

CARLIFORNIA MASTITIS TEST

(Level 3)

Topic	Training & information Content
9.1	Introduction to Animal health (Prevention vs curative health care)
9.2	Health signals
9.3	Biosecurity of dairy farms
9.4	Tick born diseases (Prevention and treatment)
9.5	Worm infections (Prevention and treatment)
9.6	Vaccination schedule and planning
9.7	Mastitis prevention and treatment
9.8	California Mastitis Test
9.9	Usage and storage of veterinary medicines on dairy farms
9.10	Administering of medicines to dairy cows
9.11	Instruction use of injectors into teat canal
9.12	Key performance indicators (KPIs) for monitoring health status of dairy herd



1. You will learn about (learning objectives):

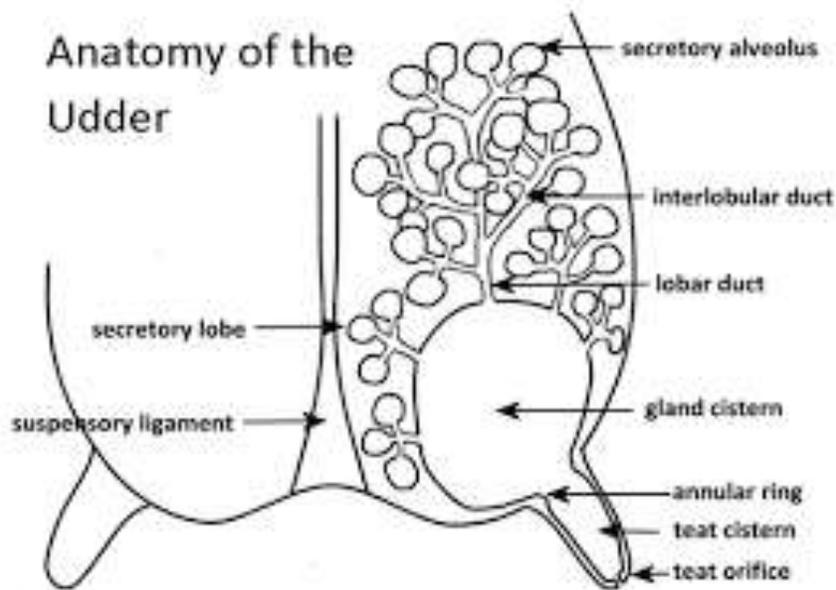
- Somatic cell counts and its effects
- How to carry out a California Mastitis Test
- How to interpret a California Mastitis test.
- How to check for udder health in a herd/dairy farm

You will learn the theoretics and understanding behind the job. Only practice can give you the skills!

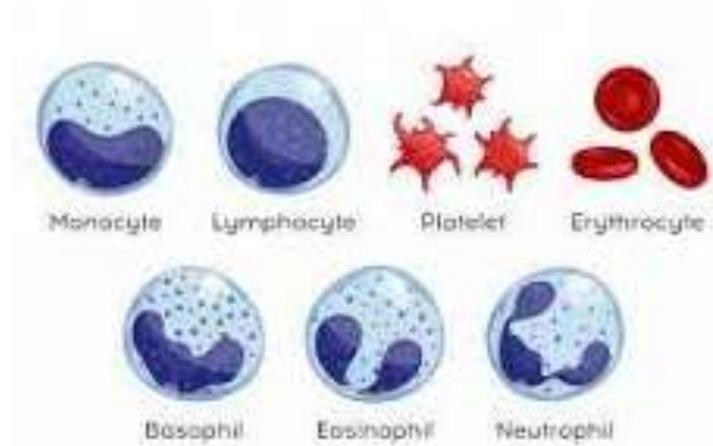


2. Background

- Bacteria cause an inflammation of body cells.
- This can lead to mastitis; hot red, warm, painful and swollen udder and visibly changed milk. This we call clinical mastitis.
- Sometimes symptoms are not sensible but body cells die and get into the milk. This we sub clinical mastitis.
- These body cells consist out of white blood cells attacking the bacteria and dead epithelial and gland cells. A difficult word for body is somatic, so the somatic cell count in milk will be increased.



Tip: White blood cells are part of the immune system. They kill bacteria directly or make antibodies so that macrophages can destroy them.

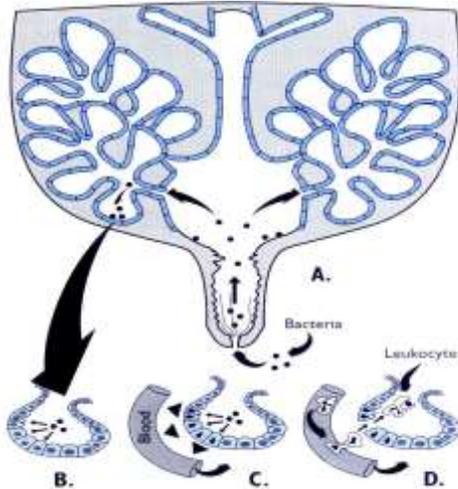


Different types of blood cells, the blue ones are the white blood cells.

