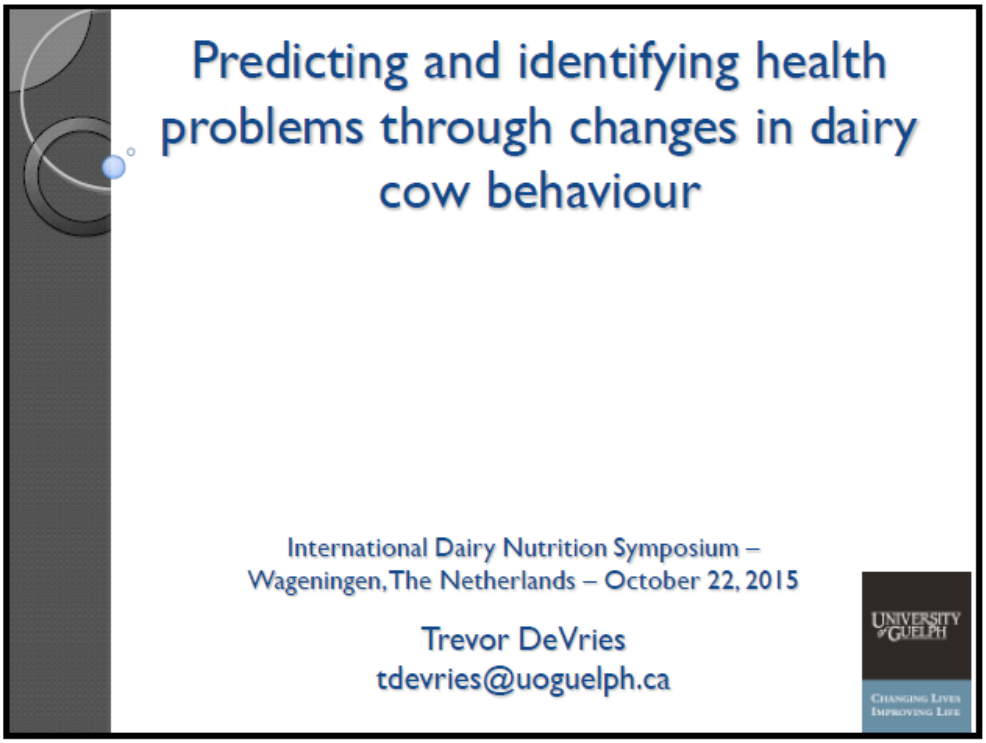
Trevor DeVries

Dr. Trevor DeVries is an Associate Professor in the Department of Animal and Poultry Science at the University of Guelph. Trevor received his B.Sc. in Agriculture from The University of British Columbia (UBC) in 2001. Immediately following he began graduate studies at UBC, focusing his research on dairy cow behavior welfare. After receiving his Ph.D. in 2006, he worked for one year as a post-doctoral researcher at Agriculture and Agri-Food Canada, focusing his research on ruminant nutrition. In 2007 he was appointed as faculty with the University of Guelph. In his current position Trevor is involved in research and teaching in the areas of dairy cattle nutrition, management, behavior, and welfare. Trevor's current research projects include understanding impact of nutrition and feeding management on behavior of dairy cattle and the effects of housing and management on the behavioral patterns and risk of illness in dairy cows.



Trevor DeVries - Predicting and identifying health problems through changes in dairy cow behaviour

Predicting and identifying health problems through changes in dairy cow behaviour

International Dairy Nutrition Symposium – Wageningen, The Netherlands – October 22, 2015

Trevor DeVries
tdevries@uoguelph.ca

Behaviour and detection of disease

- Monitoring behaviour over time may have utility in predicting and identifying health concerns in dairy cattle as well as factors that may cause health problems

Sickness behaviour

- Abnormal feeding and drinking behaviour and decreased activity are indicative of general malaise

Predictive value of behaviour

- Some behavioural patterns may have predictive value in identifying risk of various health disorders

Predictive value of behaviour

- Some behavioural patterns may have predictive value in identifying risk of various health disorders
  - We can often identify environmental (housing, feeding, and management) factors which may influence the expression of that behaviour

So….some behaviours may then…

- Be used to identify something wrong with the animal
  - Use to identify need for treatment
- Indicate a problem in the environment
  - Use to identify need to make changes

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What are we going to look at today?

