

Postpartum Uterine Diseases in Dairy Cows: Management in Daily Practice

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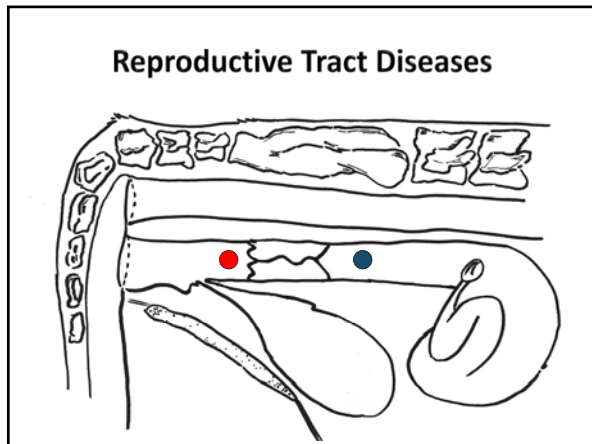
Learning Objectives

- ▶ To update on recent research results
- ▶ To present strategies for managing reproductive tract diseases in daily practice

- ▶ At the end of this presentation, veterinarians should better understand postpartum reproductive tract diseases and know how to manage them at the cow and herd level

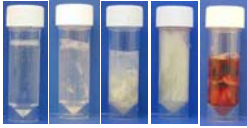
Outline of this presentation

- ▶ Review of key concepts about postpartum reproductive tract diseases
- ▶ Results from a recent research project
 - Herd-level prevalence
- ▶ Management in daily practice
- ▶ Case study (if time allows)



Reproductive Tract Diseases


- ▶ Clinical endometritis (CLIN; ≥ 21 DIM)
 - Mucopurulent or purulent vaginal discharge
 - Cervical diameter > 7.5 cm
- Diagnostic tools
 - Metricheck
 - Vaginoscope
 - Gloved hand



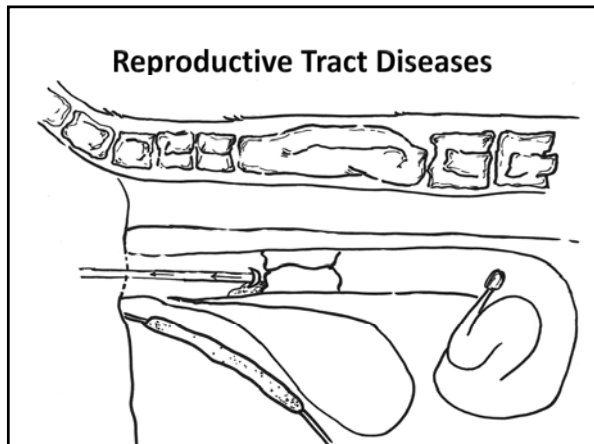
LeBlanc et al., 2002; Sheldon, 2004; McDougall et al., 2007

Reproductive Tract Diseases

- ▶ Clinical endometritis (CLIN; ≥ 21 DIM)
 - Metricheck

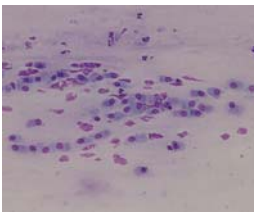


McDougall et al., 2007



Reproductive Tract Diseases

- ▶ Cytological endometritis (CYTO; ≥ 21 DIM)
 - Increased proportion of neutrophils (PMN) in endometrial cytology
 - Diagnostic tools
 - Cytobrush
 - Low-volume uterine lavage
 - Biopsy

