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Penn State Feed Assessment

Meet the Presenter

Rainey Rosemond

- Berks County
- Nutrition, feed management, crop quality

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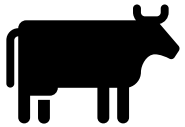
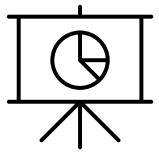
TMR Assessment Process



Data Collection – On Farm

Call us!

- Particle size
- Sample collection for nutrient analysis
- Production data collection
- Feeding protocols



Data Analysis

- Forage analysis lab
- Dry matter intake
- Feed efficiency
- Production efficiency

Recommendations

- Develop personalized recommendations for on-farm feed management and ration program

Follow Up

- Sit down conversation with farmers where results and recommendations are presented. Allows time for conversation on identified opportunities.

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Feed Efficiency – What is it? How does it benefit the environment?

Feed Efficiency = Energy Corrected Milk ÷ Dry Matter Intake

Environmental Impact

- Maximized production
- Maximized feed utilization
- Reduced waste parameters

Milk Yield

DATE	COW NUMBER	BULK TANK	MILK COW AVG	Milk Fat %	Milk Protein %	MILK FAT LBS	MILK PROTEIN LBS	TOTAL COMPONENT LBS	MUN
6/13/2022	41.00	6457.00	78.74	3.65	2.98	2.87	2.35	5.22	11.7
6/11/2022	44.00	6472.00	73.55	3.71	2.9	2.73	2.13	4.86	11.7
6/9/2022	44.00	6676.00	75.86	3.57	3.07	2.71	2.33	5.04	11.7

Benchmarks: 2x Milking	
Milk Yield lbs	75
Total Components lbs	5.5
SCC	<200,000
MUN	Table 1

Table 1. Guideline for interpreting whole herd MUN values (bulk tank milk).

MUN	Comment*	Suggestions*
<8 mg/dl	Low	Consider MUN as too low if production is less than 70 lbs. and the herd rations are not formulated for low protein (i.e. 16%). For TMR-fed herds, send out an analysis to confirm protein level. For component-fed herds and TMR-fed herds, use DHIA to evaluate individual cows and groups of cows. Evaluate protein and carbohydrate sources.
<8 mg/dl	Okay	If production is greater than 70 lbs, and the ration is formulated for low protein and well balanced for protein and carbohydrates, then the MUN may be okay.
8-10 mg/dl	Slightly low	If the ration is not formulated for low protein and milk production is less than 70 lbs, then there may be some feed management problems and/or ration program issues to address.
8-10 mg/dl	Okay	If production is greater than 70 lbs, and the ration is formulated for low protein and well balanced for protein and carbohydrates, then the MUN may be okay.
12-14 mg/dl	Slightly high	If the ration is formulated for low protein and there are no feed management issues, then closely evaluate the protein fractions (especially soluble protein) and the level and sources of nonstructural carbohydrates.
12-14 mg/dl	Okay	If the ration is formulated for high levels of protein (>17.0%) and there is only one cereal grain source being fed, then the MUN level may be okay. However, there may be opportunities to lower the protein level to reduce N excretion.
>14 mg/dl	High	For TMR-fed herds, send out for analysis to confirm protein level. For component-fed herds and TMR-fed herds, use DHIA to evaluate individual cows and groups of cows. Evaluate protein and carbohydrate sources. Evaluate feed management practices, e.g. sorting.
>14 mg/dl	Not recommended	If the ration is formulated for high levels of protein (>17.0%), high levels of degradable protein and/or inadequate starch or sugar sources, then N is not being efficiently used by the animal and excessive levels of N are being excreted.

*Comments and suggestions are based on field observations and do not address every possible explanation for the MUN level being observed.

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Feed Intake

PEN	NOTE	AM	PM	SUM	COW #	TOTAL REFUSALS	PER COW REFUSALS	TOTAL INTAKE	AS-FED FEED INTAKE
1	High	2200	2000	4200	46	400	8.7	3600	82.61
DMI	**MILK**	**EMC**	**FE**						
43.19	73.2	75.6	1.75						

AVERAGE ECM FEED EFFICIENCY: 1.75

MILK BY COW was calculated from the 3-day average	DRY MATTER INTAKE is calculated by the as-fed intake by cow multiplied by the TMR dry matter from the lab	**GOAL:** Dry Matter Feed efficiency for an operation averaging 170-180 DIM should range from 1.45-1.70
FEED EFFICIENCY is defined as the amount of milk produced per cow divided by the feed intake per cow	DRY MATTER FEED EFFICIENCY was calculated by taking the milk by cow and dividing it by the dry matter intake	

Mixing Order – Opportunity in Order

Ingredient Order	Ingredient	Time Added
1	Roasted soybeans	3:51
2	HM ear corn	
3	Concentrate mix	
4	Alfalfa/mixed grass baleage	
5	Corn silage	4:16
6		
7		
8		
9	Delivered to the bunk	4:36
	Total Time	45 MIN

Suggested Mixing Order
Alfalfa/mixed grass baleage
Concentrate Mix, HM Corn, Supplements, Premixes
Roasted Soybeans
Corn Silage
Standing Mixing Time:
Baleage + Con + Pro: 20 to 25 minutes Add in corn silage: 5 min

