Cornell University
College of Agriculture and Life Sciences

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# Cowside Monitoring & Decision Making

*"Using rapid health information to manage the herd"*

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Cornell University PRO-DAIRY

**March 16, 2016**
**Ballston Spa, NY**

## Outline

- Testing Strategies
- Test Performance
- Ketosis
- Hypocalcemia
- Mastitis
- Passive Antibody Transfer

# Why Cow-side?

- Speed
  - Faster decision making
- Economics
  - Lower start-up cost and cost/test
- Easy



# Sensitivity and Specificity

- Sensitivity:
  - how well a test does at finding true positive animals
  - highly sensitive tests rarely give a false negative
- Specificity:
  - how well a test does at finding true negative animals
  - Highly specific tests rarely give false positives
- Positive Predictive Value
- Negative Predictive Value

# Test Results vs. True Results

| | Test Positive | Test Negative |
|---|---|---|
| True Positive | Cow has disease, test found her | Cow has disease, test missed her |
| True Negative | Cow does not have disease, test said she has it | Cow does not have disease, test said she does not have it |

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# Testing Strategy

## Confirmatory Tests

- Targeted sampling
- Risk based
- High specificity is desirable

## Herd Screening

- Monitor for disease prevelence
- Identify subclinical disease
- High sensitivity is desirable

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# Herd screening

- Proportional vs. group average
- How many to test in the group?
  - How confident do you want to be?
  - How prevalent is what you are looking for?

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# Health Records

- Problematic
  - Staff Variation
  - Change In or Sporadic Use Of
  - Low Accuracy
  - Clinical vs. Subclinical
- Incidence:
  - # effected / # eligible to be effected over a set period of time

    (ex. # metritis this month / # fresh this month)

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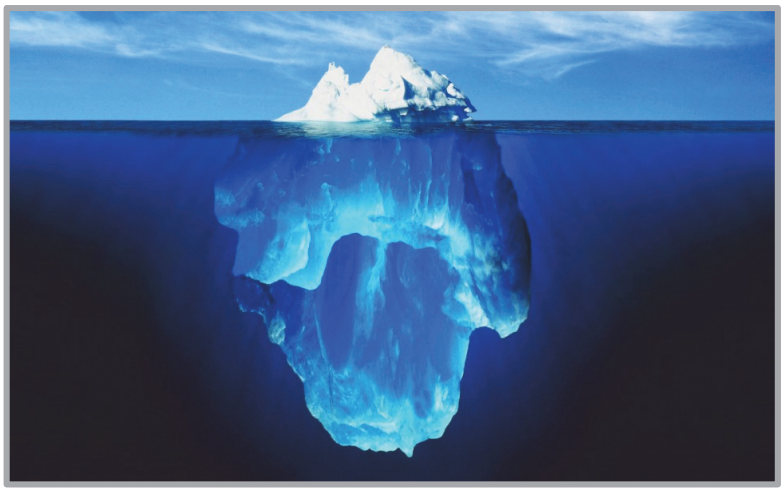
# Clinical vs. Subclinical Disease



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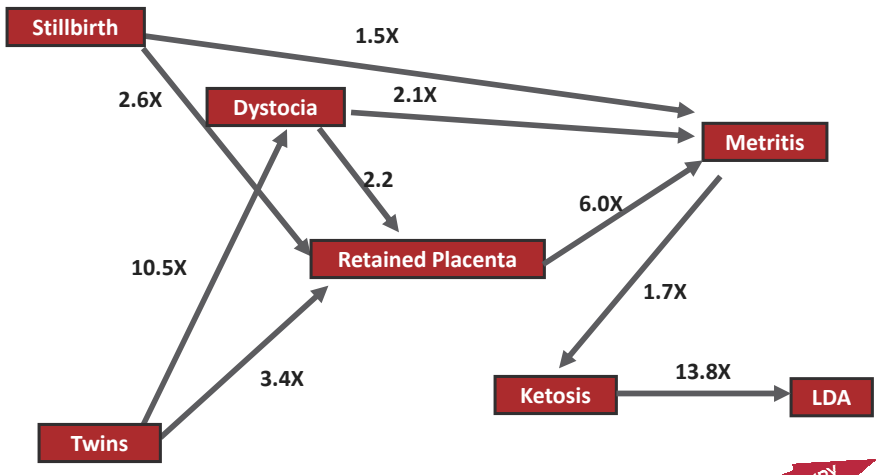
# Risk Factors




