Milk Quality: It's the Little things

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Agenda

- Why Milk Quality Matters
- High Cell Counts– Breaking it Down
- Milk Quality: The Little Things that Matter
- Impacts of Prevention

Why Worry About Mastitis?

Milk quality regulatory issues

- Bulk milk Somatic Cell Counts (SCC): 750,000 cells/ml
- Bacteria count SPC :100,000 cfu
- Milk/meat Residues

Quality has **Value**

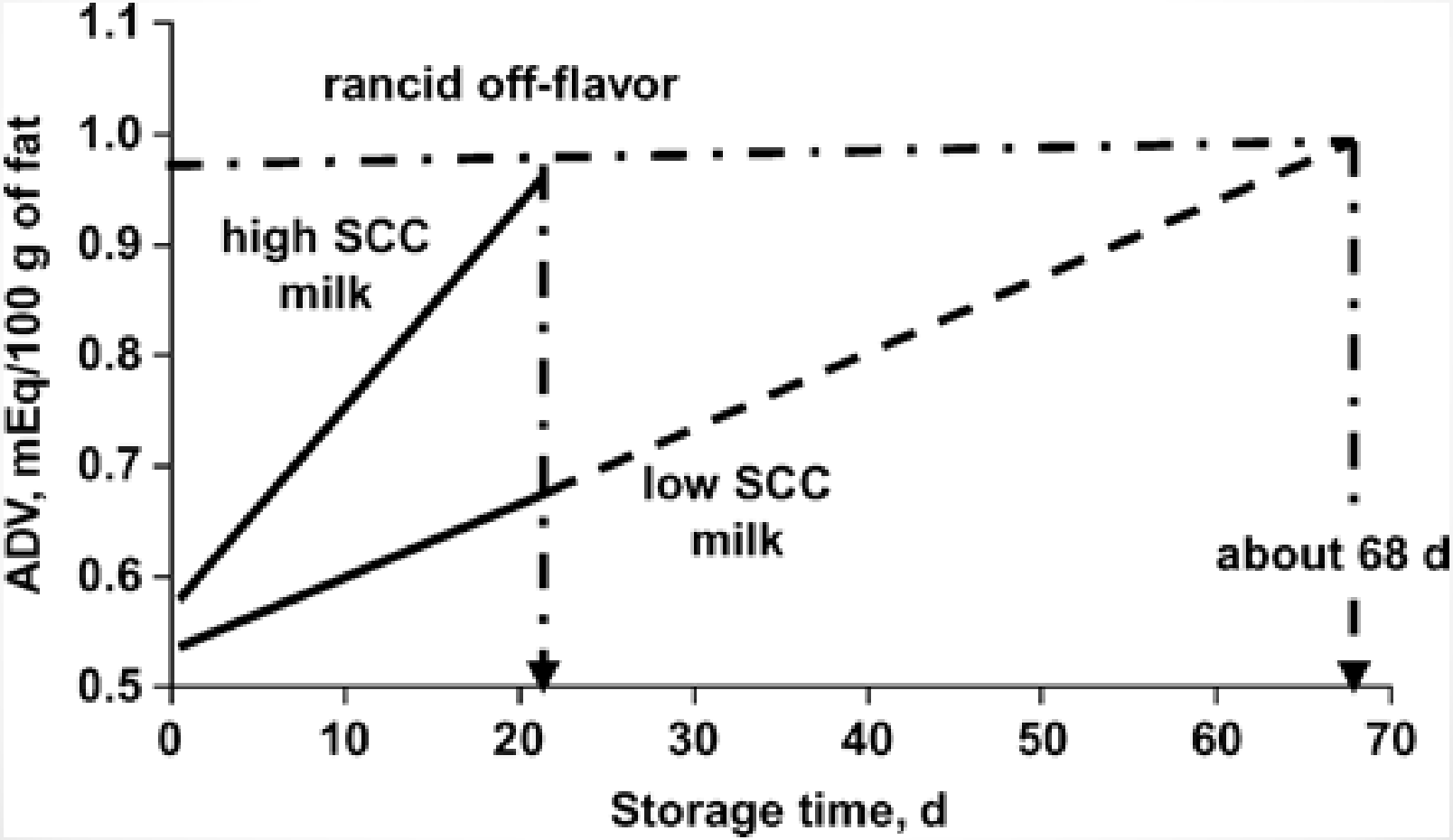
- Processor
  - Prolonged shelf life
  - Increased manufacturing yields
  - Improved product quality

Mastitis & Milk Quality

Component	Normal Milk	Mastitic Milk	% of normal
Total Solids	13.1	12.0	92%
Lactose	4.7	4.0	85
Fat	4.2	3.7	88
Chloride	0.091	0.147	161
Total Protein	3.6	3.6	100
Caseins	2.8	2.3	82
Whey proteins	0.8	1.3	162

*Source : John C. Bruhn, Extension Food Technologist, U.C.-Davis, 1983.

Milk Quality and Shelf Life



Ma et al. 2000 JDS

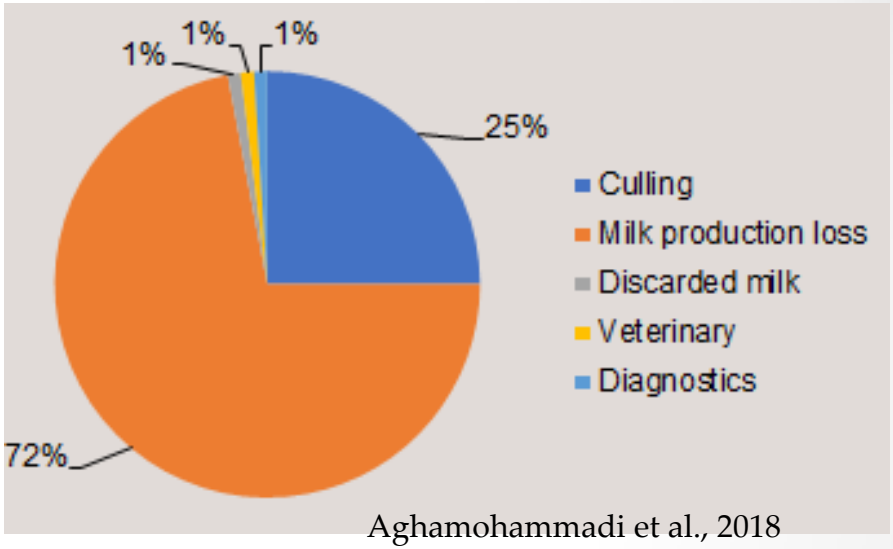
Quality has **Value**

- Producer
  - $/cwt (premiums/debits)
  - Increased production
  - Fewer culls & deaths
  - Less Labor

Courtesy of kidz4money.com

Costs Associated with Subclinical Mastitis

- Production loss
- Premium loss
- Transmission costs
- Culling



Aghamohammadi et al., 2018

Table 4: Relationship between SCC, Linear Scores and Milk Yield Loss

SCC Midpoint (range)	Linear Score	Milk Loss for Lact 1	Milk Loss for Lact 2+
25,000 (18,000-34,000)	1	0	0
50,000 (35,000-68,000)	2	0	0
100,000 (69,000-136,000)	3	200 lb	400 lb
200,000 (137,000-273,000)	4	400 lb	800 lb
400,000 (274,000-546,000)	5	600 lb	1200 lb
800,000 (547,000-1,092,000)	6	800 lb	1600 lb
1,600,000 (1,093,000-2,185,000)	7	1,000 lb	2,000 lb

My Bulk Milk SCC is >400,000… or >200,000

Now what do I do???

