Vermont Veterinary Medical Association

# 2019
# SUMMER MEETING

Friday June 21, 2019
Burlington Hilton Hotel

**Paula Ospina, DVM, MPH, Ph.D.**
Cornell University College of Veterinary Medicine
Pav5@cornell.edu

## MILK QUALITY: BEDDING, BULK TANKS, HEIFER MASTITIS AND MORE

***Generously sponsored by:***

MERCK

# HOLD THE DATES!

**2020 Winter Meeting – Saturday and Sunday, February 8-9 – Burlington Hilton Hotel**

- Small Animal Speakers TBA
- Equine Ophthalmology – Saturday, February 8 – Dr. Alison Clode
- Bovine Speaker TBA

**2020 Summer Meeting – Friday, June 19 – Burlington Hilton Hotel**

*Stay tuned for more details*

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***Thanks for being a VVMA member!***
***We are pleased to welcome the following members who joined since our 2019 Winter Meeting***

Kathryn Hazzard – Norwich Regional Animal Hospital
Laura Jesseman – Ryegate Small Animal Hospital
Amanda LaCroix – River Cove Animal Hospital
Allana Mather – Mt. Mansfield Animal Hospital
Samuel Scheu – Riverbend Veterinary Clinic
Elizabeth Wheeler – River Road Veterinary Clinic

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Vermont Veterinary Medical Association

**VVMA Mission:**
Promoting excellence in veterinary medicine, animal well-being and public health through education, advocacy and outreach.

**VVMA Vision:**
To be the preeminent authority on veterinary medicine and animal well-being in Vermont.

**VVMA Values:**
Integrity, Service, Dedication, Compassion, Inclusivity, Visionary Thinking, Life-Long Learning

**For questions or more information on the VVMA, visit www.vtvets.org or contact Executive Director Kathy Finnie at kathy@vtvets.org**

# 2019 Summer Meeting Vendors
## Thank you for your support of our Meeting!

| | | |
|---|---|---|
| Bank of America | Sean Coyle | sean.coyle@bankofamerica.com |
| Blue Buffalo | Nat Lacey | nlacy@bluebuff.com |
| Boehringer-Ingleheim | Paige Willson<br>Heather Tarmey | paige.willson@boehringer-ingelheim.com<br>heather.tarmey@boehringer-ingelheim.com |
| Burlington Emergency & Veterinary Specialists | Whitney Durivage | whitbier@bevsvt.com |
| Christian Veterinary Mission | Dr. Amy St. Denis | amystdenis@myfairpoint.net |
| Companion Animal Health by LiteCure | Kevin Gouvin | kagdistributing@aol.com |
| Eastern States Compounding Pharmacy | Kim Johnson | kimberley@easternstatesrx.com |
| Hill's Pet Nutrition | Dr. Andrew Hagner | Andrew_hagner@hillspet.com |
| IDEXX | Carmelita Castellon<br>Colin Dudunake<br>Dr. Maryse Osborn-Doser | Carmelita-Castellon@idexx.com<br>Colin.Dudunake@idexx.com<br>Maryse-Osborn-Doser@idexx.com |
| Jorgensen Laboratories | Marnie Ciquera | marnie@jorvet.com |
| MWI Animal Health | Danielle Preece | dpreece@mwianimalhealth.com |
| Nestle Purina | Lauren Koron | lauren.koron@purina.nestle.com |
| Nutramax Laboratories | Connie Hayes | chayes@nutramaxlab.com |
| Stokes 503b | Tamara Langreich | tlangreich@stokes503b.com |
| U.S. Drug Enforcement Administration | Christopher Paquette<br>George Lutz | Christopher.L.Paquette@usdoj.gov<br>George.J.Lutz@usdoj.gov |
| Universal Imaging | Michael McElhinney | mmack@universalimaginginc.com |
| VetCor | Jessica Bird<br>Bryan Brackett | jbird@vetcor.com<br>bbrackett@vetcor.com |
| Vetri-Science Laboratories | Kelley Lucarell<br>Steve Parent | klucarell@foodsciencecorp.com<br>sparent@foodsciencecorp.com |
| Wilcox Pharmacy | Tina Rotella | trotella@phsrx.com |
| Wingate Pharmacy & Compounding | Gary Wingate | garywingate25@gmail.com |

# NOTES

# Bulk tanks and mastitis

Drs. Paula Ospina, Valeria Alanis, Carlo Santisteban, Daryl Nydam, Michael Zurakowski

Vermont Veterinary Medical Association

June 2019

Quality Milk Production Services

QMPS is a program within the New York State Veterinary Diagnostic Laboratory, a partnership between the NYS Department of Agriculture and Markets and the College of Veterinary Medicine at Cornell University.

Cornell University College of Veterinary Medicine

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## Thank you

NY farm viability INSTITUTE

NYFVI
Funds that allowed this research

NYS Dairy farmers that allowed us to work with their data


Cornell QMPS (all lab sections)
Staff, interns, and students

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# Evaluation of bulk tanks to help monitor mastitis?

Bulk tanks are an easy sample to collect…

- What kind of information can you collect?
- What can you do with that information?

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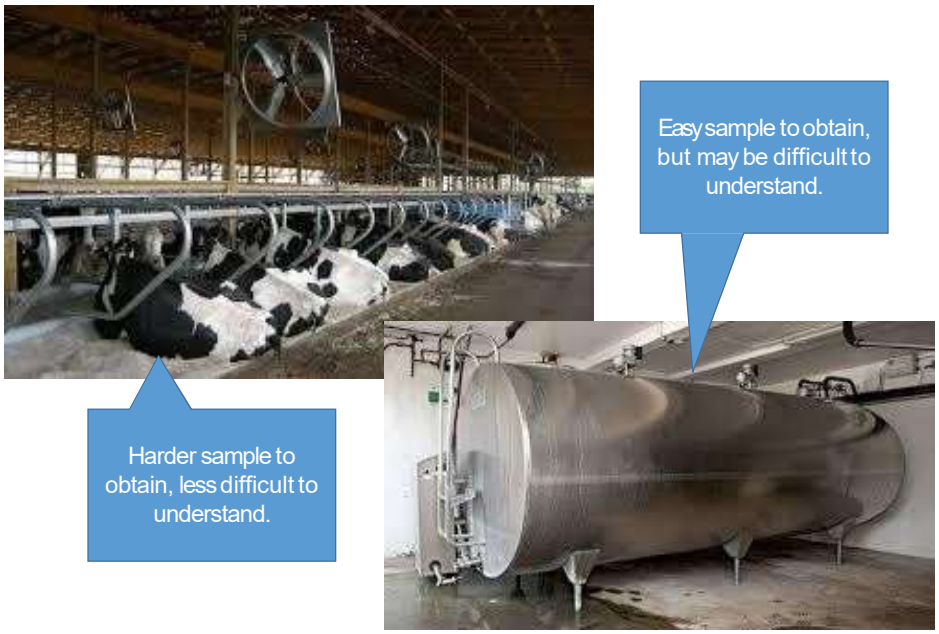


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# Bulk Tank Program with QMPS

- Farms voluntarily enroll in the bulk tank program
- QMPS collects and processes 6 samples/year (1 every other month)
  - $200 USD
  - Qualitative:

| Contagious | Gram negative | Gram positive | Other |
|---|---|---|---|
| Staph. aureus | E. Coli | Strep. spp | Yeast |
| Strep. ag | Klebsiella | Staph. spp | Prototheca |
| Mycoplasma | Serratia | | |
| | Pseudomonas | | |

  - Quantitative:
    - Coliforms, Staph. spp., Strep. spp

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# Contagious Pathogens

## Staph. aureus, Strep. ag., Mycoplasma

- Contagious pathogens are found in milk
  - They survive best in the udder
- When these pathogens are found in the bulk tank they are very likely to come from a cow(s) with an infection
- Although **it is not recommended as the only source of monitoring**, some small farms will use bulk tank monitoring to track contagious pathogens

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# Contagious Pathogens

Staph. aureus, Strep. ag., Mycoplasma

- **Why is it not recommended to use a bulk tank to monitor for contagious pathogens?**
- **False negatives** due to **decrease** in sensitivity of the test.
- Cows with Staph. aureus infections don't always shed
  - This is an issue at the individual cow level too!
- Cows with mycoplasma may also have cyclical shedding.

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# Bulk Tank Pathogens

**Staph aureus**

- This is a contagious organism
- Lives in and around the udder
  - Spread cow to cow…usually during milking
- If you are having cows with chronic high SCC, but no clinical mastitis… this may indicate a Staph aureus *problem*
- If you have a BTSCC creeping up…you may have a Staph. aureus problem
  - Even if you haven't purchased any cows!
- Rinse gloved hands frequently during milking
  - You may need to review milking procedures with your staff so they understand how contagious pathogens are transmitted
- If you have not identified your Staph aureus cows, it will be important to do so.

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## Staph. aureus positive tank

- Now what…?
  - Individual cow monitoring
    - Culture all cows in herd x2-3, 3 weeks apart
  - Sequential tanks
  - Focus on chronic cows
  - Culture fresh cows…

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## Strep. ag.

- Not seen frequently in US herds
- Elevated SCC without clinical signs
- Bulk tanks averaging > 400K
- Possible elimination of all infections with blanket treatment with penicillin based drug
  - Good biosecurity
  - Doesn't survive in environment too long
  - …Can a closed herd get Strep. ag?
    - YES IT CAN!

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# Mycoplasma

- Highly contagious organism
- Cows that test positive for Mycoplasma should be segregated from the main herd and culled as soon as possible
- Milk all cows with clinical mastitis last until Mycoplasma status is known

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# Mycoplasma

- Submit a milk sample for Mycoplasma culture from the following:
  - All clinical mastitis cows
  - 48 hours after calving from fresh cows and heifers
  - All cows exiting the hospital pen to make sure the given cow did not become infected with Mycoplasma while in the hospital pen
  - All high SCC and chronically infected cows

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# Gram negative

## E. coli, Klebsiella, Serratia, Pseudomonas

- These organisms can be found in the environment as well as infections of the udder
  - when they are found in the bulk tank it is difficult to determine if this is coming from mastitis infections or environmental contamination
- Prevention:
  - Keep environment clean and dry
  - Maintain milking equipment
  - Reduce liner slips

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# Gram negative

**E. coli**

- Clinical mastitis can vary from mild to very sick cow
- Severe infections more common in early lactation

**Klebsiella**

- Can be chronic
- May lose quarter

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# Gram Negative

**Serratia**

- Resistant to antimicrobial therapy
- Milk cows last

**Pseudomonas**

- Found in water and bedding
- Ponds, troughs, water hoses, contaminated teat dip
- Chronic infections

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# Streptococcus spp.

- Common in fresh cows
- Invade mammary gland:
  - Weeks 1 – 3 dry period
  - Pre-fresh period
- Respond well to intramammary treatment during lactation
- High counts may also be associated with cleaning issues

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# Staphylococcal spp.

- Significant increase in SCC
- Usually infected between milking but may be spread at milking
- Dirty teats, legs, udders increase risk of new infection
- Bedding management during the dry period is extremely important
- Does not respond well to intramammary treatment during lactation
  - Responds well to dry treatment

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# Other pathogens

*Yeast*

- Found in soil, plants, bedding and decaying organic matter
- Transmitted
  - Contaminated multidose bottles of medication
  - Contaminated syringes
- Improper intramammary treatment protocol increase risk of infection
- May be spread at milking time form cow-to-cow through milking equipment
- Do not treat yeast infections with antibiotics

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Bulk Tank Pathogens
Other

**Prototheca**

- It is an algae found in cow environment including water, soil, bedding and manure.
- Prototheca infection does not respond to antibiotic therapy.
- Infections last through a lactation and often the lifetime of the cow.
- Infected quarters have very high SCC levels.
- Prototheca mastitis may contribute to persistently high bacteria counts (SPC/PLC).
- Cow to cow transmission of infection during milking is likely.
- Early detection of infection is key!

We occasionally find prototheca in the bulk tank. On 1 farm this has become an issue, with real life increase in PI count and milk quality issues. The investigation is still on-going.

