Mastitis Outbreak Investigations Using Recent Case Studies

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Objectives

- Develop an appreciation for the process of performing a risk assessment on a herd to investigate a mastitis problem.
- Understand the steps necessary to dig deeper into the opportunity areas for herds in order to come up with a prioritized list of solutions.
- Work through the ways to communicate these solutions to the management team on the dairy and how to monitor the progress of the changes which are implemented.

Define the Major Herd Problem

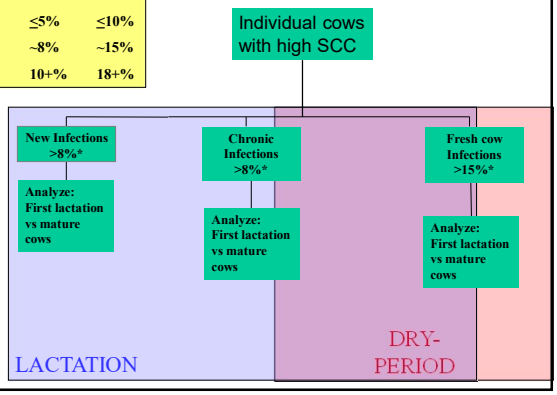
- What is the predominant organism?
  - Need individual cow cultures
    - Clinical mastitis cases
    - High SCC cows
    - Fresh cows
  - Bulk Tank (smaller herds)

Define the Major Herd Problem

- When is the initial mastitis happening?
  - During the dry period
  - During lactation
- If records use:
  - PLOT LS=4 BY LS\YRZ and modify for LCTGP=1 and LCTGP>1
  - SUM LS1=4 DRYLS=4 BY MOFSH FOR LACT>0 DRYLS>0 LS1>0
- Also Egraph for clinical mastitis and culture data

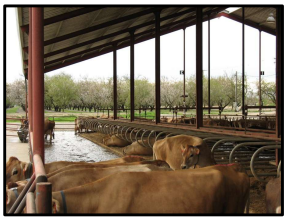
Analyze high SCC

*	New	Chronic	Fresh
Top	≤5%	≤5%	≤10%
Ok	~8%	~8%	~15%
Not ok	9+%	10+%	18+%



Farm Goals

- Prevention is overall goal
  - Find a way to reduce the incidence of mastitis
    - clinical and subclinical
  - Where is the greatest opportunity area?



Major Herd Problem Defined

- Based on culture and analysis
  - the predominant organism
  - lactating cows vs dry cows or both

Now do a targeted risk assessment on the farm of the area of concern

What should you measure?

- Average claw vacuum at peak flow
- Pulsation under load and all pulsators statically
- Milk line vacuum for 30 minutes
- Full NMC Evaluation if > 6 months
- Unit alignment scoring
- Milking routine timing
- Milk flow rate analysis
- Milking efficiency and throughput timing
- Teat end cleanliness
- Strip yields
- Teat scoring
- Udder Hygiene Scoring
- Facilities – stall maintenance, manure in alleyways, cow comfort
- DRY OFF PROCEDURE

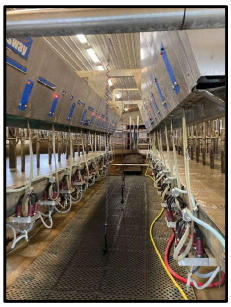
Equipment

People

Cows

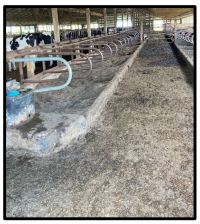
First Case Study

- 300 cow farm with a SCC that had been high for over a year
- Double 12 parallel parlor
- Raise all their own replacements



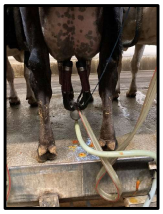
First Case Study

- Mattresses with sawdust bedding for lactating cows
- Deep bed stalls with sand for dry cows

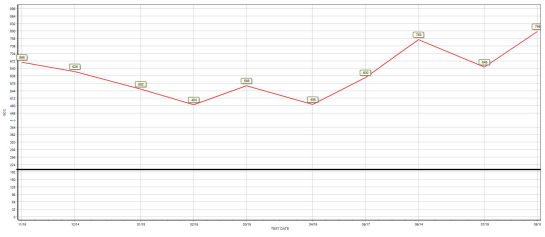


First Case Study

- Milking routine:
  - Dip cows 1-6
  - Wipe and Strip cows 1-6
  - Attach cows 1-6
- Unit alignment with Kurb-Katcher

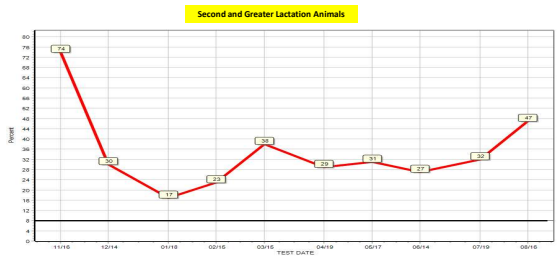


First Case Study



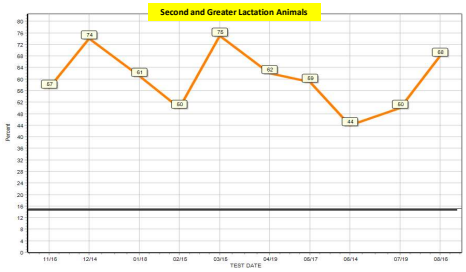
- SCC has been elevated for over 1 year and is climbing higher
- Multiple consultants have been in and evaluated the farm but no solution has been found