3. Somatic cell count

The main symptom of sub-clinical mastitis is an elevated somatic cell count (SCC). That is;

- The pathogen bacteria cause an infection.
- More udder cells die.
- White blood cell enter the area to fight the bacteria.
- More cells as normal will appear in the milk.
- Arbitrary: when more than 250,000 cell/ml are in the milk, one speaks of sub-clinical mastitis
- The milk can be tested on cell count by the **Californian Mastitis Test**.



Performing a CMT is of great help to improve udder health. The details are discussed in another PowerPoint presentation

4. High Somatic cell count

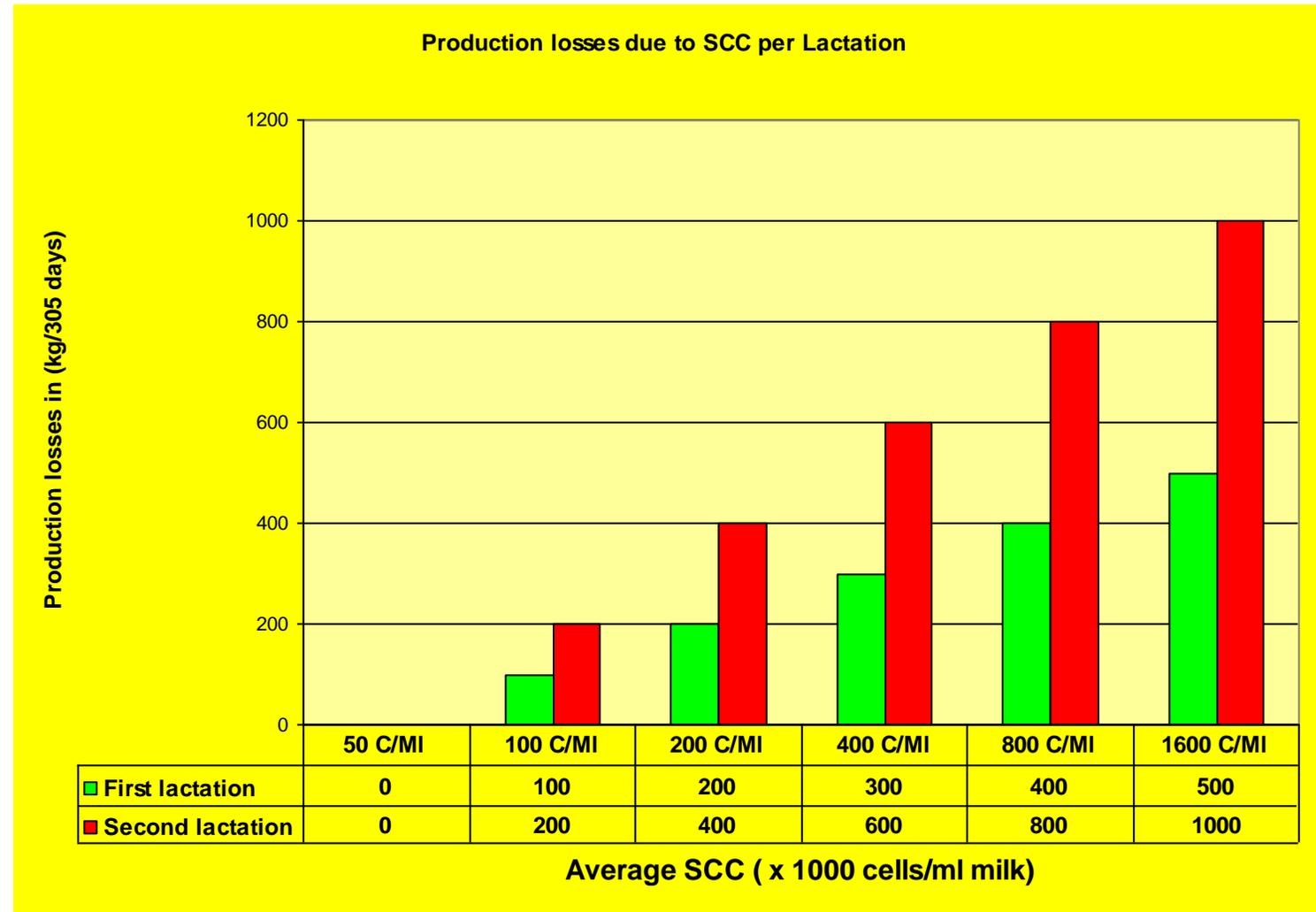
Why you should not want to have high somatic cell counts

- i. Milk production decreases.
- ii. Risk for developing clinical mastitis increases.
- iii. Quality of the milk decreases.
 - it is not a food safety hazard, but
 - salt levels are elevated.
 - casein levels also go down.
- iv. High SCC is a main concern for cheese factories because they need more liters of milk to produce one kilogram of cheese.
(This can vary from >12 litres for 1 kg hard cheese to < 10 litres from milk with low SCC).



