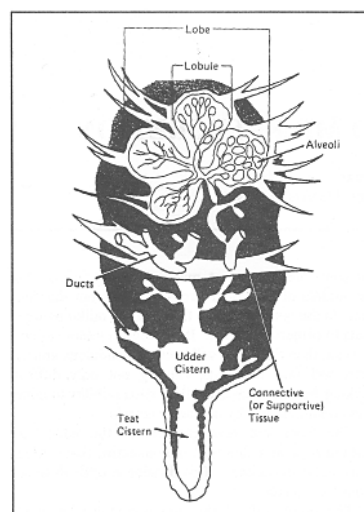


MILKING AND MASTITIS

1. UDDER STRUCTURE

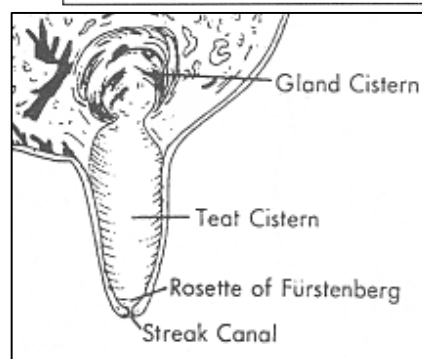
The Udder

The gland consists of alveoli - small balloon shaped structures - lined with secretory cells connected by ductules and ultimately larger ducts to the udder cistern. Milk is stored in the cistern but a significant volume of milk is still in the alveoli and ductules prior to milking. The let down affect at milking causes milk to flow to the cistern and be available to be milked out.



The Teat

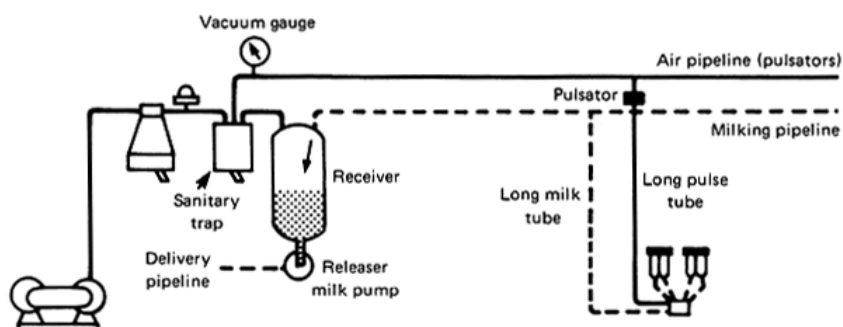
Milk is removed from each gland via the streak or teat canal which is 8 to 12 mm long. It is kept closed between milkings by a circular sphincter muscle near the tip. This muscle is important not only in keeping the milk in the gland, but also in preventing entry by bacteria.



The character of the sphincter is important to the cow's productivity. If the canal is small, or if the sphincter is unusually strong, then the cow is hard and slow to milk. At the opposite extreme (large canal, or weak sphincter), milk will leak from the teat between milkings and the udder is then open to invasion by mastitis-causing organisms.

2. MILKING MACHINES - THE MILK HARVEST

All machines have basically the same function - to apply a steady vacuum at the teat end to suck out milk, massage the teat end and deliver the milk to a receiving can (vat) with minimum physical damage to the milk structure.



Teat Cup

The cup and liner should be long enough to take the teat and still have room to close below the teat end at squeeze phase to shut off vacuum to the teat end (massages and gives the teat end a spell from the vacuum).

Matching the liner to the cup is important. Although much is being said about matching the teat liner to the herd's teats, a little thought suggests that this is difficult. Consider the ranges of teat size (diameter and length) particularly between the different age groups in a herd let alone between breeds.

Claw and Dropper Pipes

Designed to allow the milk to be removed by vacuum but without that milk removal interfering with the steady vacuum to the teat end. The air inlet hole is important to allow milk transport.

Milk Lines

Has to carry milk and vacuum. The diameter and slope are both important for milk flow and vacuum stability. New installations usually meet current recommendations for slope and diameter. Some upgrades have resulted in too many clusters added to an existing line or flattening the line to fit the new extensions have both lead to mastitis problems.

Pulsators

The machine's 'pace maker' switches the vacuum on and off at 42-48 beats per minute and allows a rest phase:squeeze phase of 30:70, 35:65, or 40:60. Pulsators need annual checks to ensure they are working to their specifications.

