OSU Milk Hauling Research Update

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Tanker trucks may be used repeatedly for up to 24 hours before mandatory clean-in-place (PMO).

Industry reports sporadic instances of raw milk quality being compromised by hauling.

Oregon State University has collaborated with the west coast dairy industry in milk hauling research since 2013.
Weaknesses in Hauling Practices Compound like a Snowball

Something small...

Gets bigger...

No going back point

Until...
Components of Milk Hauling Research

- Sampling
- Historic data
- Tanker accessories
- Repeated tanker use
- CIP validation and verification
- Manual cleaning

Historic data
4/11/2017
Exploration of Historic Microbial Data for Trends in Practices

Explore 2 years of producer bulk tank and tanker unloading milk samples

**Measurement:** Individual bacteria count (IBC) and preliminary incubation (PI-IBC)

59,855 producer bulk tank milk samples

23,290 tanker unloading milk samples

unloading count > producer load average count = **Negative impact from hauling**
Historically low counts contribute to high quality milk

Producers (n=105)

Top 1% = > 305 PI-IBC

Historically low count producers

Historically high count producers

Percentage of loads in top 1%

10%
8%
6%
4%
2%
0%
Components of Milk Hauling Research

- Repeated tanker use
- CIP validation and verification
- Manual cleaning
- Tanker accessories
- Historic data
- Sampling
Impact on Raw Milk Quality with Standard Hauling Practices

Investigated impact on raw milk quality from long distance low frequency hauling and short distance high frequency hauling

Result:

• No measurable impact from standard hauling practices (producer load average count = tanker unloading count = **no increase**)

• Area of variability - Clean-in-place systems vary in sanitation efficacy

**Bottom line**

PMO regulations are adequate for milk hauling (repeated use per 24 hours) **WHEN** sanitation and operating practices are followed as intended
Impact of Worst-Case Hauling Scenarios on Raw Milk Quality

Scale and dilution factor makes hauling research challenging

Solution: start small to develop proof of concept

Collaborate with Industry Partner

Create route based on historic producer data (Farm A > Farm B)
Quantifying Negative Impact from Hauling

unloading count > producer load average count = **Negative impact from hauling**

**Measuring impact**

1. Enumerate for standard plate count (SPC), lactic acid bacteria (LAB) and *coliforms*

2. Characterize **proteolytic** and **lipolytic** enzyme activity of isolates (thermo-stable enzymes)
Experimental Design

Clean hauling vessel

Farm A pickup*

Farm A unload*

Idle time(h) between loads

3, 6, 10, 20 hours
Incubate @ 30°C

6 hours or immediate use

Farm B unload*

Farm B pickup*

filled w/ past. milk

* milk sample collection
Impact of Idle Time Between Load Pickups

Milk Cans = proof of concept

Tanker = demonstration of <6 hours has no impact
Tanker Accessories: Transfer Hoses Identified as a Potential Weakness

Swabbed internal surfaces of transfer hoses

Tanker farm hoses n=115

Enumerated aerobic plate count (APC), lactic acid bacteria (LAB) and coliforms

Receiving hoses n=57

Compare microbial load with time and number of loads since last clean-in-place

4/11/2017
Counts variable, no measurable increase in APC, LAB, and coliforms with time or number of loads

10% were missing hose caps

6% past 24 h since last cleaning

Cleanliness of tankers greatly varied (odor from pump box, hose caps, etc.)
Conclusion

Every point in the dairy supply chain impacts milk quality.

Preventative maintenance and continuous improvements are key to best hauling practices.
Thank you!

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