



## Consequences of a High Somatic Cell Count (>200,000) at First Test

– on Production, Reproduction and Culling

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## WHAT DRIVES FINANCIAL SUCCESS ON A US DAIRY?




### STUDY GOAL – What Drives Profitability?

TO IDENTIFY SPECIFIC DAIRY PRODUCTION MEASURES THAT ARE CORRELATED WITH THE FINANCIAL HEALTH OF A DAIRY






### DATA SOURCE AND PROCESS




**SOURCE**

- Data was provided by AgStar, a major provider of agricultural lending and financial consulting services in the upper Midwest.
  - The majority of the herds are based in MN, WI, SD, MI & OH
  - Data collection began in 2006




**PROCESS**

- Once the source was identified, we then performed a regression analysis to determine which metrics have the highest correlation to profitability.



### THE DATA



**367** year-end financial and production record summaries


**90** total variables, 54 numeric

**81** farms (not counting censored)

**9** years

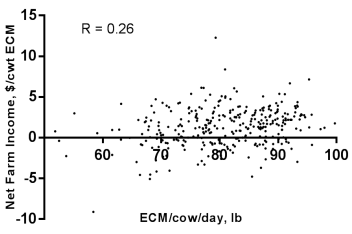
**4.5** year-end records per farm (avg.)

**1045** average lactating cows per farm (range from 95 to 4700 )



### WHAT IS A CORRELATION COEFFICIENT (R)?


A MEASURE OF THE RELATIONSHIP BETWEEN TWO VARIABLES;  
CAN RANGE FROM -1 TO 1.  
CORRELATION DOES NOT NECESSARILY EQUATE TO CAUSATION



**Can be positive:**  
NFI (Y) increases as milk yield increases (X)

**Can be negative:**  
NFI (Y) decreases as SCC increases (X)

**Can be at or near zero:**  
Little relationship between X and Y



## RELATIONSHIP BETWEEN NFI AND KEY MEASURES

VARIABLE	CORRELATION w/NFI	KEY LEARNINGS
Herd size, lactating	-0.02	Herd size not related to profit
Number heifers	0.03	Heifer inventory not related to profitability – supports culling strategy
Milk shipped, herd total, cwt	0.00	Profitability not related to total lb shipped
ECM shipped, lb/cow/day	0.17	More milk per cow is profitable – effect of marginal milk
Death loss (%)	-0.13	Death losses negatively impact profitability
Heifer survival rate, %	0.18	Keeping calves healthy is beneficial
Somatic cell count	-0.16	Investing to produce high quality milk is profitable
21 day pregnancy risk	0.29	Increased days open is expensive (small sample)
Labor cost*	-0.04	Labor cost is unrelated to profitability
Net herd replacement cost**	-0.33	Lowering replacement costs helps profitability, value of cull cows

\*Labor cost, \$/cwt ECM (includes wages, benefits, SS, owner draw)

\*\*Net herd replacement cost, \$/cwt ECM (difference between replacement cow value and book value of dead + sold cull cows [for dairy or beef])

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## RELATIONSHIPS BETWEEN KEY MEASURES AND NFI

VARIABLE	CORRELATION w/NFI	PROFITABILITY AS NET FARM INCOME (\$/cwt ECM)			KEY LEARNINGS
		LOW (<1.00)	MID (1. - 2.50)	HIGH (>2.50)	
Death loss (%)	-0.13	7.9	7.2	6.6	Death losses hurt profitability
Heifer survival rate, %	0.18	93	94	95	Keeping calves healthy is beneficial
Somatic cell count	-0.16	239	198	196	Investing to produce high quality milk is profitable
21 day pregnancy risk	0.29	22	21	23	Increased days open is expensive (small sample)
Net herd replacement cost**	-0.33	1.86	1.44	1.26	Lowering replacement costs helps profitability, value of cull cows

\*Labor cost, \$/cwt ECM (includes wages, benefits, SS, owner draw)

\*\*Net herd replacement cost, \$/cwt ECM (difference between replacement cow value and book value of dead + sold cull cows [for dairy or beef])