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Mixing Order – Why

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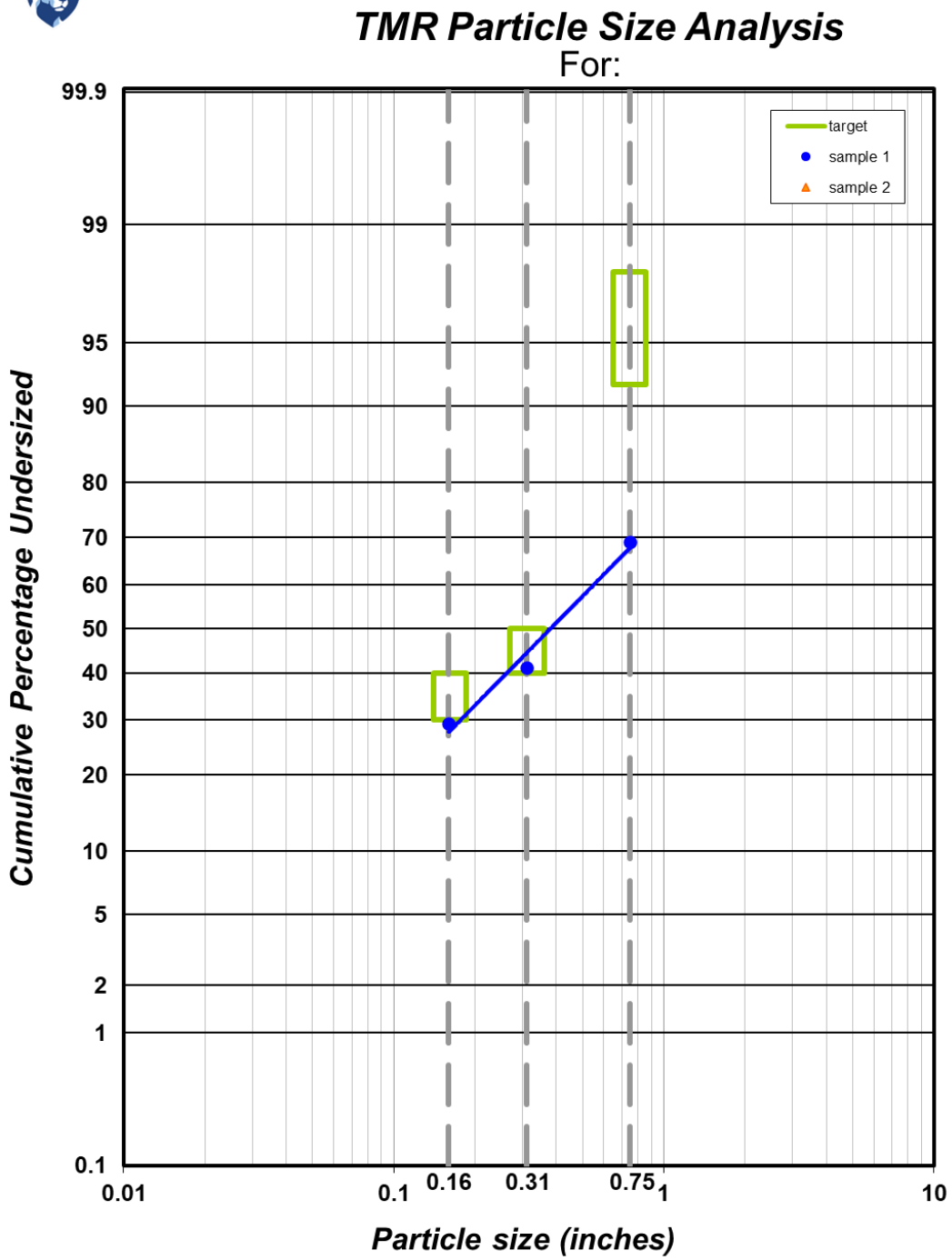

PSPS TMR Ration - Longer on Top

TMR Particle Size in ration

- Extremely long particle size
- ~31% of the ration remaining in the top sieve
- Smaller particle sizes are limited
- Potential sorting of longer particles
- Under 20% for baleage fed herds