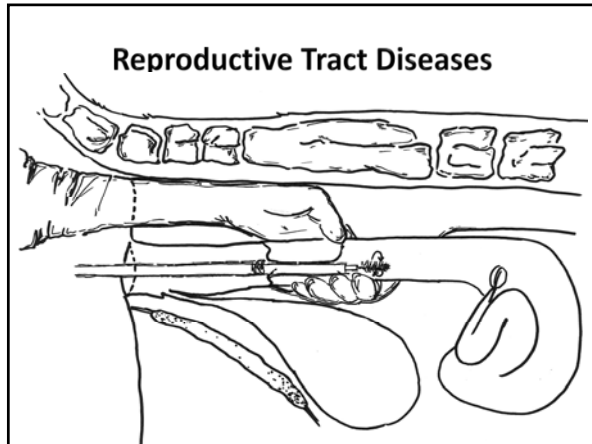


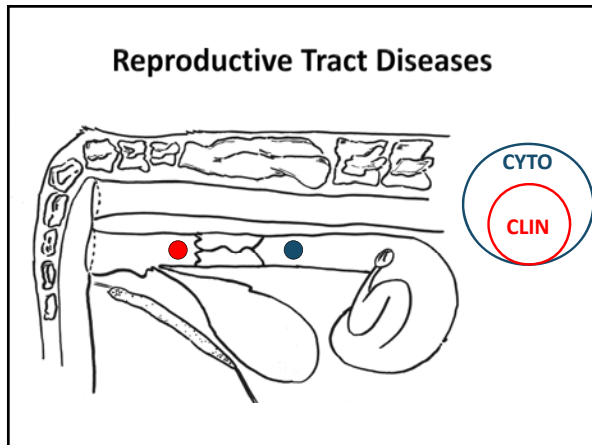
Gilbert et al., 2005; Kasimanickam et al., 2005

Reproductive Tract Diseases

- ▶ Cytological endometritis (CYTO; ≥ 21 DIM)
 - Cytobrush

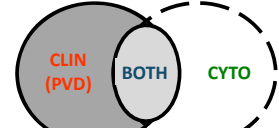







Reproductive Tract Diseases

- ▶ CYTO & CLIN are different
 - Poor agreement
 - Different risk factors
 - Additive effects on reproduction
- ▶ Terminology: CLIN ≠ endometritis
 - Suggest the use of purulent vaginal discharge (PVD)




Reproductive Tract Diseases

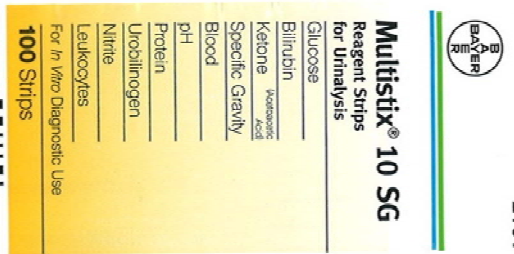


- ▶ Leukocyte esterase (LE) testing
 - Collection of endometrial cytology sample
 - Insertion of the cytobrush into a glass vial containing 1 mL of 0.9% saline + removal of the tip of the brush
 - Shaking the vial for 10 seconds
 - Putting a drop of solution on LE strip (Multistix 10)
 - Read color change after 2 minutes

Reproductive Tract Diseases



- ▶ LE testing
 - Score:
 - 0 = negative
 - 0.5=trace of leukocytes
 - 1=small amount of leukocytes
 - 2=moderate amount
 - 3=large amount



Multistix® 10 SG
 Reagent Strips for Urinalysis

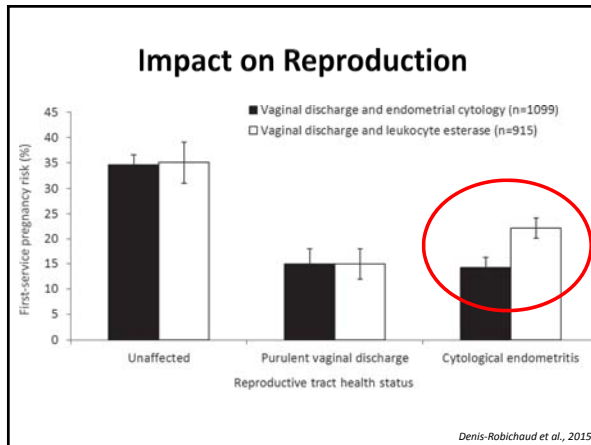
100 Strips For In Vitro Diagnostic Use

TESTS AND READING TIME	NEGATIVE	TRACE	SMALL +	MODERATE ++	LARGE +++
LEUKOCYTES 2 minutes	[Color swatch]	[Color swatch]	[Color swatch]	[Color swatch]	[Color swatch]

Optimal Diagnostic Criteria

- ▶ Optimal combination at 35 DIM
 - PVD & CYTO
 - Purulent vaginal discharge and $\geq 6\%$ PMN
 - PVD & LE
 - Purulent vaginal discharge and ≥ 1 (small amounts of leukocytes)

Denis-Robichaud et al., 2015



LE as a proxy for CYTO?