Mastitis Detection

---seek and ye shall find---

- Clinical

Grade I: abnormal milk

Grade II: abnormal milk, abnormal quarter

Grade III: abnormal milk, abnormal quarter, abnormal cow

- Subclinical

CMT testing

Individual SCC

DHIA

Delaval SCC

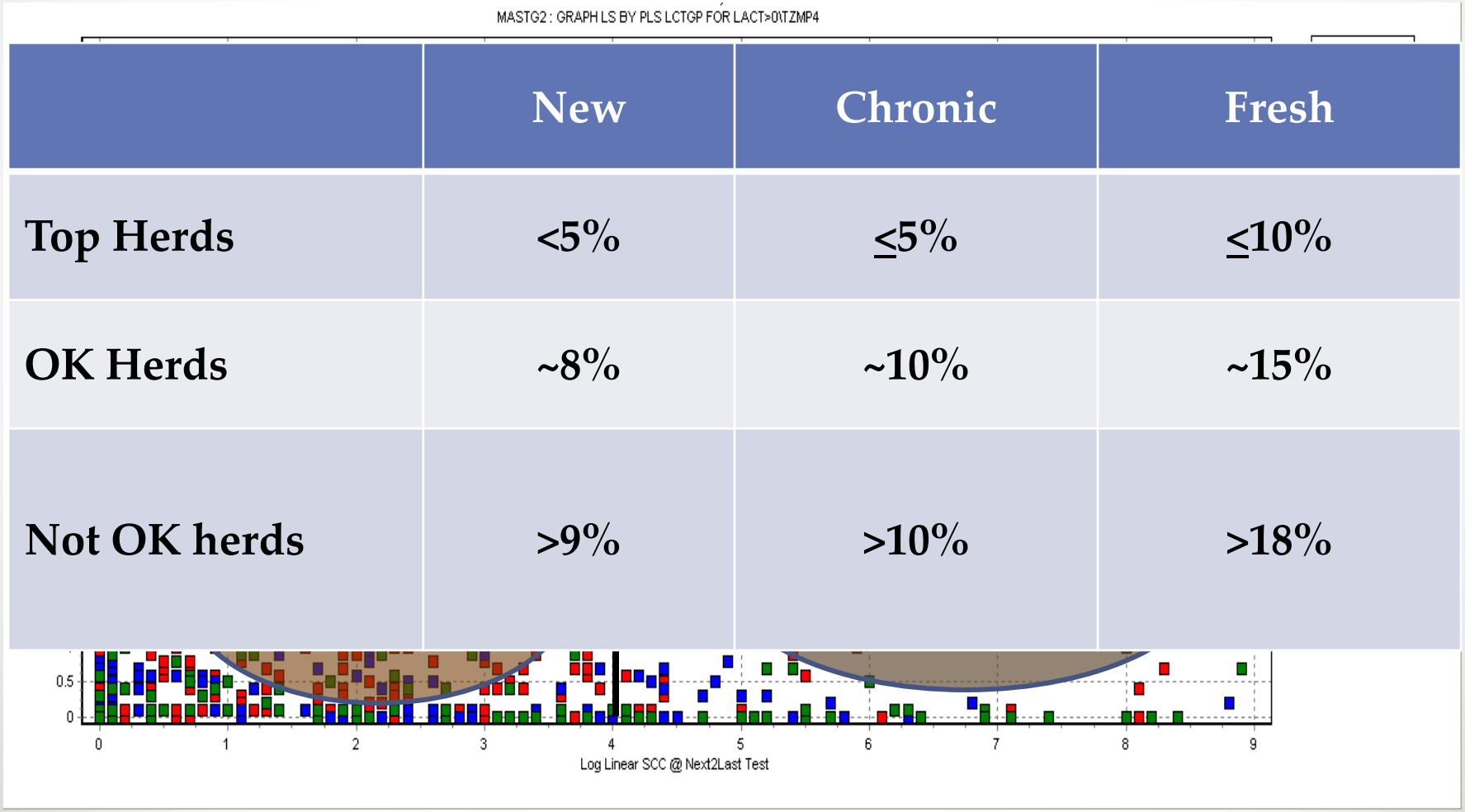
Porta SCC

Electrical conductivity

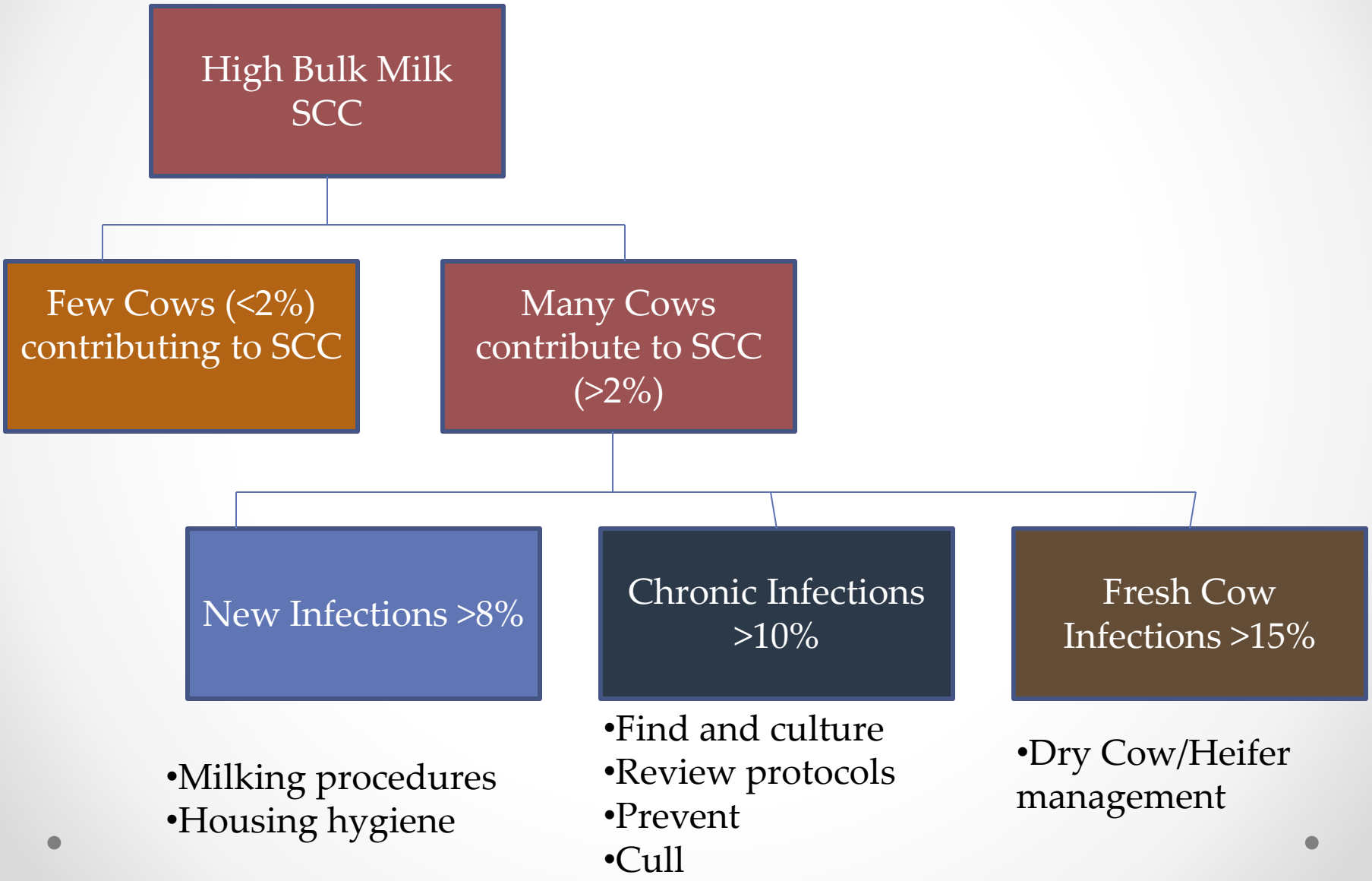
Culture

SCC Dynamics in the Herd

	New	Chronic	Fresh
Top Herds	<5%	≤5%	≤10%
OK Herds	~8%	~10%	~15%
Not OK herds	>9%	>10%	>18%