First Case Study



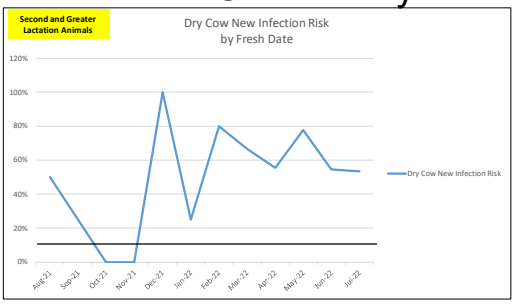
– Very high new infection risk in mature cows suggests that some of the problem is during lactation.

First Case Study



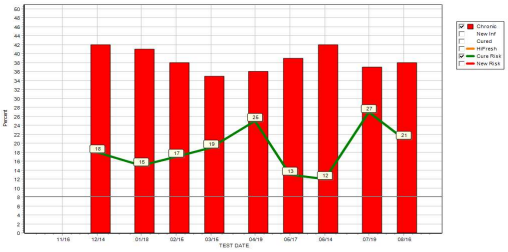
– Very high percent of mature cows calving in with a high SCC suggests dry cow new infections are an issue or many cows chronic over the dry period.

First Case Study



– Very high dry cow new infection risk suggests that many new cows are getting infected during the dry period.

First Case Study



– The high fresh percent and the high new infection risk leads to a high percent chronic. Also note the low cure risk so these infections persist. All this leads to a high bulk tank SCC.

First Case Study

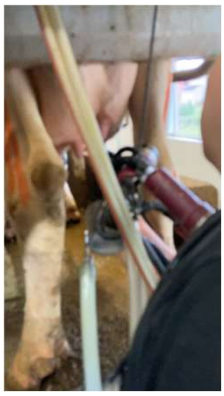
– What are 3-4 things that we should do next?

First Case Study

– Culture results of the whole herd (273 cows)
  - 50 cows with *Prototheca* (only 1 was a first lactation animal)
  - 8 cows with *Staph aureus*
  - 3 cows with *Strep dysgalactiae*, 2 with *T. pyogenes*, 2 with Yeast, and 1 with *E. coli*

First Case Study

– Dry off Procedure



First Case Study

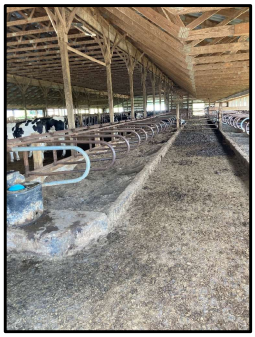
- Unit and liners that milks every single fresh mature cow (not fresh heifers)

First Case Study

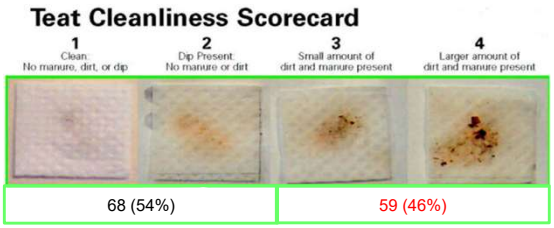
- Pack that all fresh mature cows are housed on after they calve (not fresh heifers)

First Case Study

- Dry cow environment



First Case Study



First Case Study

– What should be done on the farm to correct these problems?

First Case Study

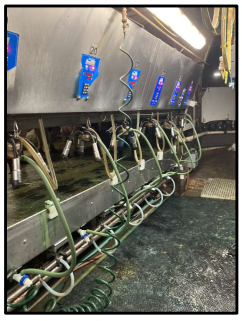
- Farm created a separate group with *Prototheca* and *Staph aureus* cows
- Online training was given on the dry off procedure at: https://dairyroutines.jimdoweb.com/
- New wash protocol was put in place for fresh cow milking unit
- Consideration was given to how to eliminate the fresh cow pack

First Case Study

- Discussion

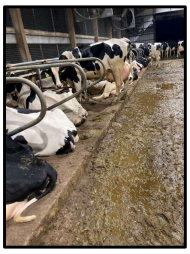
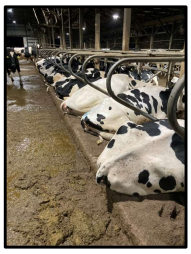
Second Case Study

- 1600 cow farm with a SCC that has been high for quite a few years
- Double 24 parallel parlor
- Raise all their own replacements



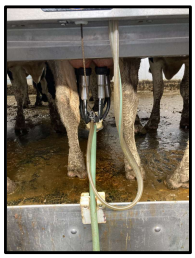
Second Case Study

- Deep bed recycled sand bedding for lactating cows, dry, and prefresh

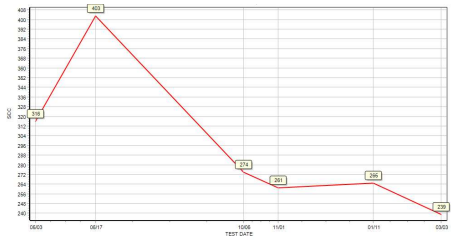




Second Case Study

- Milking routine with timers:
  - Power Brush cows 1-8
  - Wipe cows 1-8
  - Attach cows 1-8
- Using cloth towels that are washed in hot water and dried
- Unit alignment with white block on curb

