

# Good Milking Management

Proper milking procedure efficiently uses labor and maintains udder health while obtaining the available milk. The old rule of prepping a cow for at least 20-30 seconds and applying the teat cups within 1 minute after initiating prepping are still good goals. However, variation from these guidelines to accommodate different milking systems can occur without decreasing milking effectiveness in modern high producing cows as long as the routine is fairly consistent. Regardless of the routine used, it is important to be consistent in an orderly and calm fashion.

The first step in good milking management is to provide an environment for the cows so that their udders and teats remain relatively clean at all times. Stalls and walkways need to be maintained. Udder hair should be clipped or singed on a routine basis. If cows are kept clean, water can be eliminated from the cow prep routine.

The following cow prep routine was developed at the University of Minnesota and was shown to reduce bacteria counts and reduce milking machine on time compared to more traditional methods:

1. Teats are pre-dipped or pre-dip spray is used (*Figure 1*). Three vertical motions up and down the teat and a couple of motions across the teat end are made with the milker's hand. This removes dirt, gets teat dip into the crevices of the teat and stimulates milk letdown. For sanitation reasons, it is preferable for the milker to wear plastic gloves.



*Figure 1*

2. Two streams of foremilk are removed from each quarter. This step aids in detection of clinical mastitis, flushes bacteria from the teat canal, further promotes milk letdown, increases milk output and speeds milking time. In

parlors, the stream of milk may be directed onto a black patch on the floor and later washed away. Strip cups must be used in stall barns (*Figure 2*). Make sure it is kept clean, as a dirty cup is a perfect haven for bacteria. The disadvantages of fore-stripping include increased labor and a possibility of the development of tendonitis in some workers.



*Figure 2*

3. Re-dip or spray the teat. Allow at least 30 seconds of contact time before Step 4.
4. Wipe off the teat dip with a single-service towel - paper or cloth (*Figure 3*). Attach the milking unit and position the claw to prevent liner slip.



*Figure 3*

The above steps represent an ideal situation and the more religiously they are followed the better the results would be expected. Variations, within reason, can be adopted and still

## Producing Quality Milk

have acceptable results depending upon the circumstances in the herd. However, just pre-dipping grossly dirty teats and then just wiping them off prior to machine attachment is not acceptable. Nor is the use of a common rag or sponge to wash cows, or attaching units to wet or dirty teats.

If automatic detachers are not used, remove the machine when milk flow has stopped, as determined by watching milk flow in the transparent claw or appearance and feel of the udder. Do not pinch the milk tube to detect milk flow. The constriction can force mastitis organisms into the teat. Remove the machine by shutting off the vacuum and then catch the claw as it falls.

Machine stripping, where pressure is applied to the claw in a downward direction and the udder massaged, should not be necessary (*Figure 4*). Today's narrow bore liners and improved liner design minimize teat cup crawl and generally eliminate the need to strip. Use machine stripping only on cows that have problems due to injury, udder shape, mastitis or edema. Routine machine stripping increases labor and milking time without significantly increasing milk yield.



*Figure 4*

The following table gives guidelines as to how long the milking unit should be on the cow:

| Production<br>(lbs/day) | Average Milking Time<br>(minutes/milking) |           |
|-------------------------|---|-----------|
|                         | <u>2x</u>                                 | <u>3x</u> |
| 50                      | 6.5                                       | 5.6       |
| 75                      | 8.0                                       | 6.5       |
| 100                     | 9.4                                       | 7.5       |

If milking times are longer than this, the entire milking procedure should be evaluated to determine the cause.

Completeness of milking can be determined by hand-stripping a random ten cows into a bucket. If the strip averages more than 1 lb. per cow, incomplete milking is occurring. Typically, strip yields should be less than .5 lb. per cow. Incomplete milking can be caused by many different problems. Common causes are: improper vacuum levels, poor type or condition of liners, clusters that are too light or hang unevenly, poor oxytocin stimulation and partial closure of short milk tube due to claw inlet size too large compared to tube size.

Within minutes of machine removal, dip the teats to cover at least the bottom 50% of the teat in an approved teat dip preparation (*Figure 5*). The solution must be clean to be effective. Discard teat dip contaminated with manure or urine, and rinse the cup before dipping the next cow. Discard any teat dip remaining in the cup at the end of milking and wash the applicator regularly.