- ▶ Kappa (LE vs. CYTO) = 0.43
- ▶ CYTO and LE associated with poorer subsequent reproductive performance
- ▶ LE does not provide the exact same information than CYTO
- ▶ However, the combination of PVD & LE provide similar predictive values for reproduction when compared to PVD & CYTO

Denis-Robichaud et al., 2015

Efficacy of intrauterine cephalosporin (PVD-CYTO)

- ▶ Treatment improves first service pregnancy risk
 - PVD ($\approx + 15$ percentage points)
 - CYTO ($\approx + 10$ percentage points)
- ▶ The benefit of treatment is of greater magnitude in ovular cows compared to anovular cows

Denis-Robichaud et al., 2015

Efficacy of intrauterine cephalosporin (PVD-LE)

- ▶ Results very similar to PVD-CYTO
- ▶ Treatment improves first service preg risk
 - PVD ($\approx + 17$ percentage points)
 - LE ($\approx + 12$ percentage points)
- ▶ The benefit of treatment is of greater magnitude in ovular cows compared to anovular cows

Denis-Robichaud et al., 2015

**Research Project on Prevalence of
Reproductive Tract diseases**

Research Project

- ▶ Cow level: postpartum diseases are associated with herd reproductive performance
 - Hyperketonemia / PVD / CYTO / LE
 - Prolonged anovulation
- ▶ Herd level: Is the prevalence of these diseases associated with herd reproductive performance?

What is the acceptable prevalence of these diseases?

Dubuc and Denis-Robichaud, 2017

Research Project

- ▶ To quantify herd-level prevalence of hyperketonemia, PVD, CYTO, LE, and prolonged anovulation in dairy herds
- ▶ To determine the optimal herd-level prevalence associated with poor reproductive performance at first service

Dubuc and Denis-Robichaud, 2017


Materials & Methods

- ▶ Herd-level study
 - Observational study design
 - 126 dairy herds from Québec, Canada
 - Convenient sampling (135 herds eligible and invited)
 - Double-ovsynch protocol at first service
 - Farm visits
 - Every 14 days
 - 20 cows enrolled per herd at calving

Dubuc and Denis-Robichaud, 2017

Materials & Methods

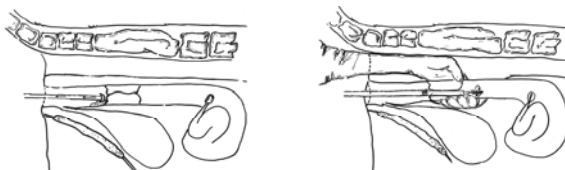
- ▶ Data collection at 1-14 DIM
 - Hyperketonemia
 - Blood BHB value ≥ 1.4 mmol/L



Dubuc and Denis-Robichaud, 2017

Materials & Methods


- ▶ Data collection at 30-43 DIM
 - PVD, CYTO, LE
 - Diagnostic criteria established in Project #2



Dubuc and Denis-Robichaud, 2017

Materials & Methods

- ▶ Data collection
 - Progesteronemia at 35 and 49 DIM
 - Prolonged anovulation: < 1 ng/mL at both tests
 - Success at first breeding
 - Transrectal palpation 33-46 days after breeding



Dubuc and Denis-Robichaud, 2017

Results – Median prevalence

- ▶ 126 herds enrolled (2,520 cows)
 - Hyperketonemia: 19 % (min-max: 4-75 %)
 - PVD: 10 % (min-max: 5-60 %) → criteria is mucopurulent or +
 - PVD: 5 % (min-max: 0-45 %) → criteria is mucopurulent or +
 - CYTO: 29 % (min-max: 5-80 %)
 - LE: 44 % (min-max: 0-80 %)
 - Prolonged anovulation: 35 % (min-max: 5-85 %)
- Success at first breeding: 40 % (min-max: 5-63 %)
 - **Poor success at herd level defined as < 40 %**