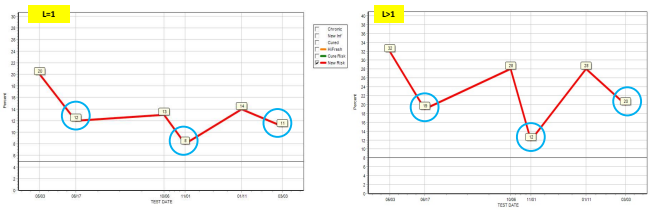


Second Case Study



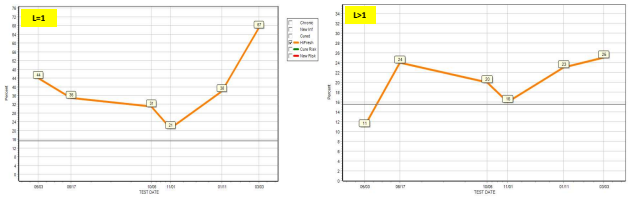
- SCC has been elevated for a long time in the 200 to 300 range
- Just recently have started doing DHIA testing 2 months at a time and then 2 month gap

Second Case Study



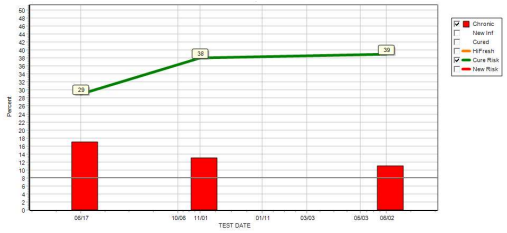
- High new infection risk in both first lactation and mature cows suggests that some of the problem is during lactation.

Second Case Study



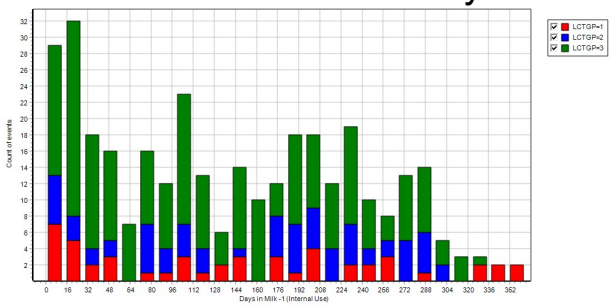
- High percent of first calf heifers calving in high (above 200,000 cells/ml)
- Variable percent of mature cows calving in high

Second Case Study



– The high new infection risk and high fresh percent leads to a high percent chronic. This leads to a high bulk tank SCC.

Second Case Study



– Clinical Mastitis by DIM by lactation group reveals many cases as fresh cows

Second Case Study

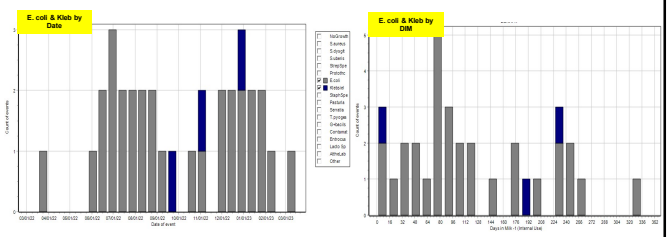
– What are 3-4 things that we should do next?

Second Case Study

– Culture results:
  - All clinicals are cultured and pathogen based treatment
  - Did suggest we culture high fresh heifers for 1 month
  - Did suggest we culture CMT positive quarters of high SCC cows following test day

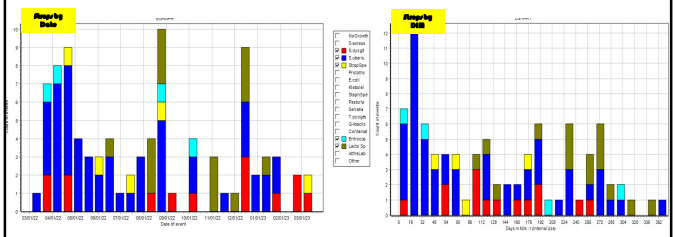
– Fresh heifer and CMT positive quarters of high SCC cows did not reveal a primary contagious mastitis problem

Second Case Study



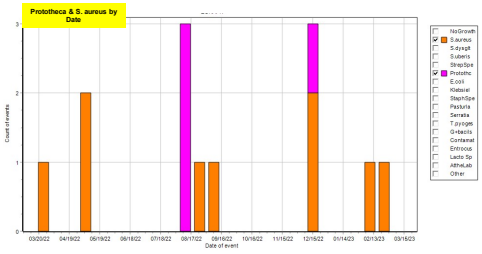
- This is a graph of only the *E. coli* and *Klebsiella* cultures by date on the left and by DIM on the right. *E. coli* is still the major gram negative with not as many lately. In looking at this by DIM the highest risk period is mid-lactation.

Second Case Study



- This is a graph of only the *Strep* cultures by date on the left and by DIM on the right. *Strep uberis* and *Lactococcus* look to be the dominant *Streps* but all of them have dropped off recently. In looking at this by DIM early fresh is the highest risk period with Strep uberis predominating.

Second Case Study



- This is a graph of the Prototheca and *Staph aureus* that have been cultured over the last year. This looks to have tapered off which is good. From my count it looks like there are 1 Prototheca cow in 1 pen and 7 *Staph aureus* cows in a few different pens still on the farm.