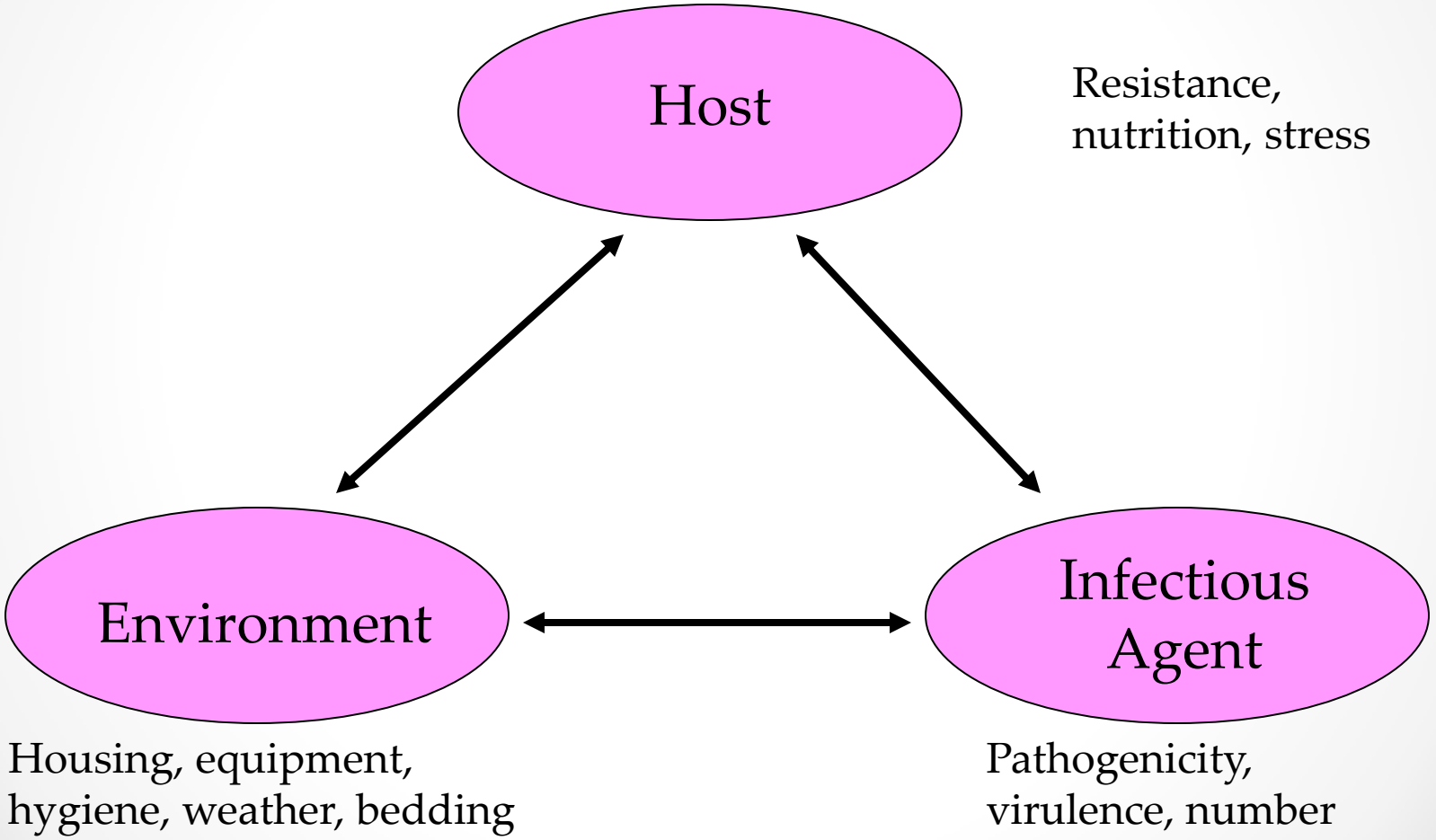


Analyze High BMSCC--simplified



The Little Things…

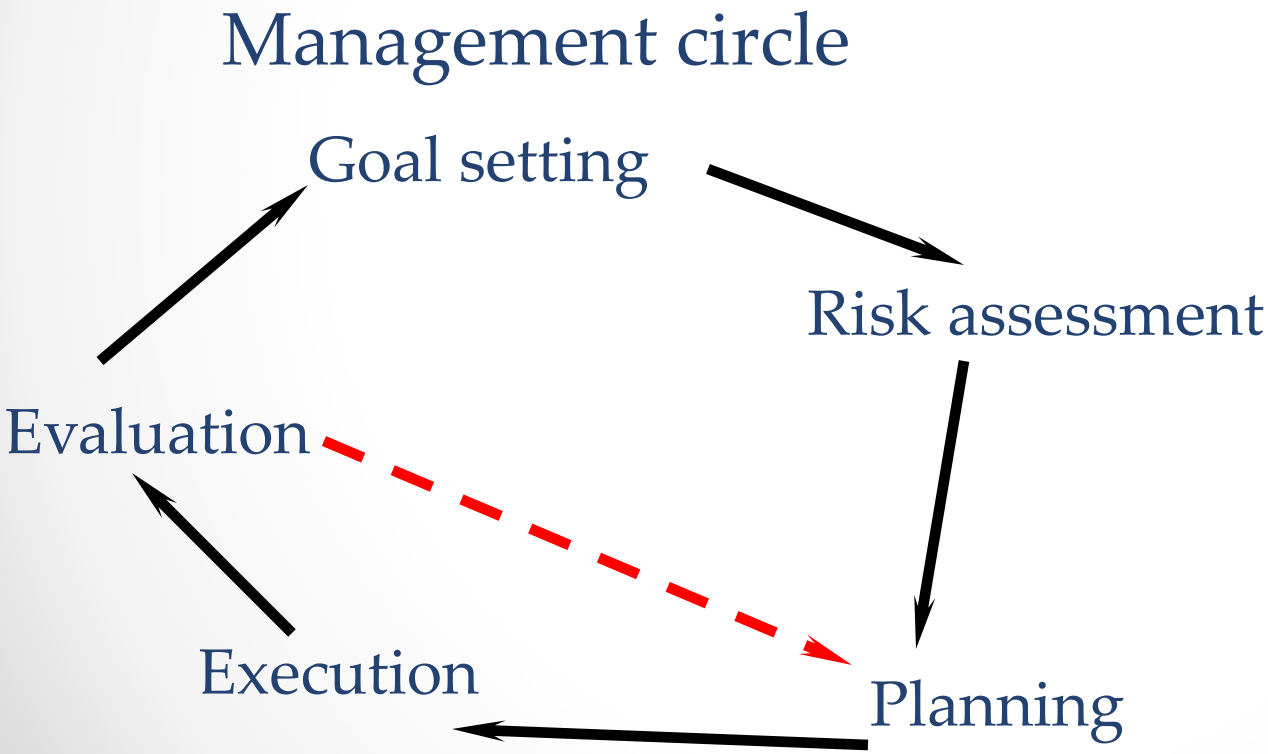
Mastitis is not a 'single issue' disease



1. Farm Specific Udder Goals

Criteria	Ideal Udder Health Targets
Bulk milk somatic cell count (SCC)	<200,000 cell/ml
Herd average (actual)	<200,000
Herd average (DHI Linear score)	<3.0 LS
100% of first calvers (DHI)	<100,000
>85% milking herd	<200,000
>95% milking herd	<500,000