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# Bulk tank pathogens

**T. pyogenes**

- Sometimes considered "Summer mastitis"
- Associated with damaged teat ends
- Treatment outcomes are poor
- Loss of the quarter is not uncommon

20

# Total number of tanks by herd size Jan 2019

| Size | Number of BT |
|---|---|
| <250 | 1,133 |
| 250 – 500 | 410 |
| 500 – 1000 | 474 |
| >1000 | 325 |
| Total # of tanks | 2,342 |

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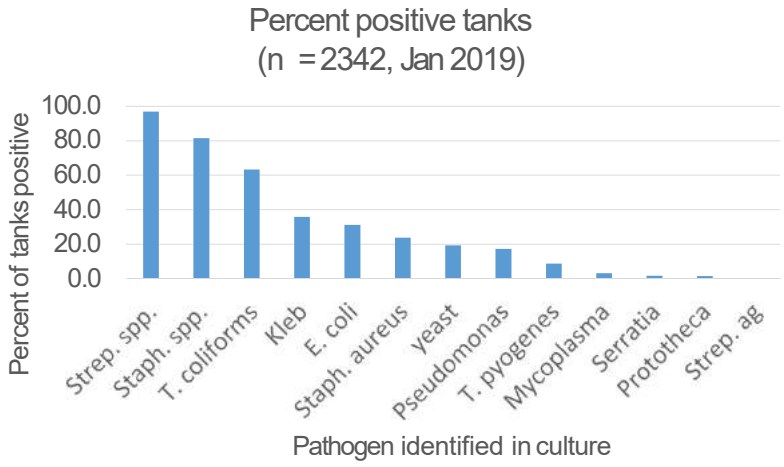
# Summary of bulk tank pathogens

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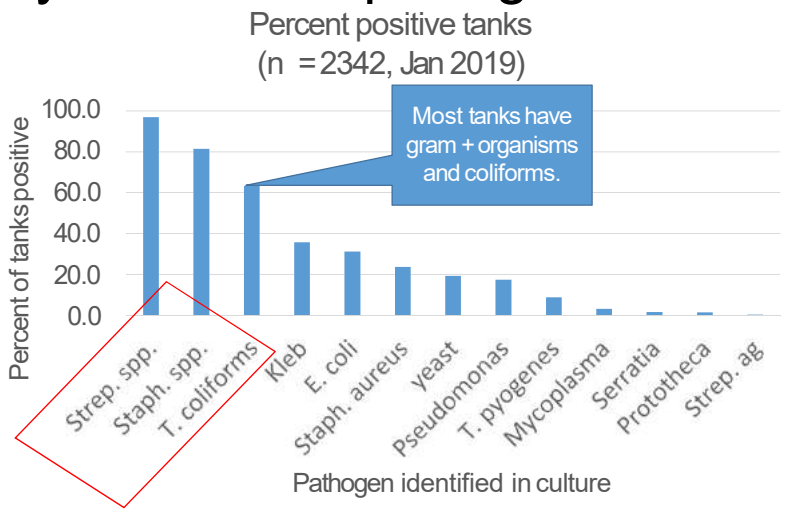
# Summary of bulk tank pathogens

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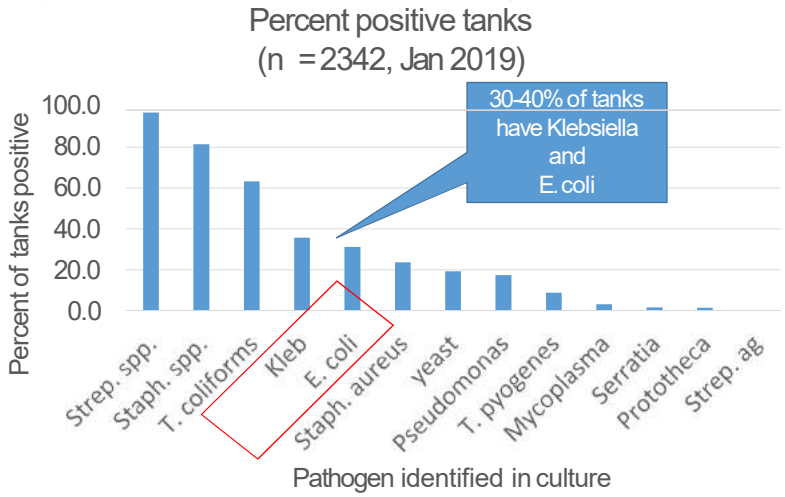
# Summary of bulk tank pathogens

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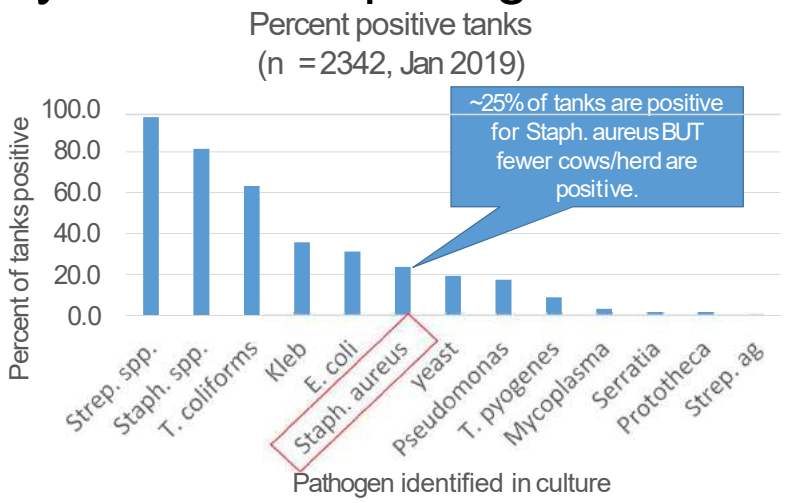
# Summary of bulk tank pathogens

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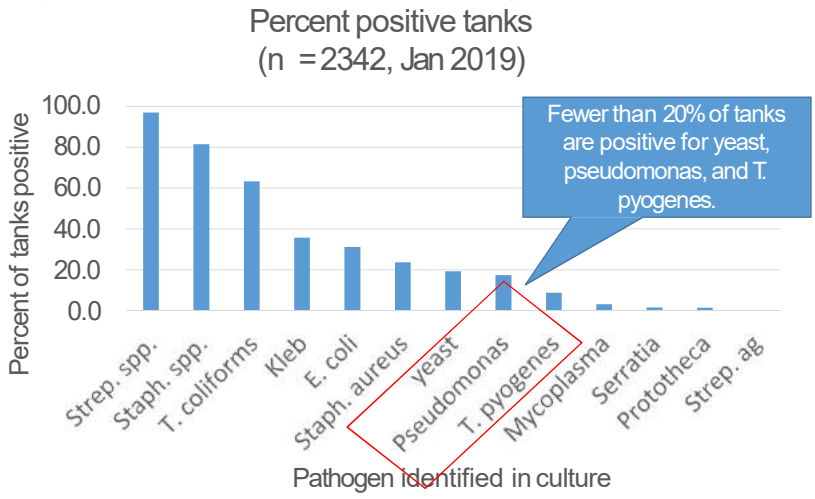
# Summary of bulk tank pathogens

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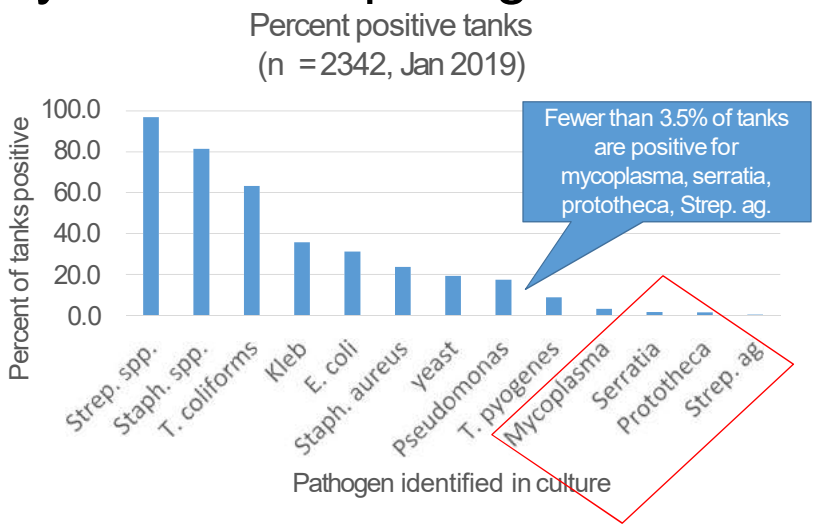
# Summary of bulk tank pathogens

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# PMN chemotaxis

Somatic Cells are pulled out of circulation to fight infection

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This is how somatic cells kill bacteria:
PMN phagocytosis and killing: *E. coli*


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Different bacteria, act differently… this is why some bacteria are hard to get rid of

# PMN 'chase' *S. aureus*

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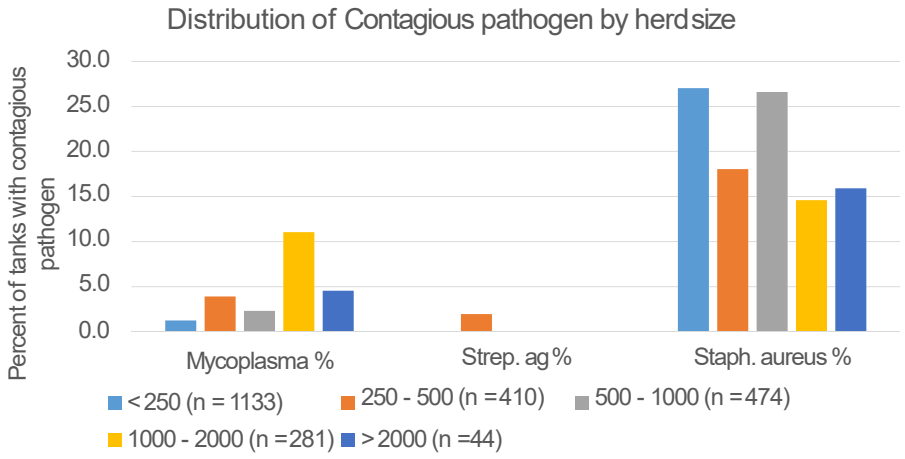
# Distribution of Contagious pathogens

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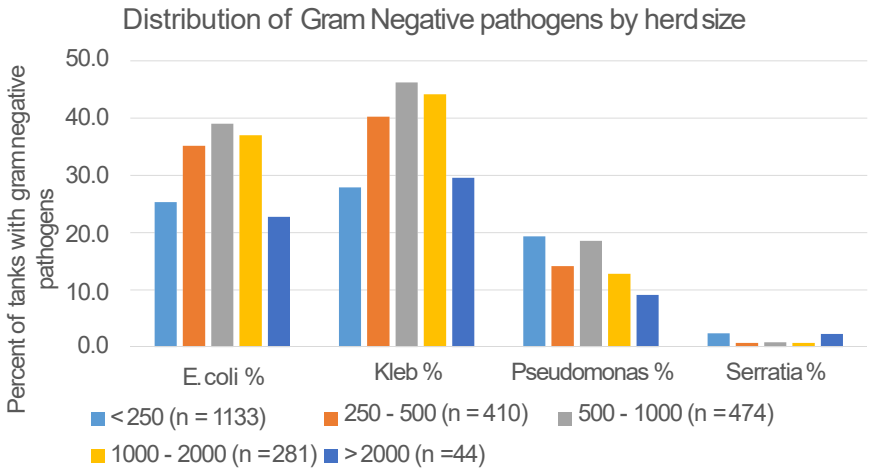
# Distribution of Gram negative pathogens

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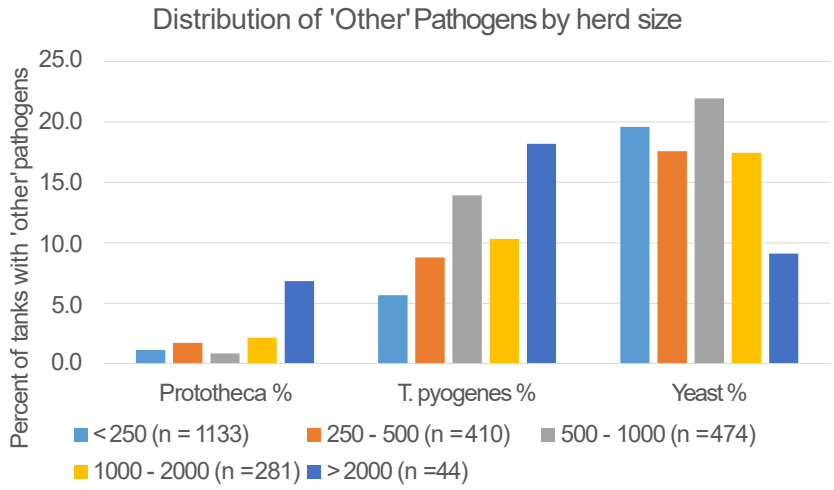
# Distribution of Other organisms

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# Does the number of bacteria matter?

- The bulk tank program includes counts of:
  - Coliforms
  - Staph. spp.
  - Strep. spp.
- The raw number may matter, but perhaps more importantly is the change over time.

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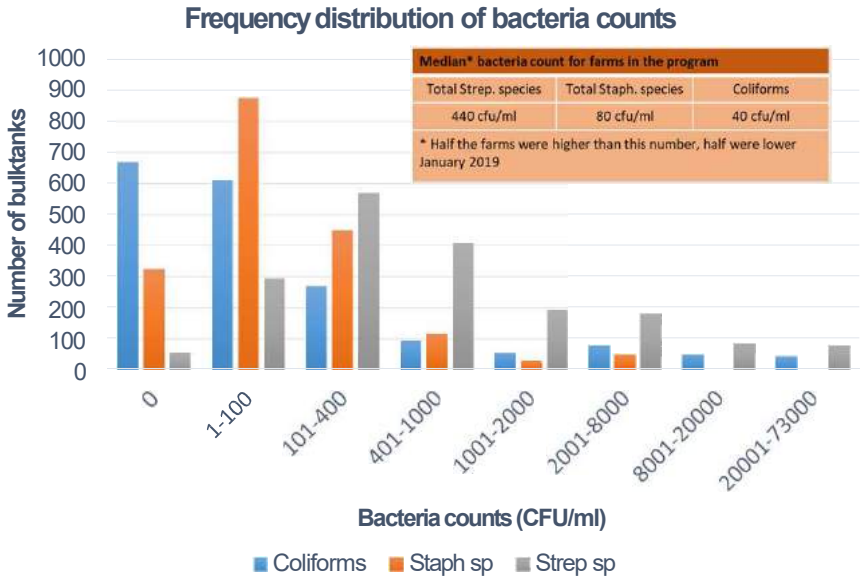


*1862 Bulk tanks (August 2014- January 2018)

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# What do bulk tank reports look like?