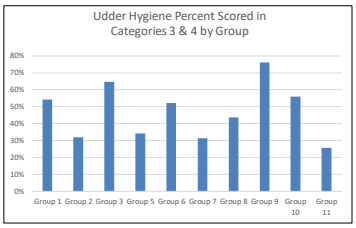
Second Case Study

- Dry off Procedure
- 2 people (Herd Manager and Lead Milker) who are involved in dry off procedure
- All antibiotic treatment done by herd manager on first pass and excellent procedure. Did discuss massaging antibiotic out of teat cistern.
- All internal sealant treatment done by lead milker. Re-cleaned all teats and excellent procedure holding off teat base. Did discuss partial insertion.

Second Case Study

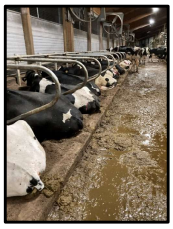
- Fresh cows milked first in maternity area
  - Pulsator supposedly graphed on schedule by dealership
  - Vacuum level reportedly checked by dealership
  - Dip being mixed

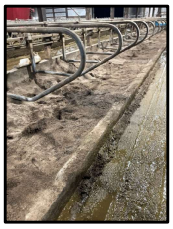
Second Case Study



Second Case Study

- Stall and Cow Scoring





- Cow positioning was a problem with only 33% of the 569 cows that I scored positioned correctly. **Bedding levels were low on all pens with overall only 3% of the stalls scored with adequate bedding.** Only 47% of the stalls were scored as clean.

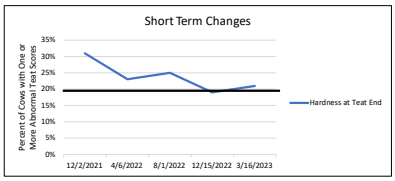
Second Case Study

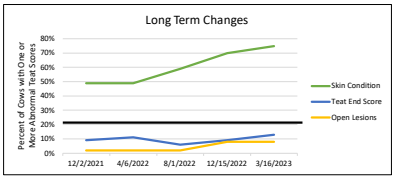
- Dry cow environment

Second Case Study

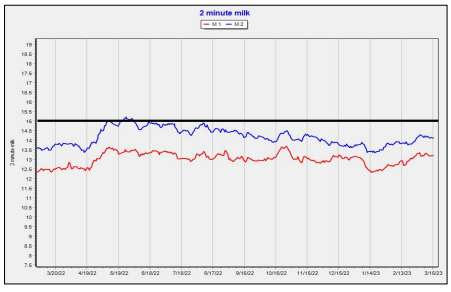
56 (52%)	52 (48%)
32 (59%)	22 (41%)
68 (64%)	39 (36%)
46 (44%)	58 (56%)
47 (42%)	65 (58%)
68 (62%)	42 (38%)

Second Case Study





Second Case Study



Second Case Study

- Vacuum and pulsation
  - 5/8” hose with mix of Boumatic claws and 450 TL liner with SMT vents
  - Average claw vacuum at peak flow 11.8” Hg
  - Pulsation rate = 64 ppm and ratio is 64:36 with b phase at 493 ms and d phase at 225 ms
  - Pulsators checked every couple of months by dealership

Second Case Study

– What should be done on the farm to correct these problems?

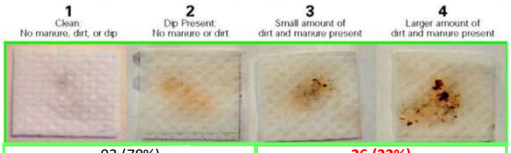
Second Case Study

– Milker meeting to motivate milkers and show videos of good wiping technique
– Started assessing cow movers ability to clean out stalls and not roll manure into stalls
– Farm management worked on sand separation equipment

Second Case Study

Teat Cleanliness Scorecard

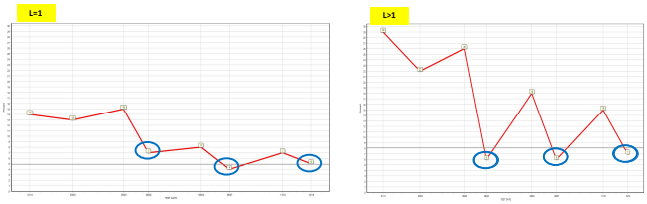
July scoring



93 (78%)	26 (22%)
74 (74%)	26 (26%)
100 (97%)	3 (3%)
96 (89%)	12 (11%)
116 (98%)	2 (2%)
97 (90%)	11 (10%)

Second Case Study

Second Case Study

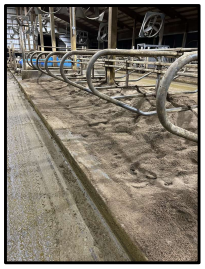


Second Case Study

- Cow positioning was a problem with only 49% of the 626 cows that I scored positioned correctly. **Bedding levels were low on all pens with overall only 14% of the stalls scored with adequate bedding.** Only 48% of the stalls were scored as clean.