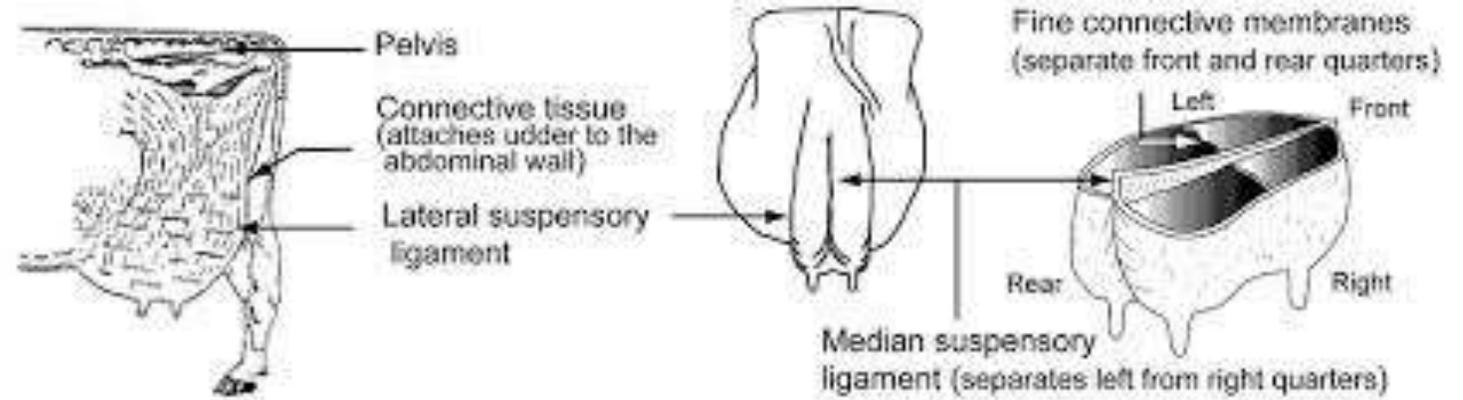
4.1 High Somatic cell count Cont'd...

- The graph alongside shows production losses due to SCC.

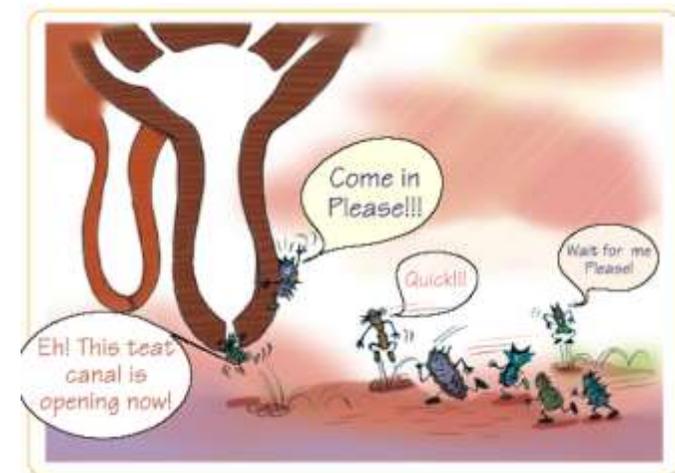
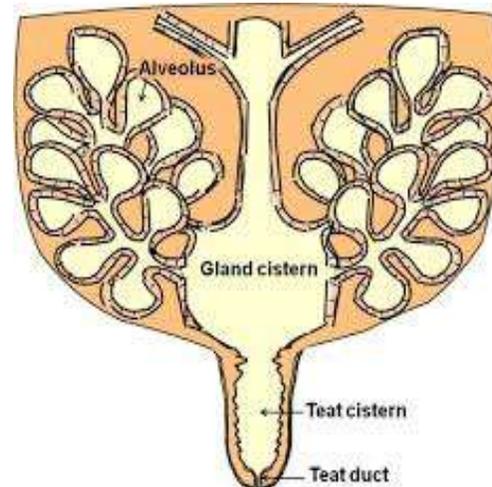


5. Benefits of CMT

- The California Mastitis Test is a simple test helpful in detecting subclinical mastitis by crudely estimating the somatic cell count.
- The benefits are:
 - It is a cheap test
 - Can be carried out by the milker during milking
 - Results are immediate
 - It gives an indication of the level of infection of each quarter.



The four quarters are completely separated from each other so when a bacterial infection enters through the teat canal only that quarter will be infected.



5.1 Benefits of CMT Cont'd...

These elevated somatic cell count we trace with the Californian Mastitis Test (CMT)

- When milk contains more than 400,000 cells/ml, it becomes visible in the CMT.
- All milk contain somatic cells, because body cells will continuously die and be replaced.
- All boundaries are arbitrary, but below 250,000 cells/ml one considers the udder healthy and when above 400,000 cells/ml one expects a sub clinical mastitis.
- The CMT therefore is an excellent tool to see if a cow has a sub clinical infection or if a treatment is completely successful.
- Every quarter is a separate milk producing unit, so one quarter can be affected while the other is free from infection.