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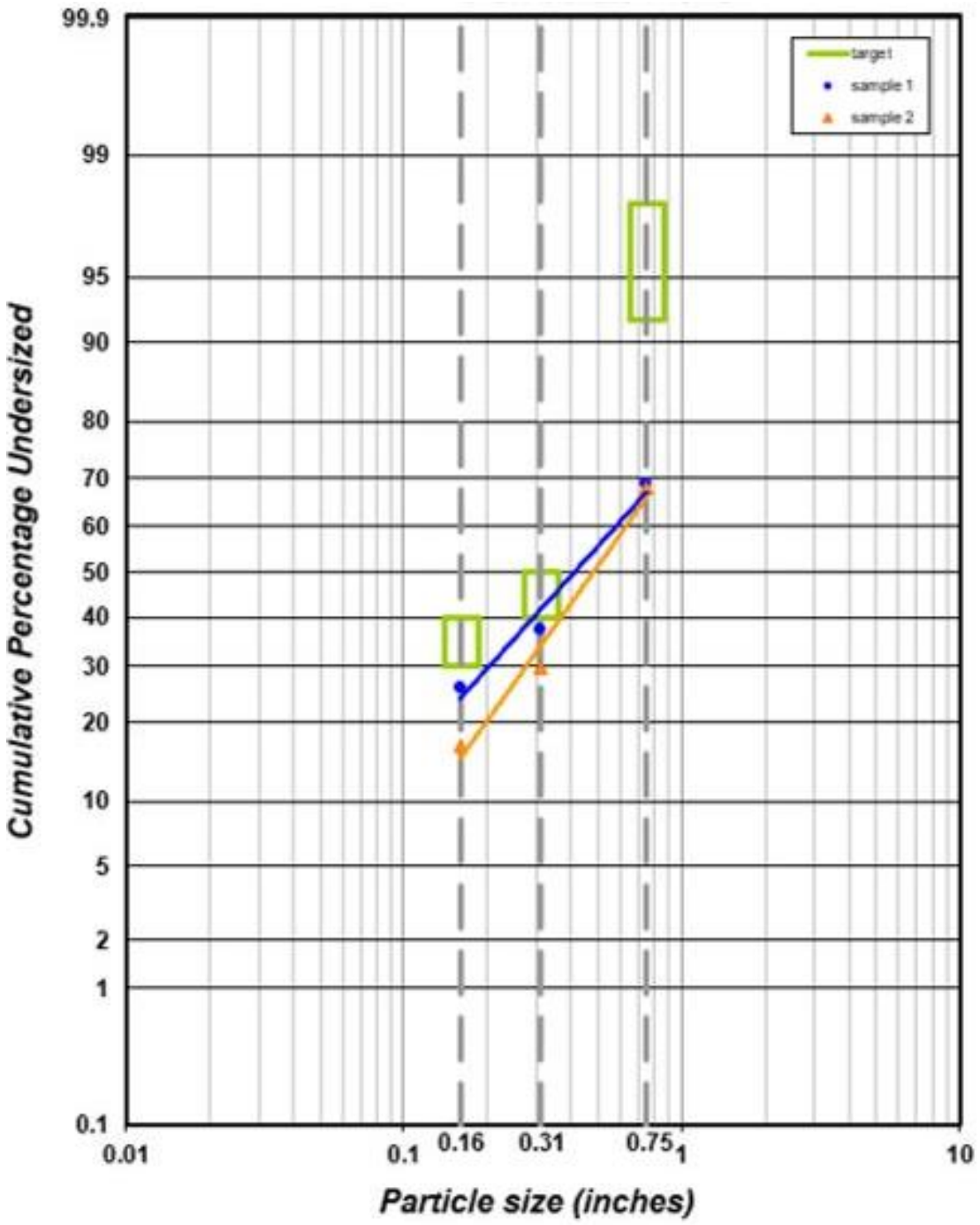
PSPS TMR

- Large portion of the ration is high on top sieve

- PSPS is at 3% on top sieve



PSPS TMR Refusals – Sorting for Smaller

- Blue line = Refusals
- Orange line = TMR

- Heavy sorting for smaller particles
- Some consumption of the longer particles, but not enough to balance sorting for smaller particles
- Further impacts on rumen health, hoof health, animal comfort, and fat percentage

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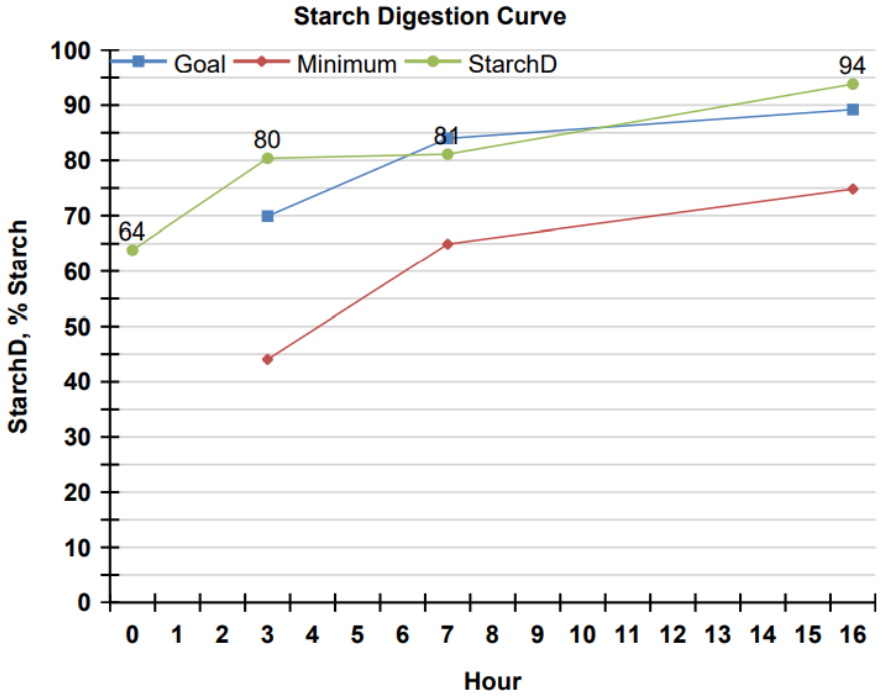
Comparative Ration