Dubuc and Denis-Robichaud, 2017

Results – Associations

- ▶ **Hyperketonemia prevalence vs. poor reproduction**
 - Herds with ≥ 12 % prevalence of hyperketonemia had 1.5 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
 - **Optimal prevalence of PVD < 12 %**
 - Updated data (previous reports were < 20 %)

Dubuc and Denis-Robichaud, 2017

Results – Associations

- ▶ **PVD prevalence vs. poor reproduction**
 - Herds with ≥ 10 % prevalence of PVD ([mucopurulent of worse](#)) had 2.0 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
 - **Optimal prevalence of PVD < 10 %**
 - Novel data

Dubuc and Denis-Robichaud, 2017

Results – Associations

▶ **PVD prevalence vs. poor reproduction**

- Herds with $\geq 5\%$ prevalence of PVD (**purulent of worse**) had 2.1 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
- **Optimal prevalence of PVD $< 5\%$**
 - Novel data

Dubuc and Denis-Robichaud, 2017

Results – Associations

▶ **CYTO prevalence vs. poor reproduction**

- Herds with $\geq 19\%$ prevalence of CYTO had 2.8 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
- **Optimal prevalence of CYTO $< 19\%$**
 - Novel data

Dubuc and Denis-Robichaud, 2017

Results – Associations

▶ **LE prevalence vs. poor reproduction**

- Herds with $\geq 35\%$ prevalence of LE had 2.6 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
- **Optimal prevalence of LE $< 35\%$**
 - Novel data

Dubuc and Denis-Robichaud, 2017

Results – Associations

▶ **Anovulation prevalence vs. poor reproduction**

- Herds with $\geq 21\%$ prevalence of anovulation at 50 DIM had 3.2 times the odds of having poor success at first breeding than herds with lower prevalence ($P < 0.01$)
- **Optimal prevalence of anovulation $< 21\%$**
 - Novel data

Dubuc and Denis-Robichaud, 2017

Management in Daily Practice

Management in Daily Practice

- ▶ On-farm systematic disease surveillance
- Disease with a significant impact
 - On-farm diagnostic test is available
 - Test provides immediate on-farm results
 - Cost of test is affordable
 - Treatment decision can be made directly on farm
 - Treatment has a proven efficacy

Management in Daily Practice

- ▶ On-farm systematic disease surveillance
 - PVD surveillance is easy to implement
 - The combination of PVD and LE would be better
 - The combination of PVD and CYTO is ideal (research)
- Such surveillance can be useful at the cow and at the herd level
 - Cow level: To find diseased cows and treat them...
 - Herd level: To quantify herd disease prevalence and determine if it's too high...

Management in Daily Practice

- ▶ PVD surveillance
 - Detrimental impact on reproductive performance
 - Dx: Mucopurulent or purulent vaginal discharge
 - Prevalence should be < 10 % at 35 DIM
 - Can be up to 60% in some herds
 - Affected cows take 36 days longer (median) to become pregnant
 - Considering \$3 per day open: \$108 per case
 - 100-cow dairy= up to \$5940 per year

LeBlanc et al., 2002; McDougall et al., 2007; Pleticha et al., 2009; Dubuc et al., 2010, 2016

Management in Daily Practice

- ▶ PVD surveillance
 - Diagnosis
 - Vaginoscope
 - Metrichick
 - Gloved hand
 - Provide similar results
 - Transrectal palpation is inaccurate

LeBlanc et al., 2002; McDougall et al., 2007; Pleticha et al., 2009

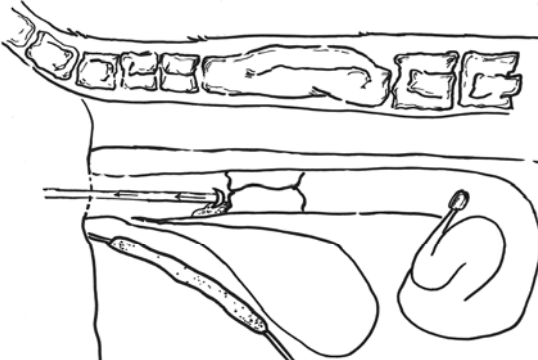
Management in Daily Practice



<http://www.simcro.com/contact.html>

McDougall et al., 2007

Management in Daily Practice



Management in Daily Practice



Sheldon, 2004

Management in Daily Practice

- ▶ PVD treatment strategies
 - Treatment: PGF
 - Beneficial for synchronizing estrus
 - Conflicting data for treating PVD
 - Treatment: Intrauterine cephalixin
 - Multiple studies show its efficacy to reduce PVD impact on reproduction

