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Animal Health Fact Sheet

HELPING DAIRY PRODUCERS REDUCE THE SCC

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Practicing veterinarians are in an excellent position to help dairy producers recognize and deal with the problem of elevated somatic cell counts (SCC). Yet they are seldom asked to assist. A high SCC is an indication of chronic, subclinical mastitis in the herd and is also an indication of significant economic losses. These herds will have difficulty competing in the market, especially in times of reduced milk prices. Consider offering to help them recognize there is a problem and then to help them deal with it.

You cannot help all dairy producers to change this problem but you can help some and it will provide a great service to them. The following pages outline steps that can be taken to evaluate a dairy and help producers make changes that will be effective. The remainder is a collection of information on specific, related topics. It would be wise to begin the program with a producer who is teachable, willing to change and in a financial position to do so.

OVERVIEW

A. Evaluate the owner/manager attitude, records, cows, corrals, facilities and procedures.

B. Collect cow (and perhaps bulk tank) milk samples for culture.

C. Determine the most likely cause(s) of the problem and evaluate the economics for this specific herd.

D. Prioritize needed changes and develop a plan with reasonable goals, along with ways to monitor progress of implementation, decreased SCC and increased production. (See Reference #1.)

E. Review and modify the plan with input from the owner / manager and gain his commitment.

F. Schedule monthly (or periodic) visits for monitoring the cows and dairy, updating the plans and procedures and educating the producer and employees.

For this type of effort to be successful, it must involve the dairy producer / manager and also the employees. Others who could be of help in a team effort would include the field representative of the milk processor, the milking equipment dealer, the nutritionist and the County Agent or Extension Dairy Specialist. (See Reference #10.)

RESOLVING AN ELEVATED SOMATIC CELL COUNT (SCC) PROBLEM

A. Dairy Evaluation

1. Evaluate the owner / manager's attitude and abilities.

Who is the decision-maker on the dairy? What is the manager's awareness, concern or complaint? What has he done previously to correct the problem? Is he financially able to make some changes if they are needed? Can you teach him?

Realize that the manager's answers, actions and perspective may be different than those from the employees or other family members involved on the dairy. Listen and observe.

2. Evaluate SCC records
DHI herd summary sheets
DHI list of cows by SCC
Processor records
Any CMT or milk culture records

Try to look back at least 6 months and preferably a full year. Look for trends. Consider weather patterns, special events, etc. that may have had an impact. There is often a lag period from the event to the SCC rise.

Were there cattle additions? When? Any episodes of frozen teats or other damage or mastitis outbreaks?

When is concern justified?

If the herd average or bulk tank SCC is over 200,000
Especially if this is over 400,000 or if less than 70% of cows are in the 0-4 linear score category
If there is a trend to higher SCC (even if the SCC is still low)
(Some producers don't get concerned until the milk exceeds the 750,000 limit and the processor is threatening that their milk will have to be dumped.)

3. Milking Equipment

Is it serviced regularly (every 3-6 months depending on use level)?
How long since it was serviced by the owner? By the serviceman?
How long since it was evaluated? By whom?
Age of vacuum pump?
Cleanliness of milking claws?
Condition of rubberware and milk hoses (cracks, holes)?

Are rocks and weights used to position the claw?
How often are inflations changed? Is that recorded someplace?
What is the vacuum gauge pressure at milking? How old is the gauge?

4. Milking Procedures (get manager's description but may have to observe also)
   How are cows prepped for milking?
   Cleanliness of dip cups?
   Are high pressure water drop hoses available? How often are they used?
   Are there automatic take-off units? How long since they were serviced?
   How many fall-offs during milking?
   How many squawks during milking?
   Teat end condition? Any special problems?
   Are gloves worn for milking?
   Do the teats require lots of cleaning to get ready for milking?

5. Mastitis
   How many cows with mastitis are in the sick-pen?
   Are treated cows banded and left in the milking string?
   Has mastitis increased recently or seasonally?
   Is it perceived as a problem?
   What patterns of mastitis are seen (chronic, acute, etc.)?
   What treatments are used for different patterns?
   Have milk cultures been done to determine the cause?
   What organisms have been identified?
   Is a coliform vaccine used? What kind? How often? When?
   Review the milk withholding plan and safeguards.

6. Lactating Cows
   Lying / standing - why?
   Pen divisions?
   Body condition?
   Manure on rear legs? Udder? Teats?
   Have udders been flamed? When?
   Teat end condition or problems?
   Dry quarters (2-3 quarter cows)?
   Are cows in pen banded / marked for milk withdrawal?
   Are they fed a vitamin E and selenium supplement in ration?

7. Corrals for lactating cows
   What type: open lot? Loafing shed? Free stalls?
   Manure cleanliness / management?
   Bedding in open shed Mounds to lie on in open corral?
   Free stall condition and maintenance? Bedding used ?
   Use of free stalls? % lying down?
   Manure and wet at rear of free stall (where the udder lies)?
   Cow comfort?
   Cement pad at manger and alleys?

Puddles? At water trough?
What will happen at the wettest season?
Feeding practices?
Condition of feedbunk? Cleaned?
Feed present? Moldy?

8. Dry cow pens / lots and cows
    Type of pen / corral?
    Are there far-off and close-up groups?
    Manure management?
    Puddles? At water trough?
    Body condition?
    Manure on rear quarters and udder? Slight, moderate, bad? % -------
    What will happen in wettest season?
    Feed quality?
    Vitamin E and selenium supplement?
    Feed bunk management?
    Antibiotic infusion of quarters at dry off?