Measurement	Formulated (%DM)	Tested (%DM)	Difference	Percent Change	DMI Intake Formulated	DMI Avg Actual	Intake % BW (1425lbs) Formulated	Intake % BW (1425lbs) Actual
Dry Matter	51.9	56.88	4.98	9.595375723	50.68	52.58716981	0.035564912	0.036903277
Net Energy Lactation (Mcal/lb)	0.77	0.767	-0.003	-0.38961039	39.0236			
ME (Mcal/lb)	1.19		-1.19		60.3092	0		
Crude Protein	16.65	16.75	0.1	0.600600601				
Soluble Protein (%CP)	37.65	52.22	14.57	38.69853918				
ADF	18.65	19.08	0.43	2.305630027				
NDF	27.03	30.9	3.87	14.31742508				
Lignin		2.81	2.81	#DIV/0!				
Starch	30.47	25.11	-5.36	-17.59107319				
Ether Extract	3.28	3.37	0.09	2.743902439				
Calcium	0.81	0.69	-0.12	-14.81481481				
Phosphorous	0.33	0.35	0.02	6.060606061				
Magnesium	0.3	0.26	-0.04	-13.33333333				
Potassium	1.26	1.37	0.11	8.73015873				
Sulfur	0.2	0.2	0	0				
Sodium	0.45	0.36	-0.09	-20				
Chloride		0.52	0.52	#DIV/0!				
Iron (PPM)		458.81	458.81	#DIV/0!				
Manganese (PPM)		64.32	64.32	#DIV/0!				
Zinc (PPM)		62.67	62.67	#DIV/0!				
Copper (PPM)		16.97	16.97	#DIV/0!				

Actual AF intake
92.45

- Changes in DM of mixed ingredients – especially forages - will change their weight
- Dryer forages will weigh less and require “more” to be mixed to meet the batch weights, while “over meeting” the nutrient requirements
- Opportunity in forage storage and stability
- Frequency of DM testing
- Calibrated scales



Ration Nutrient Analysis - Starch Digestibility

- From farm with sorting for longer particles
- Determining point of starch is difficult since it is a TMR sample and not the starch source alone
  - Fecal sampling for starch DM

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Table 3. Guidelines for forage NDF intake.

Forage NDF as % of body weight[1]	Intake level
0.75%[2]	Minimum if ration provides 1.30 to 1.40% total NDF by use of byproduct feeds.
0.85%[2]	Minimum if ration provides 1.00 to 1.20% total NDF by use of grains or starchy feeds.
0.90%	Moderately low
0.95%	Average
1.00%	Moderately high
1.10%	Maximum

[1]Forage dry matter intake should range between 1.40% and 2.40% of body weight, regardless of forage NDF intake parameters.
[2]Higher minimum may be necessary if forage is chopped too fine.

Additional Memo

peNdf = 19.53% of DM, 69.50% of Ndf

Additional Memo

peNdf = 16.02% of DM, 60.43% of Ndf

Ration Nutrient Analysis - NDF

- peNDF is low and/or insufficient depending on what cows are actually eating
- Minimum is 19%
- Minimum forage intake 1.4% BW
- No less than 40 to 45% forage in total ration DM
- Impacts on animal health long term

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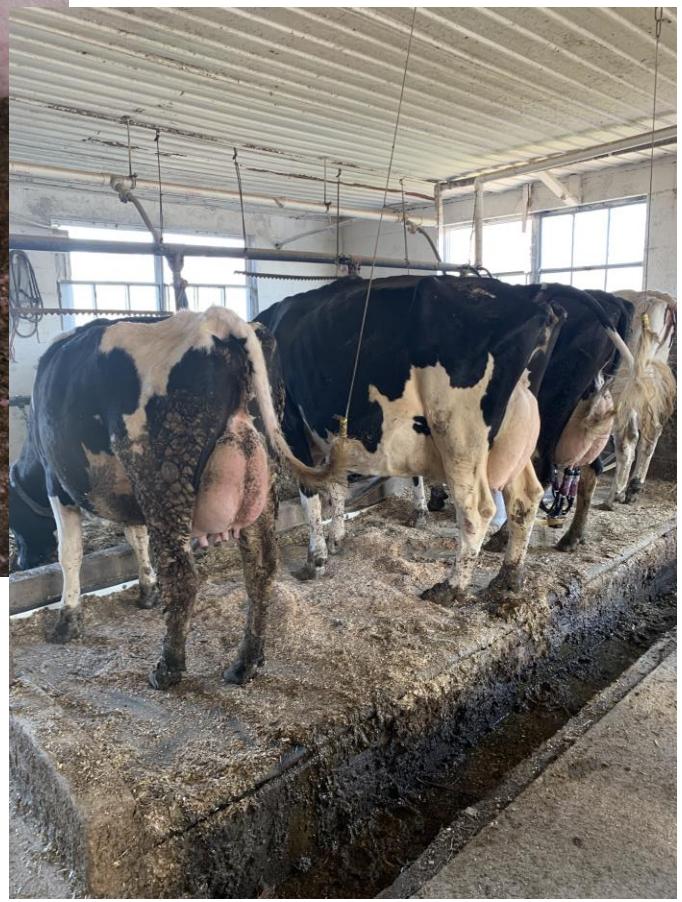
Whole Farm Assessment

Other management factors that influence feed efficiency



Management vs. Nutrition

- 47 herds with similar genetics were fed the same TMR
- Average milk yield = 65 lb/d
  - Range: 44 to 75 lb/d
- Non-dietary factors accounted for 56% of variation in milk yield
  - Feeding for refusals
  - Feed push-ups
  - Stalls per cow/comfortable resting surface
  - Overall management

