Detection, Correction, and Prevention of Milking Equipment Problems on Dairy Farms

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Learning Objectives

- Understand the process of evaluating a milking center specifically looking for equipment issues
- Explore the challenges with how to implement corrections for milking equipment issues
- Appreciate the need to help farms in developing their own system of identifying milking equipment problems through training and an effective communication channel

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What do we measure?

- Average claw vacuum at peak flow
- Pulsation under load
- Milkline vacuum for 30 minutes
- Unit alignment scoring
- Milking routine timing
- Milk flow rate analysis
- Milking efficiency and throughput timing
- Strip yields
- Teat scoring
- Teat end cleanliness
- Udder cleanliness
- Environmental assessment

Equipment

People

Cows

Perform full NMC evaluation if >6 months since previous

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Additional Observations of Milking Equipment

- Score retraction event in 3 categories
  - Unit hits deck, good retraction, unit hangs on teats
- Documentation of units not functioning correctly
- Check all claw vents or spot check liner vents

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Commonly Observed Milking System Opportunity Areas

- Inappropriate claw vacuum settings
- Unstable milkline vacuum
- Issues after claw or liner change
- Challenges with the retraction event
- Inappropriate use of manual mode

Inappropriate Claw Vacuum Settings

- Has the average claw vacuum at peak flow for a 5 to 20 second interval been accurately measured on at least 10 cows?
- Is it appropriate for this herd?
  - Goals of the dairy
  - Liners
  - Risk of over milking (milking routine, ATO settings, unit alignment, etc)

Inappropriate Claw Vacuum Settings

- 1000 cow herd with a double 20 parallel parlor
- Increasing clinical mastitis and bulk tank somatic cell count (SCC)
- Hardness at teat end = 50% abnormal
- Teat end score = 35% abnormal
- Farm vacuum gauge broken

Inappropriate Claw Vacuum Settings

- Average claw vacuum was 13.3”Hg (45.1 kPa)
- Liner manufacturer wants 11.5”Hg (39 kPa)
- Conference call with owner and equipment dealer before leaving farm
  - Plan to drop vacuum 1”Hg (3.4 kPa) in 2 steps
- Recheck claw vacuum

Unstable Milkline Vacuum Levels

- Has the milkline vacuum level been recorded for at least three turns of a milking parlor or fifteen minutes in a tiestall?
- Does it meet NMC recommendations?
  - Greater than 95% of the time the vacuum level does not exceed 0.6”Hg (2 kPa) in a drop or a rise

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Unstable Milkline Vacuum Levels

- 100 cow herd in a swing 12 parallel parlor
- Primary complaint is high SCC
- System passes a 1 unit fall-off test and has enough effective reserve.
- Pump capacity is adequate and system loss is 5%.
- 6 units per slope with a 2.5” (60 mm) milkline

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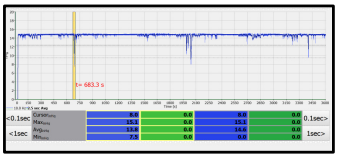
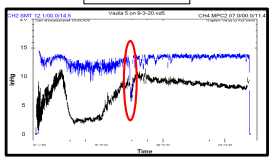
Unstable Milkline Vacuum Levels

Milkline Vacuum



Claw Vacuum



- Large fluctuations in milkline vacuum during milking and also seen in claw vacuum recordings
- Issue with slope of milkline leading to flooding
- Corrected by re-sloping line

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Unstable Milkline Vacuum Levels

- 100 cow herd in a tiestall with a highline
- Higher SCC than desired
- System fails a 1 unit fall-off test and does not have enough effective reserve.
- Pump capacity is adequate but system loss is 63%.

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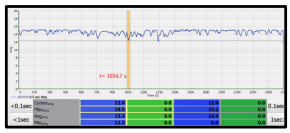
Unstable Milkline Vacuum Levels

Milkline Vacuum



- Replaced worn hoses and o-rings on stall cocks
- System then passed a 1 unit fall off and had adequate reserve

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Unstable Milkline Vacuum Levels

- 1400 cows in a double 24 parallel parlor
- Issue is SCC is higher than the farm wants
- Short term teat scores showed 43% with hardness at teat end
- Milkline vacuum at 13.6”Hg (46.1 kPa)

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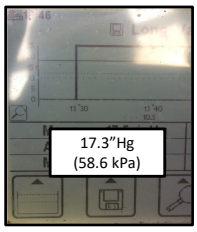
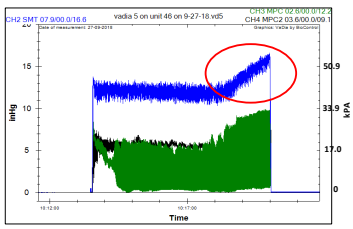
Unstable Milkline Vacuum Levels

Milkline Vacuum



Claw Vacuum



- Installed weep hole to allow VFD to work correctly

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New Claw or Liner Install

- Have the pulsation parameters been accurately measured before and after change?
- Have claw vacuum levels been accurately measured before and after change?