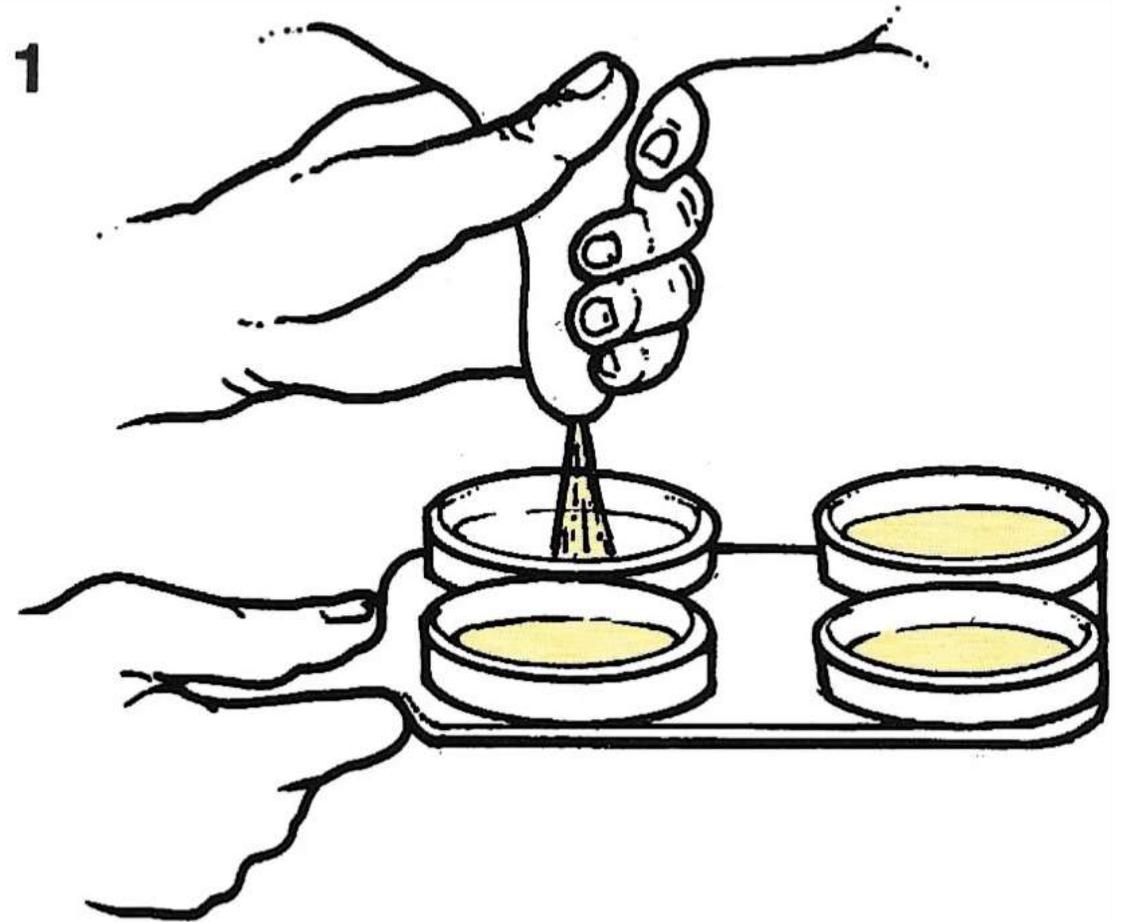
These four grades which can be recognized by judging the Californian Mastitis Test.

6. Steps for conducting CMT

- Discard the foremilk.
- Draw one or two squirts of milk from each quarter into a paddle dish.
- Follow the order Left front, Left Rear, Right Rear then Right front.