Bach et al., 2008

Factors Highly Associated with Welfare and Productivity

- Comfortable, clean beds
- Adequate feed and water
- Access to exercise
- Relationship with stockperson

Popescu et al., 2013

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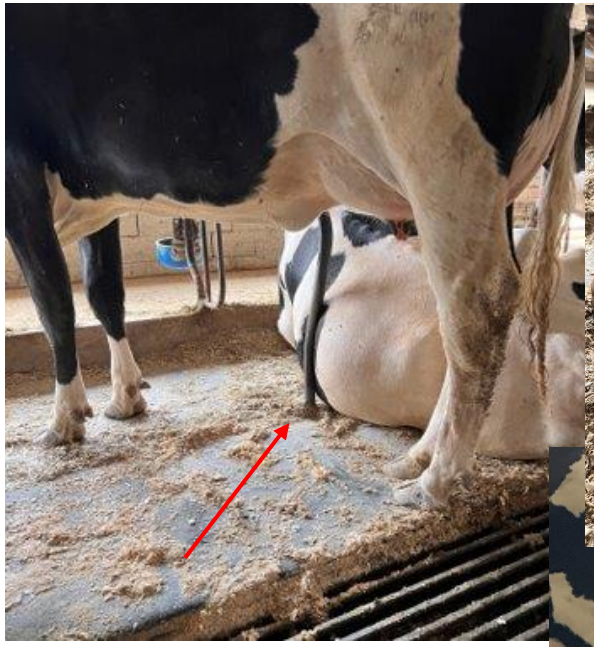

Cow Comfort

- Pressure wounds
- 3 to 4 inches of bedding on top of mattress
  - Add more towards front of stall
- Goal: trim at dry-off then again at 100 days in milk
- Goal of trimming is to provide a flat surface for weight-bearing with the appropriate angle

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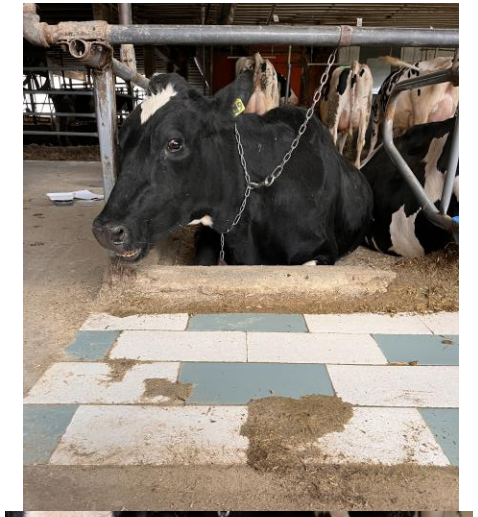
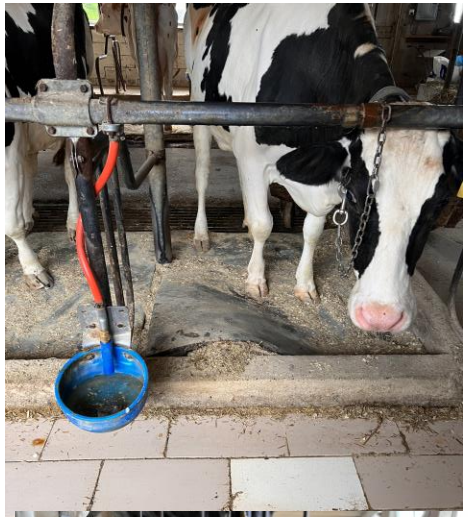
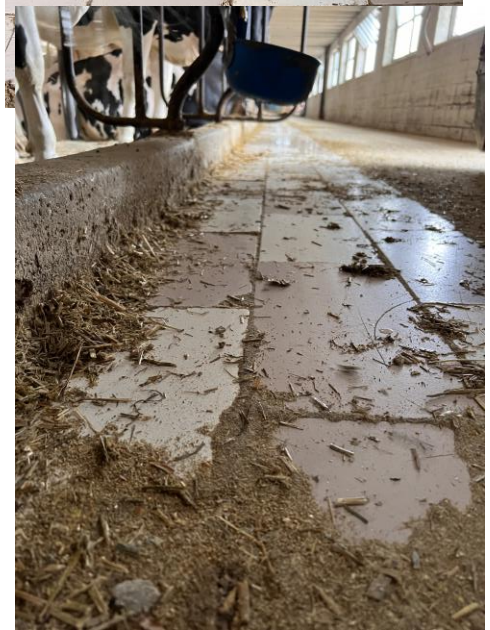
Bunk Cleanliness







- Remove caked-on, old feed around bunk
- Heating at the bunk during hot months
- Faster spoilage or odors turn cows away from eating

Photo From Harbor Freight Online Website

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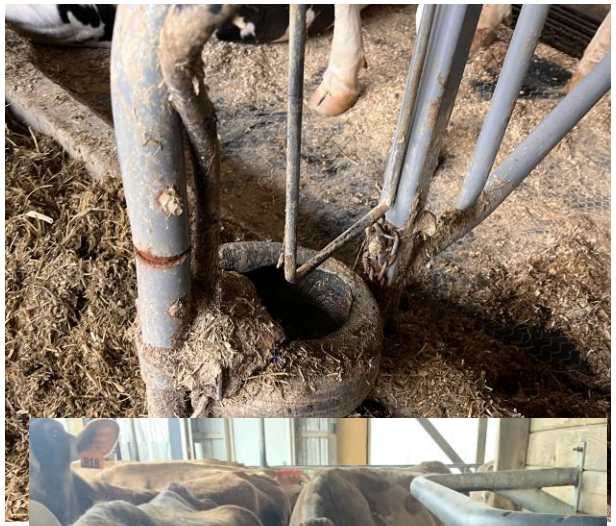