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New Claw and Liner Install

- 700 cow herd with double 10 parabone parlor
- Increase in clinical mastitis and SCC
- New claw and liners ~1 month ago with changes made by dealer but no check on vacuum or pulsation

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New Claw and Liner Install

	Previous set-up	New claws, shells, and liners	After adjustments
Claw vacuum ("Hg/kPa)	12.2/41.4	12.1/41	11.8/40
Pulsator rate	60	60	60
Pulsator ratio	60:40	65:35	60:40
b phase (ms)	450	496	442
d phase (ms)	235	186	226

- Data discussed with owner and manager and decided to make adjustments

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Retraction Event

- Has someone watched the retraction event in both first lactation and mature cow pens?

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Inappropriate Retraction Event

- 950 cow herd milking in a double 16 parallel parlor
- Short term teat scores showed 46% with hardness at teat end
- Retraction event was a problem on 9 out of 32 units

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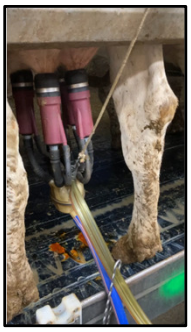
Inappropriate Retraction Event



- Dealership contacted that day to work on shut-offs

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Inappropriate Retraction Event

- 1400 cows in a double 24 parallel parlor
- Issue is SCC is higher than the farm wants
- Milking time audit showed milkers struggling to get retraction chain to release on some units
- Retraction chain catching on some units during retraction and cluster hitting the deck

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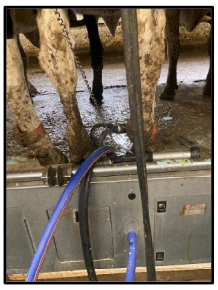
Inappropriate Retraction Event



- Multiple fixes attempted over 6 month period but still not fully corrected

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Inappropriate Retraction Event

- 1300 cow dairy with double 20 parallel parlor
- Increase in SCC is primary complaint
- Switched to liners with vents in mouthpiece chamber a while ago
- Many units hit the deck on retraction
- Vacuum decay time set to zero

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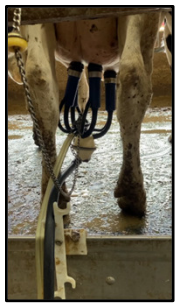
Inappropriate Retraction Event

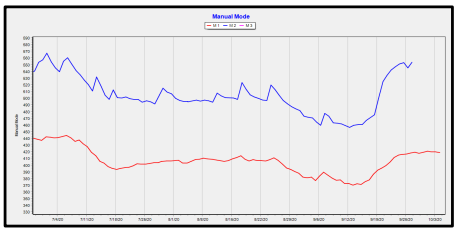


- Still have not fully corrected the problem

Inappropriate Use of Manual Mode

- 700 cows in a double 16 parallel parlor
- Issue is increasing clinical mastitis and cows kicking at units
- Milking time audit showed majority of units being put on manual in the pens we watched
- Farm has struggled with individual milking point control (MPC) electronic boards going bad

Inappropriate Use of Manual Mode



- Milker meeting to outline:
  - Manager will mark units that are not functioning and correct as soon as possible
  - Milkers agreed to only put the designated units on manual

Correction of Problems

- Collect reliable documentation that problem is significant
  - Not just a single unit problem
  - Repeatable throughout milking
- Prioritize list of equipment problems
- Share documentation and discuss in meeting with owner and equipment dealer
- Follow-up to make sure the problem is resolved

Prevention of Problems

- Training of employees on milking equipment problems
- Grant over the last year to develop an online training course
- 95 milkers on 15 farms completed training
- Over 40% of milkers reported no training or unsatisfied with the training on milking equipment

Prevention of Problems

- Set up a communication protocol for equipment issues
  - How do milkers notify management?
    - Written preferred, permanent log
    - White board example
  - Who in management is responsible for fixing the issue?
  - What is the priority and time frame to resolution

Prevention of Problems

- **Scheduled** maintenance needs to happen!
  - Equipment runs 24/7
  - Insurance policy
  - Internal vs External
  - Another set of eyes
  - Communication of findings

Prevention of Problems

- Pre-Milking Checklist
  - Record system vacuum
  - Check that liners are pulsating and properly aligned in the shell
  - Open all claw/liner vents with appropriate tool
  - Listen for any air leaks
  - Check for any torn hoses, gaskets, etc
    - Make sure that milkers have access to replacement supplies

Prevention of Problems

- Is someone in management checking critical areas on a regular basis?
  - Checklist with sign off
- Is someone monitoring the error reports out of the parlor management software?

Stall	Cows	Dev	Milk	Time	Flow	Cond	Peak	Fall	Mode	MDet	Wash	NoID
3	62										58	2
12	62									16		3
17	51								5			3
25	9		21		5.8							0
33	58									17		0
Average	59	-16	36	4.4	8.3	4.9	11	1	1	7	12	
Tolerance	18	12	2	1.2	1.2	5.2	4	2	2	8	40	

Summary

- Perform a detailed analysis on a regular basis to provide accurate data to the milk quality team meetings
- Prioritize the equipment issues detected and work with owner and dealership to get them corrected
- Help the farm train employees on detecting equipment problems and establishing a good communication channel for these problems

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Questions?

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