9. Maternity (freshening) pens
    Manure cleanliness?
    When cleaned?
    Wetness / puddles? In wet season?
    How long are cows kept there?
    Consider use of dry / fresh cow screening program (with CMT)

B. Sample Collection
    For acute mastitis problem - have manager collect quarter samples before treating and freeze, then send 6-10 at a time for culture
    From cows with high SCC on DHI (or cows with recurrent mastitis)
        Run CMT and collect samples from positive quarters
        Can collect a composite sample
        Usually collect 6-10 samples (50% will be negative)
    Bulk Tank sample
        Of value, especially for monitoring but need specific guide in using.
        Contact Dr. Allan Britten, Udder Health Systems, 303-398-1360
        (See References #7 and #8)

C. Determine the most likely cause(s) of the problem and evaluate the economics in this specific herd.

1. Economics
    Calculate the loss due to elevated SCC, using the table below and then the formula which follows it.
    If possible, also calculate the loss due to lack of premiums paid.
    Understanding the monetary loss should help motivate the manager to stay with an outlined program.

2. Table

Estimated differences in lactation milk yield associated with an increase in the SCC score.

Lactation Average Linear SCC Score	Lactation Average SCC (1000s/ml)	Difference in Milk Yield[1]	
		Lactation I	Lactation ≥ 2
		(lbs/305 Days)	
0	12.5	—	—
1	25	—	—
2	50	—	—
3	100	–200	–400
4	200	–400	–800
5	400	–600	–1200
6	800	–800	–1600
7	1600	--1000	–2000

[1]Comparisons are with lactation yield at a SCC score of 2.

-*Current concepts of Bovine Mastitis, NMC, 4th ed., 1996, pg. 6*

3. Production Losses

Loss for heifers = Pounds lost X number of heifers X milk price = $

Loss for cows = Pounds lost X number of cows X milk price = $

Total loss/yr ----------

4. Identify the cause / problem (or combinations) for this specific dairy

Obtain culture results
Review farm info and major categories
Review literature and consult with others if needed
Decide what is the most likely cause
Prioritize recommended changes to begin correction of the problem
Develop a plan and goals for implementation and monitoring

E. Meet with owner and prioritize management changes needed

Evaluate costs and potential benefits with owner
Itemize steps of plan
Set realistic goals for implementing
Plan for monitoring of implementation and achievement of SCC goals
Encourage the producer in the program and help him stay focused
Establish treatment protocols

F. Monitor (review) monthly

Records: BT and cow SCC, culture results from clinical cases, production
Clinical mastitis and treatment log; other diseases;
Nutrition program and rations
Claws and rubberware; pulsators, sanitation

Corrals
Cows
Feedbunks
Prioritized lists and progress toward goals
Update plans and procedures as needed
Educate producer and employees on another point of program
Encourage all involved

CATEGORIZATION OF HERD PROBLEMS

Herd problems tend to fall into these general categories:

A. High herd SCC (over 400,000) for several months, but now it is a threat to shipment of milk.
Usually Staph aureus (could be Strep ag but these cases are rare now).
A problem with a contagious mastitis organism that was present at a significant level but then escalated rapidly and dramatically after an incidence of teat lesions or machine malfunction, etc.
Diagnose by culture of milk samples from individual cows (quarters preferred).
(See References # 3B, 4 and 5.)

B. A high SCC (350-550,000), which varies up and down through the year.
1. Could be a contagious form (like Staph aureus) that hasn't "blown up" yet.
2. Environmental Strep and Staph species organisms involved.
Related to dirty / wet environment (especially the bedding in dry pen, maternity stall and free stalls or
Wet milking (magic water at top of inflation).
Can be seasonal - and appear after a lag time following a wet season.
Free stall problem with wet / manure can occur even when the weather is very dry because the back of the stall is wet.
Even in cold weather, the manure and bedding pack may stay warm and protect the bacterial growth from the cold.
Correct the wet and/or "dirty" problem.
Reduce squawks during milking.
Be sure they shut off the vacuum to the claw before removing after milking.
Consider use of the CMT to screen dry and fresh cows. (See Reference #9.)
(See Reference 3D also.)

3. Pseudomonas mastitis
From the water system or teat dip
Some cows may die
They don't recover from mastitis
Can become similar to contagious mastitis (A)
Culture water (from several sites) and teat dip and cups
Clean up dip cups
Increase water temperature at water heater to 160
Insure that a proper level of disinfectant is being put into water
Flush water through drop hoses for 20 seconds prior to beginning milking

C. Acute coliform cases

The SCC is irrelevant (and usually not elevated)
Involves wet bedding / corral areas or wet milking
Liner squawks at milking and not shutting off vacuum prior to claw removal contributes
Identify on basis of history and cultures of acute mastitis samples
(See Reference #3C, #4 and #6)

D. Sudden herd outbreak

Have often recently purchased animals (cows)
Rapid decrease in production of those affected
Milk is watery with “rice” or “sawdust” in it
Often affects more than one quarter
Slight if any fever
No response to antibiotic
Cows eat and act okay
Will cause an increase in SCC in bulk tank if enough herd involvement
Rapid spread to other cows
Mycoplasma (Requires special culture media for isolation)
(See Reference # 3E.)