Cow Mover Assessment

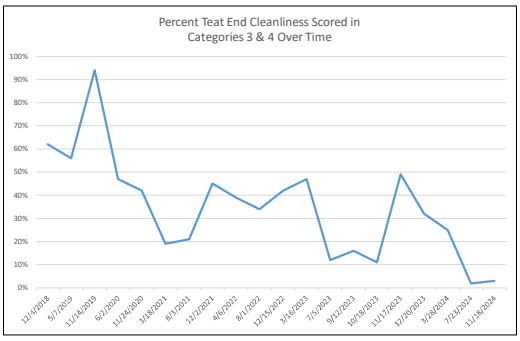
Mover	Group	% Clean	# Scored
X	11	98%	92
Y	2	100%	95
Z	3	99%	91



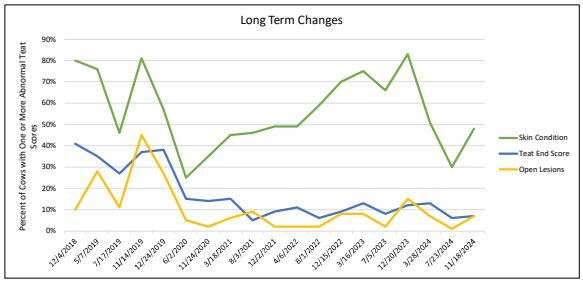
Second Case Study

- Farm requested that we start doing monthly employee evaluations of milkers and cow movers

Second Case Study



Second Case Study

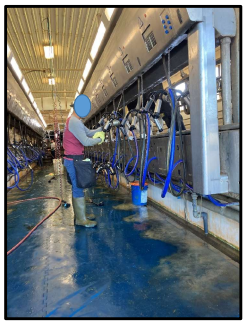


Second Case Study

– Discussion

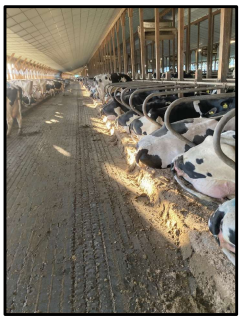
Third Case Study

- 1600 cow farm with a SCC that moved higher and remains elevated
- Double 24 parallel parlor
- Raise all their own replacements



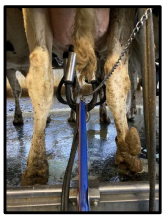
Third Case Study

- Change from deep bed sand to mattresses with fiber in the majority of pens
- Prefresh cows still in deep bed sand stalls
- Dry cows in deep bed fiber stalls

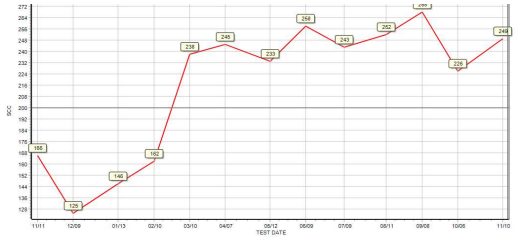


Third Case Study

- Milking routine:
  - Foam cows 1-8
  - Forestrip cows 1-8
  - Wipe cows 8-1
  - Attach cows 1-8
- Unit alignment with curb slider

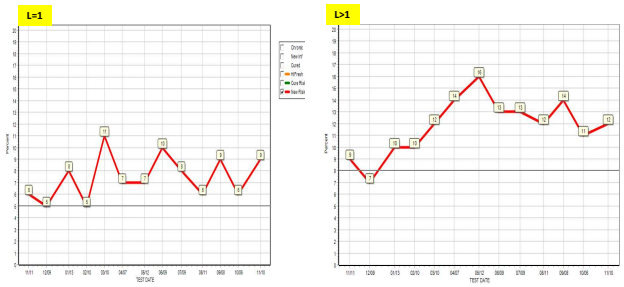


Third Case Study



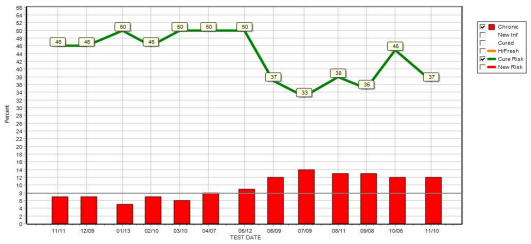
- SCC jumped up in March and has remained high

Third Case Study



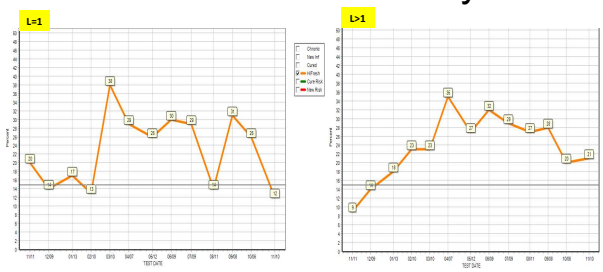
- New infection risk up in both first lactation and mature cows

Third Case Study



- Chronic infection percent now starting to rise
- Cultures of bulk tank have not shown mycoplasma or Staph aureus

Third Case Study



- High Fresh was elevated but has come down some

Third Case Study

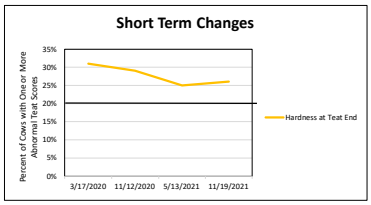
– What are 3-4 things that we should do next?

