

Preventing Identifying and Treating Mastitis in Small Ruminant Dairy Animals

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QMPS Assistant



What Is QMPS?

(Quality Milk Production Services)

- Established in 1946
- Formerly known as the New York State Mastitis Program
- Part of the Animal Health Diagnostic Laboratory at Cornell University



1948



1948

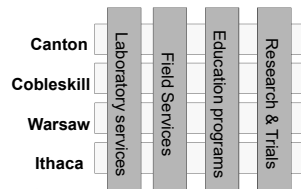


2008

Quality Milk Production Services



The mission of QMPS is to meet the needs of producers, veterinarians, and the dairy industry through *integrated* on-farm service, diagnostics, education, and research



Identifying, Treating, and Preventing Mastitis in Small Ruminants



Objectives

- Mastitis-The Disease and Costs
- Somatic cells and their effects
- Mastitis Pathogens and Management
- Mastitis pathogenesis
- Milk quality measurements
- Mastitis Prevention



Mastitis Definitions






Intramammary Infections

Inflammatory Definition -mast: mastos 'breast' or 'mammary'
-it is: inflammatory diseases

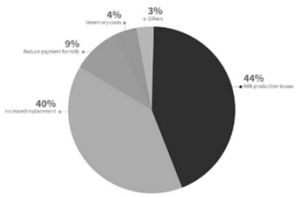
Clinical Definition

Bacterial Definition

Economic Definition \$

Cost of Mastitis




Clinical Mastitis Cost: \$293/case
Subclinical Mastitis Cost: \$78/goat/year


SOMATIC CELL COUNT	SHEEP	GOATS
1,000,000	-14.1%	-11.4%
2,000,000	-17.1%	-13.5%
3,000,000	-20.2%	-14.2%

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<https://aboutsmallfarms.com/analytic-costs-mastitis-sheep-goats/>

• Clinical mastitis:

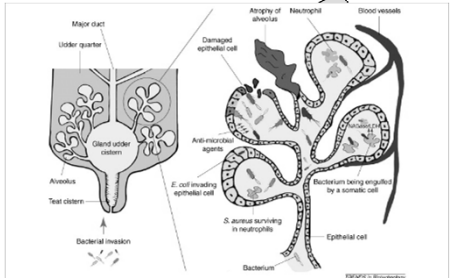


• Subclinical mastitis:



Mastitis Pathogenesis

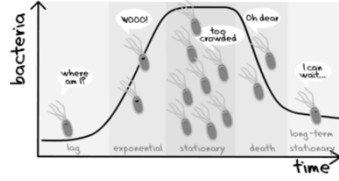
Intramammary Infections



Udder diagram from www.cell.com Trends in Biotechnology

Mastitis...

A pathogen party in the udder

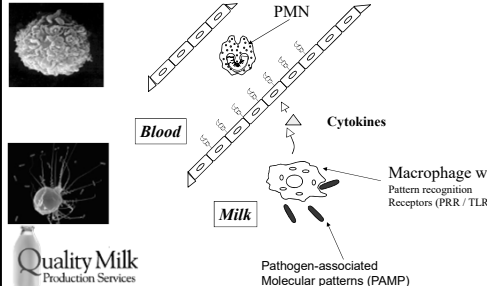


Graph from: Small Things Considered

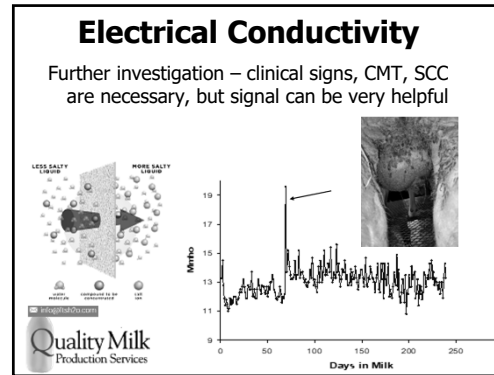
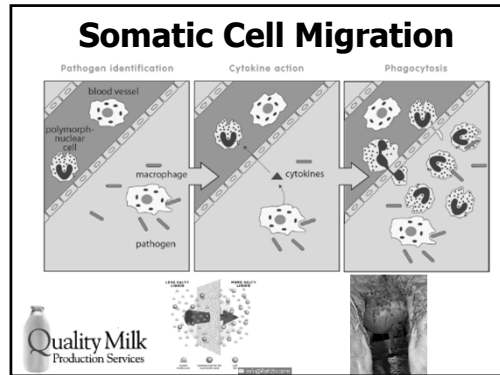
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What do you need to thrive?