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## RELATIONSHIPS BETWEEN SCC AND OTHER MEASURES

VARIABLE	CORRELATION w/SCC
Profitability (NFI, \$/cwt ECM/day)	-0.16
ECM/cow/day, lb/day	-0.41
Death loss, %	0.44
21-day pregnancy risk*	-0.20
Days open*	0.35

DIFFERENCE IN PROFIT BETWEEN HIGHEST 1/3 AND LOWEST 1/3 (BASED ON SCC, \$/cwt ECM)

\$1.14/cwt  
(~\$115 K/year\*)

\* Top third produced 355,587 cwt/year (91#/c/d); bottom third 254,333 cwt/year (72#/c/d)

\*\* Small but growing sample size

\* Small but growing sample size

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## Somatic Cell Count and Relationship to Milk Losses

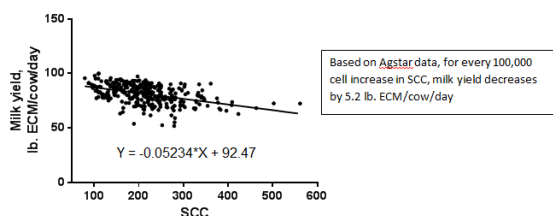
NMC chart

Linear Score	Daily Yield Lost		Lactation Yield Lost	
	First Lactation	Older Cow	First Lactation	Older Cows
	-----Lbs/Day-----		Lbs/Lactation	
0-2	0	0	0	0
3	0.6	1.3	200	400
4	1.3	2.6	400	800
5	2	3.9	600	1200
6	2.6	5.2	800	1600
7	3.3	6.6	1000	2400
8	3.9	7.9	1200	2400
9	4.6	9.2		

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## TEASER: ARE SCCs MORE COSTLY NOW?




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There's NO Incentive to manage Somatic Cell Counts...

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In Fresh Cow management we use colors to identify and signal cattle for Concerns or Needs. As an example...

**Pink date** – watch very closely during the fresh period.

**Blue date** – daily physical check and **Green stripe** (well), **Blue** (ketotic) or **Red** (infectious) according to condition

### RECORD KEEPING OFF THE COW



Look at where the industry has moved today! We can now record **Conditions** and **Protocol Use**. We can identify the **Outcomes** of Affected Populations.

Quickly see withholding times on the Cow Display

**DRMS Dairy Records Management Systems**

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## PROTOCOLS AND CONDITIONS

- Typically we have focused our recording efforts on **Experienced Disease Conditions**
  - Mastitis, Milk Fever, Retained Placenta, Metritis, Pneumonia, Displaced Abomasum, Lameness and Ketosis.
- Numeric** Conditions may be more than a number. They may have real significance.
  - Individuals with a high somatic cell count (SCC>200,000) at 1<sup>st</sup> test (5-45 Days In Milk). **LSC1**
- Milk Testing** Conditions are virtually here, i.e. KetoMonitor®, AgSource®

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## METHODOLOGY

- Records were accessed from Dairy Comp 305™ herds that recorded mastitis cases and also performed monthly herd milk testing that included somatic cells counts
- **22 Herds and 164,423 cows**
- Median herd size – 5520 head
- Jersey and Crossbred cows were removed from the analysis to standardize the evaluation

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## METHODOLOGY

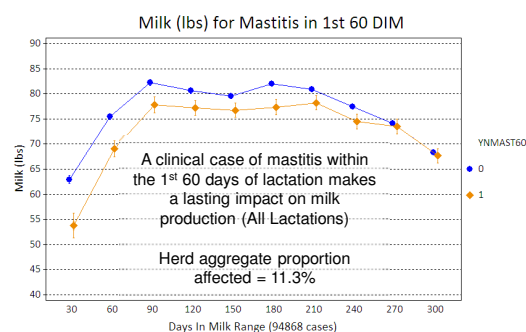
- Disease incidences are recorded as a significant **CONDITION** or **EVENT** in a cow's lactational history. These Conditions have an impact on production, efficiency of reproduction and longevity.
- A high 1<sup>st</sup> Log Linear SCC score is a numerical designation of a **CONDITION** and potentially should be considered as impactful on a cow's lactation as Clinical Mastitis.
- **High Log Linear SCC Score = 4.0 or a 200,000 Cell Count**<sup>1,2,3,4</sup>