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# Bulk tank report from the lab (Bulk Tank Monitoring Program)

**Bulk Milk Quality Test**

| Sample Date | Animal ID | Species | Sample | Site | Test Result | Comment |
|---|---|---|---|---|---|---|
| 10/17/2017 | BULK TANK | Bovine | Milk, Bulk Tank | | *E. COLI: not detected*<br>**KLEBSIELLA SP.: DETECTED**<br>*SERRATIA.: not detected*<br>*PSEUDOMONAS.: not detected*<br>*T.PYOGENES.: not detected*<br>*PROTOTHECA.: not detected*<br>*YEAST.: not detected*<br>*MYCOPLASMA.: not detected*<br>TOTAL STREP SPP.: 240<br>TOTAL STAPH SPP.: 440<br>TOTAL COLIFORMS.: 20<br>*STREP. AG.: not detected*<br>**STAPH. AUREUS.: DETECTED** | |

https://ahdc.vet.cornell.edu/sects/QMPS/Services/bulktank.cfm

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## BULK TANK PROGRAM REPORT
## Bulk Tank Culture Results
## Historical Comparison

| Bacteria Levels | June 2015 | August 2015 | October 2015 | December 2015 | February 2016 | April 2016 |
|---|---|---|---|---|---|---|
| Total Strep species | 40 cfu/ml | 40 cfu/ml | Not detected | 140 cfu/ml | 180 cfu/ml | 100 cfu/ml |
| Total Staph species | 80 cfu/ml | 80 cfu/ml | 40 cfu/ml | 80 cfu/ml | 120 cfu/ml | 140 cfu/ml |
| Total Coliform Bacteria | 20 cfu/ml | Not detected | Not detected | Not detected | Not detected | Not detected |
| Culture Results | Strep species<br>Staph species<br>Klebsiella | Strep species<br>Staph species | Staph species<br>Pseudomonas | **Staph aureus**<br>Strep species<br>Staph species<br>Yeast | **Staph aureus**<br>Strep species<br>Staph species<br>Pseudomonas | **Staph aureus**<br>Strep species<br>Staph species<br>Yeast |
| Mycoplasma Culture | Negative | Negative | Negative | Negative | Negative | Negative |

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## Bulk Tank Culture Results Historical Comparison

| Bacteria Levels | April 2015 | June 2015 | October 2015 | December 2015 | February 2016 | April 2016 |
|---|---|---|---|---|---|---|
| Total Strep species | 400 cfu/ml | 4,200 cfu/ml | 60 cfu/ml | 100 cfu/ml | 300 cfu/ml | 720 cfu/ml |
| Total Staph species | Not detected | 400 cfu/ml | Not detected | 80 cfu/ml | 60 cfu/ml | 240 cfu/ml |
| Total Coliform Bacteria | 60 cfu/ml | 20,000 cfu/ml | 40 cfu/ml | 60 cfu/ml | 2,400 cfu/ml | 20 cfu/ml |
| Culture Results | Strep species E.coli Pseudomonas | Staph aureus Strep species Staph species Pseudomonas | Strep species E. Coli T. pyogenes | **Staph aureus** Strep species Staph species Klebsiella T. pyogenes | **Staph aureus** Strep species Staph species E. coli | **Staph aureus** Strep species Staph species Klebsiella |
| Mycoplasma Culture | Negative | Positive | Negative | Negative | Negative | Negative |

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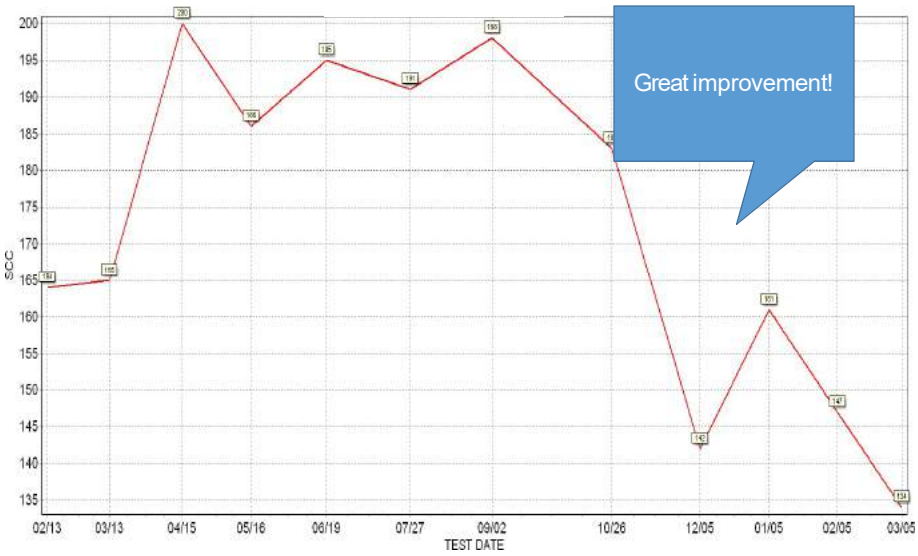
## SCC Over Time

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Analyzing 574 cows on Test Date 3/ 5/16

Without any cows removed : Bulk Tank SCC 128

| ID | #>4 | MILK | Value | SCC | %Tank | Price @SCC | Income | Price @SCC | Income |
|---|---|---|---|---|---|---|---|---|---|
| 9329 | 2 | 126 | 20.05 | 1838 | 3.2 | 16.17 | 124 9165 | 16.17 | 124 9165 |
| 9816 | 7 | 108 | 17.19 | 1838 | 2.7 | 16.16 | 125 9164 | 16.17 | 121 9147 |
| 9510 | 8 | 123 | 19.58 | 1600 | 2.7 | 16.17 | 125 9165 | 16.17 | 118 9127 |
| 9686 | 2 | 140 | 22.29 | 1213 | 2.3 | 16.16 | 125 9159 | 16.16 | 115 9101 |
| 9906 | 3 | 79 | 12.57 | 1715 | 1.9 | 16.16 | 126 9168 | 16.16 | 113 9088 |
| 8942 | 5 | 104 | 16.55 | 1300 | 1.9 | 16.17 | 126 9168 | 16.16 | 110 9071 |
| 9559 | 4 | 109 | 17.35 | 1213 | 1.8 | 16.17 | 126 9168 | 16.16 | 108 9054 |
| 9668 | 3 | 122 | [illegible] | 1056 | 1.8 | 16.16 | 126 9161 | 16.16 | 106 9034 |
| 9629 | 2 | 91 | 14.[illegible] | [illegible] | 1.6 | 16.17 | 126 9170 | 16.16 | 104 9019 |

# of times cow had LS>4 (aka > 200K) on test

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## Subclinical Infections Summary

| | | Jul-15 | Sep-15 | Oct-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Ideal Range | Ok | Needs Improvement |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LS | | | | | | | | | | | |
| Chronic % | | 13 | 11 | 8 | 9 | 10 | 11 | 11 | ≤5% | 6-10% | >10% |
| # | | 60 | 52 | 36 | 43 | 49 | 59 | 59 | | | |
| New Inf % | | 6 | 7 | 8 | 7 | 5 | 6 | 6 | ≤5% | 6-8% | >8% |
| # | | 27 | 31 | 34 | 33 | 27 | 31 | 30 | Goal: Cure %> New Infection % | | |
| Cured % | | 9 | 5 | 8 | 5 | 6 | 3 | 4 | | | |
| # | | 40 | 25 | 34 | 26 | 32 | 17 | 22 | | | |
| Clean % | | 73 | 77 | 77 | 79 | 79 | 80 | 79 | | | |
| # | | 343 | 353 | 342 | 393 | 400 | 418 | 419 | | | |
| HiFresh % | | 19 | 18 | 17 | 25 | 10 | 8 | 11 | ≤5% | 6-17% | >17% |
| # | | 14 | 13 | 19 | 16 | 5 | 3 | 5 | | | |
| LoFresh % | | 81 | 82 | 83 | 75 | 90 | 92 | 89 | | | |
| # | | 59 | 60 | 91 | 47 | 45 | 37 | 39 | | | |

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## Subclinical Infections Summary

| | | Ideal Range | Ok | Needs Improvement |
|---|---|---|---|---|
| LS | | | | |
| Chronic % | | ≤ 5% | 6-10% | > 10% |
| # | | | | |
| New Inf % | | ≤ 5% | 6-8% | > 8% |
| # | | Goal: Cure %> New Infection % | | |
| Cured % | | | | |
| # | | | | |
| Clean % | | | | |
| # | | | | |
| HiFresh % | | ≤ 5% | 6-17% | > 17% |
| Cure Risk | | Goal: Cure risk > 35% | | |

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# Evaluation of bulk tanks to help monitor mastitis?

Bulk tanks are an easy sample to collect…

- What kind of information can you collect?
- What can you do with that information?

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# Any questions?


- Dr. Paula Ospina
- QMPS
- Cornell University
- pav5@cornell.edu


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# What's growing in your bedding?

Drs. Paula Ospina, Valeria Alanis,
Carlo Santisteban, Daryl Nydam, Michael Zurakowski
Vermont Veterinary Medical Association

June 2019

Quality Milk Production Services

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Cornell University College of Veterinary Medicine

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## Thank you

NY farm viability INSTITUTE

NYFVI
Funds that allowed some of this research

NYS Dairy farmers that allowed us to work with their data


Cornell QMPS staff (all lab sections) Drs. V. Alanis, A.K. Vasquez, T. Tomazi, D.V. Nydam, F. Welcome, M. Zurakowski, P. Moroni), interns, and students

1

2

# Why do YOU care about *mastitis* pathogens in bedding?

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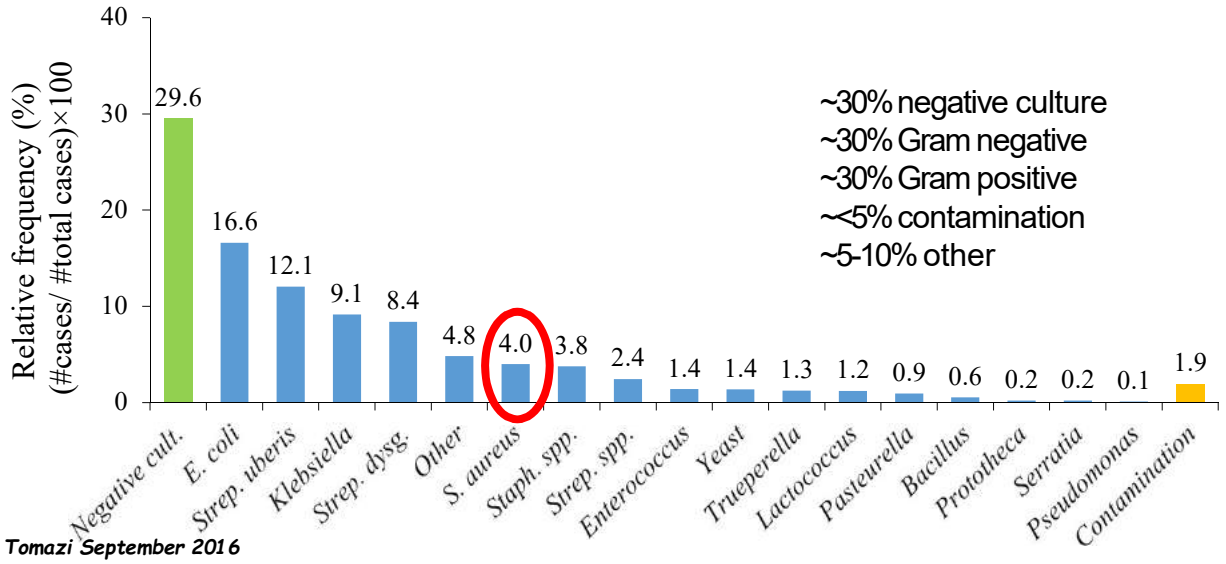
## Why do I care about bedding?

- We are doing a great job in the parlor
  - There are fewer cases of CM caused by contagious pathogens
  - Most CM are caused by environmental pathogens
- So if not the parlor, where are cows picking up bugs?
- Can we do anything about it?
  - Bedding type, bedding management, bedding anything?

2

4

## Distribution of pathogens isolated from CM (%) diagnosed from May-October, 2016 in 8 farms in NY

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# Sampling bedding?
# Who has done it?
# How have you done it?

3

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## Sample bedding

- Standard Operating Procedure (SOP) **is very important** for analysis.
- Our general recommendations are:
  - Sample at the same time
    - For example, **right before new bedding** is due to be applied
    - Right before stalls get cleaned
  - **Avoid manure piles**
  - ***Sample BEFORE lime is applied?***
  - Sample multiple stalls
  - Gather ***Fresh*** bedding ***as it is being applied*** to the stalls (but make sure it doesn't get mixed with old stuff)
  - Record stall condition
    - Bedding quantity
    - Stall cleanliness
  - Write down bedding type (new vs. used; sand/sawdust/etc.)