- Examples of behaviour and health issues related to nutrition and nutritional management
  - Sub-acute ruminal acidosis
  - Subclinical ketosis
  - Mastitis

Sub-acute ruminal acidosis (SARA)

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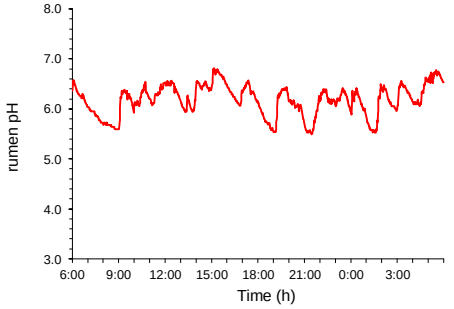
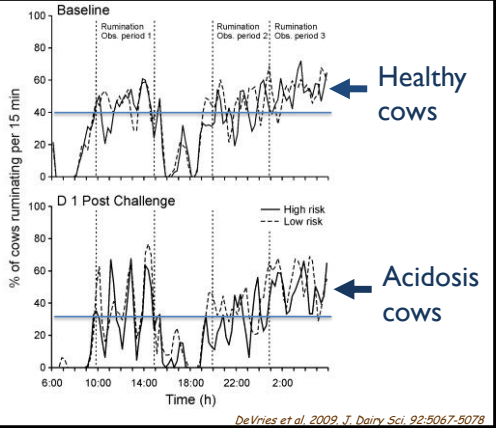


Data from Dohme et al. 2008 J. Dairy Sci. 91:3554-3567

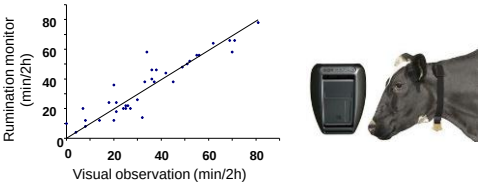
Sub-acute ruminal acidosis (SARA)

- No clinical signs, difficult to diagnose
  - Fluctuating feed intake
  - Reduced digestibility
  - Loose manure
  - Low milk fat
  - Laminitis
  - Decreased rumination?



DeVries et al. 2009. J. Dairy Sci. 92:5067-5078

We need automation to properly detect changes in this behaviour!



Schirmann et al., 2009. J. Dairy Sci. 92: 6052-6055.

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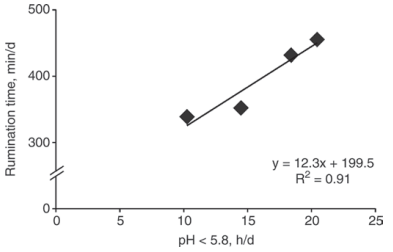
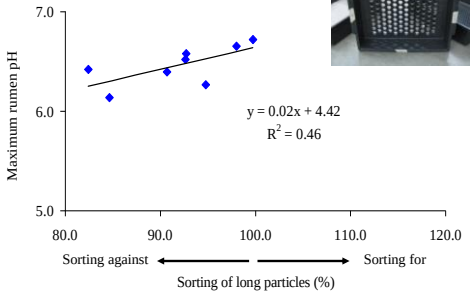
Rumination behaviour may also change in the opposite direction response to sub-acute ruminal acidosis…