E. Mastitis in recently fresh heifers

If it occurs sporadically, it could be any of usual mastitis organisms
If it is a herd problem, consider the possibility of Staph aureus (culture milk samples)
Calves nursing on each other and group feeding of milk
Fly problem - horn flies bite teat end, then go to others and transfer organisms
Small percent (up to 4%) freshen with Staph aureus infection (identify, separate and cull
(See Reference # 3F.)

REFERENCES

1. Plan to Reduce and Control SCC on (Dairy) (Date)
2. Major Causes of Mastitis (Elevated SCC): Characteristic Signs, History and Correction Plan
3. Characteristics and Control of Mastitis
4. Recommended Milking Procedures
5. Staph Mastitis: Herd Control Program
6. Controlling Coliform Mastitis
7. Using Bulk Tank Milk Cultures in a Dairy Practice
8. Sample Milk Lines with Needle
9. Fresh Cow CMT Screening
10. Troubleshooting a High SCC
11. Milking Management (Cow Preparation)
12. Teat Dips
13. Here’s the Latest on Vitamin E and Selenium

Reference #1:

Plan to Reduce and Control SCC on _____ _____
Dairy Date

(Note: major progress usually takes several months and will require consistent application of procedures.)

Prioritized changes:

1.

2.

3.

4.

5.

Specific, detailed instructions:

Reference #2: Major Causes of Mastitis (Elevated Scc): Characteristic Signs, History and Correction Plan

TYPE OF BACTERIA	SOURCE	MEANS OF SPREAD
Staphylococcus (coagulase +) aureus, hyicus	Infected udders, teat lesions, udder skin, etc.	Cow to cow by contaminated udder wash rags, teat cups, hands, etc.
Staphylococcus, spp. (coagulase -) epidermidis, micrococcus, etc.	Normal inhabitant of udder skin.	Poor udder preparation, milking wet udders and teats.
Streptococcus agalactiae (causes high somatic cell counts)	Infected udders.	Cow to cow by contaminated udder wash rags, teat cups, hands, etc.
Streptococcus non-ags *uberis, faecalis, dysgalactiae*	Numerous location on the cow: hair, lips, vagina, feces, bedding, muddy lots, etc.	Environment to cow by wet, dirty lots and bedding, milking wet teats, poor udder preparation.
Corynebacterium bovis	Teat canal.	Inhabits the teat canal. Appears in tank milk when cows are not pre-stripped.
Coliforms *Escherichia coli, Klebsiella, etc.*	Manure, bedding, especially sawdust.	Same as *Strep.* non-ags.
Arcanobacterium pyogenes	Moist environment, cracked liners, water hoses, refrigerators, drug contamination.	Common sequel to lacerated teat sphincter. Carried by flies.
Mycoplasma bovis, californicum	Infected cows, udder shedders, nasal and possible vaginal secretions in calves and older heifers.	Infusion procedures in dry and lactating cow; cow-to-cow spread via milking machine and hands.
Nocardia	Soil initially, secondarily contaminated treatment materials, hands and sponges.	Contamination of syringes and cannulas in infusion; secondarily by hands.
Protheca	Water, feces, flies, rotted materials, contaminated drugs.	Originates in environment and initially spread by contamination in infusion. Becomes contagious cow-to-cow as it gains momentum.
Miscellaneous Bacillus, Pseudomonas, etc.	Hoses, dirty water, milk, manure, bedding, etc.	Same as *Strep.* non-ags.

–*Bovine Veterinarians*/September 1998, page 9.

Reference #3: Characteristics and Control of Mastitis

A. Streptococcus agalactia (Strep Ag)
   1. Contagious but short-lived outside of udder
   2. Most likely to cause unacceptable bacterial counts in milk
   3. Eradication from herd is possible (is penicillin sensitive)
   4. Plan for Correction
      a. Improve milking procedures, including the wearing of rubber gloves.
      b. Clean up and sanitize the barn and milking units.
      c. Cull all cows that are not worth a special effort.
      d. Dry off those that are in late lactation and dry treat them with a penicillin product. (Treat all dry cows, if not done previously).
      e. Treat all the remaining lactating cows, under the direction of your veterinarian with a penicillin product. Observe proper withdrawal times and consult with your processor beforehand so specific tests can be performed before you begin marketing the milk again.

         or

         culture and treat all positive cows, improve milking hygiene to reduce spread and plan for any infected cows missed to eventually be cleared by dry-cow treatment.
      f. The goal is to eradicate this organism from the herd.
      g. Monitor with bulk tank culture or whole herd DHI / CMT and culture of those testing 2 or 3:
      h. Dry cow treatment

B. Staphylococcus aureus

   The genus contains over 20 species. Hemolysis or lack of it, is no longer part of the classification system.
   1. Epidemiology / Pathogenesis
      a. Contagious (udder to udder, mainly during milking)
      b. A leading cause of mastitis; > 80% of herds have positive cows; expect 4% of heifers to freshen with it (other reservoirs of mastitis milk, flies or mixing with dry cows)
      c. Frequently subclinical and undetected
      d. Some infected cows have a low SCC; SCC climbs slowly, so it is widespread before recognized; if in udder > 4 weeks, it locks in and can't get out - often there several months before see signs;
      e. Poor response to treatment and often recurs; dry-cow therapy is not very effective. Some response if treated early (detect with forstrip and CMT). Mass (herd) treatment is of no value.
      f. A major cause of high SCC in herds
      g. Prolonged exposure to teat dips did not alter susceptibility
      h. Usually a low level present in a herd or introduced and just stays at a low level until there is a break in sanitation or an equipment malfunction and then it spreads to a high number of cows in a few weeks (this is especially true with frozen teat ends or other teat lesions.
   2. Diagnosis as herd problem
      DHI list of high SCC cows (or CMT or recurrent cows)
      CMT