Third Case Study

Milking Routine Dbl 24

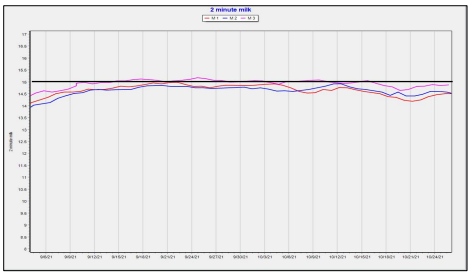
Dip contact time	= 131 seconds	= Good
Lag time from stimulation to unit attachment	= 133 seconds	= Good
• Cow 1 in set of 8 (average)	= 138 seconds	
• Cow 8 in set of 8 (average)	= 128 seconds	
• Percent below 90 seconds	= 3%	= Excellent

Third Case Study



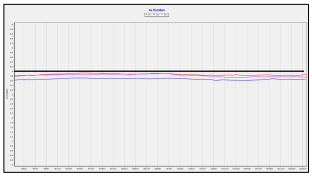
- The short term changes are in a similar range and are moving close to the goal of less than 20%.

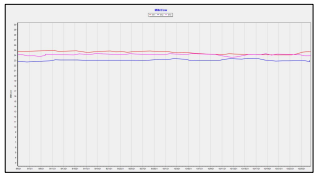
Third Case Study



- 2 minute milk looks great

Third Case Study





- Unit on time is reaching the goal

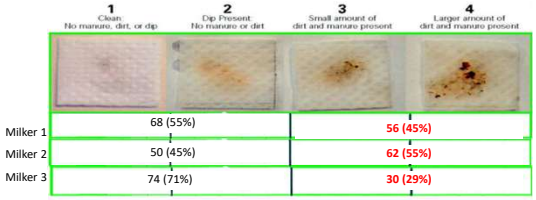
Third Case Study

Average Claw Vacuum and Milkline Vacuum

- Average Claw Vacuum at Peak Flow for 5 to 30 seconds
  - 11.8”Hg on 29 cows
  - Currently using DeLaval HC 01 with no vents in the liner.
- Milkline vacuum was measured for 60 minutes and a 2 unit fall off test performed. No major red flags were detected with system vacuum fluctuation.
- Pulsators all graphed normal but check #19 and #44 for an air leak as they were slightly low on vacuum.

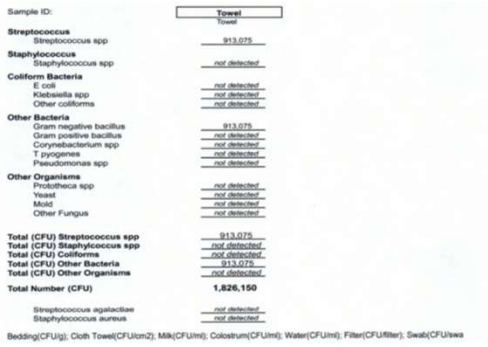
Third Case Study

Teat End Cleanliness



Third Case Study

Towel Culture



Sample ID:	Towel
	Towel
Streptococcus	
Streptococcus spp	913,075
Staphylococcus	
Staphylococcus spp	not detected
Coliform Bacteria	
E coli	not detected
Klebsiella spp	not detected
Other coliforms	not detected
Other Bacteria	
Gram negative bacillus	913,075
Gram positive bacillus	not detected
Corynebacterium spp	not detected
T pyogenes	not detected
Pseudomonas spp	not detected
Other Organisms	
Prototheca spp	not detected
Yeast	not detected
Mold	not detected
Other Fungus	not detected
Total (CFU) Streptococcus spp	913,075
Total (CFU) Staphylococcus spp	not detected
Total (CFU) Coliforms	not detected
Total (CFU) Other Bacteria	913,075
Total (CFU) Other Organisms	not detected
Total Number (CFU)	1,826,150
Streptococcus agalactiae	not detected
Staphylococcus aureus	not detected

Bedding(CFU/g); Cloth Towel(CFU/cm2); Milk(CFU/ml); Colostrum(CFU/ml); Water(CFU/ml); Filter(CFU/filter); Swab(CFU/swa

Third Case Study

Lactating Cow Stalls



- Cow positioning = 50% positioned correctly
- Bedding levels = 62% adequate
- Stall cleanliness = 55% clean

Third Case Study

Dry Cow Stalls (includes pre-fresh cows/heifers)


- Cow positioning = 73% positioned correctly
- Bedding levels = 50% adequate
- Stall cleanliness = 69% clean

Third Case Study

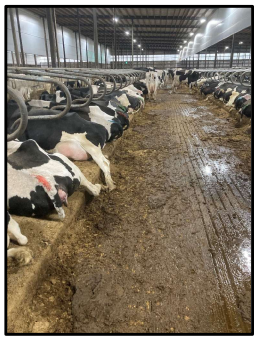
- What should be done on the farm to correct these problems?