Adapted from Correa et al, J Dairy Sci, 1993

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# Ketosis

- Excessive fat mobilization, high NEFA & ketone bodies (acetone, acetoacetate, and β-hydroxybutyrate)
- Average Incidence of SCK: 43% (26%-56%)[1]


[1]McArt, et al, JDS, 2011



# Subclinical Ketosis (SCK)

- Tracking SCK incidence becoming commonplace
- Treatment recommendations and monitor for changes in herd level ketosis incidence
- SCK leads to
  - ↑ DA risk
  - ↑ early removal risk
  - ↓conception
  - ↓ milk production

McArt, et al, JDS, 2011

# Ketosis

- Ketostix® (Bayer)
  - urine acetoacetic acid, $0.20/strip
- KetoCheck™ Powder (Great States)
  - milk, urine, or serum acetone, $0.60/test
- Keto-Test® (Elanco)
  - milk BHBA, $1.70/strip
- PortaBHB® (PortaCheck
  - milk BHBA, $2.05/strip




McArt, et al, JDS, 2011

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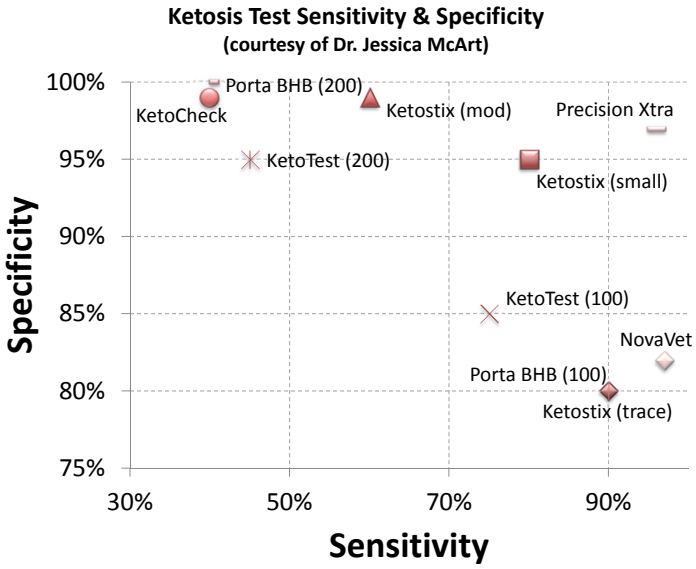


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# Precision Xtra cow side blood BHBA test


- BHBA concentrations:
  - SCK: 1.2-2.9 mM/L
  - Clinical Ketosis: ≥3.0 mM/L
- Investigating SCK:
  - Test 12 apparently healthy fresh cows between 5-15 DIM
  - If >10% of cows tested have BHBA levels >1.2 mM/L, investigate further

Oetzel, Vet Clin Food Anim, 2004

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# Individual Cow BHBA Test Results

- Cows tested for BHBA levels from 3-16 DIM 3X/week
- Cows with BHBA concentrations of 1.2-2.9 mM/L receive oral propylene glycol (300mL SID) until the day they tested <1.2 mM/L or reached 17 DIM.
- 43.2% (26%-56%) eligible cows had at least one BHBA test of 1.2-2.9 mM/L.
- Significant ↓ in clinical ketosis and ↑ in early lactation milk production in subclinical ketosis cows receiving oral propylene glycol.

McArt, et al, JDS, 2011

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# SCK Strategy Based on Incidence

- Estimate Herd Level Prevalence
  - Sample 20cows 3-14DIM
  - >1.2mM/L = +

| ≤15% | >15-40% | >40% |
|---|---|---|
| • Monitor herd level prevalence EOW<br>• 20cows 3-14DIM | • Test All Fresh Cows 3-9DIM 2X/Week<br>• PG SID for 5 Days all + Cows | • Stop Testing Individual Cows<br>• PG All Fresh Cows SID for 5 Days<br>• Investigate ketosis problem<br>• Recheck prevalence in 2 weeks |

Ospina, et al, Vet Clin Food Anim, 2013

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# Hypocalcemia

- Subclinical hypocalcemia under diagnosed
  - Test 1-2 days after calving
- Cutpoint: Serum Calcium <8-8.5mg/dl
- Alarm Level: >30%
- Water Hardness Test
  - sensitivity: 100%
  - specificity: 73%
  - centrifuge

Matsas, et al, JAVMA, 1999

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# Urine pH

- Lower Close-Up Diet DCAD with anionic salts to improve calcium mobilization around time of calving
- Check 8-12 pre-fresh cows weekly
- Goal: mean urinary pH values ~6.0 to 6.5
- pH Paper or digital meter (Calibrate!)