LeBlanc et al., 2002; McDougall et al. 2003; Runciman et al., 2008; Denis-Robichaud et al., 2015

Management in Daily Practice

- ▶ CYTO surveillance
 - Detrimental impact on reproductive performance
 - Dx: $\geq 6\%$ neutrophils in cytology sample
 - Prevalence should be $< 19\%$ at 35 DIM
 - Can be up to 80% in some farms
 - Affected cows take 24 days longer (median) to become pregnant
 - Considering \$3 per day open: \$72 per case
 - 100-cow dairy= up to \$5760 per year

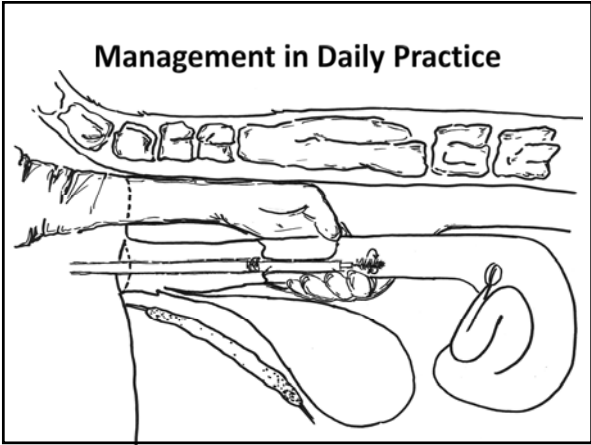
Gilbert et al., 2005; Galvão et al., 2009; Dubuc et al., 2010

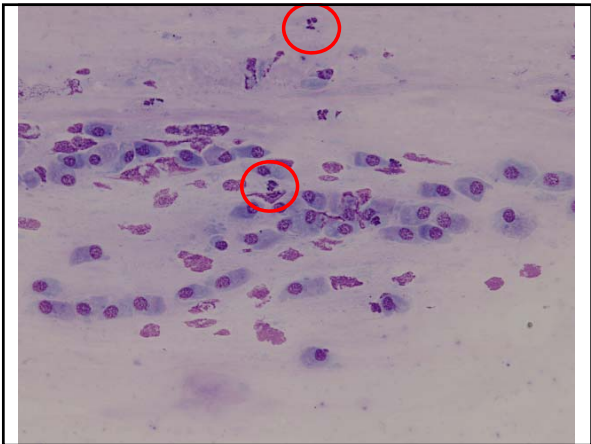
Management in Daily Practice

- ▶ CYTO surveillance
 - Diagnosis
 - Cytobrush
 - Low-volume uterine lavage
 - Biopsy
 - These techniques provide similar results
 - However, these techniques do not provide immediate on-farm results

Kasimanickam et al., 2004, 2005; Gilbert et al., 2005







Management in Daily Practice

- ▶ CYTO treatment strategies
 - Treatment: PGF
 - Beneficial for synchronizing estrus
 - Conflicting data for treating CYTO
 - Treatment: Intrauterine cephalixin
 - Two studies show its efficacy to reduce PVD impact on reproduction

Kasimanickam et al., 2005; Denis-Robichaud et al., 2015

Management in Daily Practice

- ▶ LE surveillance
 - Detrimental impact on reproductive performance
 - Dx: ≥ 1 (small amount of leukocytes or worse)
 - Prevalence should be $< 35\%$ at 35 DIM
 - Can be up to 85% in some farms
 - Affected cows take 22 days longer (median) to become pregnant
 - Considering \$3 per day open: \$66 per case
 - 100-cow dairy= up to \$5610 per year

Denis-Robichaud et al., 2015

Management in Daily Practice


- ▶ LE surveillance
 - Diagnosis
 - Cytobrush with Multistix 10
 - This technique can be implemented quite easily when you have the material for performing endometrial cytology