DeVries et al. 2009. J. Dairy Sci. 92:5067-5078

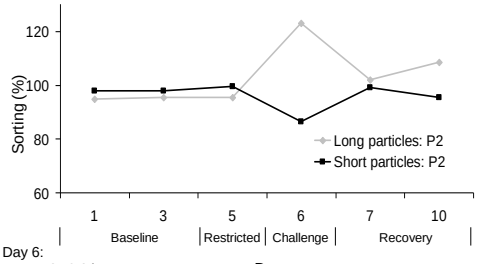
Another behaviour linked to ruminal acidosis is feed sorting…

More sorting against long particles = greater risk of SARA



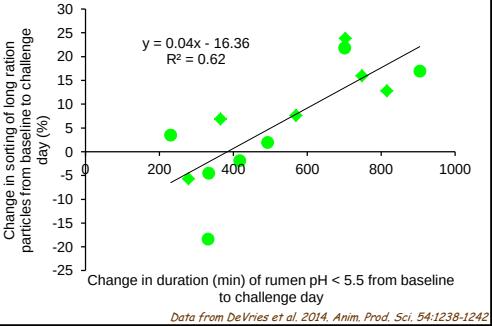
DeVries et al. 2008 J. Dairy Sci. 91:3958-3967

BUT…we also know dairy cows will alter sorting behaviour in response to a more severe bout of ruminal acidosis



DeVries et al. 2008 J. Dairy Sci. 91:3958-3967

Longer duration of rumen pH < 5.5 associated with more sorting for long and medium ration particles



Data from DeVries et al. 2014. Anim. Prod. Sci. 54:1238-1242

What else can monitoring sorting tell us?

- Dairy cows will select a diet to reduce effects of low rumen pH
  - Long alfalfa over pelleted alfalfa (Keunen et al., 2002)
  - Long forage particles (Beauchemin and Yang, 2005; Yang and Beauchemin, 2006; DeVries et al., 2008)
  - Sodium bicarbonate (Cooper et al., 1996; Phy and Provenza, 1998)

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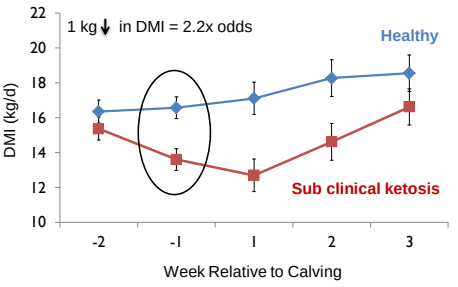
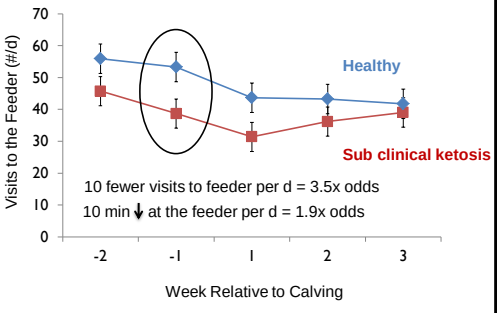
Subclinical ketosis

Cows with subclinical ketosis ate less in the week before and 2 wk after calving



Goldhawk et al., 2009. J. Dairy Sci. 92:4971-4977

Cows with subclinical ketosis had fewer visits to the feeder in the weeks prior to calving

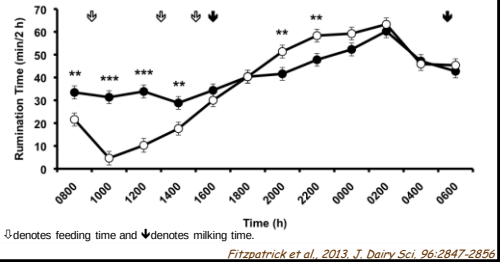


Goldhawk et al., 2009. J. Dairy Sci. 92:4971-4977

Mastitis

Reduced rumination and clinical mastitis!

Rumination minutes between baseline (●), and day of endotoxin challenge (○)



⇩denotes feeding time and ↓denotes milking time.