Number of culls due to mastitis or other udder health problems	<5 cases/100 cows per year

1. Set Farm Specific Goals



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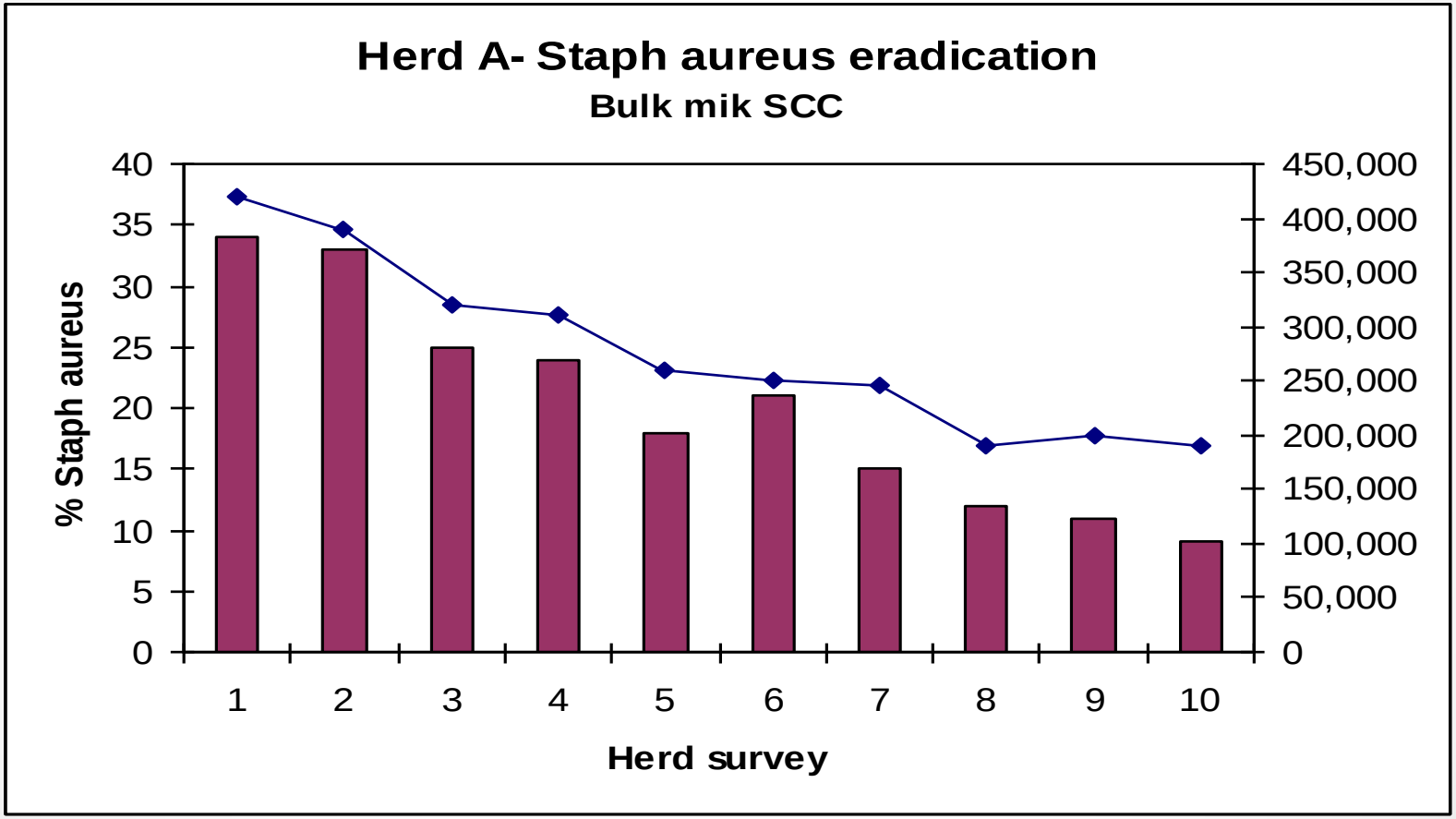


2. Regular Udder Health Monitoring

- Detect problems/outbreaks early
- Early intervention for minimal loss of production and profit
- Monitoring systems can be quite simple or quite complex
- Your certification paperwork has already got you trained!