Quarter cultures on affected or all quarters, looking especially for Staph aureus

3. Plan for control
   Stop (greatly reduce) the spread to non-infected cows
   Cull the infected cows as soon as possible
   Avoid purchase of infected adult cows
   Improve milking hygiene, including wearing of rubber gloves.
4. Stopping the transmission
   a. Separate into clean and infected herds if at all possible. Or, by some means, alter the milking order. Use a milking order of heifers, clean herd, newly calved, and last, the infected herd. Cull all infected cows that are not worth a special effort. The infected herd often has a high cull rate due to reproductive problems. Keep the infected herd separate until they are eventually culled from the herd. (Cornell study on segregation or milking with separate units was of significant and important benefit with 78 herds. Reduced 30% to 16% vs no change in non-segregated.)
   b. Identify Staph infected cows (after identifying it as a predominant organism in the herd) by:
      Take quarter samples (or composite) on all cows and culture for Staph aureus. Repeat monthly on the clean herd (for at least 2 more tests) until no more positive cultures are found. Test all dry cows and heifers at 4 days post calving. Also, culture all clinical mastitis cases in the clean herd

      Some have separated based on high SCC (DHI) or by palpation of the udder for fibrous tissue, after milkout. Both of these will miss more infected cows than does herd culture.

      A backflush system (even manual) will reduce exposure of uninfected cows (25 ppm iodophore, 100 ppm chlorine or hot water, > 150°).

   c. Clean up and sanitize barn and milking units

   d. Monitor status of the clean herd with monthly cultures of the bulk tank milk from the clean herd. Continue further testing if a positive culture is found.

   e. Identify and treat clinical cases early through use of the strip cup and CMT. Culture prior to treatment and separate those that are Staph positive.

      (If herd separation is not possible, the positive cows could still be identified by one of the methods in #9 and then preferentially culled. This may require testing for a longer period and will require even further improved milking hygiene.)

   f. Post milking teat dip - is critical. Use a product that has been shown effective against Staph aureus

   g. Early treatment may be of benefit. Use a stripcup and the CMT to identify early quarter infections and then treat promptly. However, some will not show signs of infection until the agent is walled off and protected from treatments.

h. Dry treat all quarters of all cows. May not help in Staph cure but is very important to prevent other forms of mastitis.

i. Monitor herd status (SCC; bulk tank culture of clean herd, monthly)

j. Supplementation with Vitamin E / Selenium may be helpful in prevention or recovery.

C. Coliform (E. coli, Klebsiella, etc.)

1. Often peracute (8-10%) with 80-90% evident as clinical cases; 10% die, 20% recover and 70% are eventually culled with decreased milk production. There are some chronic infections (13% last > 100 days), but these are usually an organism other than E. coli.
2. Usually < 1% of quarters are infected at one time, but it may cause 30-40% of the clinical mastitis in a herd.
3. It is usually associated with wet milking or wet bedding.
4. It is not contagious, but is an environmental pathogen.
5. Signs: Elevated temperature early, later it's depressed.
   Transient leukopenia
   Shivering, loss of appetite
   Dysgalactia; hard, swollen quarter (or none to moderate)
   Increased SCC and CMT
   Milk watery or like blood sera with clots or flakes
6. The highest incidence occurs during the first 3 months of lactation, during the summer in those continuously housed and in the rainy season (winter) for California. Expect more during periods of numerous calvings. The peracute cases tend to occur in older cows, early lactation during persistently hot and humid weather. Highest incidence in confined and lowest in pastured. Hot weather and thunderstorms tend to cause an increase as do crowding and poor ventilation. Caution when there is a damp humid environment with warm temperatures.
7. Early in the dry period the cows are able to eradicate it from themselves and dry-cow treatment probably doesn't help. If infected later (at 1 month prior to calving) many become chronically infected and then flare up to the acute and peracute stage at calving or within 2 weeks after. This may account for 50% of coliform problem. Caution about environmental sanitation during the dry period. Must eliminate all puddles and water in the dry and maternity pens. May consider infusion of a lactation product just prior to freshening in old cows and easy milkers but must be cautious for antibiotic residues.
8. Ineffective
   a. Germicidal teat dips (Barrier dips help prevent new infections, but are less effective on other bacteria.)
   b. Lactation therapy
   c. Backflushing
9. Monitor herd by records of new clinical cases and the culture of clinical quarters. Keep culture tubes available to sample clinical quarters and freeze, then have cultured periodically.
   Can't monitor with: bulk tank SCC, cow SCC, bulk tank culture, or culture of a "sample" of cows.