1. DeGraves, F.J. and J. Fetrow. 1993. Vet. Clin. North Am: Food Anim. Pract. 9(3): 421-434.
2. Harmon, R.J. 1994. J. Dairy Sci. 77:2103-2112.
3. Hillerton, J.E. 1999. Int. Dairy Fed. No.345, pp. 4-6.
4. National Mastitis Council. Guidelines on Normal and Abnormal Raw Milk Based on Somatic Cell Counts and Signs of Clinical Mastitis. <https://nmconline.org/docs/abnmilk.pdf>

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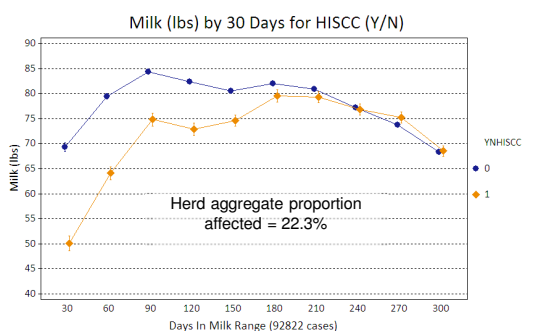
## MILK PRODUCTION – MASTITIS (1<sup>st</sup> 60 DIM)



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### MILK PRODUCTION – HI LSC1 (Y/N)



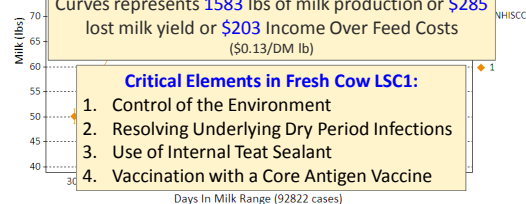
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### What is the Lost Opportunity?

**Clinical Mastitis – 1<sup>st</sup> 60 Days:** Calculated Differences in the Curves represents **1007 lbs** of milk production or **\$181** lost milk yield (\$18.00/cwt) or **\$129** Income Over Feed Costs (\$0.13/DM lb)

**HI LSC1 at 1<sup>st</sup> Test:** Calculated Differences in the Curves represents **1583 lbs** of milk production or **\$285** lost milk yield or **\$203** Income Over Feed Costs (\$0.13/DM lb)



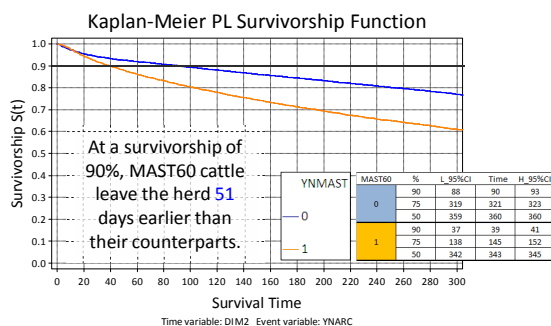
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#### Critical Elements in Fresh Cow LSC1:

1. Control of the Environment
2. Resolving Underlying Dry Period Infections
3. Use of Internal Teat Sealant
4. Vaccination with a Core Antigen Vaccine

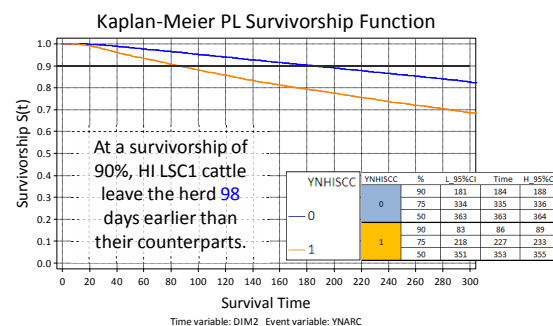
### REMOVAL SURVIVAL – MASTITIS (1<sup>st</sup> 60 DIM)



