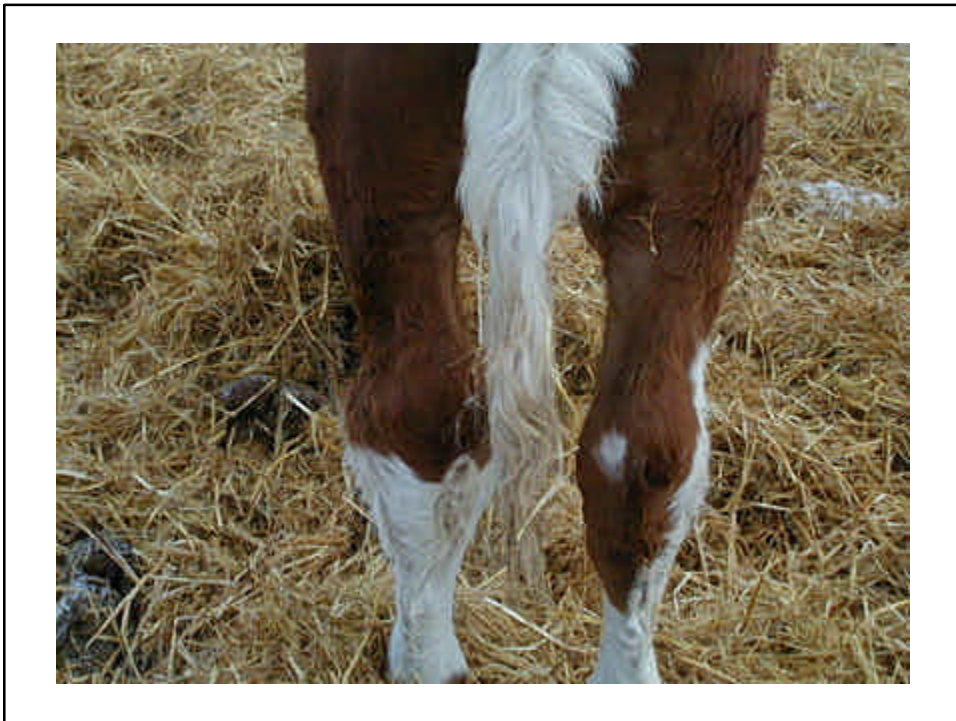
## Seroepidemiological evidence

- Booker et al, Can Vet J 1999
- 100 UF cases and 100 controls
- Bled at arrival, selection and day 33
- Quartiles and median titers reported only
- *M. bovis* and *M. alkalescens* titers were common at arrival and there was significant seroconversion by day 33
- *Mycoplasma alkalescens* was associated with an increased risk of morbidity



## Chronicity and Treatment Costs

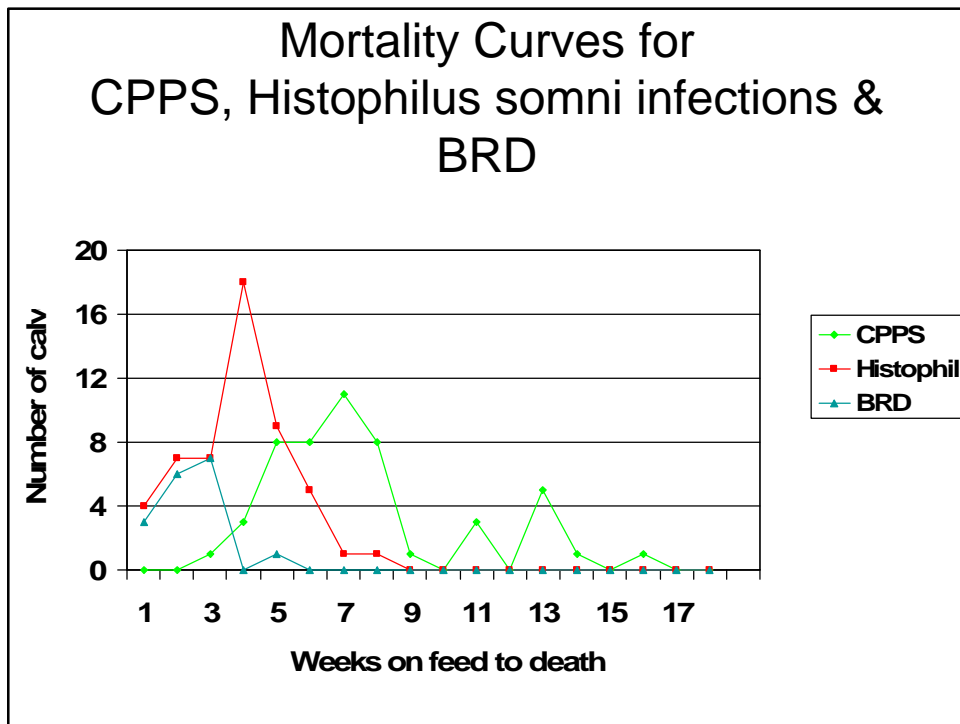
- Chronic nature of *Mycoplasma bovis* infections
- Many animals have multiple treatments with antibiotics prior to either entering chronic pen or dying
- Significant money invested in treatment often even prior to diagnosis of *Mycoplasma bovis*
- Most do not respond to conventional treatment
- There is often \$100.00 or more invested in animal health costs in these animals prior to death
- Animals that survive are “behind” their penmates






### Mean weight difference between 'chronic' calves and home pen

Final outcome category	#	Mean wt diff (kg) entering convalescent pen (+/- SD)	Mean # days in convalescent pen (+/- SD)	Mean wt diff (kg) exiting convalescent pen (+/- SD)
Returned to home pen	94	-54.2 (25.0) <sup>a</sup>	30 (15) <sup>b</sup>	-57.8 (32.5) <sup>d</sup>
Died or euthanized	62	-58.6 (22.8) <sup>a</sup>	15 (16) <sup>c</sup>	-85.5 (30.9) <sup>e</sup>
		P = 0.283	P < 0.001	P < 0.001



## Order of Magnitude Estimates



**How many piano tuners are there in Saskatoon?**

## A “order of magnitude” economic calculation

- 600 lb fall placed calves (moderate-high risk)
- Tulathromycin metaphylaxis (\$25/hd)
- 8% pull rate (\$23/hd)
- 15% first relapse rate (\$23/hd)
- 20% 2<sup>nd</sup> relapse rate (\$23/hd)
- 90% M. bovis cases in chronic pen
- 80% case fatality rate in chronic pen
- Salvage value of 50% of normal animal

## 2009 Canadian dollars

- Average of a minimum of \$100.00 expended per case of M. bovis on treatment costs/animal health
- A conservative estimate of approximately \$20,000 in expenses due to Mycoplasma bovis CPPS cases in a 10,000 head feedlot
- Note: Losses associated with mortality and loss in value of salvageable chronics
- Subclinical production losses???

## Conclusions

- *Mycoplasma bovis* is a component cause of some of the most important economic diseases in beef and dairy cattle
- The high case fatality rate, increases in culling, production losses, chronicity and high treatment costs all contribute to significant losses
- It is probable that metaphylaxis with tulathromycin has reduced some of those losses
- Don't forget the big picture! Purchase costs and feed costs drive economics in the feedlot!