Fitzpatrick et al., 2013. J. Dairy Sci. 96:2847-2856

Behavioural patterns and risk of mastitis

- Environment is a potential risk factor for acquiring infection
  - environmental bacteria
- Standing and lying behaviour patterns have potential to influence the risk of such infections

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Behavioural patterns and mastitis

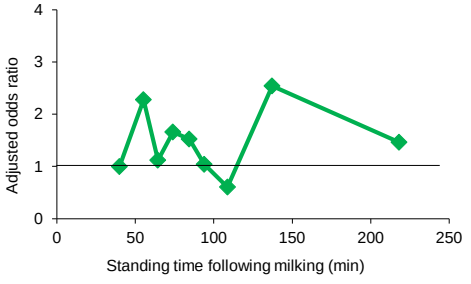
- Theory….the longer cows stand following milking, the more time the teat canal has to close, less chance of infection

Lying behaviour patterns and risk of subclinical mastitis

- Series of studies…
  - Tie stall housed cows
  - Free stall housed…
    - Robotic and parlour milked
- Standing time after milking
  - Median = 55-80 min

DeVries et al, 2010, J. Dairy Sci, 93:1987-1997
DeVries et al, 2011, J. Dairy Sci, 94 :3845-3855
Watters et al, 2014, J. Dairy Sci, 97 :3456-3471

Subclinical mastitis risk - 3x/d milked cows



Watters et al, 2014, J. Dairy Sci, 97 :3456-3471

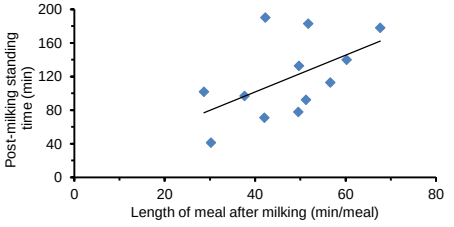
Identifying cows at risk for subclinical mastitis…

- Greater risk in…
  - Those that lay down immediately after milking (within 30-60 min)
    - Longer for 3x milked cows
  - Those that wait for extended periods of time (2 hours and beyond) following milking prior to lying down

DeVries et al, 2010, J. Dairy Sci, 93:1987-1997
DeVries et al, 2011, J. Dairy Sci, 94 :3845-3855
Watters et al, 2014, J. Dairy Sci, 97 :3456-3471

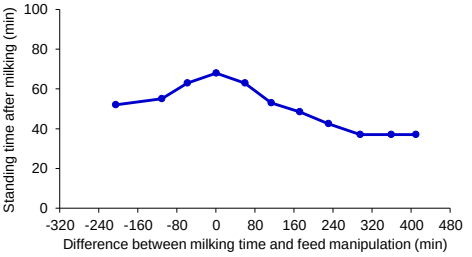
How do we reduce this risk…

- Ensure cows have a stimulus to stay on their feet after milking



Data adapted from Hart et al, 2014, J. Dairy Sci, 97:1713-1724

Effect of feed manipulation on standing time after milking



DeVries et al, 2011, J. Dairy Sci, 94 :3845-3855

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Take home messages…

- Behaviour can be used to identify dairy cattle experiencing, or at risk for, illness
  - Important to watch cows!
  - Visual detection of changes in behaviour is sometimes difficult
    - But…technologies do exist to help monitor behaviour!

Take home messages…

- Behaviour can be used to identify dairy cattle experiencing, or at risk for, illness
  - Changes in a behaviour do not always identify the problem
  - Housing and management changes can be made to change these behavioural patterns and reduce risk

QUESTIONS???

Thank you to NSERC, Dairy Farmers of Canada, Agriculture and Agri-Food Canada, the Canadian Dairy Commission, Dairy Farmers of Ontario, the Investment Agriculture Foundation of British Columbia, the Canadian Bovine Mastitis Research Network, the Ontario Ministry of Agriculture, Food, and Rural Affairs, the University of Guelph, and the University of British Columbia Animal Welfare Program for their financial support of this research.