Macrophages recognize pathogens



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Measurements of Milk Quality

- Bacterial Counts
 - Standard Plate Count (<100,000 cfu/ml)
 - Pre-incubation Count
 - Laboratory Pasteurized Count
 - Coliform Count
- Somatic Cell Counts (<1,500,000 cells/mL - goats)
- Antibiotic Residues & Inhibitors
- Sediment
- Added Water

Test/Procedure	Standard Standard ¹	Regulatory Standard ²
Standard Plate Count	< 10,000	≤ 100,000
Laboratory Pasteurization Count	< 200 - 300	none
Preliminary Incubation Count	50,000 - 100,000 <i>colony forming units</i> < SPC	none
Coliform Bacteria Count	< 50	California < 7500

¹All counts expressed as colony forming units per ml.

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Bacteria Counts

- Standard Plate Count
 - CFU/ml of aerobic bacteria (32° F), (<100,000 cfu/ml)
 - Cleaning (equipment, teats), cooling, mastitis
- Pre-incubation Count
 - CFU/ml of bacteria at cool temperatures (55° F), (<50-100,000 cfu/ml)
 - Equipment sanitizing, cleaning, hot water, rubber parts,
- Lab Pasteurized Count
 - CFU/ml of thermophilic bacteria (145° F), (<100-200 cfu/ml)
 - Sporeforming bacteria, environment, equipment cleaning, animals
- Coliform Count
 - CFU/ml of coliform bacteria, (<10-50 cfu/ml)
 - milking procedures, environmental hygiene, animal hygiene

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Effect of Somatic Cells on Milk

	High level	Low level	SE
Somatic Cell Count (Log ₁₀)	6.40 A	5.56 B	0.142
Protein (%)	5.27	5.32	0.140
Casein (%)	4.25	4.39	0.072
Whey Protein (%)	1.08	1.03	0.086
Non Protein Nitrogen (%)	0.06	0.05	0.003
Urea (mg/ml)	31.65 B	33.07 A	0.303
Lactose (%)	4.38 B	4.71 A	0.085
Total Bacterial Count (Log ₁₀)	5.99	6.04	0.057
pH	6.79 A	6.68 B	0.006
Titratable acidity (*SH/50 ml)	3.66	4.39	0.263
Calcium (g/l)	1.89	1.93	0.028
Phosphorus (g/l)	1.42	1.35	0.030
Freezing point (°C)	-0.553	-0.557	0.001
r (min) - Cooling time	24.11 A	19.96 B	1.181
K ₂₃ (min)	1.38	1.45	0.095
α30 (mm)	25.50	51.54	5.325
Non reactive milk samples (%)	63.50	32.50	-

On the row different letters are significant at P<0.05; capital different letters are significant at P<0.01. (J. Am. Dairy Sci., 4 (Nov. 21), 341-347, 2011)