*Figure 5*

Finally, be as calm and quiet as possible around the cows, especially during milking. When cows are excited or treated roughly, adrenalin from the adrenal gland will suppress the effects of oxytocin and good milk letdown is not achieved.

## Clipping Cows

Clipping excessive hair from cows in late fall and winter serves several purposes. Clipped cows stay cleaner, which reduces prep time. Bulk tank bacteria count and sediment are reduced by up to 50%. Mastitis infection may be decreased because of reduced exposure to pathogens. Clipping is also a good lice control measure.

Equipment needed for clipping a cow includes the clippers, one or two sets of spare blades, a screwdriver for clipper adjustment, diesel fuel or similar lubricant, curry comb and brush (*Figure 1*). You may need a halter or other restraining device as well.

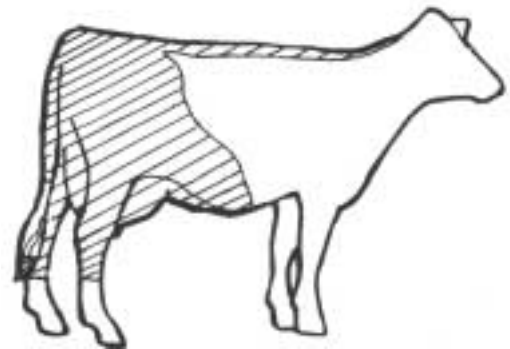


*Figure 1*

The area that needs to be clipped varies with individual cows and the environment they're in. Minimal clipping should include the cow's udder (*Figure 2*), along with the legs and thigh from the hock up to about 12 inches from the tailhead. In most cases it is worthwhile to clip a larger area, if time allows, as illustrated in *Figure 3*.



*Figure 2*



*Figure 3*

If clipping a number of cows, it's best to get a routine down. For example:

- Approach the cow from the side so she sees you, and begin clipping the tail.
- Cut off the switch to within 4 inches of the tailbone, or 1 ft. from the floor. Clip the tail starting a few inches above the switch and continue up over the tailhead.
- Clip the udder against the hair. Use your free hand to pull the folds out of the skin (*Figure 4*).



*Figure 4*

- Clip the legs and thighs and continue up over the rump. The belly should be clipped from the milkwells back.
- Four strokes down the topline to the poll will help prevent lice.

Long-haired springers brought into a warm barn from an outside lot will adjust to the temperature change faster if given a complete body clip.

Calves will also benefit from a small trim job. Clip the tail from the switch to the tailhead, and clip a small patch under

the tail (*Figure 5*). This will prevent manure from accumulating on the tail, which can restrict blood flow. If not removed, these manure balls can result in loss of the tail.



*Figure 5*

Clippers and blades are relatively expensive, but proper care and maintenance will insure a long life:

1. Keep blades sharp. Dull blades irritate the cow, overload the clipper motor and make clipping an unpleasant task.
2. Clean extremely dirty cows before clipping. Plowing through packed manure will dull blades. Sharpen dull blades.
3. Submerge the clipper head into diesel fuel while running, to lubricate the blades and flush out dirt and hair. Do this periodically as you're clipping the cow. The clipper should not run hot. Submersing the clipper head is preferable over using a spray lube.
4. Wipe the hair off the motor screen as you clip.
5. Turn down the tension screw just enough to get the blades to cut. Too much tension will wear blades and overheat the motor. The tension screw might tighten as you clip. Check it periodically to make sure it isn't tighter than need be.
6. If the clipper blades are bumped against a hard surface, teeth can break. Discard and replace blades rather than try to get additional use from them.
7. Maintain the clippers routinely, depending on amount of use. Oil the bearings through the holes in the case. The bearings are wick-fed. Do not remove the wicks. Periodically, add a small amount of grease to the gears inside of the clipper head as needed. Dry gears will make a rattling or clanking sound.

8. Don't store clippers in the barn or other damp area. Clean and oil clippers before storage. Store in a dry, dust-free area with the motor resting higher than the head to prevent oil from seeping back into the motor.

### **Singeing Hair Off the Udder**

A fast, easy way to get the hair off of the udder is to singe it off using a modified propane torch. The air vents need to be blocked and a flange can be placed on the nozzle to broaden the flame (*Figure 6*). The flame should be orange not blue when lit.