1

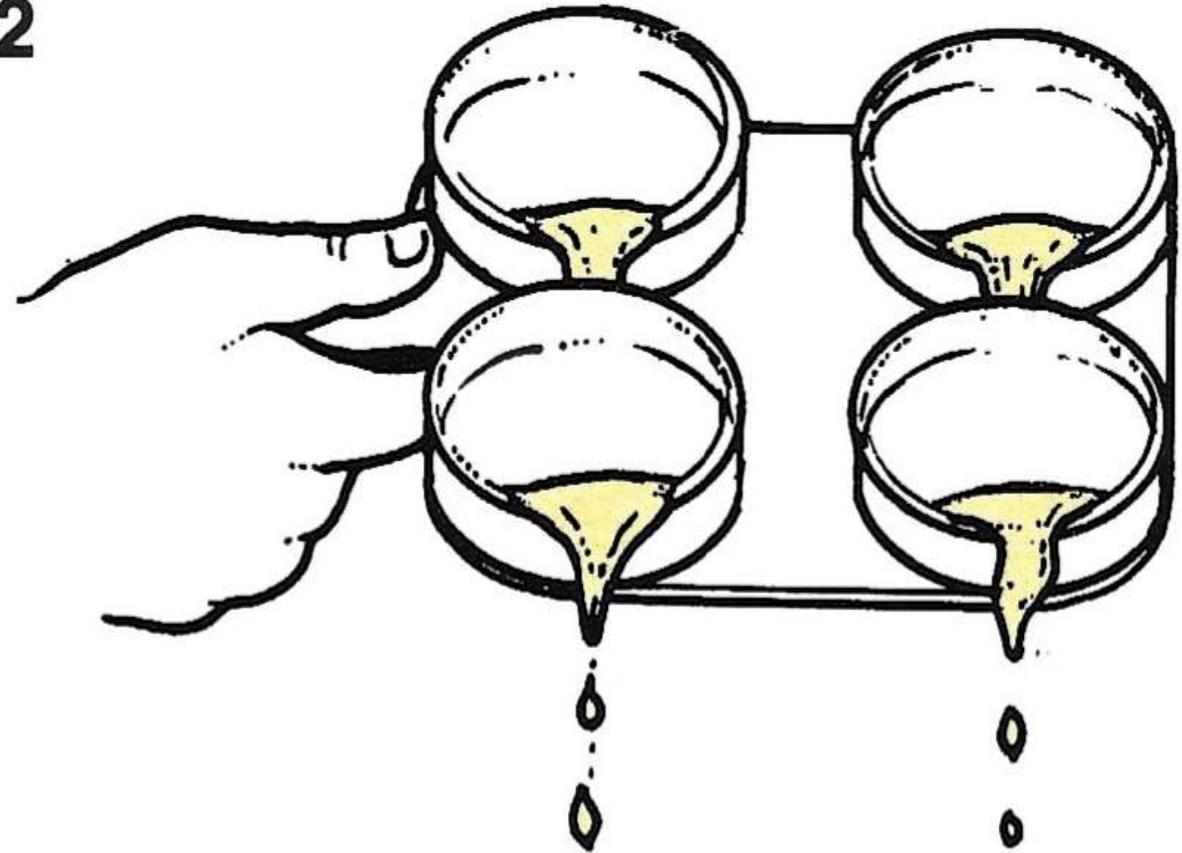


6.1 Steps for conducting CMT Cont'd...

- Discard excess milk. This way you have equal amounts of milk in each cup. Also, you are safe on the use of test liquid.



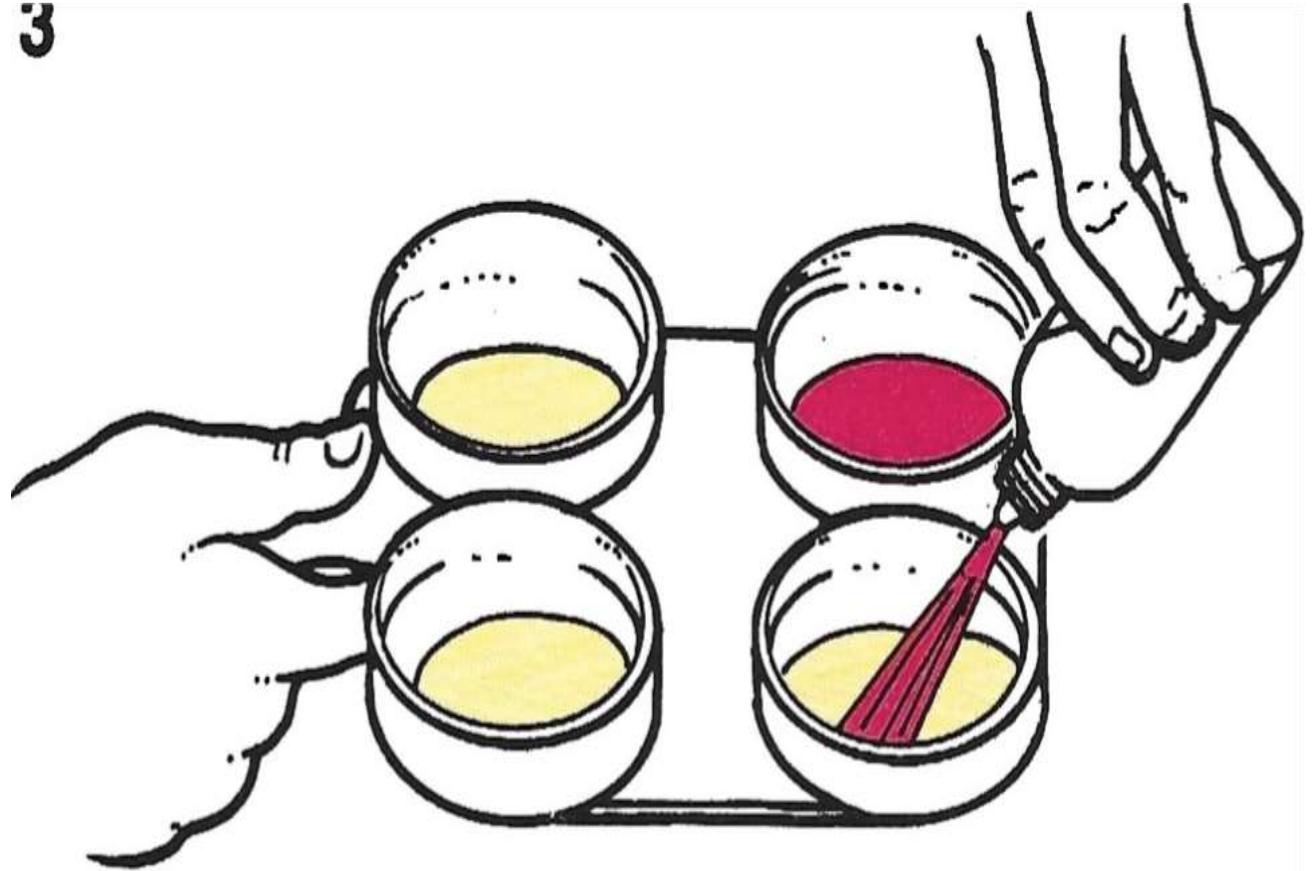
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6.2 Steps for conducting CMT Cont'd...