2. Regular Health Monitoring

File Herds Cowdata Perform SCC Mast Cull Sampling list Reports Monitor Help

Command ?

Reports

Lists

CowCards

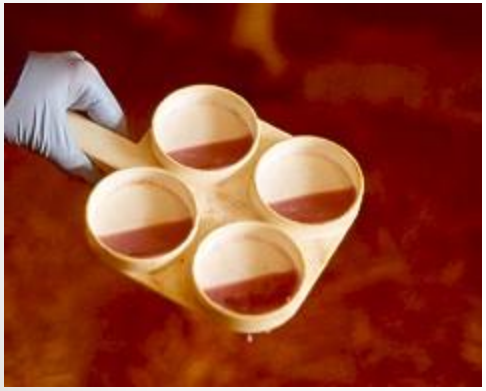
Graphs

Summaries

SAMPLE1: LIST ... FOR (LS>4.5 PLS>4.5) (LS>4.5 PLS3>4.5) DOWNBY LS

ID	LACT	DIM	CWVAL	DRYLS	LS1	PLS4	PLS3	PLS	LS	AVLS
8324	3	64	0	0.9	6.0	0.0	0.0	6.0	7.0	6.5
8339	2	275	0	2.4	4.3	0.0	5.2	5.3	6.2	5.3
8260	4	177	0	4.8	3.3	0.0	8.4	5.2	6.1	5.2
8368	2	208	0	1.2	4.8	0.0	8.2	5.5	6.0	5.6
8347	2	179	0	3.4	4.7	0.0	7.4	6.9	5.9	5.9
8420	1	199	0	0	6.4	0.0	3.6	6.0	5.9	4.4
8263	4	335	0	2.4	6.2	0.0	6.9	5.4	5.4	6.2
8310	3	288	0	1.4	7.3	0.0	5.2	5.5	5.4	5.0
8353	2	231	0	2.1	2.7	0.0	1.9	5.5	5.4	2.8
8430	1	209	0	0	4.1	0.0	5.8	5.4	5.0	4.8
8313	3	78	0	3.6	5.7	0.0	5.7	6.8	4.7	5.7

Total: 11

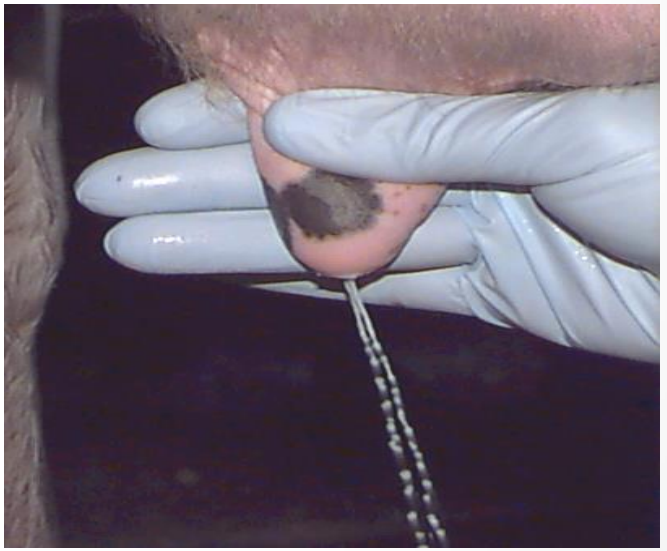


3. Proper Milking Technique

- Milking is the time of greatest risk for new infections
- Consistency and a positive attitude go a long way in helping your cows milk
- Clean environment

3. Proper Milking Technique

- Wear gloves.