*Figure 6*

A wand type torch can be constructed from 36" of heavy duty brake line, some fuel line tubing, hose barbs, and a ball type gas shut-off valve. These materials can be found in hardware and auto stores. Squeeze one end of the brakeline closed and drill 6-8 1/16" holes about 1/2" apart starting at the crimped end. The other end is attached to the gas shut off valve which is attached to the rubber tubing running to a modified torch attachment screwed onto a 14 oz propane bottle. The bottle can then be hung from your belt. The brakeline can be bent to the most convenient shape to singe the udder. Make sure all connections are leak free. Larger herds may wish to use a BBQ sized propane tank rather than the small propane bottle.

The hair is removed around the teats and udder floor by circling the flame around the bottom of the udder. It may take several passes depending on the density of the hair. Keep the hot nozzle away from the teats and keep the flame moving. Keep your hand or stick with a pad on near the udder to rub out the flames if the hair catches on fire. Because some cows may object to this procedure, for added safety and efficiency, it is best to have someone restrain the cow with a tail hold. The area should be ventilated but a draft will blow out the flame.

The biggest advantage of singeing is the speed. A hundred cows can be done in less than an hour. With this efficiency, herds can be done every 2-3 months. If cows are done often the job is easier as there will be less flame-ups. This job should be assigned to a competent, well trained individual as there has been reported cases of cows' teats being severely burnt from improper use of this procedure.

# Milking Equipment Maintenance

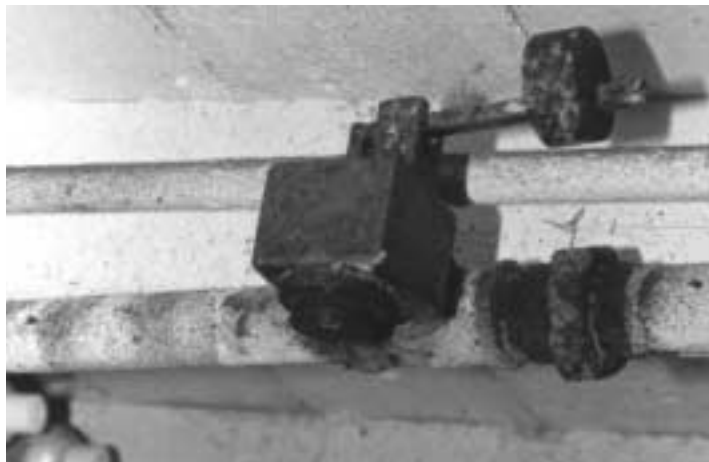
Even the best milking equipment needs routine maintenance. The system should be serviced at least once every 6 months by a competent service technician. In addition, the operator needs to make routine inspections to avoid costly repairs of equipment or injuries to mammary tissue.

During each milking, check the vacuum gauge to ensure that proper vacuum is being maintained (*Figure 1*). The vacuum is usually set at 12-13 inches of mercury for low pipelines, 14-15 inches for high lines. Vacuum level should not fluctuate more than 1/2 inch during milking. Excessive fluctuation indicates problems with the regulator or other inadequacies. Keep the gauge clean, and check it for accuracy each time the system is serviced. Gauges lose their accuracy after several years due to corrosion and need to be replaced. Do not adjust vacuum levels without first checking the accuracy of the gauge!



*Figure 1*

Clean the vacuum controller or regulator at least monthly, or according to manufacturer's directions. *Figure 2* shows a weighted style regulator that has been poorly maintained. Frequency of cleaning is determined by how much dust and grime the regulator is exposed to. One way to check if a regulator is sticky or faulty is to open a milk inlet halfway. Vacuum should hold within 1/2 inch of the original level. Next, open it all the way and then close it. As the vacuum level returns to normal, it should not go past the set position. Newer diaphragm controllers are superior in maintaining a stable vacuum than the older, weighted style regulators. Old style regulators need to be replaced.



*Figure 2*

Service the pump as directed by the service manual. Check oil level or usage, belt tension and alignment every 2 weeks (*Figure 3*). Always use a vacuum pump oil recommended by the manufacturer. Using a substitute oil may void the pump warranty or cause it to fail. Turn pump by hand to detect unusual drag, loose pulleys or rough bearings.