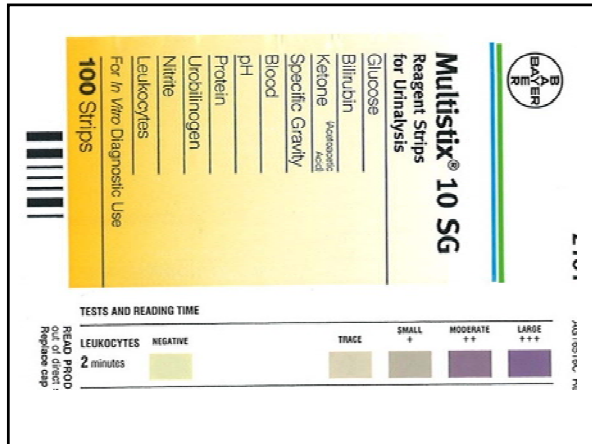




Management in Daily Practice

- ▶ LE testing
 - Collection of endometrial cytology
 - Insertion of the cytobrush into a glass vial containing 1 mL of 0.9% saline
 - Shaking the vial for 10 seconds
 - Putting a drop of solution on LE strip (Multistix 10)
 - Read color change after 2 minutes





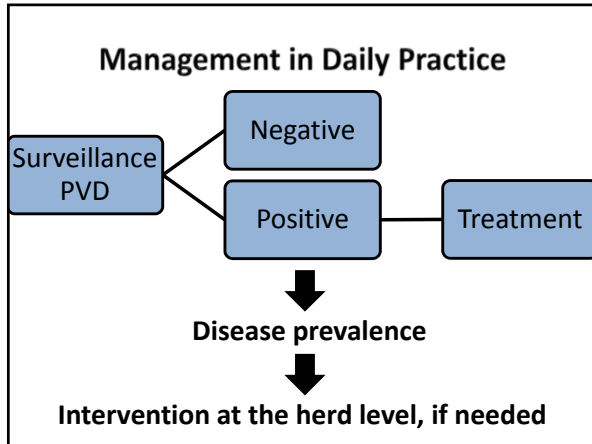
Management in Daily Practice

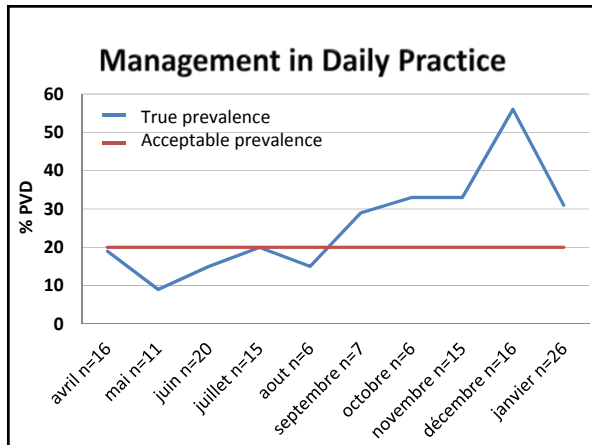
- ▶ LE treatment strategies
 - Treatment: PGF
 - Beneficial for synchronizing estrus
 - No data available specifically for LE treatment
 - Treatment: Intrauterine cephalixin
 - One study showing its benefit to reduce LE impact on subsequent reproductive performance

Denis-Robichaud et al., 2015

Management in Daily Practice

- ▶ If doing a PVD-LE surveillance
 - Need to adjust the diagnostic criteria used
 - Optimal: Purulent vaginal discharge & ≥ 1 LE score
 - Could use a decision tree such as
 - Perform a PVD testing using the metricheck device
 - If PVD positive then treat (no need for LE testing)
 - If PVD negative then perform LE testing
 - If LE positive then treat
 - If LE negative then no intervention is needed





- ### Management in Daily Practice
- What do we do if disease prevalence is too high?
- Try to prevent the condition based on risk factors
 - ↓ immunity
 - Vitamin E, selenium
 - Excessive negative energy balance (BHBA, NEFA)
 - Hypocalcemia
 - Stress (competition, reduced DMI, etc.)
 - ↑ uterine bacterial contamination
 - Dystocia
 - Human intervention at calving
 - Cleanliness of cows and environment

Management in Daily Practice

- ▶ What about prolonged anovulation?
 - Should we care that anovular cows have poorer responses to intrauterine cephalosporin?
 - From a research perspective: Yes (to explain why...)
 - From a practice perspective: ???
 - Yes but there is no better proven treatment anyway...
 - No and instead we should aim at reducing the prevalence of anovulation by working on the transition period...