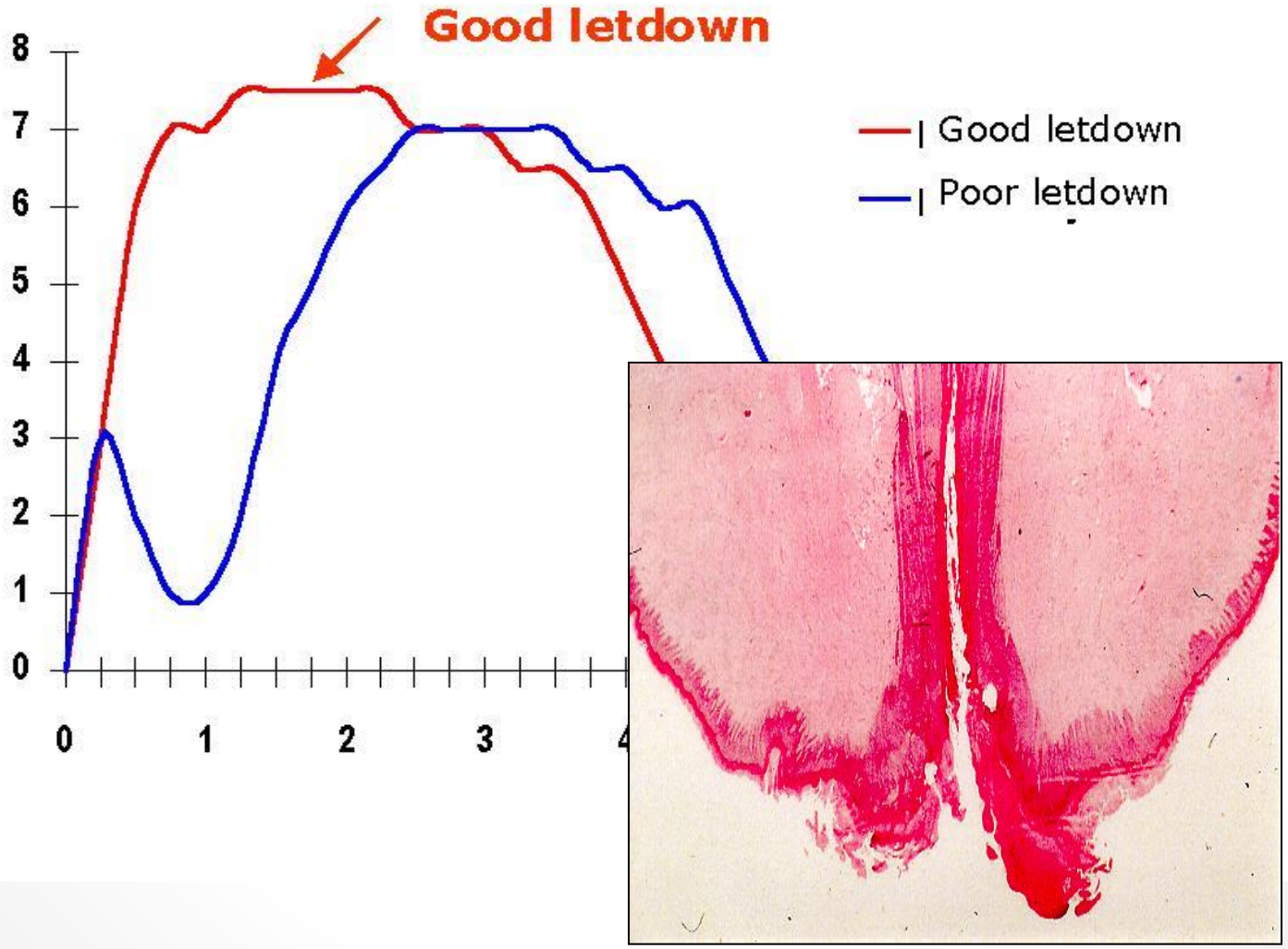


3. Proper Milking Technique

Forestripping

- Removes milk in the teat end that is higher in bacteria and somatic cells
- Aids in the early detection of clinical mastitis.
- Helps stimulate milk letdown for faster and more complete milkout.

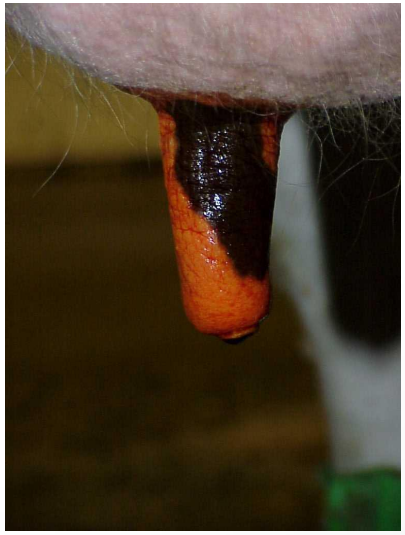
Adapted from The Bovine Udder and Mastitis, ed. Sandholm et al. 1995


Good letdown
8
7
6
5
4
3
2
1
0
0
1
2
3
Good letdown
Poor letdown

3. Proper Milking Technique

Predip or Wash/Dry

- Dip should remain on teats for 20-30 sec for maximum bacterial kill
- Cup application preferred over spraying
- Non-return dipcup



3. Proper Milking Technique

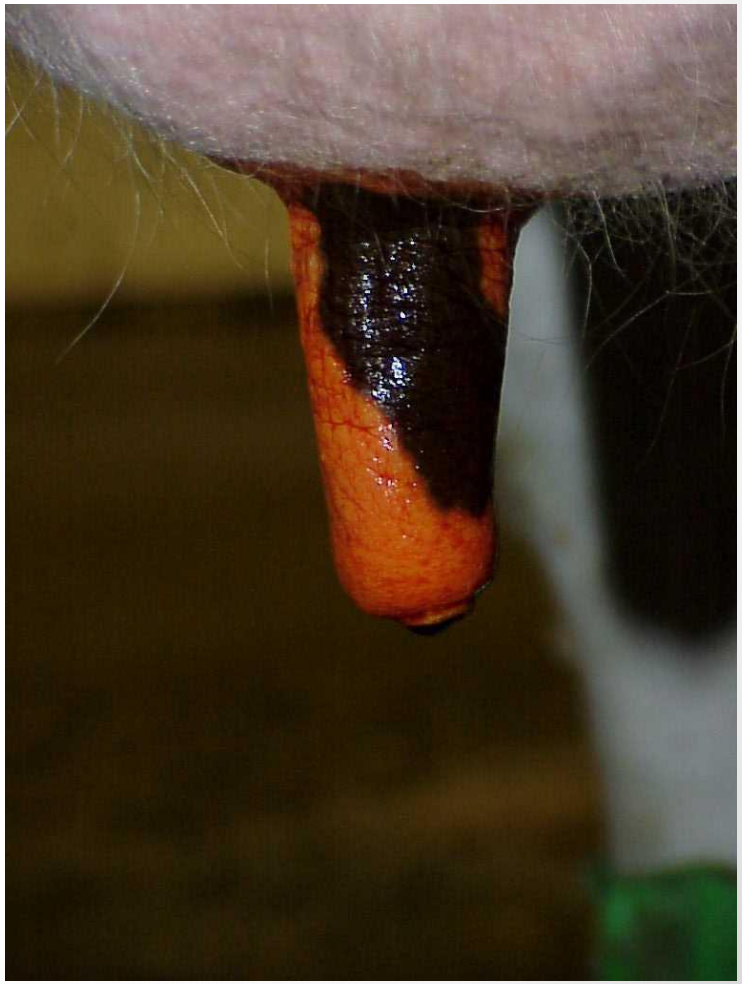
Wipe dry

- Single service paper or cloth towels
- Cloth towels: Launder/Bleach/Spin or Launder/Heat dry
- Wet milking may result in liner slips

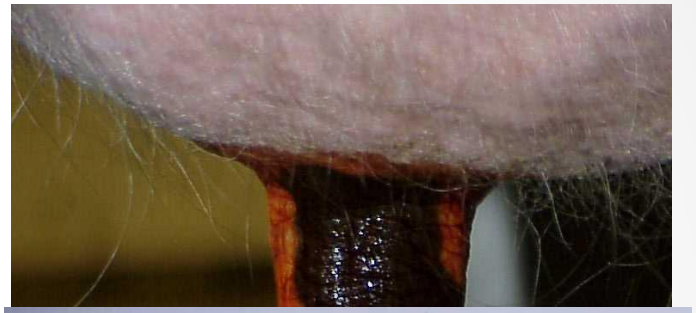
3. Proper Milking Technique

Post Milking Teat Dipping

The single most important procedure for controlling the spread of contagious mastitis.



Dip versus spray?



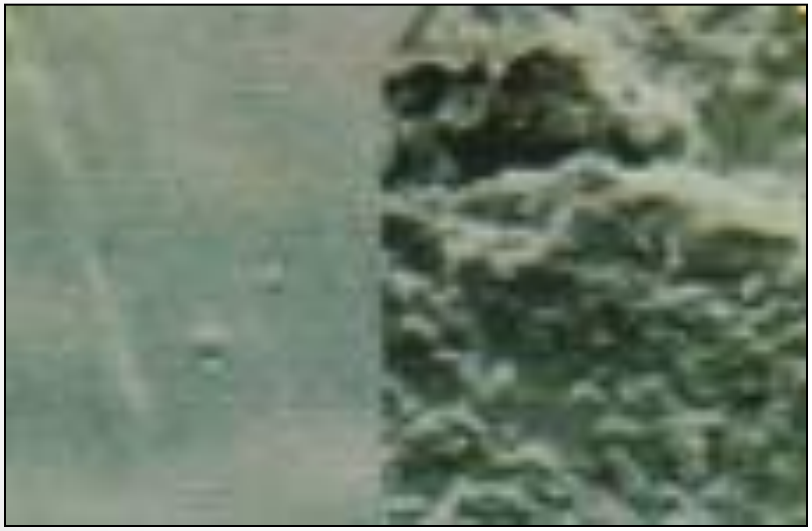
3. Proper Milking Technique

Milking order

1. Fresh heifers
2. Low SCC Cows
3. High SCC Cows
4. Contagious Mastitis Cows

4. Maintain Milking Equipment

- System airflow and reserve—is it adequate?
- Pulsation rates and ratios—are they consistent?
- Rubber parts—how often are they replaced?