*Figure 3*

A pulsation rate between 50-60 is generally recommended. This may vary slightly with manufacturers. Pulsators need to be cleaned and serviced regularly to ensure proper functioning (*Figure 4*). A pulsator that sounds sluggish or unusual should be fixed or replaced immediately. A spare pulsator kept on hand for emergencies is cheap insurance.

A couple of quick, easy procedures can determine if there is adequate vacuum capacity in the system. Set up the milking system as during milking. In a 4-unit system, admit air by turning over 1 unit - similar to what would happen if a unit

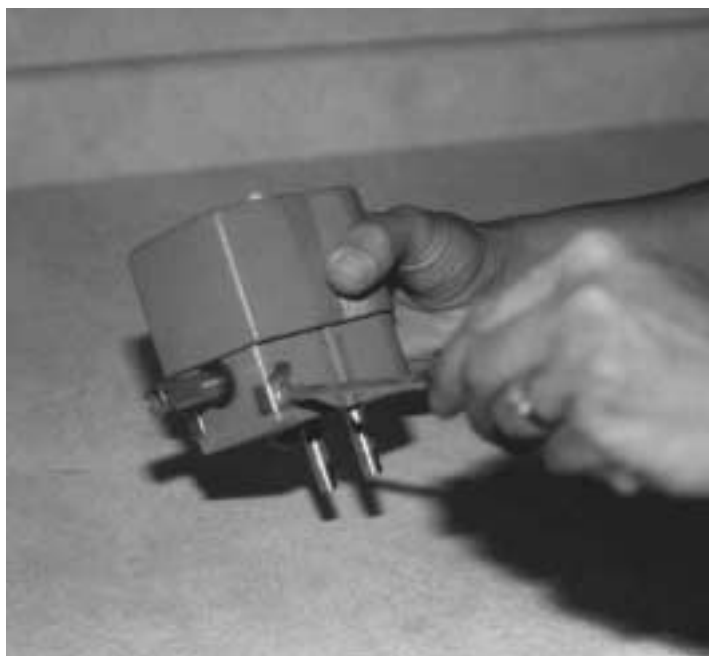


Figure 4

fell off during milking. The vacuum level should remain within 1/2 inch of mercury. Rather than turning over a unit, an alternate test is to open a milk inlet for 5 seconds and then close it. The vacuum in the line will drop but should recover in 3 seconds or less. An extended recovery time may be caused by problems with the pump or regulator, under-sized lines or leaks in the system. To detect a leak, hold plastic wrap over the suspected area. If a leak is present, the plastic will be sucked to the hole.

Milk lines must be of adequate size, slope and design. The following table provides guidelines to prevent flooding. These guidelines are also influenced by how fast units are attached and milk flow per cow. A pipeline's effective size is reduced if there are restrictions anywhere along it. Many times, restrictions are found at the receiver jar (Figure 5) because of improper design. In this illustration, the black plug cuts the effective size of the pipeline in half and should be replaced with a more efficient design.



Figure 5

Parlor with looped line, units per slope\*

| line size | Slope (percent) |     |     |      |     |     |
|-----------|-----------------|-----|-----|------|-----|-----|
|           | 0.5             | 0.8 | 1.0 | 1.25 | 1.5 | 2.0 |
| 2-inch    | 2               | 3   | 3   | 4    | 4   | 5   |
| 2.5-inch  | 4               | 5   | 6   | 7    | 8   | 10  |
| 3-inch    | 6               | 9   | 10  | 13   | 16  | 24  |
| 4-inch    | 21              | 28  | 32  | 35   | 38  | 43  |

Clean air vents in the claws when they become obscured during milking. If vented inflations are used, the air vent in the claw should be plugged. Vented equipment should move milk away from the cow faster, but also requires more air flow. Make sure that there is adequate vacuum reserve before changing to vented equipment.

Inspect hoses and tubes regularly for obvious wear, cracks, kinking, distortion or swelling. This is especially important for the pulsation hose and short milk tube. Replace hoses on a regular basis before they start causing problems.

Conscientious attention to machine maintenance will help achieve maximum milking efficiency. The operator needs to be aware of the importance of regular inspection, follow manufacturer's recommendations and consult with an expert if any problems arise.