10. Culture with 0.01 ml of milk on esculin agar and 0.1 ml on ½ plate of McConkey agar to facilitate diagnosis. There are frequently <100 CFU on esculin..
11. The incidence correlates with coliform counts in the bedding. If over 1 million/g, there is an increased risk. In fine chopped types of bedding there are often > 100 million/g.. With clean, long straw, it is usually < 1 million/g, but this may also result in greater problems with environmental Strep organisms. New bedding may be low in count, but in 24 hours this can increase to very high. The appearance is not a good indicator as it is often higher in "clean" sawdust than in heavily soiled. Composted manure is probably no better than fresh. Use inorganic bedding (sand or crushed limestone) especially in summer and fall. Or, clean out the posterior 1/3 of the freestall daily and replace. Avoid hollowed out freestalls.
    Keep the herd environment clean and dry for both the lactating and dry cows. Keep cows away from farm ponds and muddy exercise lots.
12. Liner slips cause reverse teat impacts and increase coliform infections. Removal of teat cups without first shutting off the vacuum has the same effect.
13. Wet milking must be eliminated. (Clip or flame udders on cows; stop using drop hose)
14. Predipping may reduce by 50%, especially if there is poor milking machine function or dirty teats. (Wash teats, dry, pre-dip, 30 sec. contact, blot dry, and milk).
15. Correction Plan
    a. Almost always associated with wed bedding or with the milking of wet cows.Correct and continue to monitor these via management at least 2-3 times per week. Eliminate Wet milking (clip hair from udders). Bedding.
    b. Predipping
    c. Dry cow environment (eliminate all puddles and wetness).
    d. Control liner slip (squawking) and shut off vacuum prior to removal
    e. Vaccinate for coliform mastitis - quite effective

D. Environmental Strep (S. Uberus and S. dysgalactia) and Staph species
1. Signs
    Clotted or flaky milk with moderate swelling.
    Seldom any systemic signs.
2. Occurs more in older cows; 40% recover spontaneously. For length of infection, 60% are present < 30 days; 22% intermediate and 18% become chronic and persist > 100 days. The percent of infected quarters is low when compared the contagious forms (seldom > 10%). S. uberus can behave much like a contagious form of mastitis.
3. Culture
    a. Can reliably culture with 0.01 ml of milk on esculin blood agar. Expect >100 CFU from infected quarters. Must clean the teat end carefully to avoid contaminated samples.
    b. Confirm by isolation from duplicate samples or from 2 of 3 samples.
    c. Composite samples are more often contaminated and dilution may reduce recovery. Use CMT and sample specific quarters.
4. Herd Monitoring
    a. Culture fresh cows, cows going dry and clinical quarters.
    b. The bulk tank SCC, bacterial count or culture can't be used to reliably assess herd status. (These organisms do cause an elevated SCC in the bulk tank.)

5. The bedding may influence incidence. Long straw may favor environmental Strep while fine chopped favors Coliform. The number of organisms in the bedding has not been correlated with infection, as it has for coliform. The herd environment must be kept clean and dry for lactating and dry cows.
6. There are more new infections during the dry period and especially during the first and last 2 weeks. Dry cow therapy is of good benefit early, but of none later and there was no benefit from reinfusion.
7. Lactation therapy is <u>less</u> effective than for Strep ag, with cure rates of 50 - 60%
8. Germicidal teat dips are of benefit.
9. Backflushing does <u>not</u> control.
10. Liner slips (squawking) result in teat impacts and an increased incidence.
11. Wet milking must be eliminated (clip / flame hair from udder).
12. Predipping will reduce by 50% (see Coliform).
13. Correction Plan
    a. Improve milking hygiene
    b. Eliminate wet milking (clip / flame hair from udders)
    c. Bedding
    d. Dry cow treatment
    e. Early treatment of clinical quarters
    f. Teat dip
    g. Liner slips
    h. Predipping

E. Mycoplasma
1. Signs
    a. Watery milk with “rice” or “sawdust” in it, but may become purulent or serious.
    b. Usually affects more than one quarter; spreads to other quarters of same cow.
    c. Severe (25 - 30%) decrease in milk production and some cease lactation.
    d. Doesn’t respond to antibiotics.
    e. Only slight increase in temperature.
    f. Cow eats and acts alright
    g. Will cause an increase in SCC and in BTSCC if sufficient cow numbers involved
2. Sudden, <u>herd</u> outbreak. Have often purchased cows from other herds. A much higher risk (15X) in large (>350) cow herds.
3. Culture (Special media and request)
    a. Composite from purchased cow(s)
    b. Bulk tank
    c. Samples fresh and cool or keep frozen
4. Eradication - whole herd culture and cull all carriers; repeat until clean.
5. Culture, segregate and live with it. Improve milking hygiene and careful in udder treatments.
6. Correction Plan
    a. Improve milking hygiene, including wearing of rubber gloves.
    b. Clean up and sanitize barn and milking units.
    c. Cull all cows that are not worth a special effort.
    d. Run whole herd culture (using composite samples) to identify and cull all infected cows. Continue to re-culture cows with a high SCC or clinical mastitis. Monitor the

herd monthly via culture of the bulk tank, for at least 6 months after the last case was found.

F. Heifer Mastitis
   a. Pasteurized milk is preferred for feeding.
   b. Don't feed milk to calves in group pens as this encourages nursing.
   c. Heifer infection - use barbed nose rings to reduce nursing on each other.. (Feeding mastitic milk causes infection of tonsils, but supposedly not of udder).
   d. Observe for nursing, but also for wet hair and enlarged udders.
   e. Careful with: housing, sanitation and fly control. (Flies are a major means of spread in southern U.S., especially horn flies biting teat ends.) 4% of heifers freshen with Staph mastitis.