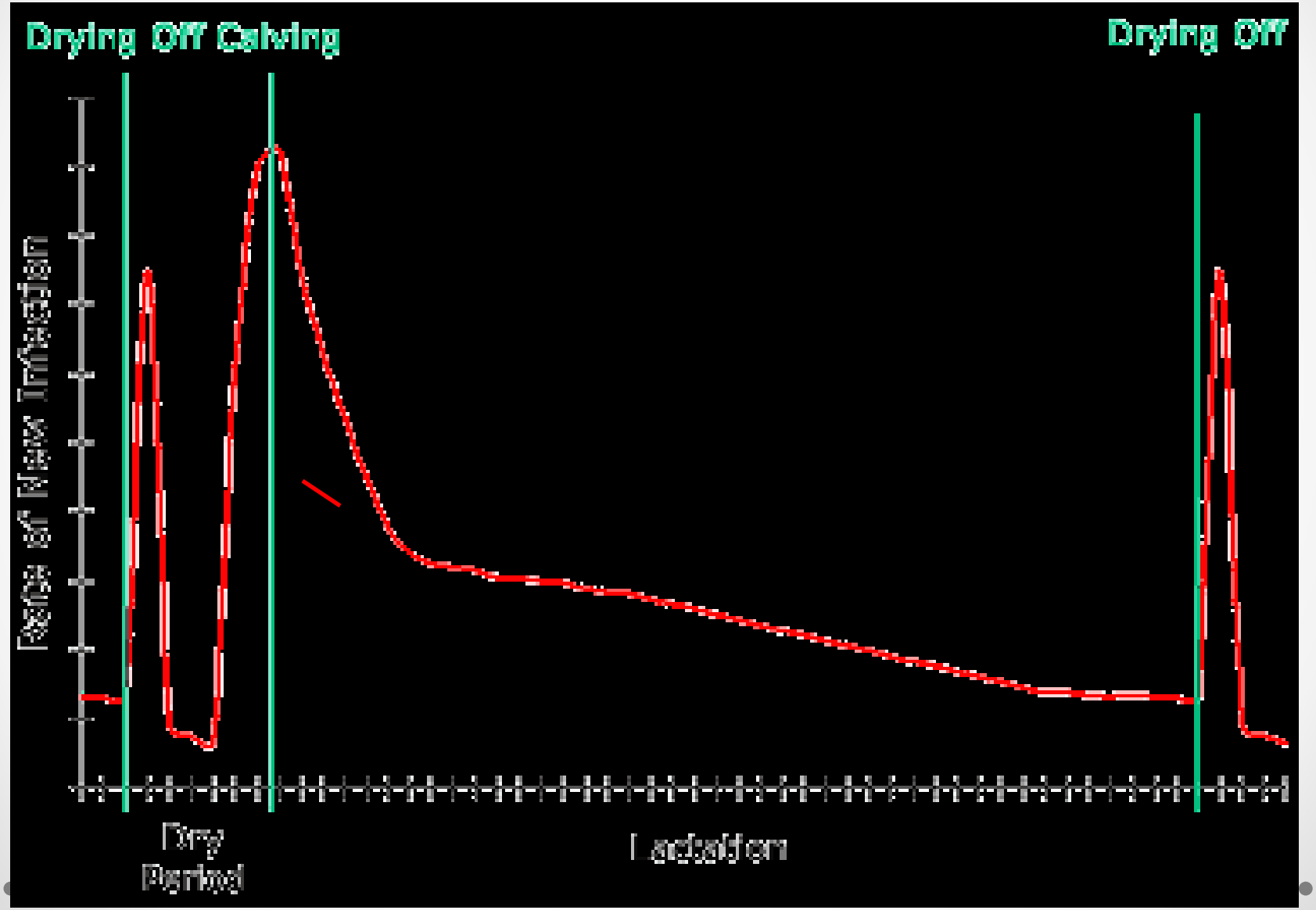


5. Dry Cow Management

Dry Period Goals:

- Proper nutrition for calf development
- Prepare the mammary gland for the next lactation
- Resolve infections from the previous lactation
- Minimize metabolic problems in the next lactation