## Proper Use and Care of Inflations

Inflations, or teat cup liners, relieve vacuum to the teat and massage the teat as they collapse during the pulsation cycle. Teat-end irritation and high somatic cell counts can result from inflations that are worn, misused or not properly selected for the milking system. In addition, six fold differences in strip yield, eight-fold differences in the incidence of teatcup slips, and 33% differences in milking times between liner types have been reported.

There are many different types of liners on the market. Narrow bore liners are less prone to damage teat and udder tissue, and are preferred over inflations with more than 7/8 inch inside diameter (*Figure 1*). The internal diameter of a liner is usually measured 3 inches below the top. Ideally, liners should have an internal diameter about 1-2 mm less than the average diameter of the teats after milk letdown.



*Figure 1*

Liners should be long enough to collapse below the teat. If the liners are unable to collapse because there is not enough liner past the teat end, the teat end is exposed to constant vacuum and will be damaged. The minimum lengths of the liner barrel should be: 5.1" for liners up to .8 inch diameter; 5.3" for liners .82" to .88"; and 5.5" for liners over .90" to .94".

Liners are basically of two designs: molded or multiple piece. There are advantages and disadvantages for each. The advantage of a molded inflation is reduced labor required for cleaning and changing the inflations. Multiple piece design allows an air vent above the short milk tube, which may help prevent teat cup flooding. Liners may be made from natural rubber, synthetic rubber, a combination of the two, or silicon.

There is no "best" inflation. In fact, most suppliers handle a variety of liners. The inflation that works best in a given sit-

uation may depend upon milking system design, vacuum level, udder conformation and personal preferences. Because of their design differences, there are inflation differences in milking speed, completeness of milkout, amount of liner slips, and fall-offs. If the rest of the milking system checks out and any of these problems persist, changing inflation types may help. However, changing inflation type will not compensate for deficiencies in the overall system and will seldom cure a mastitis problem.

Probably the biggest abuse of liners is that they are used too long. Follow the manufacturer's recommendations. Generally, rubber inflations can be used for 600 cow milkings, synthetic rubber for 1,200 cow milkings, and silicon inflations for about 5,000 cow milkings. For example, a 60-cow herd is milked with 4 units. Each unit milks 15 cows per milking, or 30 per day. If natural rubber inflations are used, you would expect to change them every 20 days. Synthetic rubber would be changed every 40 days in this example.

Examine liners regularly and discard any that show signs of roughness or wear. Change all 4 inflations on a unit at the same time, because mixing new and old inflations can lead to uneven milk-out.

Liners should be checked daily to make sure they are not twisted in the shell. Many liners have markings to insure proper alignment (*Figure 2*). A twisted liner may cause incomplete milking and may increase dropoff problems.



*Figure 2*

Water should not get between the liner and the shell. This may result in slow, incomplete milking. It is recommended to check for water between shell and liner before each milking. Just one teaspoon of water can cause the inflation to malfunction.

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To avoid a buildup of organic materials such as milk fat, protein and sugar, never allow milk to dry in the liners. Immediately rinse liners with cool water after milking, then wash and rinse again. Natural rubber liners tend to be more porous, and absorb milk solids more easily. To extend their usefulness, boil them in a lye solution for 1 hour weekly and soak overnight (*Figure 3*). It may pay to have 2 sets if stretch liners are used. By alternating your sets every 7-10 days - one set in use and the other soaking in solution - you can lengthen the useful life of the liners and help maintain flexibility.



*Figure 3*

Other considerations:

1. Make sure the liner fits the shell. When collapsed, the liners should still move freely within the shell. The inflation's diameter when flattened should not exceed the diameter of the shell as noted in *Figure 4*. The mouthpiece should not be distorted by a shell diameter that is too big, but the shell needs to be large enough to hold the mouthpiece firmly to avoid twisting.