Water Cleanliness

- Milk is 80% water
- Water functions in thermoregulation – critical for cows to be hydrated, especially during hot months
- Remove debris frequently
- Clean waterers bi-weekly
- Use a weak chlorine solution to clean with and rise well
- Slop guard
- Pasture

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Heat Abatement

Shade

Air Exchange

Air Flow

Water

- Can see signs of heat stress in records
  - Lag time
- Circulating fans throughout barn
- Water quality and availability
- Pasture– dry cows and heifers get heat stressed too!

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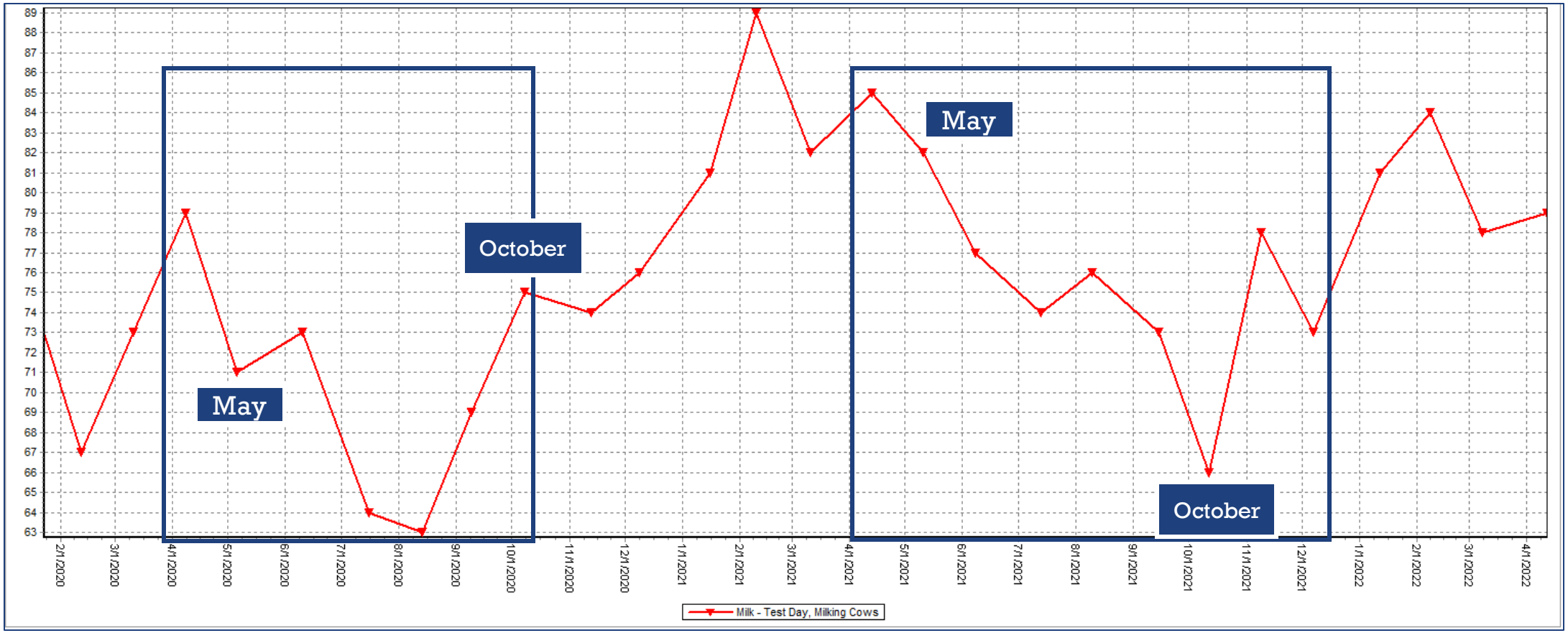
Production Evaluation – Heat Abatement