- Add an equal amount of reagent compared to the volume of milk.

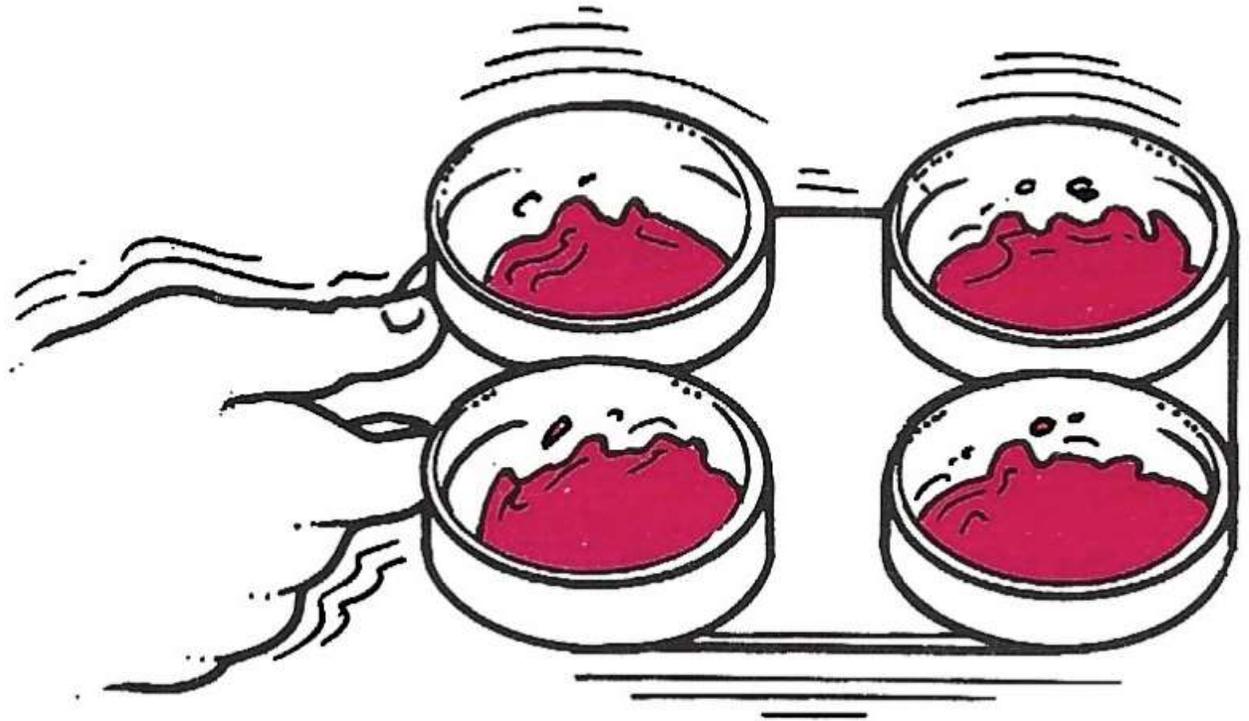
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6.3 Steps for conducting CMT Cont'd...