Reference #4: Recommended Milking Procedures

http://www.nmconline.org/milkprd.htm

(See following two pages.)

Udder Prep Routine Without Water Effective in Reducing Mastitis

Call it "one step" udder prep. Or waterless udder prep. Or waterless milking. Whatever the name, an udder prep routine without water is finding favor among an increasing number of dairy producers and dairy practitioners.

The reason: Better mastitis control and lower somatic cell counts.

Testimonials from dairy producers using waterless udder prep and accumulated data from formal studies show that the elimination of water from the udder prep, or pre-milking routine, pays dividends:

- greater throughput in the milking parlor;
- standardized milking procedure; and
- the control of mastitis-causing pathogens.

More effective cleaning of the teat, especially the teat end:

- facilitated milk let-down; and
- provided a more standardized udder prep routine to remove variation from milker to milker all figure importantly in the "waterless" or "one-step" udder prep procedure.

Basically, the routine is as follows:

—When the cow is presented for milking, the teats are predipped or sprayed with sanitizing teat dip.

—With a gloved hand, sides of the teat are rubbed with a vertical motion, and thumb/forefinger movement across the teat end cleans and encourages milk let-down.

—Quarters are forestripped and checked for mastitis.

—Teats are re-dipped.

—After 15 to 30 seconds, teats are wiped dry.

—Milker unit is attached.

With extremely dirty teats, the predipping, loosening, rubbing steps may be performed twice.

Following are comments from Dr. Jeff Reneau, extension dairy practitioner, University of Minnesota, Dr. Andy Johnson, dairy practitioner and consultant, Seymour, Wisconsin, and Dr. Ralph Farnsworth, University of Minnesota.

Dr. Jeff Reneau:

"Field studies in Minnesota indicated that 80% of herds experiencing either high somatic cell count or high levels of mastitis do not follow recommended milking procedure. Approximately 3 to 4 years ago it became apparent to us that if an 'ideal' pre-milking cow prep procedure could be developed which could be practically applied on dairies, great advances could be made in milk quality, udder health, and milking efficiency."

"Milking procedure is often a sensitive matter. No one likes to be told that his/her personal milking habits are wrong or bad. Yet everyone is intrigued by something new and if it is both practical and effective they are usually willing to give it a try."

"The 'One-Step Cow Prep' was developed with this in mind. After testing the procedure to be sure that it was effective, we began recommending the 'One-Step Cow Prep' procedure in those herds where it could be applied effectively. The success was very encouraging."

"Obviously the 'One-Step' procedure involves more than a single step. The title 'One-Step' was meant to convey the fact that washing and predipping were combined into a single step, the predip being used as the wash solution."

"The procedure is ideal for milking parlors but will also work in a stall barn. Done correctly, the procedure eliminates water use, removes all dirt and debris from the teat surfaces, assures complete teat coverage with predip, maximizes milk let-down response, contributing to improved milking efficiency."

"Equally importantly is the fact that this technique standardizes the pre-milking cow prep procedure. Every milker is doing the same procedure for every milking during a cow's lactation. Data from Denmark documented a 5% production increase where a standardized milking procedure was used."

Dr. Andy Johnson:

"I have found that whether you are milking 20,000 cows, 2,000 cows or 10 cows, the waterless udder prep technique works very well if it is done correctly."

"Water is our biggest enemy in mastitis control. Eliminate water, and you eliminate our biggest problem."

"I have California dairies that have shut off their wash pens and reduced their incidence of coliform mastitis significantly. I have stanchion barns in Wisconsin dairies seeing big drops in somatic cell counts."

"To be effective, you have to keep the waterless udder prep technique simple so everyone will use it. What I say is: Strip, dip, dry, and apply."

"There are four absolutely key factors: (1) use an approved, effective predip; (2) make sure 75% of the teat is covered with predip; (3) leave the predip on 15 to 30 seconds; and (4) make sure the predip is properly wiped off."

"Follow the procedure religiously, and you will get the maximum benefits from it."

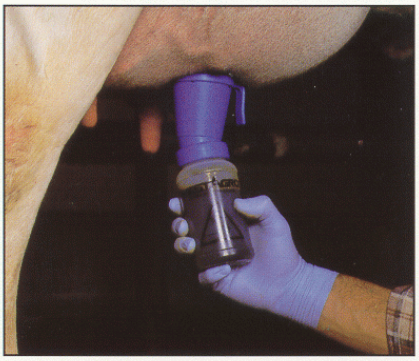
Dr. Ralph Farnsworth:

"As we have seen the waterless prep system used, there has been a tendency for some to try a shortcut of one type or another, but the system does not lend itself to a lot of modifications. I would caution those using the system to follow it, and not to attempt changes that violate the basic principles."

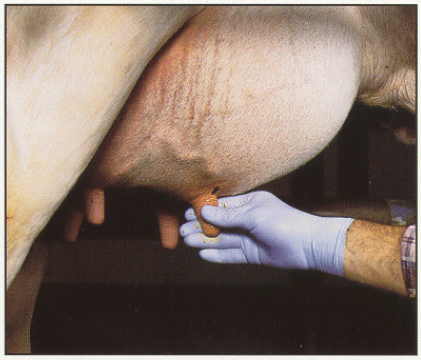
"You cannot shorten the contact time of the sanitizing teat dip. You have to make sure you get good coverage of teats, whether you spray or dip. And you have to follow the rubbing procedure carefully. The rubbing action, vertical on the sides of the teat and across the teat end, is absolutely critical. It ensures good coverage of the teat dip, and it stimulates proper milk letdown."