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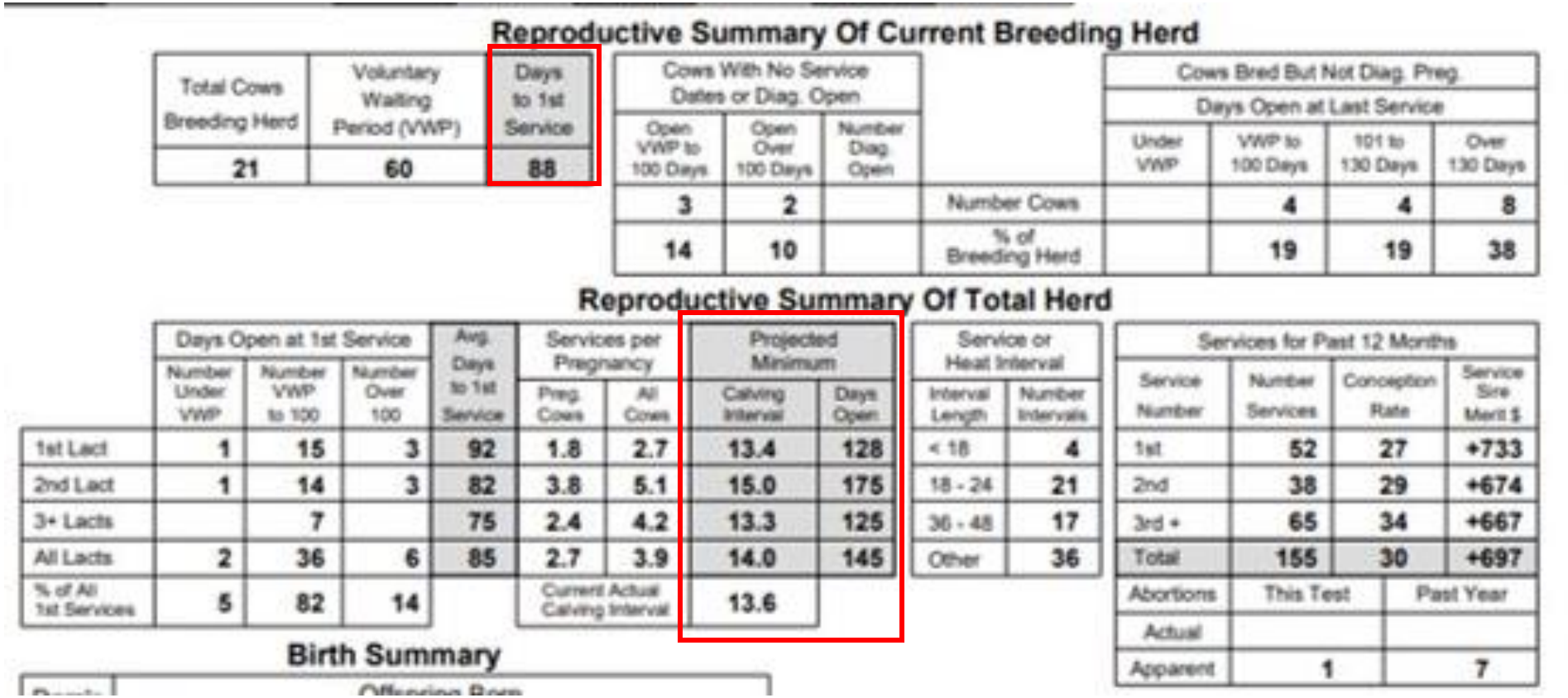
Breeding Management



Reproductive Summary Of Current Breeding Herd

Total Cows Breeding Herd	Voluntary Waiting Period (VWP)	Days to 1st Service
21	60	88

Cows With No Service Dates or Diag. Open				Cows Bred But Not Diag. Preg.			
				Days Open at Last Service			
Open VWP to 100 Days	Open Over 100 Days	Number Diag. Open		Under VWP	VWP to 100 Days	101 to 130 Days	Over 130 Days
3	2		Number Cows		4	4	8
14	10		% of Breeding Herd		19	19	38

Reproductive Summary Of Total Herd

	Days Open at 1st Service			Avg. Days to 1st Service	Services per Pregnancy		Projected Minimum	
	Number Under VWP	Number VWP to 100	Number Over 100		Preg. Cows	All Cows	Calving Interval	Days Open
1st Lact	1	15	3	92	1.8	2.7	13.4	128
2nd Lact	1	14	3	82	3.8	5.1	15.0	175
3+ Lacts		7		75	2.4	4.2	13.3	125
All Lacts	2	36	6	85	2.7	3.9	14.0	145
% of All 1st Services	5	82	14		Current Actual Calving Interval		13.6	

Service or Heat Interval	
Interval Length	Number Intervals
< 18	4
18 - 24	21
36 - 48	17
Other	36

Services for Past 12 Months			
Service Number	Number Services	Conception Rate	Service Sire Merit $
1st	52	27	+733
2nd	38	29	+674
3rd +	65	34	+667
Total	155	30	+697

Abortions	This Test	Past Year
Actual		
Apparent	1	7

Birth Summary

Benchmarks

- Calving interval: <13.5 mos
- Average days open: ≤ 120 days
- Heat detection rate: ≥ 65%
- Days to first service: < 80 days