Third Case Study

- Farm meeting to discuss findings
- Fresh cows switched back to sand and try to keep adequate level on top of mattresses
- Bedding cultures performed on fiber and storage noted to be an issue so bedded immediately when delivered
- Wash issue corrected with towels and chlorine added

Fourth Case Study

- 2700 cow herd with mainly Holsteins
- 72 stall rotary milking parlor
- Housed in cross-ventilated barn
- Freestalls are mattresses with fresh manure solids for bedding



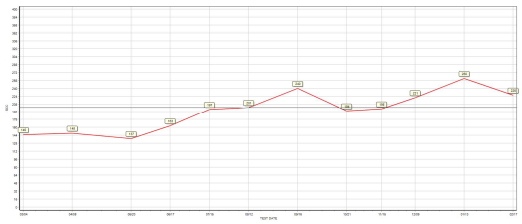
Fourth Case Study

- Regular scheduled equipment maintenance performed on parlor
- Claw vacuum and pulsator parameters within NMC recommendations
- ATO settings at 2.8 lbs/min with a 1 sec delay

Fourth Case Study

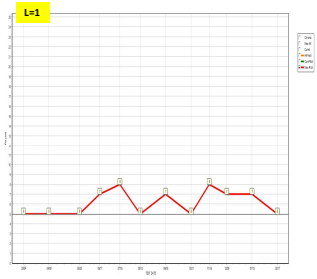
- Robot — 1.) Applies dip, brushes and cleans teats (stall 3)
- 1st Milker — 2.) Wipes cow (stall 6)
- 2nd Milker — 3.) Attaches unit (stall 17)
- Robot — 4.) Post-dips (stall 66)

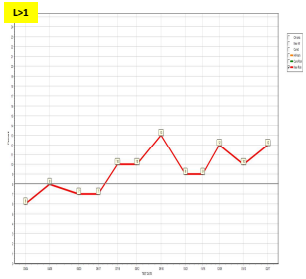
Fourth Case Study



- SCC moved higher in June and is currently above the goal of less than 200,000 SCC/ml

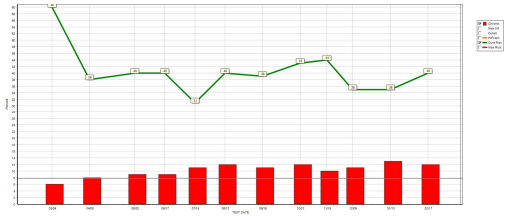
Fourth Case Study





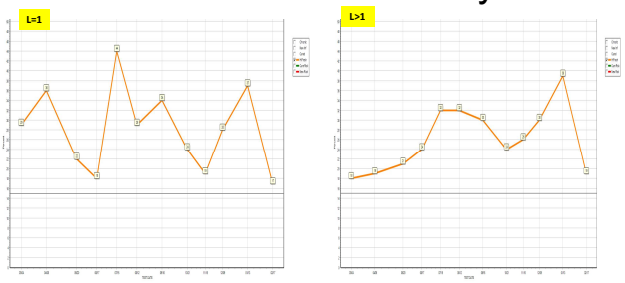
- New infection risk up in mature cows

Fourth Case Study



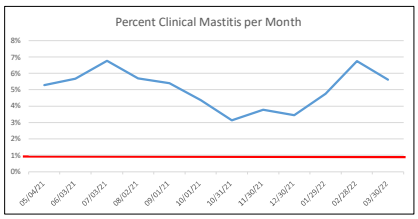
- Chronic infection has remained elevated
- Culture results show Strep uberis and Klebsiella

Fourth Case Study



– High Fresh has been elevated although on this test day it looks better

Fourth Case Study



- Clinical mastitis remains high

Fourth Case Study

– What are 3-4 things that we should do next?

Fourth Case Study

Milking Routine Timing 72 Stall Rotary

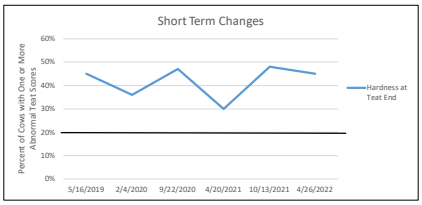
Dip contact time (considering on to Wipe off) = 40 sec = Good

Lag time from stimulation to unit attachment (if brush is stimulation) = 121 sec = Good
- Percent below 90 seconds = 0% = Good

Lag time from stimulation to unit attachment (if wiping is stimulation) = 81 sec = Short
- Percent below 90 seconds = 64% = Too many

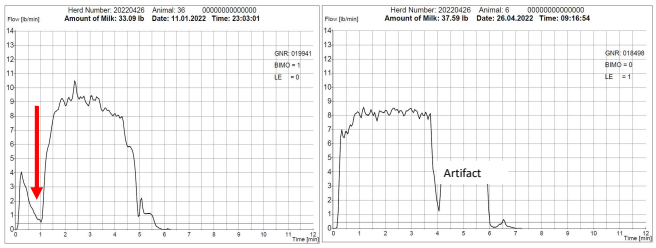
Fourth Case Study

Post-Milking Teat Evaluation – Short Term



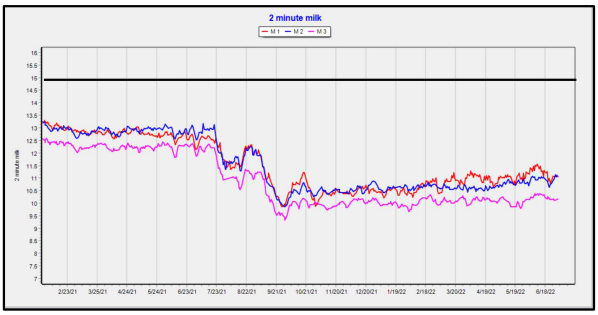
Fourth Case Study

LactoCorder® Analysis



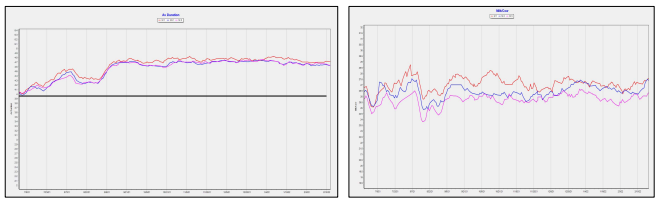
- 46% of the 26 cows that we graphed showed a bimodal flow pattern

Fourth Case Study



- 2 minute milk remains low

Fourth Case Study



- Unit on time remains elevated.