*Figure 4*

2. Store liners away from electric motors and sunlight. Ozone from the electric motors can cause the rubber to crack. Sunlight shortens the liner's life.
3. Some manufacturers recommend that inflations be taken out of the shell for manual cleaning or at least removed once a week to allow the rubber to relax. Inflations should be pushed out rather than pulled. Twist the milk tube clockwise, then push to remove the inflation correctly.
4. Ointments and teat dips may cause deterioration, so check liners often. You may need to change ointments or teat dips if fast deterioration is noted.
5. Liner life varies with how they are stored, used, and cleaned. Adjust the manufacturers suggested replacement rate accordingly. If there is a significant change in milkability when liners are replaced, the liners were used too long.
6. When switching from a stiff to a more pliable liner, such as silicon, milking time may increase. This happens because the more pliable liners may close sooner and open later during the pulsation cycle. If milking speed remains greatly decreased after a 2-week adjustment period, then the pulsation ratio of the unit may need to be changed to achieve the same milking speed as with the stiffer liners. Softer, more pliable liners generally are preferred for good udder health.

You need to do everything possible to promote good udder health and produce a quality product. Proper selection, care and use of inflations is important in reducing teat irritation and somatic cell counts.

## Detecting and Treating Mastitis

A total mastitis control program is needed to minimize mastitis. However, even in the best managed herds, mastitis flare-ups occur occasionally. Timely diagnosis of clinical and subclinical mastitis and proper treatment are key elements in the fight against this disease.

Observe and palpate the udder to detect clinical mastitis. Quarters that become hot or swollen are suspect, and examination of the milk may confirm a clinical mastitis flare-up (*Figure 1*). Flakes, clots or garget can be seen in the milk from clinical quarters. Treat these cows promptly.



*Figure 1*

For every clinical case, there are 15-40 subclinical cases in a herd. Although milk from subclinical mastitis appears normal, yield is reduced significantly. In addition, most clinical mastitis develops from subclinical cases, and subclinically infected cows serve as bacteria reservoirs to infect other cows. Subclinical infections can be detected by an elevated somatic cell count.

Somatic Cell Count should be monitored through the DHIA SCC option. In addition, the California Mastitis Test (CMT) is a fast, efficient screening test for individual quarters. Mix 1 or 2 streams of milk from each quarter with an equivalent amount of reagent in the 4-compartment CMT paddle (*Figure 2*). The reagent causes the membranes of the somatic cells to rupture and a gel to form. The more gel, the higher the cell count.

Generally, it is not effective to treat cows with elevated counts unless they show symptoms of clinical mastitis. However, knowing the cell counts of individual cows will help monitor incidence of mastitis, important in a mastitis control program.



*Figure 2*

Culturing a milk sample to identify the microorganism involved will help prescribe the correct treatment (see page 101). It is extremely important to maintain sanitary conditions to obtain a useful sample. Wash your hands before sampling. Be careful not to contaminate the container or its cap. To obtain the sample, wash and dry the udder and teats as you would if prepping the cow for milking. Remove three streams of milk from each teat. Soak a clean cotton ball in 70 percent rubbing alcohol and swab off the teat end. If multiple quarters are being sampled, start with the far teat so that you don't contaminate a clean teat with your arm. Hold the tube at a 45 degree angle and squirt the milk sideways into the container. Then fill the container provided by your veterinarian (*Figure 3*). Refrigerate samples immediately at 34-40°F and culture within 24 hours, or freeze until delivery to the lab.



*Figure 3*

## Producing Quality Milk

When infusing a cow with an antibiotic, make sure you follow these simple rules. Dip the teats with a teat dip. Allow 30-60 seconds contact time then dry with a clean towel. Swab the teat end with cotton saturated in alcohol, or use the pad provided with the antibiotic product. Be careful not to contaminate the cannula of the syringe as you insert it into the teat canal (*Figure 4*). The cannula should only be inserted about 1/8 inch or just deep enough to deliver the antibiotic into the teat. Depress the plunger slowly and remove the syringe. Massage the quarter to distribute the antibiotic, and re-dip the teats.



*Figure 4*

Use only single-dose syringes and products designed for udder infusion. The few cents saved by using multiple dose containers or homemade mixtures is not worth the risk of introducing pathogens into the udder.

Make it standard practice to mark the cow and record the treatment. Marking methods include paint stick, marker, paint spray on the rear leg, or a leg band (*Figure 5*). Don't take a chance. Mark the cow on both sides in parlors where they can be milked from the left or right. Develop a system that works and is understood by everyone milking, so contaminated milk does not enter the bulk tank.