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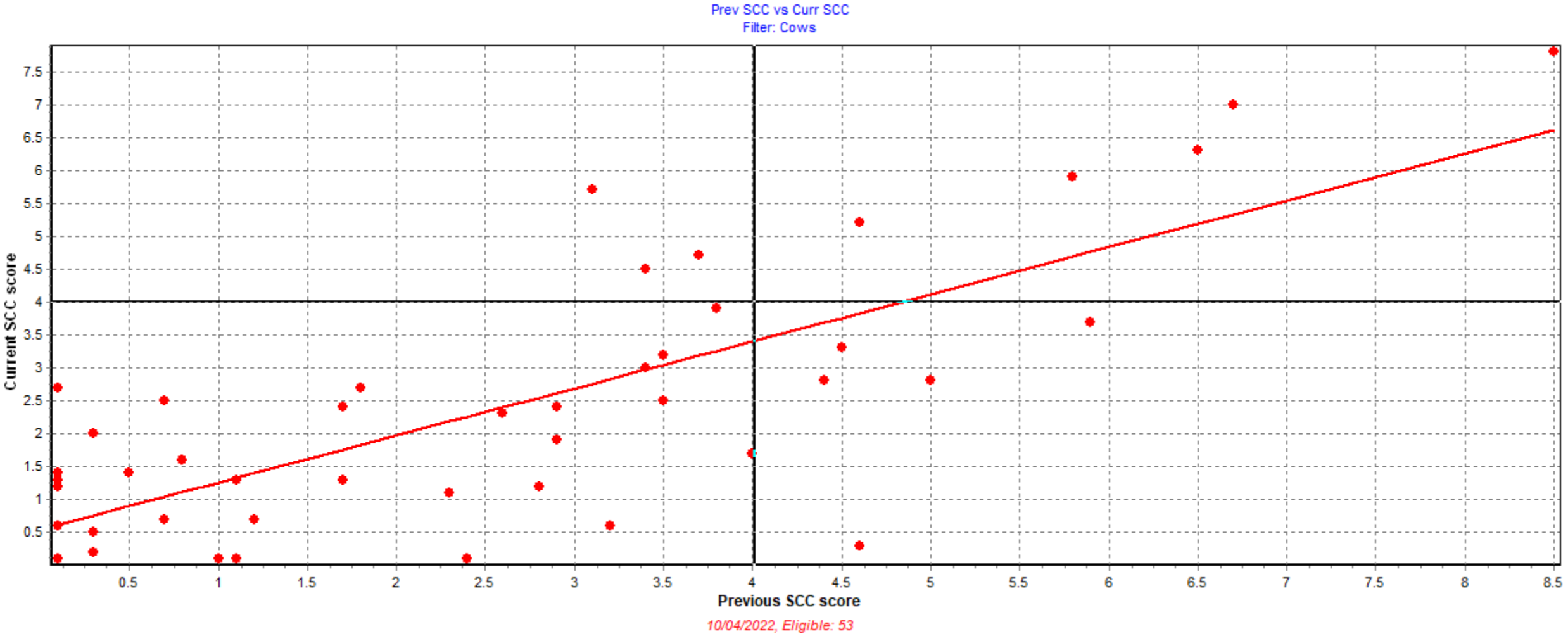
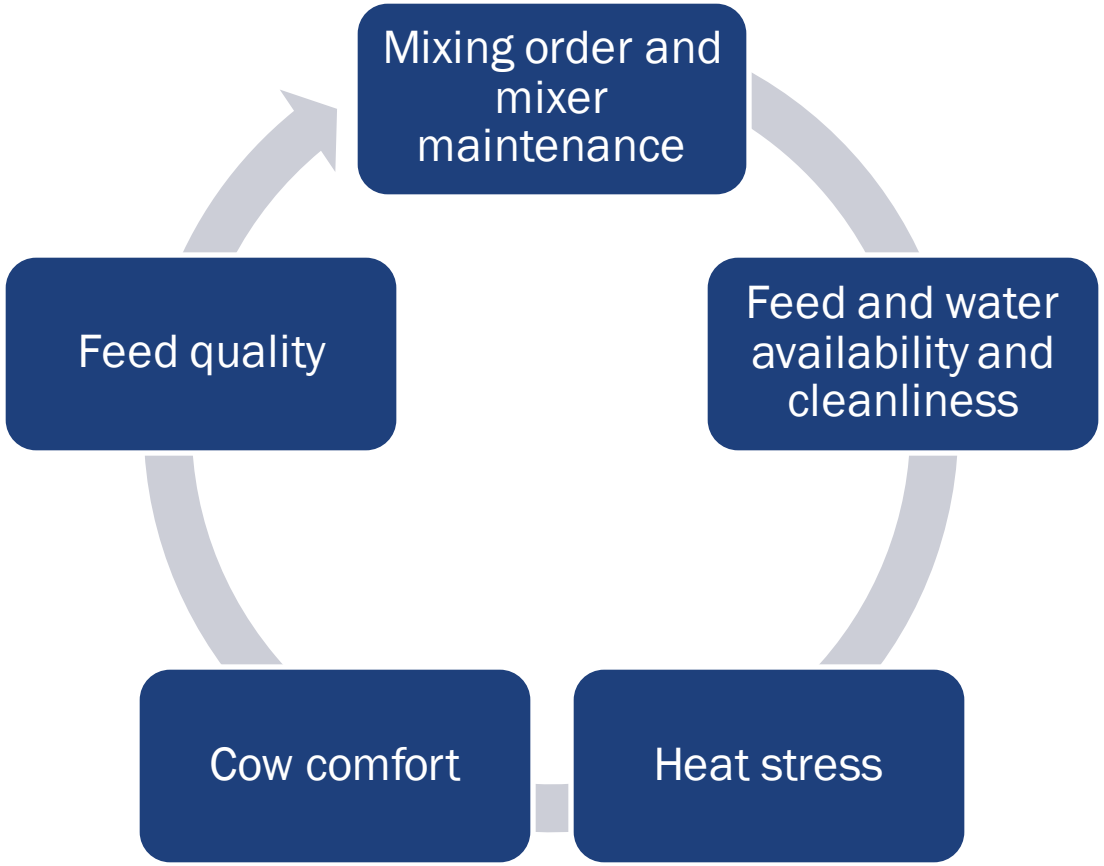
Milk Quality: Previous SCC vs. Current SCC



Summary



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