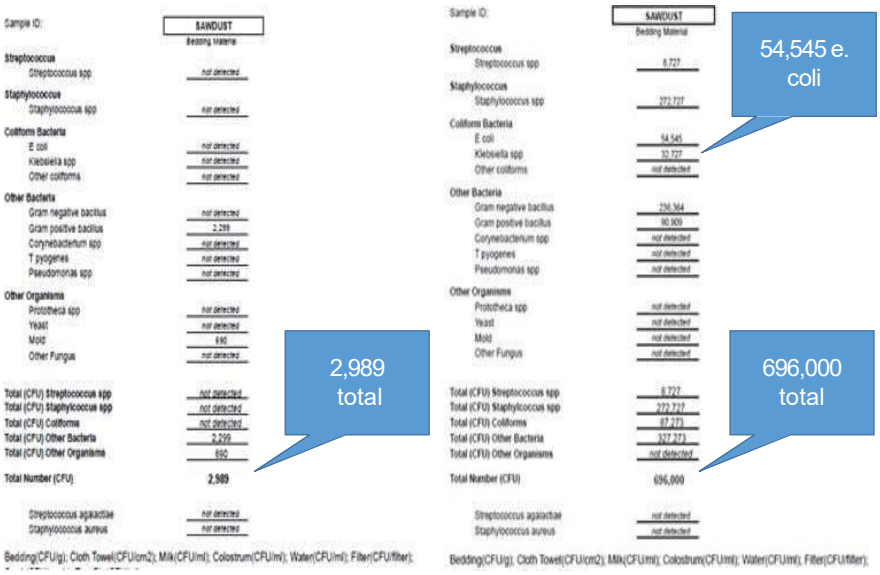
7

# Does sampling make a difference?



8

# Fresh sawdust bedding



| Sample ID: | SAWDUST Bedding Material |
|---|---|
| **Streptococcus** | |
| Streptococcus spp | not detected |
| **Staphylococcus** | |
| Staphylococcus spp | not detected |
| **Coliform Bacteria** | |
| E coli | not detected |
| Klebsiella spp | not detected |
| Other coliforms | not detected |
| **Other Bacteria** | |
| Gram negative bacilus | not detected |
| Gram positive bacilus | 2,299 |
| Corynebacterium spp | not detected |
| T pyogenes | not detected |
| Pseudomonas spp | not detected |
| **Other Organisms** | |
| Prototheca spp | not detected |
| Yeast | not detected |
| Mold | 690 |
| Other Fungus | not detected |
| Total (CFU) Streptococcus spp | not detected |
| Total (CFU) Staphylococcus spp | not detected |
| Total (CFU) Coliforms | not detected |
| Total (CFU) Other Bacteria | 2,299 |
| Total (CFU) Other Organisms | 690 |
| Total Number (CFU) | 2,989 |
| 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);

2,989 total

| Sample ID: | SAWDUST Bedding Material |
|---|---|
| **Streptococcus** | |
| Streptococcus spp | 8,727 |
| **Staphylococcus** | |
| Staphylococcus spp | 272,727 |
| **Coliform Bacteria** | |
| E coli | 54,545 |
| Klebsiella spp | 32,727 |
| Other coliforms | not detected |
| **Other Bacteria** | |
| Gram negative bacilus | 236,364 |
| Gram positive bacilus | 90,909 |
| 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 | 8,727 |
| Total (CFU) Staphylococcus spp | 272,727 |
| Total (CFU) Coliforms | 87,273 |
| Total (CFU) Other Bacteria | 327,273 |
| Total (CFU) Other Organisms | not detected |
| Total Number (CFU) | 696,000 |
| 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);

54,545 e. coli

696,000 total

9

# USED Bedding Sampling SOP

Sample 3 to 5 representative stalls.
Use a new bag for each sample.

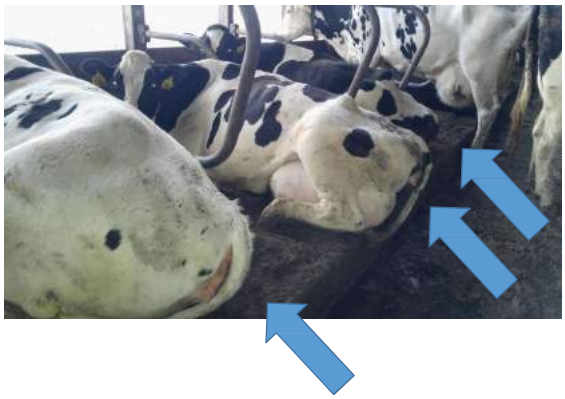
Only sample bedding from the 2' x 2' section where the udder would touch the stall.
Scrape 1 inch off the top of the bedding material into a new bag.

Avoid sampling manure, but write down how many stalls were dirty…

5

10

# Record Cow positioning



11

# Cleanliness

Evaluate stall cleanliness as 1 or 2.

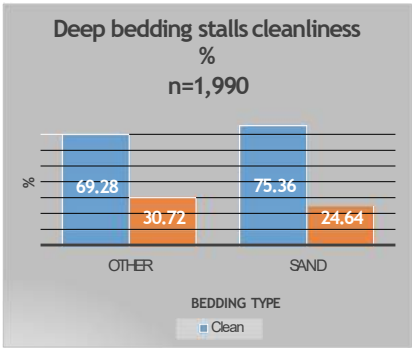
1 = mostly/completely clean (no evidence of manure/urine, e.g. just looks used)

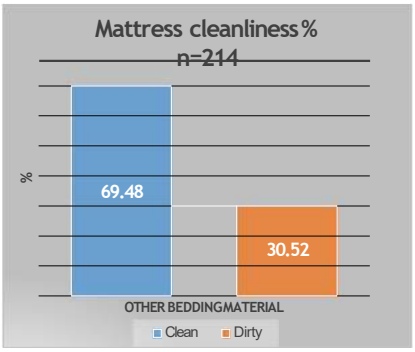
2 = dirty (piles of manure, urine pooling)



12

# Stall evaluation Cleanliness




13

# Bedding quantity

Evaluate the bedding quantity for deep beds.

1 = adequate bedding: minimal curb exposure

2 = inadequate bedding: visible curbs, holes where cows lay down

7

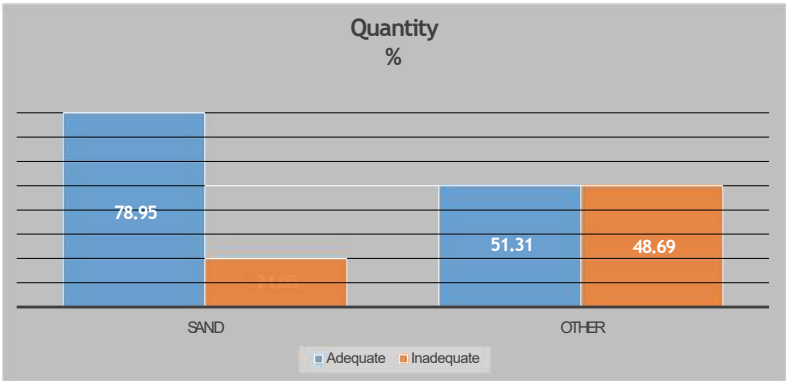
Evaluate the bedding quantity for mattresses.

1 = adequate bedding: none or only one small bare spot (<$3^2$ in), mattress not visible

2 = inadequate bedding: no bedding, mattress visible in multiple spots

14

# Stall evaluation
# Quantity




15

# FRESH BEDDING Sampling SOP

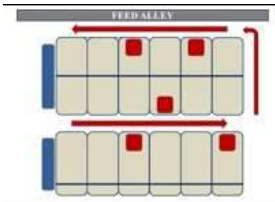
Walk behind the vehicle delivering new bedding.

Open a new bag and let some bedding flow into the bag.

8

16

# FRESH BEDDING
# Collect Representative Samples




Keep following the bedding vehicle throughout the whole pen and collect 5 samples.

All 5 samples go into 1 bag.

17

# ALL SAMPLES:
# LABEL & KEEP COLD OR FROZEN

Label the bags with this information

- Farm
- Date
- New or used bedding
- Type of bedding (e.g. sand, manure solids)

Place the samples in a cooler with ice for travel.

Freeze, if they are not processed the same day.

9

18

# Lab protocols

- 10g mixed bedding added to 90 mL of PBS
  - In stomacher for 2 minutes
  - 5 serial dilutions
  - 50 µL of each dilution inoculated different 4 media
    - Edwards, Vogel-Johnson, MacConkey, Trypticase Soy Agar with 5% sheep blood and 0.01 esculin
    - Plates dried at room temperature for 10 min.
    - Inverted, and incubated at 35-38° C for 24 – 48 hrs then evaluated
    - Quantification on dilution with 25 – 250 CFU, CFU/g
      - ID based on morphology

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# What does QMPS report?

| Sample ID: | BULK TANK<br>Milk, Bulk Tank | NEW BEDDING<br>Bedding Material | USED 1<br>Bedding Material |
|---|---|---|---|
| **Streptococcus** | | | |
| Streptococcus spp | 80 | 43,956 | 202,298,851 |
| **Staphylococcus** | | | |
| Staphylococcus spp | 20 | 46,154 | 140,229,885 |
| **Coliform Bacteria** | | | |
| E coli | 40 | not detected | not detected |
| Klebsiella spp | 20 | not detected | not detected |
| Other coliforms | not detected | 879 | 229,885 |
| **Other Bacteria** | | | |
| Gram negative bacillus | not detected | 1,319 | 2,758,621 |
| Gram positive bacillus | not detected | not detected | not detected |
| Corynebacterium spp | 40 | 17,582 | 45,977,011 |
| T pyogenes | not detected | not detected | not detected |
| Pseudomonas spp | not detected | not detected | not detected |
| **Other Organisms** | | | |
| Prototheca spp | not detected | not detected | not detected |
| Yeast | not detected | 22 | not detected |
| Mold | not detected | not detected | not detected |
| Other Fungus | not detected | not detected | not detected |
| **Total (CFU) Streptococcus spp** | 80 | 43,956 | 202,298,851 |
| **Total (CFU) Staphylococcus spp** | 20 | 46,154 | 140,229,885 |
| **Total (CFU) Coliforms** | 60 | 879 | 229,885 |
| **Total (CFU) Other Bacteria** | 40 | 18,901 | 48,735,632 |
| **Total (CFU) Other Organisms** | not detected | 22 | not detected |
| **Total Number (CFU)** | **200** | **109,912** | **391,494,253** |
| Streptococcus agalactiae | not detected | not detected | not detected |
| Staphylococcus aureus | not detected | not detected | not detected |

Stay tuned for upcoming changes!

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# QMPS bedding report?

- Streptococcus spp.
- Staphylococcus spp.
- Coliform
  - E. coli
  - Klebsiella
  - Other
- Other bacteria
  - Gram – bacillus
  - Gram + bacillus
  - Cornybacterium spp.
  - T. pyogenes
  - Pseudomonas spp.
- Other Organisms
  - Prototheca spp.
  - Yeast
  - Mold
  - Other Fungus
- Total Strep.
- Total Staph.
- Total Coliforms
- Total other bacteria
- Total other organisms
- TOTAL Number
- (Staph. aureus/Strep. ag)

21

# There is a lot of variability in bedding samples!

11

22

# 1st study


MILK QUALITY
by Paula Ospina, D.V.M.
August 25, 2016 517

**Bedding and teat end bacteria lack a strong tie**

- Three farms all using manure solids.
- Farm A =
  - Deep beds, raw manure solids, applied lime to end of stall
- Farm B =
  - Deep beds, post digester manure solids and mixed lime in mixer prior to applying bedding to stalls
- Farm C=
  - Mattresses with post-digester manure solids and applied lime to end of stall before adding fresh bedding

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# Bacteria counts in USED raw manure solids (FARM A; 23 stalls)

| Management Step | Used bedding in Farm A pathogen count (CFU/g; ±Standard Error) | | |
|---|---|---|---|
| | Gram Positive Organisms | | Gram negative organisms |
| | Staphylococcal species | Streptococcus species | Coliforms |
| Pre | 6.5 million (±1.8 m) | 181 million (±39 m) | 12.1 million (±1.9 m) |
| Raking | 25 million (±9.5 m) | 284 million (±63 m) | 9.5 million (±2.6 m) |
| Lime | 2,484 (±1,401) | 29,823 (±27,014) | 1 (±0) |

Lime stopped growth… but for how long?

12

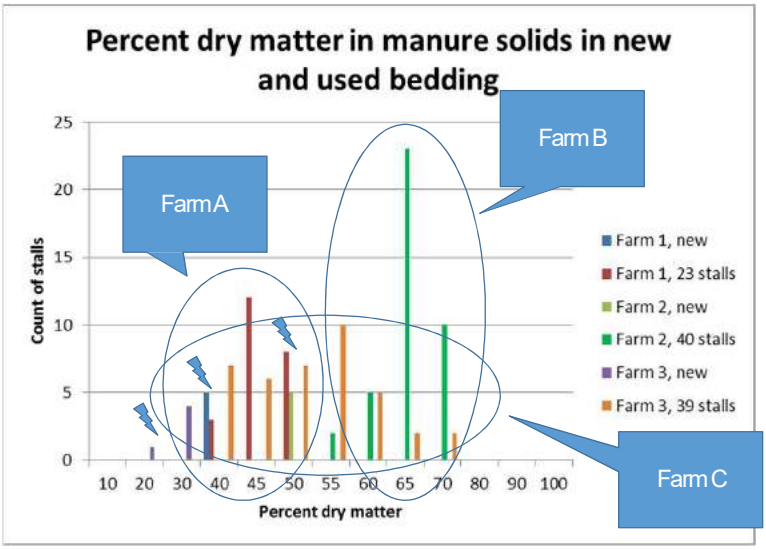
24

# Bacteria counts in manure solids

| Manure solid type | Farm | Fresh Bedding (CFU/g; ± Standard Error) | | | USED bedding (CFU/g; ± Standard Error) | | |
|---|---|---|---|---|---|---|---|
| | | Gram positive organisms | | Gram negative | Gram positive organisms | | Gram negative |
| | | Staphs | Streps | Coliforms | Staphs | Streps | Coliforms |
| Raw solids | A 23/23 stalls | 158,198 (±47,364) | 3.2 million (±766,087) | 135,866 (±30,332) | 25 million (±9.5 m) | 284 million (±63.5 m) | 9.5 million (±2.6 m) |
| Post digester + lime | B 40/400 stalls | 48,801 (±24,819) | 5,024 (±1,891) | 0 | 72 million (±6.9 m) | 520 million (±34.1 m) | 51 million (±7.8 m) |
| Post digester | C 40/100 stalls | 1.3 million (±586,377) | 22 million (±8.9 m) | 0 | 95 million (±12.4 m) | 313 million (±24 m) | 416,055 (±206,007) |

25

# Variability in samples… hopefully NOT due to sampling technique…

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# 2nd study – different farms and bedding types

27

# On-going study…
# Over 50 farms (> 250 BEDDING SAMPLES)

- Different types of bedding
- Samples in FRESH PEN:
  - 3-6 used bedding samples
  - 1 Fresh sample (over ~5 stalls)
- Objective –
  - Define distribution of pathogens in bedding
    - To answer the question, is this # ok?