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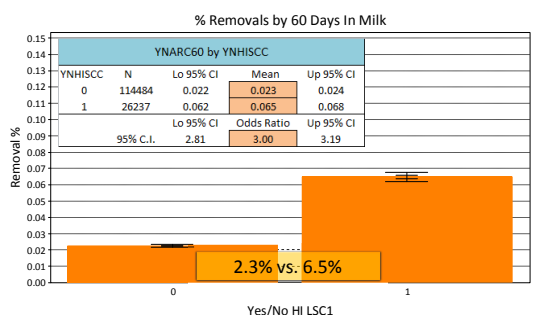
### REMOVAL SURVIVAL – HI LSC1 (Y/N)



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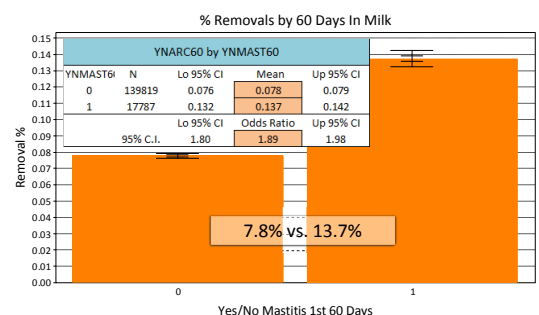
### % Removed by 60 DIM – HI LSC1 (Y/N)



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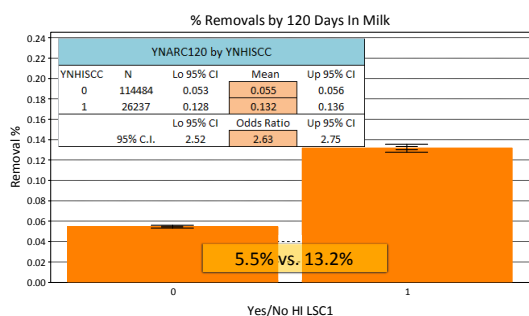
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### % Removed by 60 DIM – Mastitis-60 days (Y/N)



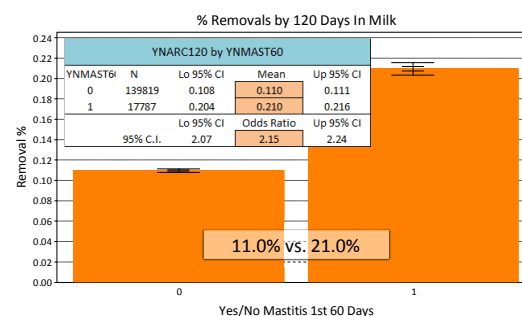
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**% Removed by 120 DIM – HI LSC1 (Y/N)**

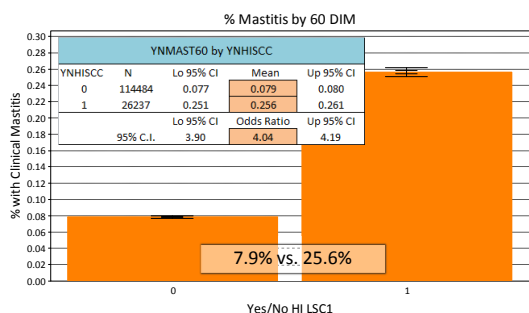
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**% Removed by 120 DIM – Mastitis-60 days (Y/N)**

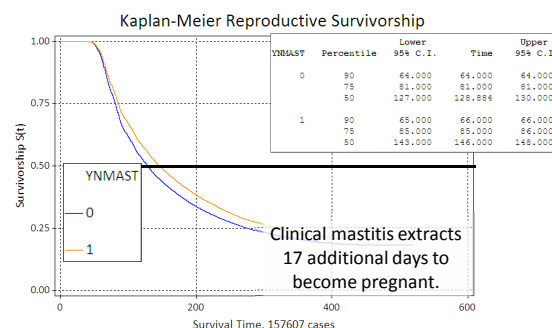
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**% with Mastitis, 1<sup>st</sup> 60 days– HI LSC1 (Y/N)**