"Of course, you should realize that the cows need to be somewhat clean to start with. You can't have extremely dirty cows… all caked up with dirt . . . and expect this system to work."

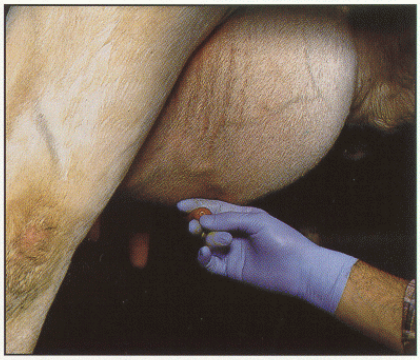
Waterless Udder Prep



Predip each teat, covering ⅔ of teat surface

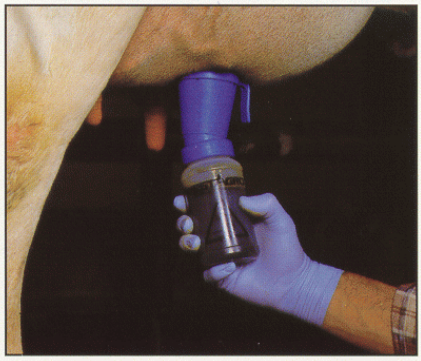


Vigorously rub sides of teats with vertical hand/finger motion



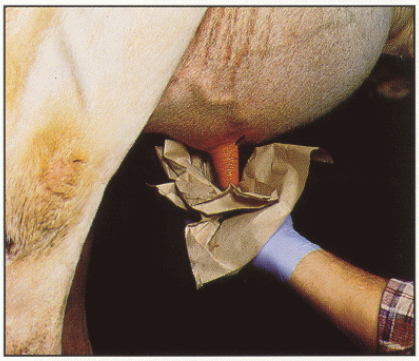
Rub across teat end with thumb and forefinger

Forestrip each quarter

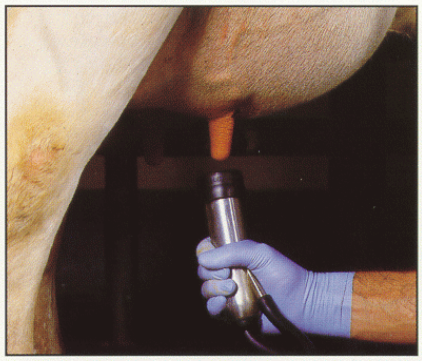


Re-dip

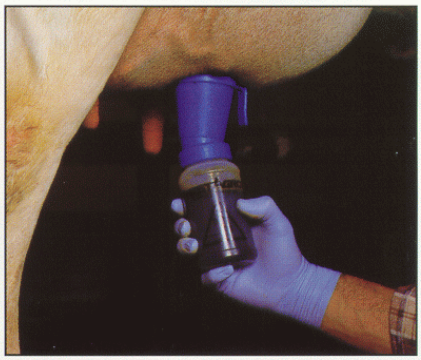
Allow 15 to 30 seconds contact time



Wipe dry with single service towel



Attach milker



Postdip

Gloves Essential in Waterless Udder Prep

It has been established that one of the main causes of the spread of mastitis is the milkers' hands. And, with the one-step or waterless udder prep technique gloves are essential. The sanitizing predip is being used to clean the teats (sides and teat end).

Extremely Dirty Teats

For extremely dirty teats, it is recommended that the predip and cleansing steps be repeated, with the second application of sanitizing predip allowed to remain the necessary 15–30 seconds.

Products Available

The following products are available from your independent West Agro dealer, to increase the performance results of waterless udder preparation.

West Agro
- Non-Return Dip Cup
- Dip Cup Filler Gun
- Spray Gun
- Trigger Sprayer
- Paper Towels

Cloverfield™ Brand
- Nitrile or Latex Dairy Gloves
- Cloth Towels
- Clippers
- Strip Cup

Reference #5: Staph Mastitis: Herd Control Program

http://www.ext.usu.edu/publica/agpubs/ah/dairy03.pdf

Reference #6: Controlling Coliform Mastitis

http://www.ext.usu.edu/publica/agpubs/ah/dairy01.pdf

Reference #7: Using Bulk Tank Milk Cultures in a Dairy Practice

http://www.nmconline.org/bulktank.htm

Reference #8: Sample Milk Lines with Needle

To make it easier to sample milk from a specific group of cows, use a 20-gauge bleeding needle and a Whirl-Pak bag. Select a site by a joint in the milk line; insert the bleeding needle through the gasket and into the milk line; snip a small hole in the protector that covers the "tube" end of the needle (large or small depending on how fast you want the drip to be); then suspend a Whirl-Pak bag to collect the drops of milk. When a sufficient sample has been collected or when the group is finished, remove the needle, close the Whirl-Pak and submit it for culture. This technique provides a means to:

Compare milking technique of different shifts of milkers.
Monitor pathogens for different groups of cows.
Test group composite samples for SCC's and milk components.
Investigate sections of the milkline for bacteria problems.
Provide a more sensitive and specific means of testing than a bulk tank sample.

(Tip from Dr. Mark Wustenberg, Kilchis Dairy Herd Services, Bay City, Oregon)

Reference #9: Fresh Cow CMT Screening

The goal is to identify cows which recently became infected, near freshening, to minimize the damage done. The CMT along with temperature monitoring are the best techniques available to monitor these cows during this high risk period.