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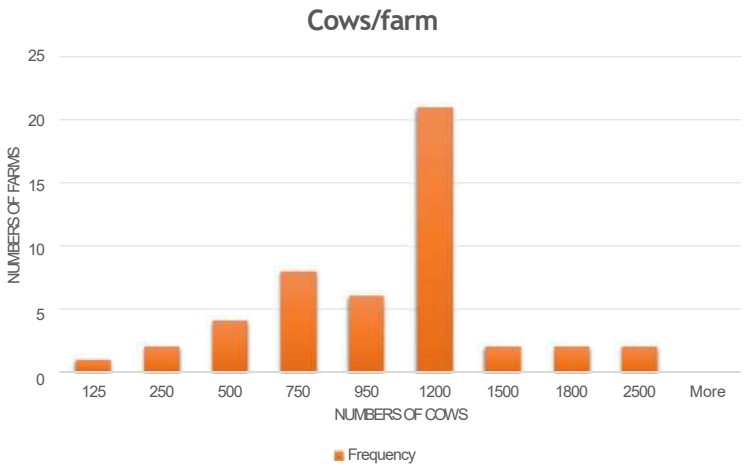
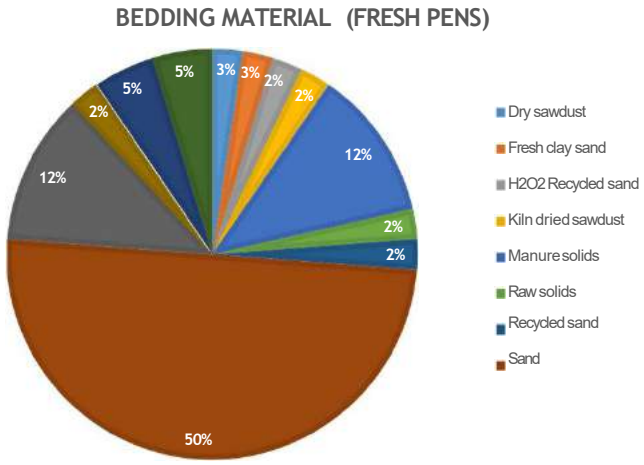
# 2nd study (on-going)

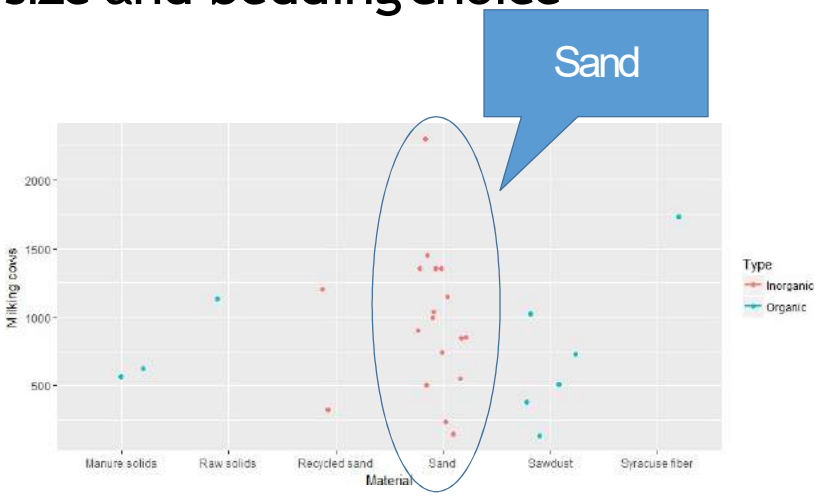



29




30

# Farm size and bedding choice




31

# What about the association between bedding and milk quality?

That's difficult to answer because there are a lot of factors that influence milk quality.

You also have to decide which parameter you want to measure.

BTSCC
? CM?
Subclinical mastitis?

What else can influence this?

16

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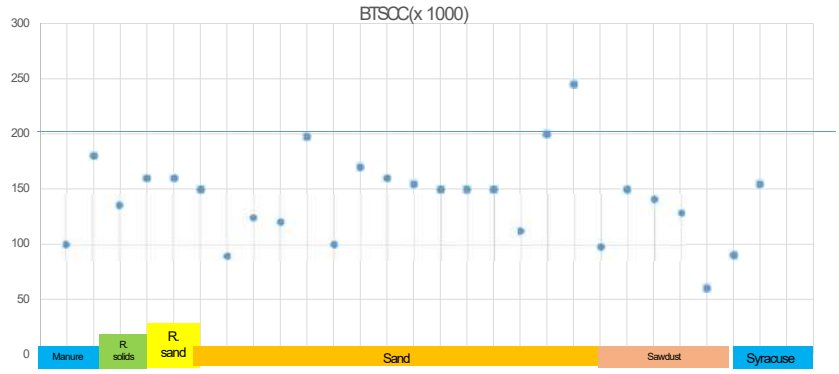
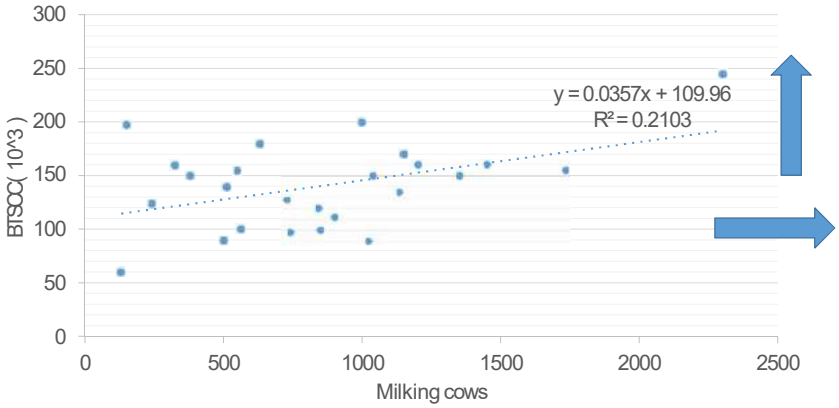
# SCC and bedding type




33

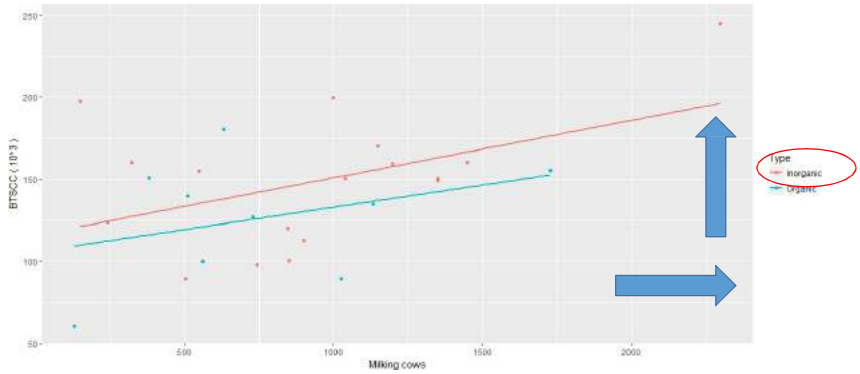
# Farm size and BTSCC




As cow numbers go up, BTSCCgoes up

34

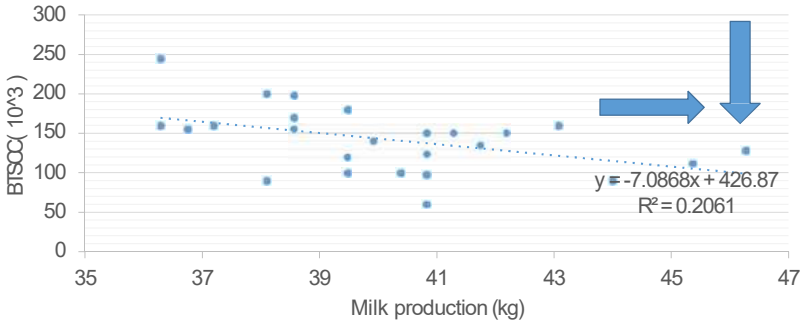
# Farm size and BTSCC: Different relationship based on bedding type?




As cow numbers go up, BTSCC goes up

35

# Milk production and BTSCC




As milk production goes up, BTSCC goes down

18

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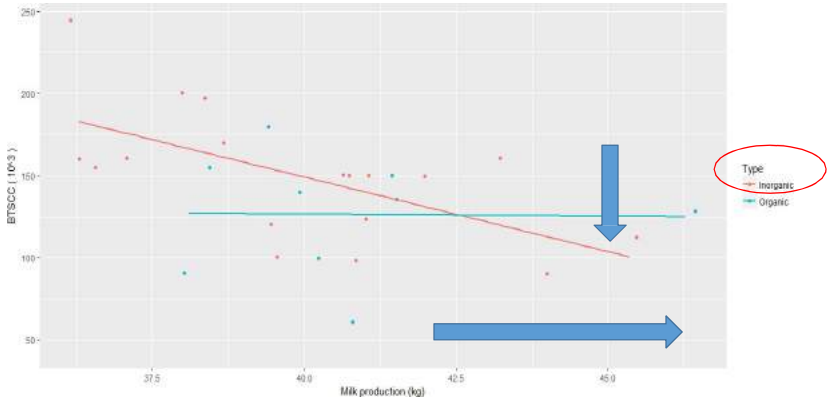
# Milk production and BTSCC: Different relationship based on bedding type?

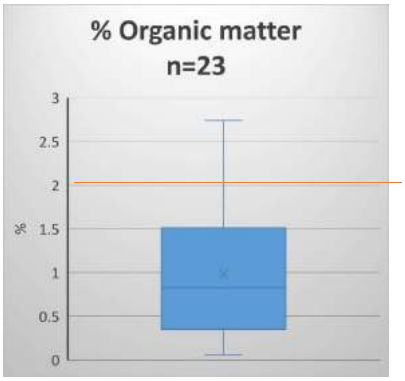


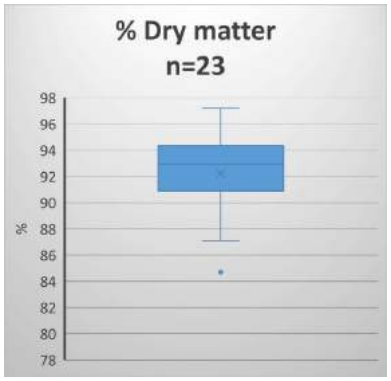

As milk production goes up, BTSCC stays stable in farms using organic bedding, but trends down in farms using sand.



# Additional testing for sand

# Additional test for sand




Goal is < 2%

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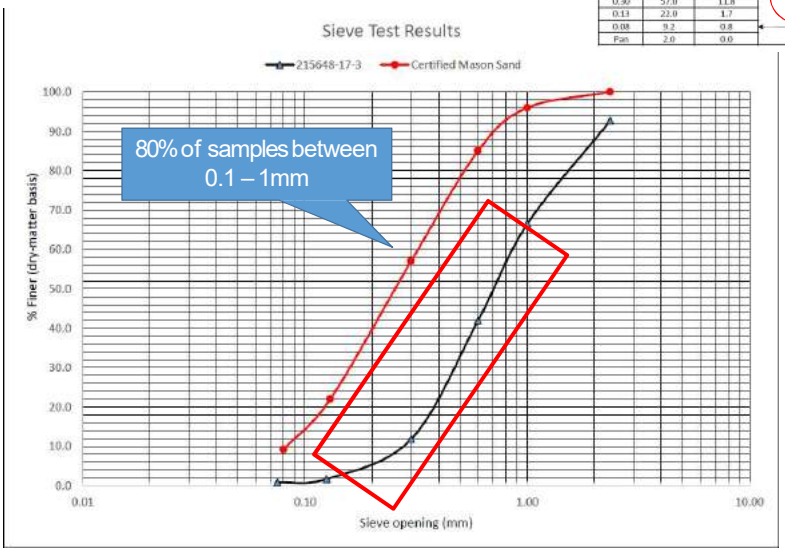
# Particle Size

| Sieve Opening (mm) | Certified Mason Sand % Finer (DM) | 215648-17-3 % Finer (DM) | Material between these sieves % Sum (DM) |
|---|---|---|---|
| 2.36 | 100.0 | 92.7 | |
| 1.00 | 96.0 | 66.5 | |
| 0.60 | 85.0 | 41.9 | 91.9 |
| 0.30 | 57.0 | 11.8 | |
| 0.13 | 22.0 | 1.7 | |
| 0.08 | 9.2 | 0.8 | |
| Pan | 2.0 | 0.0 | |

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# QMPS -SAND

Results based on search parameters

Show All

| Test Name | Lab Section | Fee |
|---|---|---|
| Sand Bedding Particle Size - BSS | Quality Milk Production Services | $38.00 |
| Sand Recovery Analysis - SAND | Parasitology | $15.00 |
| Total Organic Matter - TOM | Quality Milk Production Services | $12.00 |

Sand Bedding Particle Size - BSS

**Sample Details:** Sand bedding
**Cost/Fee:** $38.00

Details | Reference Ranges | Test Interpretations

Guidelines for sand bedding: At least 80% of sand particles should be within the ideal particle size range, which is approximately 0.1 mm to 1.0 mm. There should be no large debris or particles. Particles greater than approximately 2.5 or 3.0 mm in diameter are considered a concern.