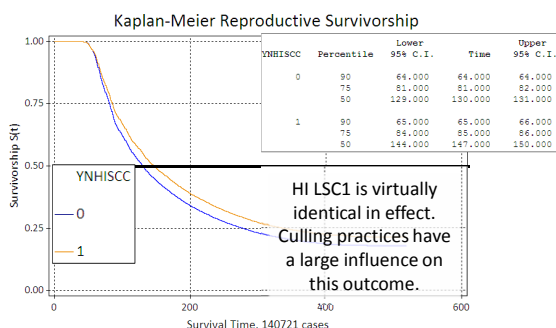
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**REPRODUCTIVE SURVIVAL – MASTITIS (Y/N)**

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**REPRODUCTIVE SURVIVAL – HI LSC1 (Y/N)**

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**Effect of High 1<sup>st</sup> Test SCC**

	1 <sup>st</sup> SCC < 200,000	1 <sup>st</sup> SCC > 200,000	Difference
Lost Milk, lbs (Lo – Hi)			1583
Removed by 60 DIM	2.26% <sup>a</sup>	6.49% <sup>b</sup>	4.23%
Clinical mastitis 1 <sup>st</sup> 60 DIM	7.85% <sup>a</sup>	25.61% <sup>b</sup>	17.76%
Median Days Open	130 <sup>a</sup>	147 <sup>b</sup>	17

\* a, b denote difference p&lt;0.05

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### Effect of Clinical mastitis in first 60 DIM

	No mastitis	Clinical mastitis	Difference
Lost Milk, lbs (Y/N Mastitis)			1007
Removed by 60 DIM	7.78% <sup>a</sup>	13.73% <sup>b</sup>	5.95%
Removed by 120 DIM	10.97% <sup>a</sup>	20.95% <sup>b</sup>	9.98%
Median Days Open	129 <sup>a</sup>	146 <sup>b</sup>	17

\* a, b denote difference p<0.05

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### THE IMPACT OF MASTITIS AND HI LSC1 IS NOT SIMPLE...

#### —Specifically:

—A **HI LSC1** (1<sup>st</sup> Log Linear Score, >4.0 or 200,000 cell count) is as much a disease condition as Clinical Mastitis

#### —Having this condition is associated with:

- Significantly Lower Lactational Milk Production (1583 lbs)
- 57 days earlier to the onset of clinical mastitis (of the mastitis cases recorded)
- Quicker Removal from the Herd - 2.3% vs. 6.5%
- Reduced Reproductive Efficiency – 17 additional days open

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### THE IMPACT OF MASTITIS AND HI LSC1 IS NOT SIMPLE...

#### —The **Costs are Multiple**

- Lost **Milk Production** through the lactation
- Risk of **Clinical Mastitis** with the attendant Cost of Treatment and Loss of Production
- Risk of **Mastitis Recurrence** – the Erosion of the lactation curve associated with each event.
- Decreased **Reproductive Efficiency**
- The Cost of **Early Removals**
  - Loss of development costs
  - Loss of flexibility to strategically cull the individuals from the herd that need to go.

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### THE IMPACT OF MASTITIS AND HI LSC1 IS NOT SIMPLE...

—These **Losses Are Avoidable** using proven scientific interventions.

#### —This is the case to:

- Managing the **Dry Cow Environment**.
- Use a highly efficacious **Dry Cow therapy** to address existing infections.
- Use an **Internal Teat Sealant** to reduce new dry period infections.
- Use a **Core Antigen Vaccine** to aid in control of clinical signs associated with *E.coli* mastitis.

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### SUMMARY

- Even in the face of No Milk Quality Premiums it remains in the Producer's Best Financial Interest to manage somatic cell counts.
- Routine Testing** and determination of **Subclinical Mastitis** has Great Management Value in addressing Herd and Individual Udder Health
- A **HI LSC1** (Numerical Classification) is as much a disease condition as Clinical Mastitis, and it extracts a **Significant Penalty**.

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### A FINAL THOUGHT ABOUT CLINICAL MASTITIS PROTOCOLS...

—**Clinical Mastitis** should always be tracked through the use of Protocols to understand the full significance. There are three types of Protocols:

- **TREAT**
- **NO TREAT**
- **SELL FOR MASTITIS**

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