The CMT can be used reliably on fresh colostrum..... The colostrum is quite thick. Only true 3's are cause for alarm on fresh cow secretions... There is no advantage to re-treating quarters that were treated at dry off. Records will help distinguish recent from old infections. Temperature monitoring should be done during this same critical three day period right after calving. . Uterine and udder infections are both common causes of fever so use the CMT to help you decide the cause of a fever.

Some of these infections are coliforms and will not respond to treatment. But a high percentage of the subclinical strep and staph infections will respond. If they are not treated, many of these infected quarters will have high cell counts and / or clinical episodes during the first 100 days of lactation. Dairies that use this screening program will see lower SCC, raw counts and less clinical mastitis.

Form for Dry Cow Screening (using CMT)

Dry Date	Cow ID	Dry Off LH	LF	RH	RF	Fresh LH	LF	RH	RR	Comments	Fresh Date

--Dr. Allan Britten, Udder Health Systems, 360-398-1360

Reference #10 : Troubleshooting a High SCC

http://www.ext.usu.edu/ag/dairy/newsletter/scc.htm

Reference #11: Milking Management (Cow Preparation)

Proper milk harvest is a critically important part of the production process. The manager must set the proper example anytime they are personally involved in the process and in their attitude toward it. They must also monitor the procedures regularly to insure consistency with proper technique. It is essential that workers have the supplies and equipment needed and have a comfortable, safe environment in which to work.

A videotape was recently produced here at USU, titled "The Milking School." It contains both English and Spanish language versions (30 and 33 minutes). The videotape is focused on teaching novice personnel how to milk cows. There is a brief overview of milking equipment and a small segment on handling cows. Most of the information is on the step by step procedure of cow preparation and management of the milking equipment on the cow. The goal was to avoid "talking heads" and show the cows, equipment, workers and very specific steps - and to make it available in Spanish as well as English. A copy of the videotape (includes both versions) may be obtained by sending $25, (checks made payable to Utah State University) along with a note of request and a mailing address to:
Dr. Clell Bagley
5600 Old Main Hill
Utah State University
Logan, UT 84322-5600

The price includes shipping and handling. For larger volume orders, there is a reduced price (over 5 = $22.50 each; over 10 = $20 each).

If more detailed information is needed on equipment, mastitis and several other aspects of milking, a computer / internet version (also titled "The Milking School") is also available at:
http://www.ext.usu.edu/ag/mschool
or at
http://www.ext.usu.edu/ag/ah/ (and then select "The Milking School")

Reference #12: Teat Dips

Must be approved by FDA or they are illegal to use

Protocols for testing have been established by the National Mastitis Council; revised the A, B, C system in 1997 (see new protocol at NMC website)

A list of products that have been tested appears in each NMC proceedings (1998 current)

Some producers want to use diluted Clorox, etc; inspectors won't allow if know of it

Acceptable iodine level in milk is <500 ug/l (ppb)

Other products have a zero tolerance

Iodine level: the free iodine is much more important in efficacy than is available Iodine

Don't add more glycerine to dips; it may break down to gluteraldehyde and glucose and provide energy for bacterial growth

Cold weather - post dipping

When below 10 degrees, dip, leave on 30 seconds and blot teat end before turning out. If don't dip a drop of milk can also be left there and cause frozen teat.

Frozen dips

This may result in precipitation of active ingredients and cause the solution to be dilute and ineffective at the top and concentrated and irritating at the lower levels. Check with manufacturer for recommendations. If okay, thaw, mix thoroughly and then prevent it from re-freezing.

Visual appraisal of teat skin condition - it influences milking speed and susceptibility to mastitis

See NMC information at: http://www.nmconline.org/dipfacts.htm
http://www.nmconline.org/teatdip.htm

Reference #13: Vitamin and Mineral Supplementation

Much has been learned about minerals and feeding dairy cows in recent years but much is still unknown. The essential elements / minerals need to be present in the ration and in proper (balanced) amounts. However, dairymen have often spent far more money on this type of nutrient than was needed, hoping for a wondrous result, rather than correcting some of the other problems present. Ask questions of the person doing the nutrition work for you and educate yourself so you know what is reasonable. Don't be afraid to ask another qualified nutritionist for a second opinion when the costs seem too high. Know what you are buying and why. Monitor for results. Vitamin E and selenium are especially important for the immune system and for udder health.

Vitamin A 1800 IU/# DM (54# x 1800 = 97,200 IU)
Beta-carotene 100 mg/day for young and dry; 300 mg/day for lactation
Deficiency affects ovarian function and EED
Vitamin D 450 IU /# DM (54 x 450 = 24,300 IU/day)
Vitamin E 7 IU/# DM (54# x 7 = 378 IU) (Recommend 500 in lactation)
Selenium 0.3 ppm/# (max allow) (54# x 454,000 mg/# x .00003 = 7.4mg)
(If adequate blood levels of Se can't be reached, it may be of benefit to increase Vitamin E from 1000 IU to 3000 IU during dry period)
Niacin - 6 gm/day from 2 weeks before calving until peak
Zinc / methionine for hooves
Feed trace mineralized salt at 1 oz maintenance + 1 oz/30# milk
Heat stress - K @ 1.5%; Na @ 0.5%; Mg @ 0.35%