Total Organic Matter - TOM

**Sample Details:** Sand bedding
**Cost/Fee:** $12.00

Details | Reference Ranges | Test Interpretations

Ideally, organic matter levels should be below 2%. Between 2-5% is considered fair, and greater than 5% is a concern.

https://ahdc.vet.cornell.edu/test/list.aspx?Species=&Test_Name=sand&TstTyp=&WebDisc=

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# Bedding and mastitis

- On going research
  - Bedding type and BTSCC
    - Milk production and farm size
  - Follow farms – mastitis and bedding for 1 year
- Lots of variability
  - In sampling at the farm and lab
- Important to follow sampling SOP
  - Also include information on SAMPLE

Label the bags with this information
- Farm
- Date
- New or used bedding
- Type of bedding (e.g. sand, manure solids)



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# Any questions?


- Dr. Paula Ospina
- QMPS
- Cornell University
- pav5@cornell.edu


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# Heifer NAS mastitis What about it?

Drs. P.A. Ospina, V. Alanis,
A.K. Vasquez, T. Tomazi, R. Watters,
K. Marely, D.V. Nydam Vermont
Veterinary Medical Association

June 2019

Quality Milk Production Services

QMPS is a program within the New York State Veterinary Diagnostic Laboratory, a partnership between the NYS Department of Agriculture and Markets and the College of Veterinary Medicine at Cornell University.

Cornell University College of Veterinary Medicine

1

## Introduction and definitions

- Having healthy replacement animals is a necessity not a luxury
- Mastitis impairs this goal
- Interesting issue
  - Starting their milking careers
  - Elevated SCC, certain pathogens can negatively affect milk production and longevity
- 1980's Heifer Mastitis wasn't recognized as a significant problem

2

# Introduction and definitions

- Subclinical mastitis (**SCM**) samples
  - Changes in SCC, no clinical signs
- Clinical mastitis (**CM**) samples
  - Milk appearance, changes in SCC, +/- udder and cow
- Surveillance samples
  - Fresh cow
  - Random sampling
  - Blocked sampling
- **Heifer**
  - 1st lactation animals
- **Cow**
  - 2nd and greater lactation

3

# Introduction and definitions

- Mastitis in heifers
  - What about it?
- Comprehensive literature review in 2012
  - De Vliegher et. al.
- Review the last 5 – 7 years
  - Advances in genetics
  - Immunology
  - Treatment
- Cornell University
  - Quality Milk Production Services
  - Surveillance and clinical mastitis samples in New York State
    - Milk production, milk quality, and the presence of **Staph. spp**.

4

# Staph. spp.?

- Higher prevalence of Staph. spp. in heifers (compared to cows)
  - Surveillance
  - SCM
  - CM?
- Outcomes
  - Milk production
    - Mixed results
  - Increase in SCC
- Species level identification
  - Access to technology
    - Matrix assisted Laser Desorption Ionization Time-of-Flight (MALDI-ToF)
- Coagulase negative staph. or non-aureus Staph.?
  - Some in either column, making the NAS more descriptive term

5

# CNS or NAS?

- Coagulase negative *Staph.* vs. *Staph. aureus* (which is coagulase positive)
- Historically we were only interested in this distinction.
  - Staph. aureus vs. CNS
  - As we learn about Staph. at the species level, this is not enough.
- Are there coagulase positive NON-Staph. aureus of interest in dairy mastitis?
  - Yes, but only a few, and they are rare.
    - (*S. hyicus* and *S. intermedius*)
      - S. hyicus more common and has been seen to create chronic, low grade IMI.
- NEW description: **n**on-**a**ureus **S**taph. (= aka CNS)

6

# Background – SCM or surveillance

1992-2007
Schukken et al., 2009. CNS mastitis: Nothing to worry about?
77K composite heifer *surveillance* samples from 4200 herds

**Prevalence** of CNS in **heifers was 17.9%** compared to **8% in cows** (No species level information)

When CNS in sample, heifers had higher SCC when compared to cows

This can affect herds with low BMSCC (not such an issue in herds with already high BMSCC)

Cows with CNS made **more milk** when compared to culture negative

Major pathogens made less milk and had higher SCC

7

# Background – SCM or surveillance

2006 – 2007 (Flanders)
Piepers et al., 2013. The effect of intramammary infection with coagulase-negative staphylococci in early lactating heifers on milk yield throughout first lactation revisited.

*Surveillance* samples of heifers 1-4 and 5-8 DIM; 1-3 DIM
1/3 of quarters had an IMI, 77% were CNS (no species level)

Heifers with NAS had **higher average test day MY** compared to non-infected herd mates.

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# Background – SCM or surveillance

De Visscher et al., 2015; De Visscher et al., 2016; Sampimon et al., 2009 (Belgium and Netherlands)

*Surveillance* quarter samples: more NAS in heifers than cows
Higher SCC, but **differed based on species**

Valckenier et al., 2019; Belgium study – NAS in heifers = no difference in milk yield 1st 4 months, slight increase in SCC (robot dairys, ~324 QRTS; no spp. level)

Wald et al., 2019; Austria. Staph. aureus and NAS (at spp. level with MALDI). Found some NAS in low SCC more resistant to AB than Staph. aureus (but may be part of normal flora). Most NAS in SCM. Need more spp. level data to determine treatment recommendations.

9

# Summary

- Heifers had higher prevalence of NAS when compared to cows
- Herd to herd variation at species level
  - Growing body of knowledge
- On-going research about milk production
  - Piepers et al., 2013 evaluated genetic merit of milk yield
    - More milk in heifers with CNS
  - Tomazi et al., 2015 evaluated contralateral quarters
    - No difference between non-infected quarters
- NAS part of normal flora?
  - Some reports of lower prevalence when milk sampled directly from cistern or through sterile methods

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## QMPS:
## Surveillance samples of fresh heifers

- Feb – Oct 2017
- Composite samples of heifers 1-7 DIM
  - (n = 935) from a 2725 cow dairy, milking 3x
- Describe distribution at species level based on MALDI-ToF results
- NAS versus major pathogens and negative culture results:
  - with daily milk production in first 60 DIM
  - 1st test day linear score through DHIA testing

11

## Materials and methods

- At the farm:
  - Milk samples frozen then taken to lab
  - Delpro on-farm management system (DeLaval, Tumba Sweeden) saved milk session
  - Data retrieved from Dairy Comp 305 (Ag Valley Software)
- At the lab:
  - Cultured on sheep blood
    - Monoculture (or up to two isolates) analyzed with MALDI-ToF
      - ≥ 2 species level ID

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# Materials and methods

- Statistical analysis:
  - Delpro data into Excel
  - Descriptive JMP Pro 11
  - Data analysis with SAS v. 9.4
    - PROC GLIMMIX with repeated measures
- Culture results were grouped:
  - NAS
  - Major pathogens
  - Negative

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# Results

Table 2. Culture results from 796 composite surveillance milk samples from healthy (no signs of clinical mastitis) 1st lactation animals within 1 – 7 DIM for all pathogens and species level non-aureus Staphylococci (NAS).

| Culture results | N | % of culture results |
|---|---|---|
| Negative | 515 | 64.7 |
| Gram negative | | |
| *Escherichia coli* | 4 | 0.5 |
| *Pasteurella* spp. | 3 | 0.4 |
| Gram positive | | |
| NAS | 229 | 28.8 |
| *Staph. Aureus* | 11 | 1.4 |
| *Strep.* spp. | 11 | 1.4 |
| *Strep. dysgalactiae* | 9 | 1.1 |
| *Lacto.* spp. | 9 | 1.1 |
| *Enterococcus* spp. | 4 | 0.5 |
| *Trueperella pyogenes* | 1 | 0.1 |
| TOTAL | 796 | 100.0 |
| NAS culture results[1] | N | % of NAS |
| *Staph. chromogenes* | 172 | 75.1 |
| *Staph. Simulans* | 33 | 14.4 |
| *Staph. heamolyticus* | 20 | 8.7 |
| *Staph. Capitis* | 3 | 1.3 |
| *Staph. Hyicus* | 1 | 0.4 |
| Total NAS | 229 | 100 |

~65% samples negative

~29% samples NAS

~75% of NAS *S. chromogenes*

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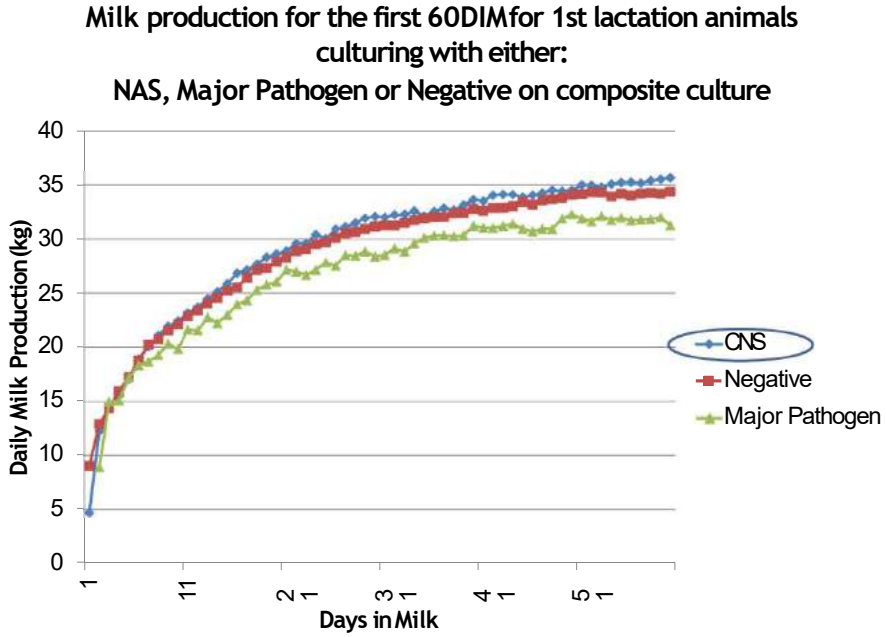


15

**Oneway Anova results comparing 1st test day linear score (from composite milk samples 5 - 30 DIM) in healthy (non-clinical) 1st lactation animals with the following culture results: non-aureus Staphylococci (NAS), major pathogens, and negative.**

| Culture Result | N | Mean LS | Standard Error | Lower 95% | Upper 95% |
|---|---|---|---|---|---|
| NAS[1] | 178 | 3.2 | 0.1 | 3.0 | 3.5 |
| Major pathogen[2] | 42 | 3.3 | 0.2 | 2.9 | 3.9 |
| Negative | 379 | 2.4* | 0.1 | 2.3 | 2.6 |

No difference between NAS and major pathogens and LS ($P = 0.9$).
NAS - Culture negative heifers ($P < 0.0001$).
Major pathogens – culture negative ($P = 0.0007$).

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# What about CM?

- NAS is categorized as a minor pathogen
  - Less impact on the udder, virulence, spread, etc.
- However, NAS in CM can range from 5 –20%
- Although heifers generally have less CM when compared to cows
  - the effect and prevalence of NAS maybe different
  - herd and species level factors may also play a role
- Large studies are lacking, especially at species level

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# Background – CM samples

Estonia, Germany:
Heifers had **higher** prevalence of NAS in CM samples
Norway:
Cows and heifers had **similar** NAS prevalence, **no difference in milk** yield
New York:
**No difference in milk loss** with NAS compared to other pathogens
Belgium**: incidence of CM was higher in heifers** the first week postpartum, NAS was 5%.
Thailand: 16% NAS
Turkey (pre-partum): NAS 45%
Central China: 30% NAS
Canada: **similar prevalence** distribution between H and C
Japan: all pathogens associated with **milk loss**

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**IS IT TIME TO WORRY ABOUT THESE COAGULASE POSITIVE STAPH. THAT ARE NOT STAPH. AUREUS?**

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## QMPS:
## Clinical mastitis data

- Quarter level samples of all clinical mastitis cases 2016 -2017
- Samples submitted daily to QMPS for aerobic culture and MALDI-ToF from 8 farms in New York State
- Farm description:
  - Milking between 1,100 – 2,000 cows
  - Milk: 39 – 43 kg/cow/day
  - BTSCC: 145 – 361,000 cell/mL

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# Materials and methods

- Data:
  - Dairy Comp 305 daily backups
  - SAS v. 9.4
    - PROC GLM repeated measures, farm as random variable
  - Outcomes:
    - **Monthly** linear score
    - **Monthly** milk production based on DHIA test day data
  - Variables:
    - No mastitis
    - Culture results
      - Other pathogen
      - NAS

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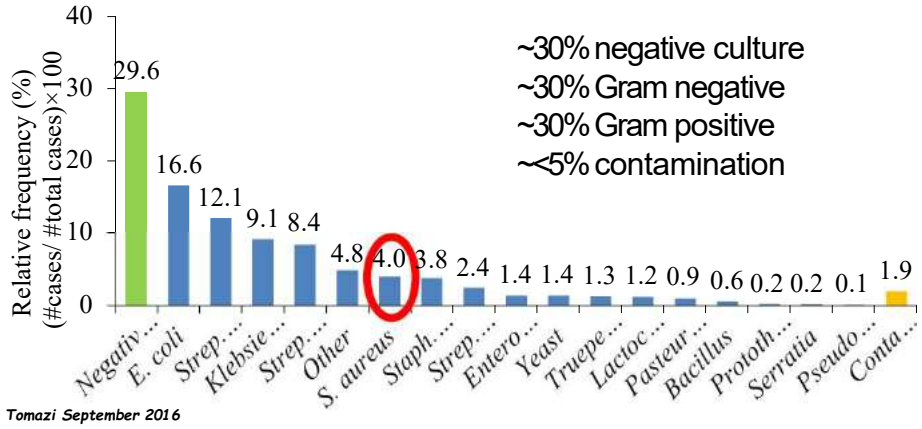
# Results

- Overall, mean incidence risk of clinical mastitis:
  - **4.8% (min - max 1.2 - 7.5%; n = 7,515)**
- 75% of CM cases were identified in cows (n=5655)
  - **2.0%** were NAS.
- 25% of CM cases were identified in heifers (n = 1860)
  - **4.4%** were NAS.