Vacuum

Most are set to 50 KPA. In the early part of the season sheds will run comfortably at 47-48 KPA and rotary sheds and low line sheds lower still.

Milking Machines & Mastitis

Mastitis is caused by machines in two ways - passive and active.

Passive - the transfer of mastitis bacteria from cow to cow via cups and teat liners, milker's hands or anything else that contacts teats (e.g. open contaminated containers of teat ointment is a good agent).

Active - where the machine is performing in such a way as to damage teat ends and allow easier entry of bacteria to the teat plus some other activity by machine or operator that causes milk Droplet impacts on the teat end. This can occur with cup slip or pulling off the cups before the vacuum in the cups equalise.

3. CLINICAL MASTITIS

SEVERE OR ACUTE MASTITIS

Hard swollen quarter

Milk changes – watery, clots, dis-coloured

Cow sick - high temperature 39.5°C +

- off feed

- often limping

These are sick cows that usually need veterinary assistance.

CLINICAL MASTITIS

Hard or swollen quarter

Milk changes- watery, clots

Minor sick cow symptoms e.g. off food, back of herd

Usually respond to intramammary treatments.

SUB-CLINICAL

No clinical signs of changes in milk

Clinical Treatments:

What to use: Talk to your veterinarian. Different farms have different bacteria and resistance patterns. Lab results can help identify likely cause of mastitis e.g. environmental, contagious or milking machine problem.

How to treat:

1. Carefully strip the affected quarter
2. Swab with teat wipe or 70% meths on a cotton wool ball
3. Insert tube carefully - "respect the nipple" -> partially insert the nozzle 3.5mm only
4. Massage contents up the teat
5. Teat spray all teats
6. Mark the cow clearly

Then: record the cow number AND the treatment used

Cows with mastitis should not be milked during milking but drafted and brought back at the end of milking because:

- 1) Teat cups from a mastitis infected cow have been shown to carry the mastitis bacteria for up to five cows later even after flushing.
- 2) It is too easy to make mistakes during milking - and get a residue grade
- 3) Messing around with buckets etc during milking interferes with the smooth routine you are striving for.

4. SUBCLINICAL MASTITIS (definition - mastitis you can't see)

The quarter excretes bacteria from time to time, has a high somatic cell count, but no clinical signs of mastitis. It is important because it is a source of bacteria to:

-develop mastitis at a later date.

OR

-bacteria spread to other cows.

-production loss - "ball park" figures of 10% of the cows production for every quarter infected.

It's importance (economically) is increasing with the need to manage bulk somatic cell counts.

5. SOMATIC CELL COUNTS (SCC)

Somatic Cells can always be found in milk, if only in small numbers. They are mainly white blood cells sent to fight infection in the udder and also include a small number of damaged udder cells. The milk from cows that have mastitis therefore contains more somatic cells.

The best method for identifying cows with sub-clinical mastitis is the Individual Cow Somatic Cell Count.

Somatic cell counts are expressed as the number of somatic cells in a millilitre (ml) of milk.

Normal Levels: Cows that have never had mastitis have naturally occurring counts around 20,000 to 100,000 (higher counts for older cows). Cows that have had mastitis and have been cured may have a normal count above 100,000.

Infected Levels: Cows that have mastitis consistently show a large increase in SCC compared to their normal levels. Cows with counts above 150,000 are likely to be infected. The higher the count the worse the infection (levels vary depending on the type of mastitis bacteria).

Variation: Somatic cell counts can vary over a season for reasons other than mastitis. They increase following calving for several days before dropping to normal levels, they also tend to rise towards the end of lactation. Short term rises can occur due to under feeding, pregnancy testing, bulling activity and holding milk. These effects are usually more noticeable in cows with mastitis.

Why are we interested in Somatic Cells?

Cows with high somatic cell counts usually produce less milk than those with lower counts (by up to 8 kg of milksolids per lactation for every increase of 250,000 cells/ml in the range between 100,000 and 600,000)

Cows that are infected in their first lactation produce about 8% less milk, this effect is carried over in to the second lactation even if the infection is cured.

High SCC milk is related to changes in milk composition that reduce the yield of cheese and casein products. The flavour and shelf life of products can also be affected; these are indirect costs to the farmer.