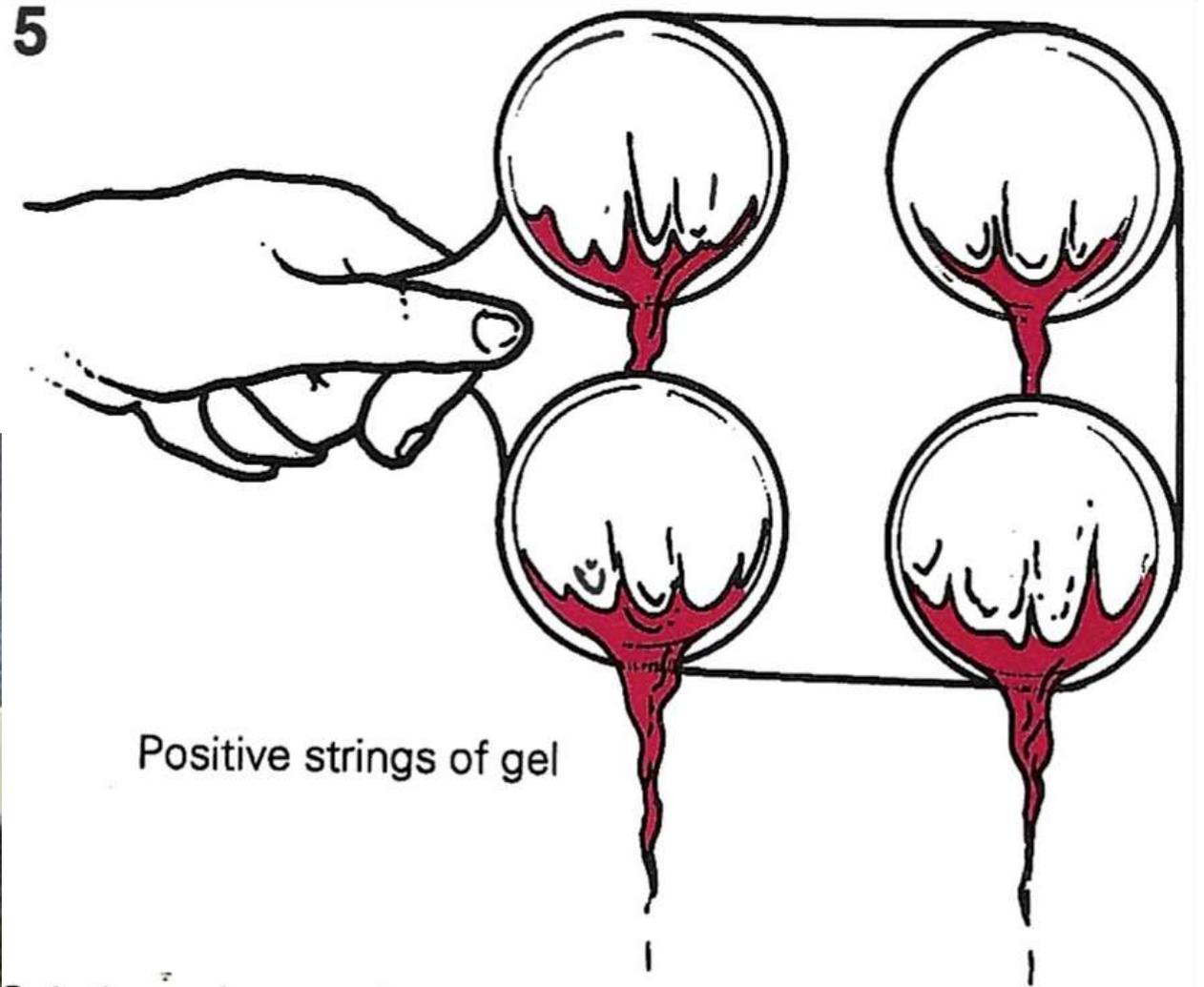
- Mix the milk and the reagent. Please do not use your fingers.
- If necessary use a stick.

4



6.4 Steps for conducting CMT Cont'd...

- Solutions are examined for the presence of a gel or slime reaction.
- Gelatinous 'strings' indicate a high cell count.



7. Video illustrating CMT

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8. CMT results

Test outcome	Result	Score	Description	SCC
	Negative	-	Mixture remains liquid. No slime or gel form. It can drip out of the paddle well.	< 400,000
	Trace	+	Mixture becomes slimy or gel like. It is seen to best advantage by tipping paddle back and forth, observing mixture as it flows over the bottom of cups.	> 400,000
	Weak Positive	++	Mixture distinctly forms a gel.	
	Clear positive	+++	Mixture thickens immediately, tends to form jelly. Swirling cup moves mixture in, towards center exposing outer edges of the cup.	> 1,000,000

8.1 CMT results Cont'd: Analysis and recording

Ear tag number	Left Front	Left Rear	Right Rear	Right Front
UG1234AB	-	-	-	-
UG5678UK	-	+++	+	-
UG4567KL	-	-	-	-
UG8889BN	++	++++	++	++
UG3355VN	-	+	-	-
UG9876BF	-	-	-	-

Write the results down carefully and analyze them;

- Check how many cattle and quarters are affected (20% or less of the quarters showing a positive result is acceptable).
- What kind of cattle are having positive results, old vs. young, start lactation vs. end of lactation, breed, etc.
- Which quarters are affected. (Right handed people have most difficulties with milk the left rear quarter.)

Example of how to fill the results of a CMT test.