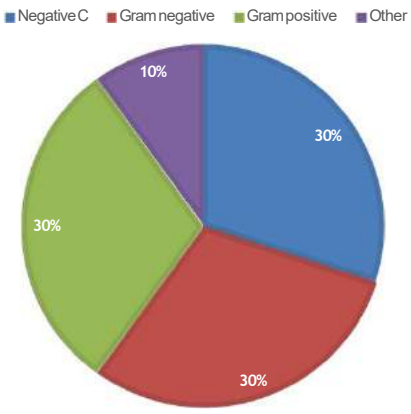
22

**Distribution of pathogens isolated from CM (%; ~7,500 cases) diagnosed from May-October, 2016 in 8 farms in NY**



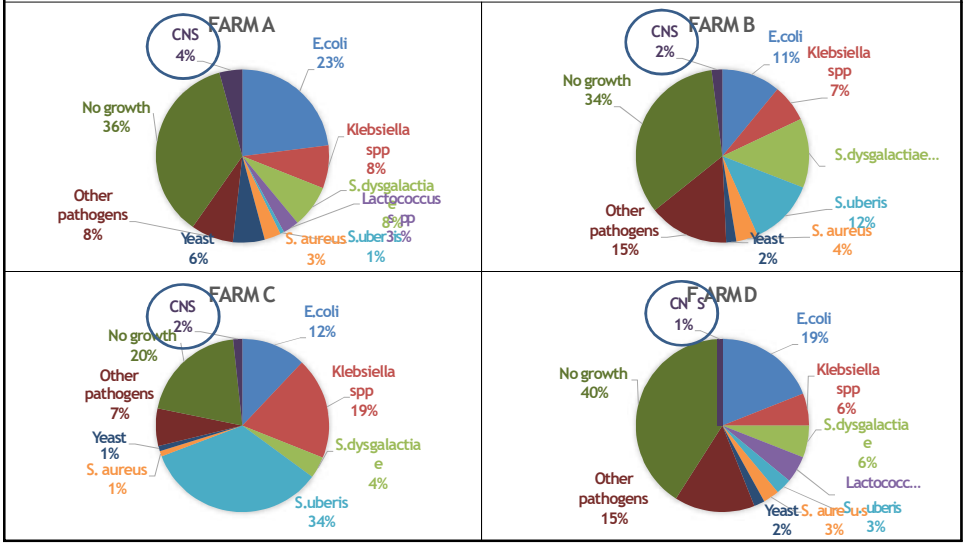

23

# General distribution of pathogens



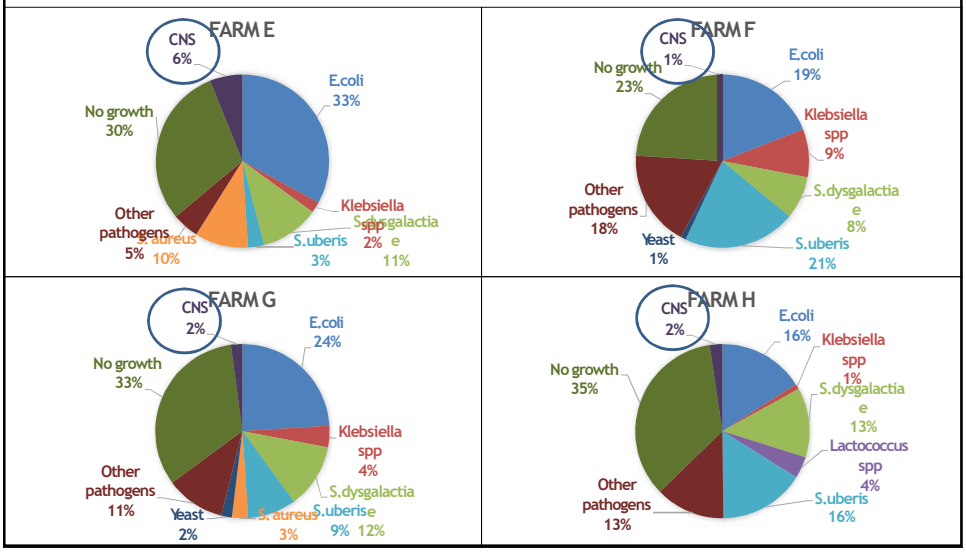

24

# Distribution of pathogens in CM samples (2016 – 2017)




25

# Distribution of pathogens in CM (2016 – 2017)

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## From (~7,500) Clinical mastitis samples submitted 2016-2017

| FARM | Total clinical cases | Total No growth | Total NAS positive |
|---|---|---|---|
| A | 1,337 | 456 | 58 |
| B | 1,457 | 489 | 30 |
| C | 746 | 147 | 13 |
| D | 1,078 | 350 | 11 |
| E | 789 | 196 | 48 |
| F | 774 | 174 | 7 |
| G | 1,040 | 307 | 22 |
| H | 295 | 98 | 7 |
| Total | 7,516 | 2,217 | 196 |

2%

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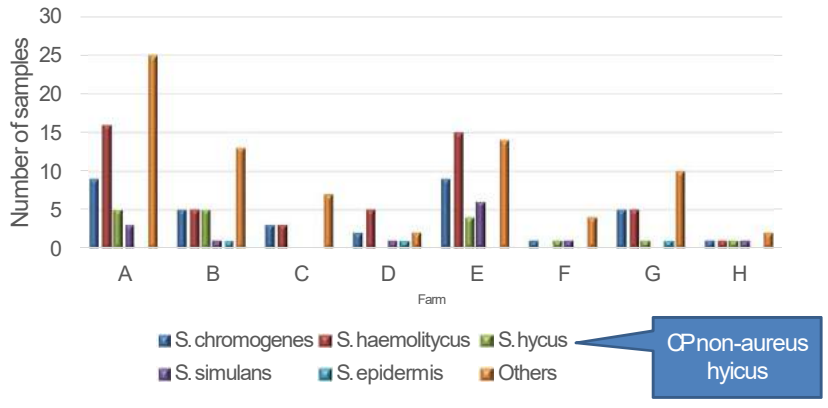
## Distribution of NAS by farm (2016 – 2017)




CP non-aureus hyicus

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# NAS: Genus and species (MALDI ≥ 1.7)

| | S. haemolyticus | S. chromogenes | S. hyicus | S. simulans | S. epidermidis | S. saprophyticus | Others | Total |
|---|---|---|---|---|---|---|---|---|
| Heifer | 20 | 20 | 7 | 3 | 0 | 0 | 32 | 82 |
| Cow | 28 | 15 | 10 | 11 | 3 | 1 | 46 | 114 |
| Total | 48 | 35 | 17 | 14 | 3 | 1 | 78 | 196 |
| %of TOTAL | 0.6 | 0.5 | 0.2 | 0.2 | 0.04 | 0.01 | 1.0 | 2.6 |

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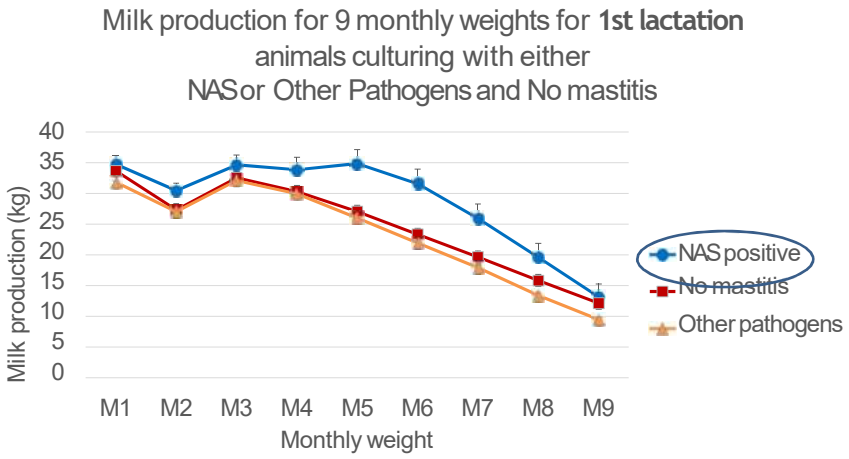
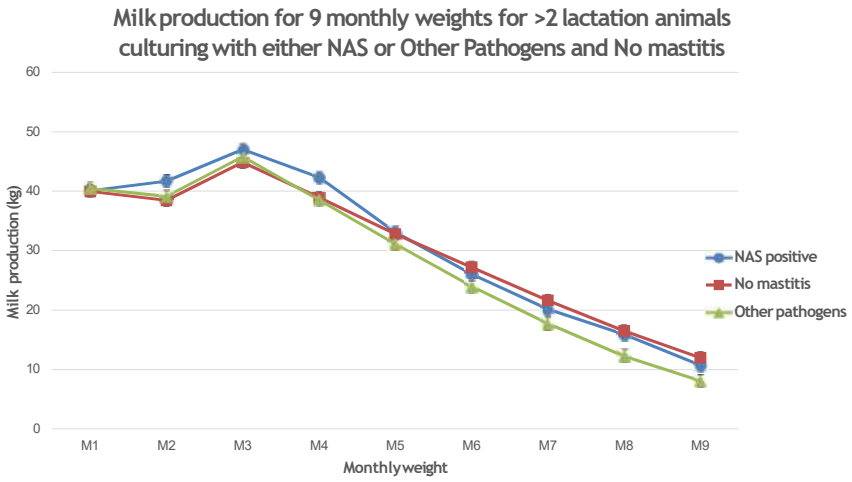


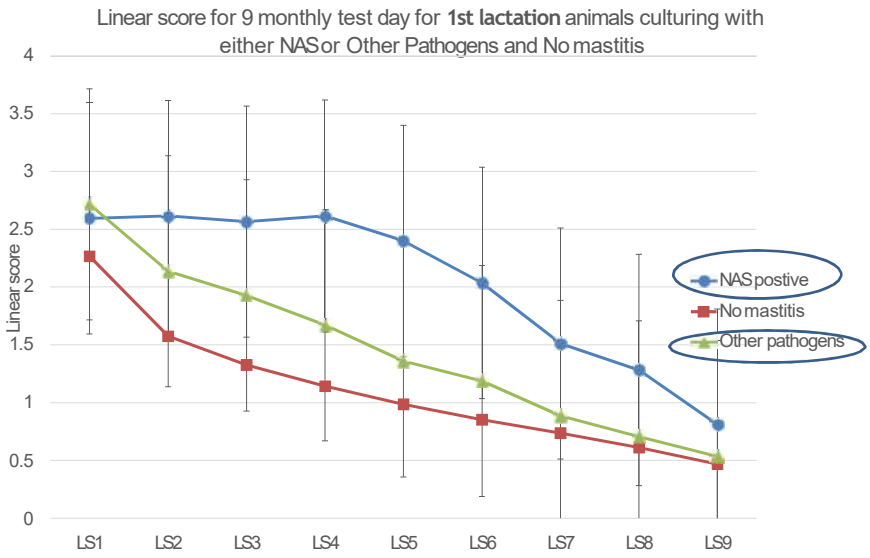

Heifers with NAS in CM sample produced more milk for most of the 9 months when compared to major pathogens and heifers with no mastitis. ($P < 0.0001$)

30

# What about cows?




31

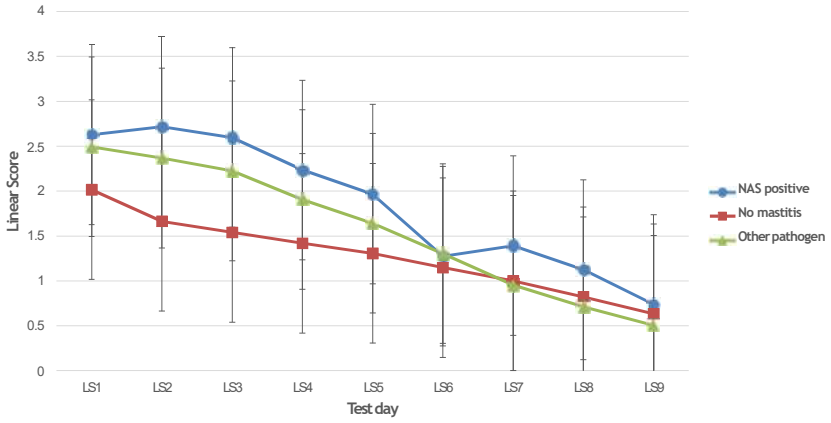



NAS positive heifers had higher SCC throughout lactation when compared to other pathogens and those with no mastitis ($P < 0.001$).