Fourth Case Study

30-60 second flow rate by individual cow for 1 shift

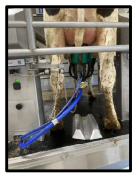
One day worth of data for Case Herd for 30-60 second flow rate
(Excludes cows with no ID or no milk flow data)

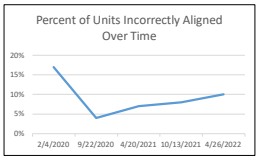
	Percent	Cows
session 1 below 6.8 lbs/min	**57%**	**1096**
session 1 above 6.8 lbs/min	43%	833
session 2 below 6.8 lbs/min	**77%**	**1483**
session 2 above 6.8 lbs/min	23%	450
session 3 below 6.8 lbs/min	**78%**	**1543**
session 3 above 6.8 lbs/min	22%	431

Fourth Case Study

Unit Alignment

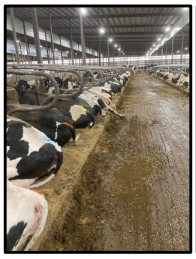
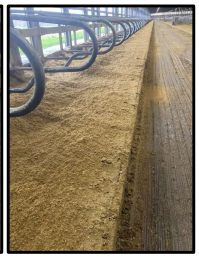
- Unit alignment is not a major issue with only 10% not properly aligned.
- **<u>Make sure that the milker who is attaching units moves the arm across behind the cow since this sets the unit alignment.</u>**





Fourth Case Study

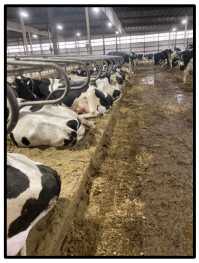
Lactating Cows


- Cow positioning = 49% positioned correctly
- Bedding levels = 78% adequate
- Stall cleanliness = 70% clean

Fourth Case Study

Dry Cows/Prefresh




- Cow positioning = 62% positioned correctly
- Bedding levels = 64% adequate
- Stall cleanliness = 86% clean

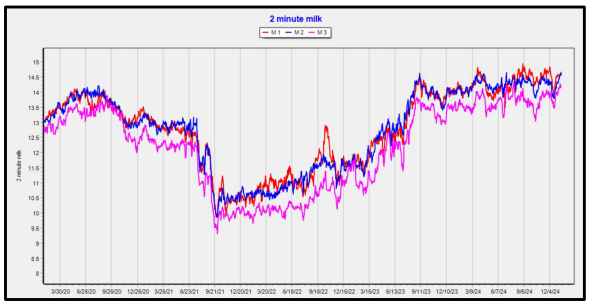
Fourth Case Study

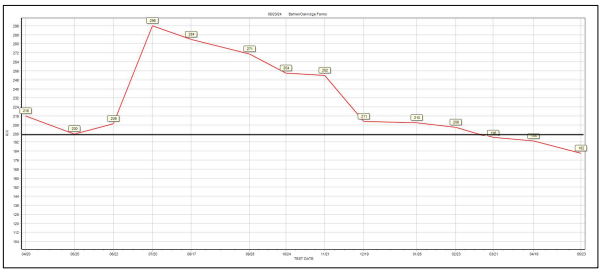
– What should be done on the farm to correct these problems?

Fourth Case Study

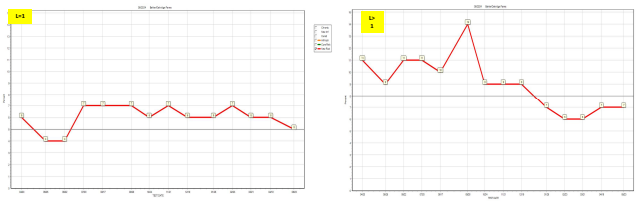
– Farm meeting to discuss findings
– Adding in another milker to forestrip
– More monitoring of attach position

Fourth Case Study





- This is the test day bulk tank SCC which most likely is different than the shipped SCC. The SCC has been on an excellent downward trend since July and is currently at 182,000 cells/ml. This is great work by all of your team to achieve these results. Keep up the forward progress!



- This is a graph of the new infection risk over the last year by first lactation (left) and mature cows (right). The new infection in first lactation animals has trended down and for May is now at 5% which is just above the goal of less than 5%. **The mature cows have also trended down since September and are now reaching the goal of less than 8% which is great!**
- The opportunity areas that we identified to continue this trend are **improving teat end cleanliness by re-training and monitoring milkers,** monitoring the effectiveness of the stripping position (especially on milking 3), correcting the abnormal pulsators, lowering the vacuum in the treated parlor, and working with the cow mover with the new stall design to make sure he cleans out the back area well.

Mastitis Summary

- Organisms arrive through the teat end
  - Contagious organism management
  - Dry cow issues
  - Milking equipment issues
  - Bedding/stall/alley issues
  - Milking routine issues

Questions