Take Home Message

- ▶ CYTO and CLIN are different
 - Poor agreement & different risk factors & additive impacts
 - CYTO and CLIN are detrimental to reproduction
 - Should use PVD terminology instead of CLIN

Make sure to consider PVD and CYTO in your analysis

- ➔ One is known or easy to find out (PVD)
- ➔ One is hidden (CYTO)

Take Home Message

- ▶ LE testing is an interesting proxy for CYTO
 - Do not provide the exact same information
 - But LE diagnostic and treatment are helpful
 - LE surveillance can be done on the farm when needed

Make sure to consider LE testing for

- ➔ Case investigation (herd with poor success 1st AI)
- ➔ Systematic surveillance (ideal to adjust early)

Take Home Message

- ▶ To reduce impact on herd repro performance, prevalence should be
 - PVD < 10 % / LE < 35 % / CYTO < 19 %
 - Prolonged anovulation < 21 %

➔ Although all these conditions are detrimental to cows, the real focus at the herd level should be about finding if you have too much of them.

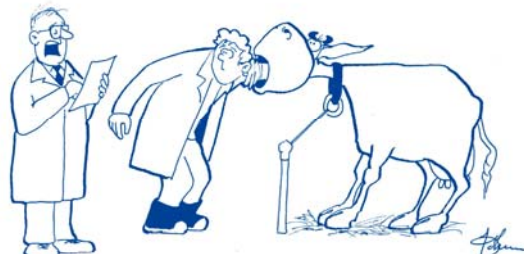
➔ PVD affecting only 5% of the herd is unlikely to be the cause of the poor success at 1st AI...

Acknowledgements

- ▶ Funding
 - Research project #1: Zoetis Animal Health
 - Research project #2: Merck Animal Health
 - Research project #3: MAPAQ (Innovaction IA113014)
- ▶ Participants
 - Farmers
 - Veterinarians
 - Technical staff

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ÉCOLE VÉTÉRINAIRE



Ta technique est bonne, mais c'est par l'autre bout!

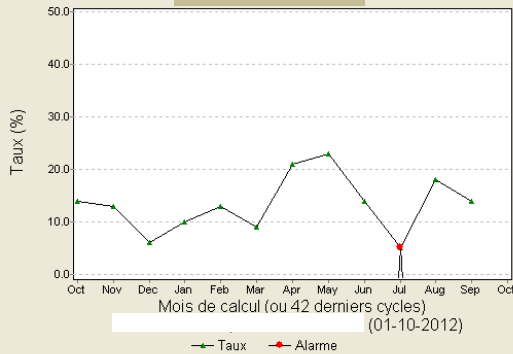
Source: Le producteur de lait québécois

Case study – Herd B

- ▶ 120 milking cows (2 milking robots)
- ▶ Freestall barn
- ▶ TMR feeding
- ▶ Veterinarian visits the farm every 4 weeks

- ▶ No DHI data
- ▶ 1 breeding bull in each pen (1 robot per pen)

Pregnancy rate



Case study – Herd B

- ▶ In this context, improving pregnancy rate of the herd without the use of PGF is a challenge...
- ▶ Reproductive tract disease too prevalent?
 - How will you implement systematic disease surveillance in this herd?
 - Think about how you would do it in your practice
 - Surveillance of what? On who? When?
 - Which cows do you treat? With what?
 - How do you collect, store and analyze data? When?
 - Acceptable prevalence?

Case study – Herd B

- ▶ 10 minutes to think about it
 - After that, we will share our ideas...

Case study – Herd B

- ▶ Surveillance strategy
 - Disease of interest: _____
 - Diagnostic test: _____
 - Cut-off of this result (if relevant): _____
 - At-risk period for surveillance: _____
 - Cow population to sample: _____
 - Moment of sampling: _____
 - Treatment strategy if positive: _____
 - Acceptable prevalence: _____

Case study – Herd B

- ▶ What do you think?

- ▶ Potential causes of the problem?

- ▶ What do we do?