32

# What about cows?

Linear score for 9 monthly test day for >2 lactation animals culturing with either NAS or Other Pathogens and No mastitis

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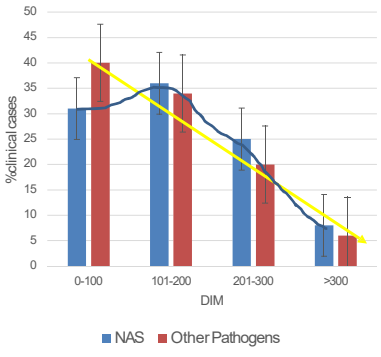
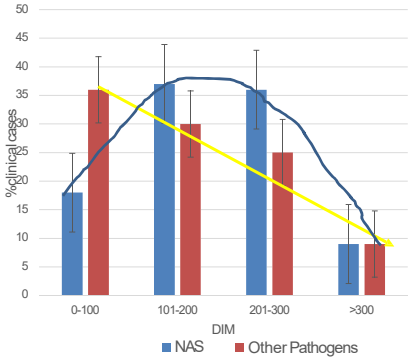
# Clinical cases: DIM distribution 2016- 2017

**Cows (n=5,655)**




**Heifers (n=1,860)**

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## MORE SAMPLES…?

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## 2016 - 2019

- QMPS picking up CM samples daily
- MALDI-ToF on positive cultures
- Evaluated distribution of NAS

36

# Clinical mastitis samples submitted 2016-2019

| FARM | Total clinical cases | Total No growth | Total NAS positive | Total NAS by MALDI | Other NAS |
|---|---|---|---|---|---|
| A | 2,943 | 908 | 82 | 54 | 28 |
| B | 4,479 | 1,709 | 113 | 88 | 25 |
| C | 2,724 | 1,084 | 98 | 73 | 25 |
| D | 3,361 | 1,212 | 31 | 23 | 8 |
| E | 3,288 | 1,112 | 176 | 142 | 35 |
| F | 1,942 | 408 | 20 | 16 | 4 |
| G | 3,035 | 913 | 71 | 53 | 18 |
| H | 1,104 | 337 | 47 | 33 | 14 |
| Total | 22,876 | 7,638 | 638 | 482 | 157 |

2%

MALDI ≥ 1.7

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# Genus and species (MALDI n = 482) 2016 - 2019

| Farm | *S. chromogenes* | *S. haemolyticus* | *S. hyicus* | *S. simulans* | *S. epidermidis* | Others |
|---|---|---|---|---|---|---|
| A | 15 | 24 | 5 | 4 | 2 | 4 |
| B | 43 | 18 | 10 | 8 | 6 | 3 |
| C | 46 | 10 | 2 | 12 | 0 | 3 |
| D | 7 | 7 | 0 | 4 | 4 | 1 |
| E | 51 | 55 | 5 | 13 | 7 | 11 |
| F | 11 | 1 | 1 | 2 | 0 | 1 |
| G | 22 | 13 | 1 | 3 | 2 | 12 |
| H | 14 | 1 | 1 | 12 | 1 | 4 |
| Total | 209 | 129 | 25 | 58 | 22 | 39 |

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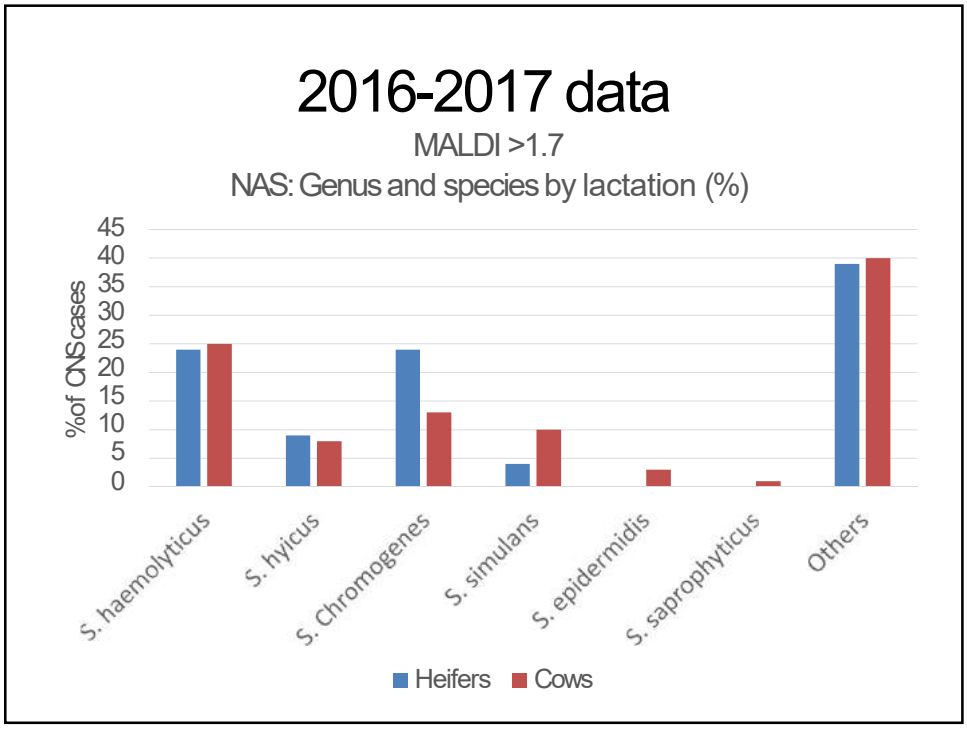
2016-2017 data
MALDI >1.7
NAS: Genus and species by lactation (%)
%of CNScases
45
40
35
30
25
20
15
10
5
0
S. haemolyticus
S. hyicus
S. Chromogenes
S. simulans
S. epidermidis
S. saprophyticus
Others
Heifers
Cows

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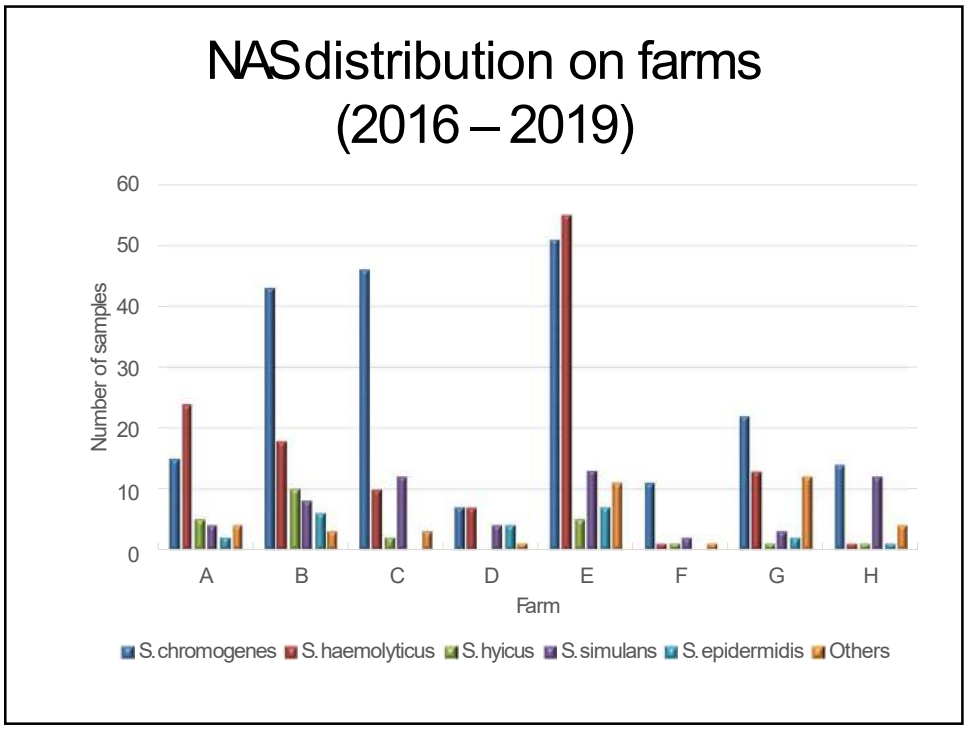
NAS distribution on farms
(2016 – 2019)
Number of samples
60
50
40
30
20
10
0
A
B
C
D
E
F
G
H
Farm
S. chromogenes
S. haemolyticus
S. hyicus
S. simulans
S. epidermidis
Others

40

# Summary

- 2016 – 2017
  - Heifers with NAS showed more milk production throughout lactation based on test day data compared to those with other mastitis pathogens AND no mastitis
  - Heifers with NAS had higher SCC throughout lactation based on test day data compared to those with **other mastitis pathogens** AND no mastitis
- *S. chromogenes* the most common pathogen in CM samples (2016 – 2019)
- Possible herd effect and difference in NAS at species level distribution by farm need further evaluation

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# Thank you!
# Questions?


- Dr. Paula Ospina
- QMPS
- Cornell University
- pav5@cornell.edu


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# What methods and training options are there for milkers?

Drs. P.A. Ospina, V. Alanis,
W. Heuwieser
Vermont Veterinary Medical Association
June 2019

Quality Milk Production Services

QMPS is a program within the New York State Veterinary Diagnostic Laboratory, a partnership between the NYS Department of Agriculture and Markets and the College of Veterinary Medicine at Cornell University.

Cornell University College of Veterinary Medicine

1

# What kind of on-farm employee interaction do you have?

1

2

# Who works in the parlor, and who works with milkers?

3

## Generally two schools of thought:

- Explain WHY
- Teach them HOW

2

4

# Teach them HOW

**Pros**

- If you have a good following…
- They will do what you ask them to, how you them to…
- Depend on:
  - Self motivation
  - Some intrinsic understanding

**Cons**

- If you don't have a good following
- They will NOT do what you ask them the way you told them to…
- Depending on:
  - Self motivation
  - Intrinsic understanding – without fostering these, is hard

5

# Explain WHY

**Pros**

- They are more likely to do what you want them to, the way you told them to…
- Feed the motivation and learning

**Cons**

- They have to know HOW
- It takes time (hopefully billable time)
- **It takes time**



6

# Who works on farms?

- In NYS:
  - Latinos
    - Mexico or Guatemala
  - Agriculture background?
    - NO
  - Speak English?
    - NO
  - Read Spanish?
    - Maybe


7

# Let's talk training aids…

4

8

# Standard operating procedures (SOP)

- Who has these on their farms?
- Who has them in Spanish?
  - What do they look like?
- Where are they?
- When was the last time they were updated?

9

# Who has SOPs?

J. Dairy Sci. 99:9319–9333
http://dx.doi.org/10.3168/jds.2016-11178


**Fresh-cow handling practices and methods for identification of health disorders on 45 dairy farms in California**

A. Espadamala,*† P. Pallarés,*† A. Lago,‡ and N. Silva-del-Río*†¹
*Veterinary Medicine Teaching and Research Center, 18830 Road 112, Tulare, CA 93274
†Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, Davis 95616
‡DairyExperts, Tulare, CA 93274

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- On **10 dairies**, fresh cow evaluators reported that written herd health protocols existed, but researchers only had access to those on **4 dairies**. On most surveyed dairies, fresh cow evaluators reported following protocols taught by another coworker or the dairy veterinarian. Therefore, except in the 4 dairies, observed management practices could not be compared with written protocols.

10

# Who has them in Spanish?

- 该协议应该用于任何显然没有反刍的奶牛，这种奶牛在牛奶生产中已经下降或明显生病。
- 看看两侧和后面的牛
- 评估以下几点：
- 瘤胃是如何充实的
- 乳房是如何充满的
- 耳朵（跌倒？）
- 眼睛（沉没？）
- 跛行
- 凳子的特点
- 评估温度。
- 听瘤胃1-2分钟，因为在这段时间你应该听1-2次强烈的反刍动作（似乎雷声低噪音）。
- 在左侧检查位移（DAI）的金属共振（Ping）特征，或空瘤胃“ping”

11

# Where are they?



12

# When was the last time they were updated?

13


7

14

# Electronic SOP/microlearning modules

Short Communication: Microlearning courses are effective at increasing the feeling of confidence and the feeling of accuracy in the work of dairy personnel

A. Hesse et al., 2019

- Germany
  - 243 employees in 35 farms
  - 3 microlearning courses
    - Colostrum
  - > 90% took the course
  - 59% launched course in leisure time
  - 80% thought they worked better after the course
  - Most (76%) thought they spent less time than they did
  - Most (89%) accessed background information
  - 55% provided feedback

15

# Northern New York Agricultural Development Program

- 10 farms
  - Evaluate milking SOP before and after micro-learning training
  - Basic information
    - What can confound outcomes?
      - Cow teat end health
      - Equipment function
      - Employee turn-over…

8

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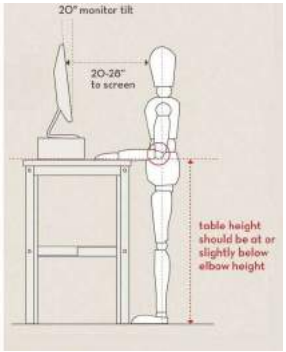
# Microlearning module

17

## HR and milk quality

- Work-life balance?
  - What does this mean in the dairy?
  - What is achievable?
  - What are your neighbors doing?
  - What is the law going to say?
- Ergonomics?




9

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# Life outside of the job?

- What makes people happy?
- What helps people rest?
- What do people need?

- How can we as veterinarians help?
  - Provide outside perspective.
  - We see a lot of farms, work with several farmers and employees.

19

# Questions?


- Paula Ospina DVM, PhD
- pav5@cornell.edu
- Cornell University, QMPS


10

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