Companies are targeting SCC because The international market led by the European Community requires milk to be less than 400,000 cells/ml. It is important that New Zealand milk is of the highest quality.

The Bulk Milk Somatic Cell Count (BMSCC) is the somatic cell count of milk from your vat. It is an indicator of the quality of milk supplied to the company. It can also be used as a guide to the number of cows infected in your herd.

The table gives a general indication of the percentage of infected cows in a herd (clinically or sub-clinically)

BULK MILK COUNT	EST % OF HERD INFECTED
100 000	20
500 000	46
900 000	54

Individual Cow Somatic Cell Counts (ICSCC) are from herd test samples collected and tested for each cow at intervals during the season. They can be used to identify problem cows for special attention.

Estimated Bulk Milk Somatic Cell Counts (EBMSCC) appear in SCC reports. They come from counts of individual cows which are adjusted for the volume each cow produces on the day of the herd test. When measured on the same day as the bulk count the two figures should be reasonably close, however the estimated bulk count includes milk that may have been held back from the vat due to excessive counts or antibiotics

6. MASTITIS CONTROL – THE SAMM PLAN

SAMM= Seasonal Approach to Managing Mastitis

Designed around a set of guidelines for different stages of the lactation:

- Dry period
- Calving
- Lactation
- Late lactation
- Drying-off

Dry period

- Get milking machine serviced
- Check have recording systems are in place and everyone on the farm is aware of them
- Check all cows are numbered
- Train heifers through shed

Calving

- Calve cows in clean environment
- Remove calves < 24 hours after calving (check calves get colostrum)
- Check for, and treat clinicals at first milking
- Strip +/- RMT in colostrum mob before joining milkers
- Watch bulk SCC & check for sub/clinical if >300,000
- Identify, treat and separate clinical cows
- Teat spray all year
- increase emollient to 15% if teats cracked/dry
- Check all cows are milked out thoroughly ie check at end of milking that bag is not uneven. Shouldn't be able to get more than 3 or 4 good strips of milk out of quarter
- Use let down hormone if required in heifers
- Keep an eye on teat end: damage if over-milking or vacuum set too high

Lactation period

- Teat spray all season will reduce new infections by 50%
- Keep monitoring for clinicals e.g. BTSCC goes up, filter sock dirty
- Take sterile milk samples to culture bacteria
- Use correct antibiotic for full course
- Watch the withholding periods (especially if using extended therapy)
- Leg band and spray raddle infected cows + record numbers and day back into vat
- Best to run separate antibiotic/clinical mob
- Monitor bulk SCC ie graph daily bulk SCC and watch for 'blips' which indicate that there is a clinical cow
- Cull /dry off high SCC cows if SCC is getting >300,00 at any time
- Keep milking routine calm and gentle
- Watch vacuum level
- Replace cracked rubber ware (liners, milk tubes etc)

Late lactation

- Decisions on dry cow usage:
- Dry cow whole herd if
 - >400,000 bulks SCC &/or
 - >10% clinicals in 1st month lactation, &/or
 - >50% cows > 150,000 at herd test after Christmas &/or
 - > 5% cows with clinical mastitis in dry period last lactation
- Talk to vet about which antibiotic to use and how to dry-off herd
- Dry cow for only part of herd if:
 - if <400,000 bulks SCC &
 - < 10% clinicals in 1st month lactation, &
 - < 50% cows > 150,000 at herd test after Christmas &
 - < 5% cows with clinical mastitis in dry period last lactation
- Talk to vet about which antibiotic to use and how to dry-off herd

Drying off process

- Dry-off high SCC cows before the main mob select from last herd test
- Can do in series ie last 2 rows dried off every couple of days
- Reduce feed intake to maintenance for 3 to 5 days but give free access to water
- Once a day for 4 days or less (don't skip a day milk as get more clinicals)
- Keep teat spraying up till last milking
- Use dry cow after last milking of season
- Thoroughly clean teat with 70% meths on cotton wool swab
- Partially insert antibiotic tube into quarter + massage material in
- Spray teats with normal (full strength) teat spray
- Examine cows after drying off
- start 1 week after drying off and run through the shed to check quarters
- Check for uneven, hot, swollen quarters, Only break teat seal if suspect infection
- Strip out infected quarters and treat with LACTATING cow antibiotic
- Teat spray after treatment
- Mark and record clinicals