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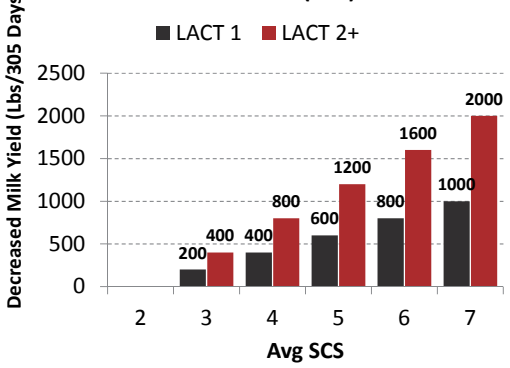
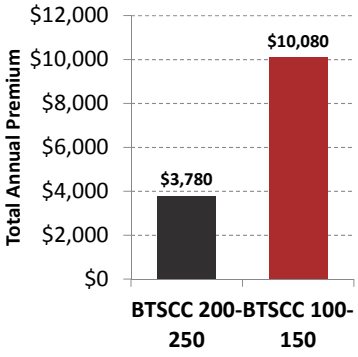
# SOMATIC CELL SCORE & RELATIONSHIP TO MILK LOSSES

**Estimated change in lactation milk yield associated with an increase in somatic cell score (SCS)[1]**




**Annual Increased Income due to Milk Premiums[2]**
**[100 Cow Dairy @70Lbs/Cow]**




[1] NMC: The Value and Use of Dairy Herd Improvement Somatic Cell Count
[2] QMPS: 400K Beat It! 200K Get It!

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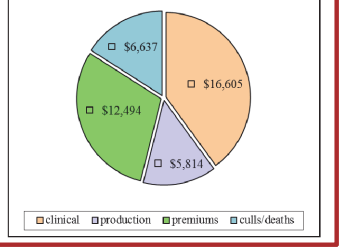
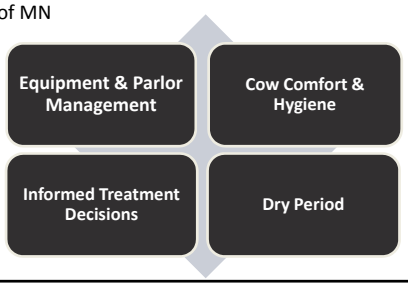
# MILK QUALITY

Annual losses due to mastitis above a desirable baseline level
2015 ##########

| | | | |
|---|---|---|---|
| $ | 16,605 | clinical | losses due to excess clinical mastitis |
| $ | 5,814 | production | dollars of milk lost/ due to subclinical mastitis' effect on production |
| $ | 12,494 | premiums | losses due to lost premium income |
| $ | 6,637 | culls/deaths | losses due to excess culling and death |
| $ | 41,549 | | total losses per year above the desired baseline |
| $ | 225 | | losses per cow per year above the desired baseline |




Fetrow, U of MN




Quality Milk Production Services
Cornell College of Veterinary Medicine

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# California Mastitis Test (CMT)

- Detects DNA from ruptured somatic cells in milk
- Mix test solution from concentrate
- Quarters checked by mixing equal parts milk and CMT solution.
- Inexpensive
- Does not identify bacteria
- Low sensitivity