*Figure 5*

Even if a cow is treated in only 1 quarter, milk from all 4 quarters must be discarded for the length of time prescribed on the label. If antibiotic milk is fed to calves, they must be withheld from market until the antibiotic clears their tissues. This also applies to calves fed colostrum from dry treated cows.

Wishing to avoid antibiotic use and residue problems, alternative methods to treat clinic mastitis have been sought. For mild cases of mastitis, giving an injection of oxytocin during milking and milking frequently during the day may allow many cows to cure themselves. Work with your veterinarian to develop a treatment plan and recording scheme for your dairy. An example plan is given on page 100.

Good management is essential to diagnose and properly treat mastitis, and prevent antibiotic residues in human food products. Good records and communication with your veterinarian are also essential in a total mastitis control program. Finally, clinical mastitis can be reduced significantly in the future by wise selection of A. I. sires today. Bulls with low PTA's for SCS have daughters with significantly lower incidences of mastitis.

Farm: \_\_\_\_\_

Date: \_\_\_\_\_

Veterinarian: \_\_\_\_\_

| <b>Guidelines for Clinical Mastitis Treatment</b> |  |                   |  |             |                      |
|---|--|-------------------|--|-------------|----------------------|
| Severity  | Symptoms   | Type of infection | General treatment plan   |             | Specific drugs/doses |
| Mild  | Abnormal milk  |                   | 1-3 cc oxytocin, milkout   |             |                      |
| Moderate  | Abnormal milk<br>Swollen quarters  |                   | 1-3 cc oxytocin, milkout 1 <sup>st</sup> episode, then Rx IMM<br>If 2 or more episodes, chronic, antibiotics are often ineffective               |             |                      |
| Severe  | Temp > 102°<br>Abnormal milk<br>Swollen quarters<br>Severely ill, depressed, off-feed and dehydrated |                   | 1-3 cc oxytocin, milkout<br>Antipyretics (Aspirin, Banamine, etc.) and anti-inflammatory.<br>Antibiotic IMM and/or systemic IV. Fluids as needed |             |                      |
|   |  |                   | Withholding  |             |                      |
| Drug used   | Dose   |                   | Milk (hrs)   | Meat (days) | Appropriate test     |
|   |  |                   |  |             |                      |
|   |  |                   |  |             |                      |
|   |  |                   |  |             |                      |
|   |  |                   |  |             |                      |

**Further Instructions**

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_

| <b>Organisms That Cause Mastitis</b>  |  |                                     |  |  |
|---|--|-------------------------------------|--|--|
| <b>Bacteria</b>   | <b>Source</b>  | <b>Persistence</b>                  | <b>Subclinical* Treatment</b>                    | <b>Control Measures**</b>  |
| Strep. ag.  | infected udders  | chronic                             | eradicated by antibiotics                        | antibiotic treatment   |
| Staph aureus  | infected udders, contaminated bedding, teat sores        | chronic                             | not recommended                                  | segregate or cull infected cows, check milking equipment   |
| Environment. strep. (Strep uberus, Strep dysgalactia, Strep bovis)  | environment  | self-limiting, occasionally chronic | treatment not recommended                        | improve barn, lot, and stall sanitation, check milking equipment, avoid liner slips  |
| Staph epidermitis   | common on skin   | sporadic and self-limiting          | do not treat                                     | not necessary because of low pathogenicity   |
| E. coli (coliform)  | environment, cow feces, contaminated water               | cow dies or infection eliminated    | seldom subclinical, no treatment for subclinical | barn and lot sanitation, especially during hot-humid weather, avoid liner slips, avoid letting cows lay in contaminated area after milking |
| Klebsiella (coliform)   | environment-often in sawdust bedding                     | variable                            | chronics difficult to treat                      | keep sawdust fresh and dry if used (same as for E. coli)   |
| Yeast   | contaminated antibiotics or syringe used to infuse udder | self-limiting                       | no treatment                                     | use sterile equipment for intramammary therapy, avoid homemade mixtures  |
| Mycoplasma  | infected udders  | becomes chronic                     | no treatment                                     | culture cows, segregate or cull infected cow   |
| <p>*Clinical cases should be treated according to treatment criteria for individual farms.</p> <p>**Teat dipping after milking and dry treatment are recommended for all herds. Organisms may be spread from infected to uninfected quarters by contaminated milking units or milker's hands. Damaged teat-ends greatly increases cow's susceptibility.</p> |  |                                     |  |  |

## Sampling Forages

Dairy rations are generally balanced nutritionally by adding concentrates to complement nutrients supplied by forage. The surest way of accurately determining nutrient content of forage is through a well-planned feed analysis program. Frequent and proper sampling is important.