5. Dry Cow Management



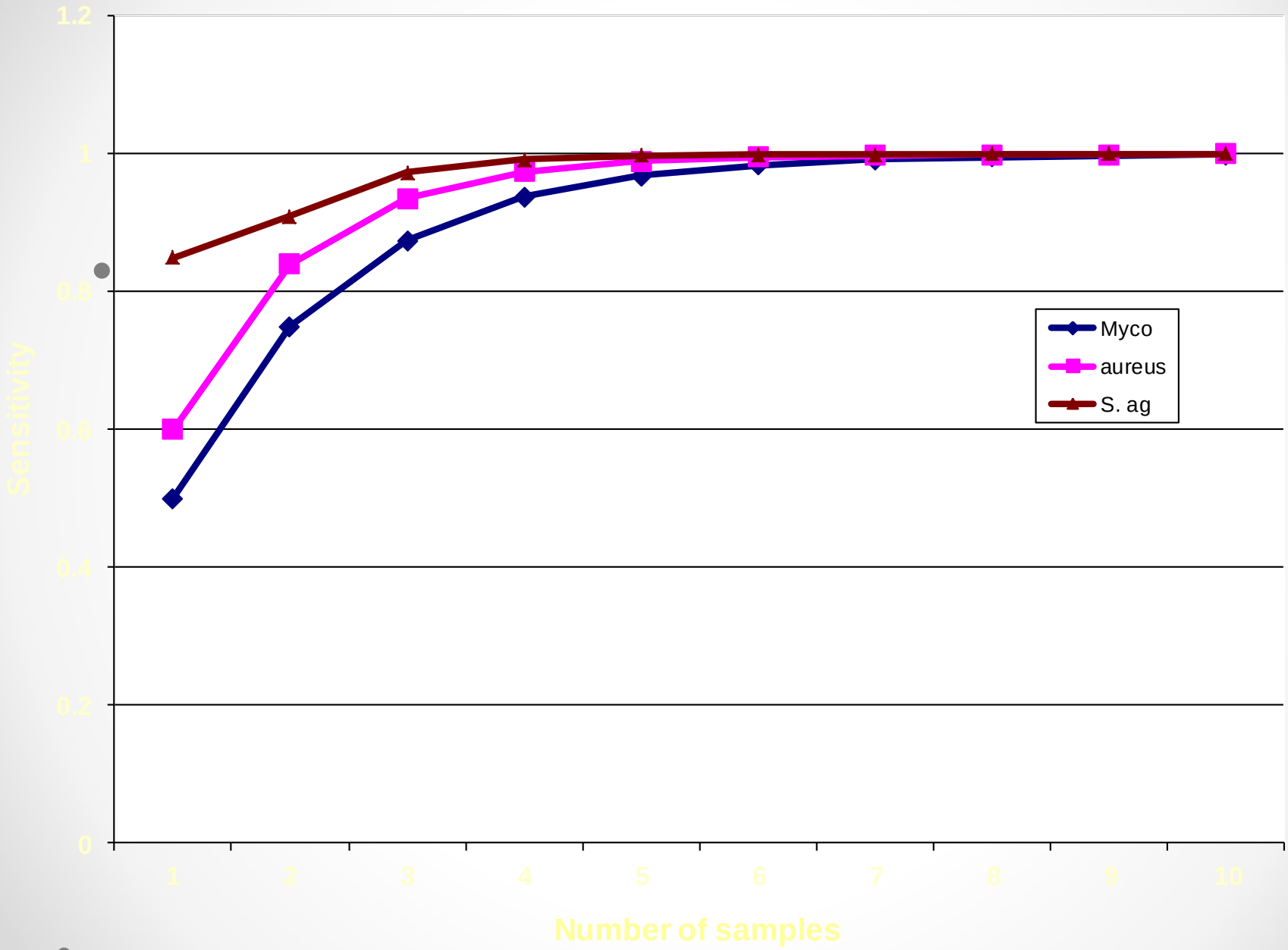
5. Dry Cow Management

Giving the dry cow the upper hand (hoof)..

- Clean environment
- Dipping after dry off?
- Nutrition
  - Selenium/Vitamin E
  - Trace minerals
  - Body condition
  - Prevention of milk fever

5. Dry Cow (Transition) Management

- Ketosis: severity of coliform mastitis is increased (Kremer et al., 1993; Leslie et al., 2000)
  - Vitamin E/Selenium: supplementation reduces incidence and duration of clinical mastitis (Smith et al., 1984) and milk SCC (Moyo et al., 2005).
- Hypocalcemia
  - Clinical: OR 5.4 (Curtis et al., 1985)
  - Subclinical: calcium supplemented cows had ↓ risk of mastitis (Domino et al., 2017)
  - Association between teat canal diameter and subclinical hypocalcemia (Barragan et al., 2018)


1.2
1
0.8
0.6
0.4
0.2
0
Sensitivity
1
2
3
4
5
6
7
8
9
10
Number of samples
Myco
aureus
S. ag

6. Biosecurity

What are the risks for spreading disease within the farm?

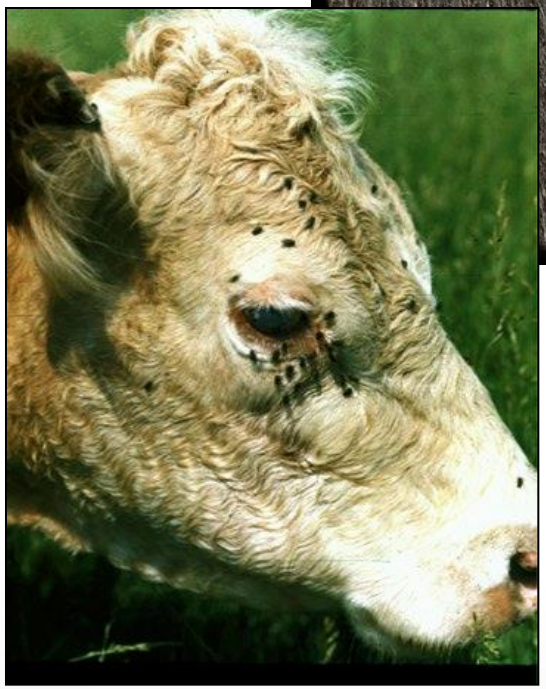
7. Maintain a Healthy Environment

- Clean, dry and comfortable
- Properly sized stalls
- Ventilation
- Sunlight
- Bedding Source—which is best?
- Pasture access

7. Maintain a healthy environment

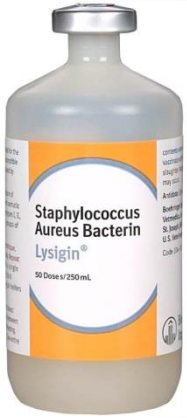
Why control flies?

- Nuisance
- Spread disease
- Decreased production



8. Vaccination

- Use strategically
- Coliform mastitis:
  - 81% reduction in new cases
  - Vaccinates with clinical mastitis: more milk, less culling
- Staph aureus mastitis:
  - 50% reduction in SCC
  - 40% reduction in IMI
  - More milk



What's the impact of prevention?

Expert Ranking of Preventive Measures

Measure	100% Environmental	100% Contagious
~~Blanket Dry Cow Therapy~~	~~1~~	~~1~~
Post-dipping	2	2
Prevent overcrowding	3	14
Improve nutrition	4	8
Stall hygiene	5	12
Milk subclinical cows last	15	3
Back flushing cluster (SCM)	12	4
Milk clinical cows last	16	5

Hoogeveen et al., 2011

Effect of Intervention on Bulk Milk SCC Reduction (%)

Measure	Environmental	Contagious
Post milking teat dipping	33.84	36.16
Milk subclinical mastitis last	20.91	25.98
Appropriate dry cow minerals	20.89	20.18
~~Blanket dry cow treatment~~	~~18.69~~	~~21.10~~
Milk clinical cases last	14.37	17.46
Pre-stripping	13.62	14.09
Improve nutrition	13.45	14.44

Huijps et al., 2010

Effect of Intervention on Clinical Mastitis Reduction (%)

Measure	Environmental	Contagious
Post milking teat dipping	36.51	37.15
Improve nutrition	17.00	16.48
Appropriate dry cow minerals	14.98	14.27
Prevent overcrowding	12.06	8.75
~~Blanket dry cow treatment~~	~~11.75~~	~~14.02~~
Clean stalls	11.57	5.55
Milk subclinical cases last	2.63	12.08

Huijps et al., 2010

Conclusions

- There are no silver bullets.
- Daily conscious attention to the little things drive milk quality.
- Interventions that have the biggest impact:
  - Post-milking teat dipping
  - Milk high SCC cows last
  - Nutrition: including dry cow minerals
  - Cleanliness

Thank you!