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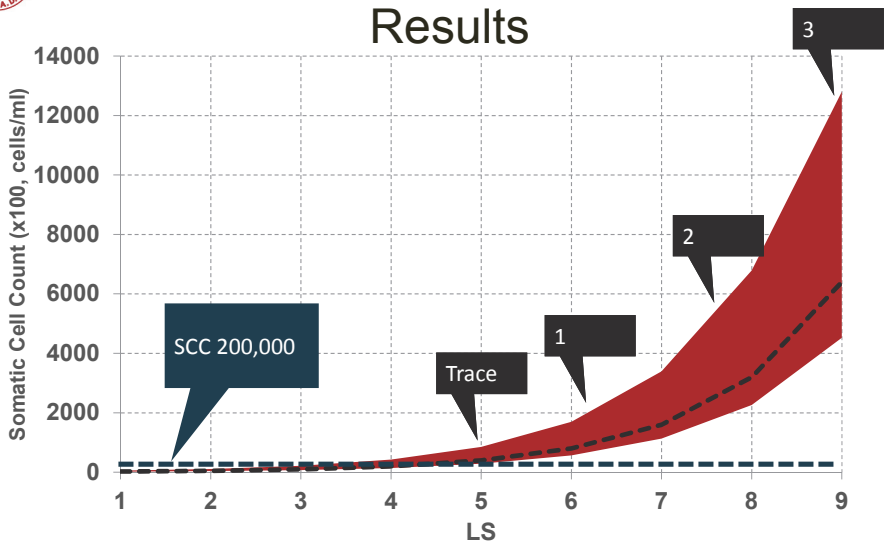
# Somatic Cell Scores & CMT Results

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# Cow-side SCC Tests

- PortaSCC® (PortaCheck)
- DCC (Delval)
- Improved SCC over CMT
- Does not identify bacteria


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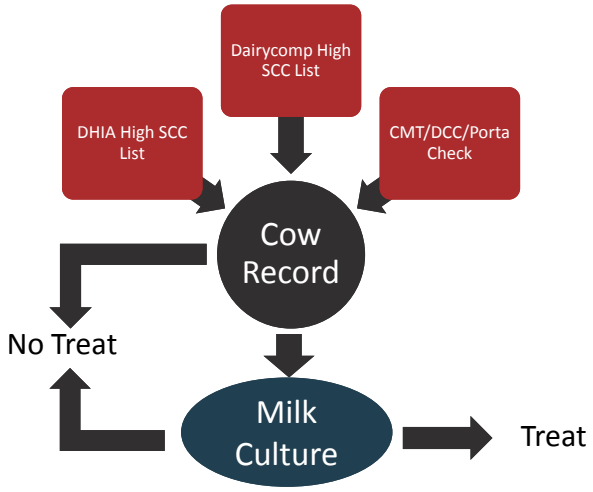
# Subclinical Mastitis Decisions

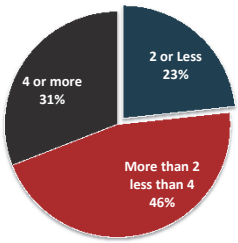




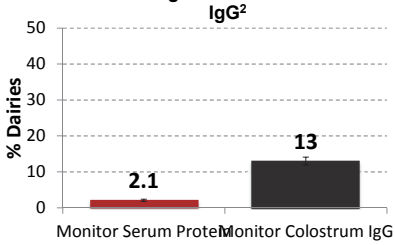

# Colostrum

- Health Benefits of Feeding Colostrum Well Established[1]
  - Lower Morbidity & Mortality
  - Better Growth
  - Lower Raising Costs (Meds)
  - Improved Future Milk Production

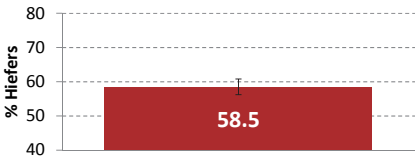
**Colostrum Feeding Volume (Quarts)[2]**




**Percent of Dairies Routinely Screening for FPT & Colostrum IgG[2]**




**Heifers with Serum Protein 5.5gm/dl or Greater[2]**




[1] Faber et al, Prof An Sci 21, 2005
[2] NAHMS, 2007

# Failure of Passive Transfer using Serum Protein

- Goal in feeding colostrum is to achieve a serum IgG concentration > 10 mg/mL
- Serum Protein
  - healthy calves 2-7days of age
  - all or proportion
  - @ room temp
-

| Test Level | Alarm Level |
|---|---|
| S.P. <5.5gm/dl | >20% |
| Brix% 8.4 | >20% |
| S.P. <5.2gm/dl | >10% |

McGuirk, UofWI School of Vet Med

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# Questions?