The analysis of feed is only as good as the sample. When sampling hay, keep the different fields and cuttings separate. Using a bale corer is essential for a good hay sample (*Figure 1*). The best sample is obtained if the corer is put in at an angle in the end of the bale. Hay corers are available from many farm supply outlets. They can be manually turned into the bale or mounted on an electric drill.



*Figure 1*

Sample a minimum of 12-15 bales from the same lot. Pick bales randomly for the best estimation of hay quality. Don't hand pick the best appearing bales for sampling!

Mix the 12-15 cores together to get a composite sample. Testing labs generally need about 1 lb. (1-2 quarts) of material to run the analysis. Avoid grabbing a majority of stems or fines for the composite sample.

By mixing the cores on the top of a table and then pushing a portion into a bag, an adequate sample should be obtained (*Figure 2*).

*Figure 3* shows a labeled plastic bag with a paper label inside for identification. Labels should include your name, address, sample number, forage mixture, stage of maturity and date harvested. Store in the freezer if the sample will not be sent to the lab right away.

Sample haylage and silage as the silo is being filled. In a pail, collect 4-5 handfuls from the first load and from every



*Figure 2*



*Figure 3*

second or third load after that from each field. Again, get a good composite sample in a 1 to 2-quart airtight plastic bag and put the container in the freezer to prevent spoilage. Send the sample to the lab early in the week, so the analysis is run before the weekend. The label should indicate that the sample was taken prior to fermentation.

By sampling feed as it's going into the silo, you can get results from the lab and balance the ration before the feed is fed. When fields or feed changes, mark the spot in the silo by throwing a few small pieces of black or colored plastic into the blower. *Figure 4* shows the plastic in corn silage coming out of the silo.

If forage is ensiled too dry, heat damage may occur. The sweet-smelling, dark brown material is very palatable to cows, but much of the protein may be indigestible. This feed needs to be tested for available crude protein, and rations adjusted accordingly. Test corn silage for crude protein after



*Figure 4*

fermentation if urea or anhydrous ammonia is added at ensiling. Indicate on the label the additive used.

The moisture content of a sample will be included on the lab report. However, it can fluctuate quite a bit in different depths of the silo, and should be retested and rations adjusted accordingly. *Figure 5* shows the equipment needed to test for moisture content: a small scale and microwave oven.



*Figure 5*

A simple method is to weigh 100 gm. of material on a plate or dish that is microwave oven-safe. Make sure you deduct the weight of the plate. Arrange the material on the plate with a hole in the center. Place the material into the center of the oven for 6 minutes for haylage or silage, 2 minutes for hay. Mix haylage and silage samples every 2 minutes to ensure uniform drying. Remove from the oven and reweigh. Place in the oven for another 2 minutes and reweigh. If the weight changed little from the previous weighing, the sample is dry. If charring occurs, the sample is overcooked, so use the previous weight to calculate moisture content.

If you started with an initial weight of 100 gm. and the dry weight is 40 gm., then the percent dry matter is 40% and percent moisture is 60%. Besides helping to balance the ration, this method of determining moisture content can also help determine when hay is dry enough to bale or of proper moisture to ensile.

The microwave method usually can be completed in 10 to 15 minutes but can take up to 30 to 45 minutes for high-moisture feeds. Electronic moisture testers are available that require about 4 minutes per sample. A Koster Tester requires 15 to 40 minutes, but the operator does not have to be present while the test is run.

Quick test of moisture in the field: Keep a roll of paper towels in the tractor. After chopping a small amount, put a pool ball-size ball in a towel and squeeze. If there is lots of free liquid it is too wet. If there is just a few stains it is too dry. The amount of staining will depend on the crop, how hard you squeeze, and fineness of chop. By comparing the amount of staining to moisture content determined by a different method, you can “calibrate” this test for your conditions.