- Make sure each cow can be recognized on the sheet either by name or ear tag number.
- Write the results down per quarter;
 - RF = right front
 - RR = right rear
 - LR = left rear
 - LF = left front

8.2 CMT results Cont'd: Analysis and recording

Ear nr.	Name cow	RF	RB	LB	LF
1	Ntendegyere	+		++	+
2	Ngabo ya Mpuga	-	-	-	+
3	Shamitu	-	-	+	-
4	Ihinda ya moses	-	-	+	+
5	Kirembe	-	-	-	-
6	Mayenje	-	-	+	+
7	Kyasha	+	-	+	-
8	Nshara	+	+	++	++
9	Mpuga	-	-	-	+
10	Ibara	+	-	-	++

Findings:

- More than 20% shows a positive CMT
- Most cases are found on left quarters

The table alongside are real figures as found in a trial in the field;

Analysis:

- The fact that most cases are found in left quarters can indicate a problem with the milk technique.
- Most milkers sit on the right side of the cow, so milking the left quarters is more difficult.
- This herd clearly has a problem with halve of the quarters with a high CMT test result.
- Now check the results of the questionnaire to come to an improvement plan.

9. Checklist Questionnaire

Questionnaire part 1: Cleanliness and hygiene

Questions	Bad or not done	Unsatisfactory	Satisfactory	Good	Very good
Cleanliness & hygiene					
How clean is the place of milking (milking parlour)?			✓		
How clean are the udders of the cattle?				✓	
How clean are the milker's clothes?				✓	
How clean are the milk buckets?					
How are the milk buckets and cans stored?				✓	
The cleanliness of the buckets and cans					✓

- The checklist is made as a tool to assess the milking procedures in combination with CMT.
- The CMT test gives you an objective score on the udder health. When the CMT test results are good, it is likely the milking procedure is also good. When the the CMT test result is not good (>20% positive), the checklist should be a tool to look for where to improve.
- The checklist basically looks for two items:
 - i. Cleanliness & hygiene (This effects mostly milk quality),
 - ii. The way of milking (This has most effect on udder health).
- The milking technique is especially very important.
- According to the results, you can make a plan with the farmer how and when to improve.

9.1 Checklist Questionnaire Cont'd...

Questionnaire part 1: Milking technique					
Questions	Bad or not done	Unsatisfactory	Satisfactory	Good	Very good
Milking					
How is the cleaning and the massage of the udder done?		✓			
How are paper or clothed towels used?			✓		
How is the use of detergent and soap done?		✓			
How are disinfectants used?				✓	
How dry is the udder before milking?				✓	
How is the fore stripping / removal of first milk done?	✓				
How is the milking technique?		✓			
How is the post milk dipping done?	✓				

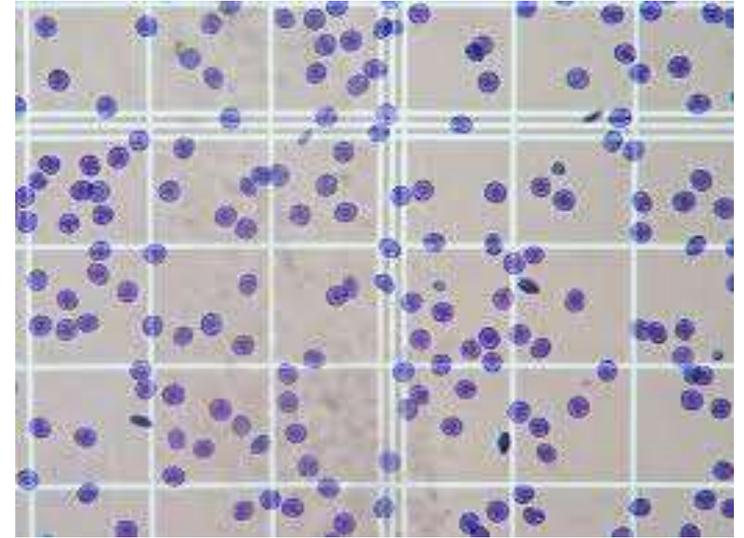
- In this part of the questionnaire the most important question is; How is the milk technique?
- Experience learned that a lot of improvement is possible here in many farms.
- To solve this issue is very difficult, because the milkers have to be re-educated.
- If you now combine the results of the CMT sheet with the questionnaire it becomes clear where improvements can be made.
- The results of the CMT test support the urgency to take action.

10. Other ways of measuring Somatic Cell Count

- In the past somatic cell count was measured by putting a certain amount of milk on a glass plate with a grid (coulter counter), colouring the cells and then visually counting the cells one by one by looking through a microscope. This requests a lot of time and effort.
- Nowadays there are also automated systems. For instance, Foss, Delta Instruments, De Laval and Lactoscan make these cell counters.
- They are reliable, but price can be a constrain and it is not recommended to use them in the milking parlour.



Automatic Somatic Cell Counters



This is what you see when looking through the microscope

11. Principle behind CMT

- The CMT test is also called the T-pol test.
- T-pol is a cleaning detergent which binds with the DNA of the cells and forms a gel.
- T-pol is mostly industrially used. In commercial CMT test, often bromo-cresol is used to turn sour (mastitis) milk dark blue.
- The commercial solutions are relatively expensive. A good alternative for T-pol are most ordinary dish wash detergents. They do exactly the same and give reliable test results.
- In India they call it for that reason the Surf test, while in England the P&G brand fairy is used. The Dutch know this brand as Dreft.
- Do not dilute the detergent before use!

T-pol and dish
wash detergents