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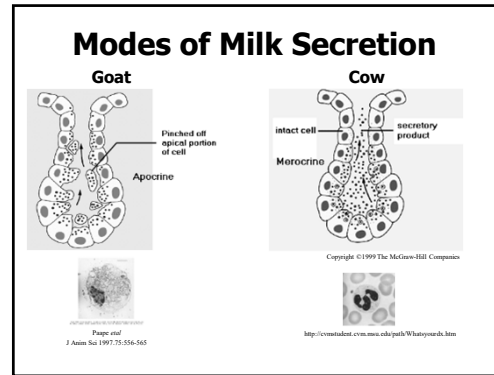
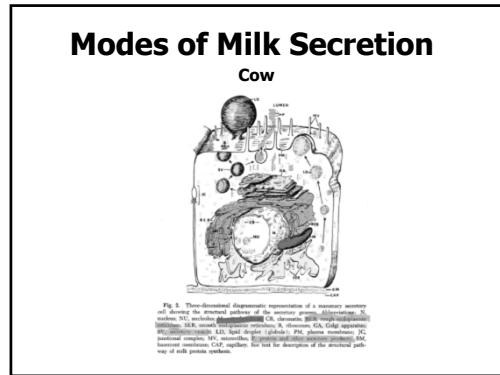
Studies show that sheep milk with a SCC<1,000,000 decreased the cheese yield and increases the development of rancid flavors in the cheese (Jaeggi, 2001).

Effect of Somatic Cells on Milk/Product Quality

Parameter	2%			12%			2%			12%			2%			12%		
	Mean	SD	SEM	Mean	SD	SEM	Mean	SD	SEM	Mean	SD	SEM	Mean	SD	SEM	Mean	SD	SEM
Protein (%)	3.17	0.01	0.001	3.17	0.01	0.001	3.17	0.01	0.001	3.17	0.01	0.001	3.17	0.01	0.001	3.17	0.01	0.001
Casein (%)	2.45	0.01	0.001	2.45	0.01	0.001	2.45	0.01	0.001	2.45	0.01	0.001	2.45	0.01	0.001	2.45	0.01	0.001
Whey Protein (%)	0.72	0.01	0.001	0.72	0.01	0.001	0.72	0.01	0.001	0.72	0.01	0.001	0.72	0.01	0.001	0.72	0.01	0.001
Non Protein Nitrogen (%)	0.05	0.001	0.000	0.05	0.001	0.000	0.05	0.001	0.000	0.05	0.001	0.000	0.05	0.001	0.000	0.05	0.001	0.000
Urea (mg/ml)	31.65	0.50	0.050	31.65	0.50	0.050	31.65	0.50	0.050	31.65	0.50	0.050	31.65	0.50	0.050	31.65	0.50	0.050
Lactose (%)	4.38	0.01	0.001	4.38	0.01	0.001	4.38	0.01	0.001	4.38	0.01	0.001	4.38	0.01	0.001	4.38	0.01	0.001
Total Bacterial Count (Log ₁₀)	5.99	0.01	0.001	5.99	0.01	0.001	5.99	0.01	0.001	5.99	0.01	0.001	5.99	0.01	0.001	5.99	0.01	0.001
pH	6.79	0.01	0.001	6.79	0.01	0.001	6.79	0.01	0.001	6.79	0.01	0.001	6.79	0.01	0.001	6.79	0.01	0.001
Titratable acidity (*SH/50 ml)	3.66	0.01	0.001	3.66	0.01	0.001	3.66	0.01	0.001	3.66	0.01	0.001	3.66	0.01	0.001	3.66	0.01	0.001
Calcium (g/l)	1.89	0.01	0.001	1.89	0.01	0.001	1.89	0.01	0.001	1.89	0.01	0.001	1.89	0.01	0.001	1.89	0.01	0.001
Phosphorus (g/l)	1.42	0.01	0.001	1.42	0.01	0.001	1.42	0.01	0.001	1.42	0.01	0.001	1.42	0.01	0.001	1.42	0.01	0.001
Freezing point (°C)	-0.553	0.001	0.000	-0.553	0.001	0.000	-0.553	0.001	0.000	-0.553	0.001	0.000	-0.553	0.001	0.000	-0.553	0.001	0.000
r (min) - Cooling time	24.11	0.50	0.050	24.11	0.50	0.050	24.11	0.50	0.050	24.11	0.50	0.050	24.11	0.50	0.050	24.11	0.50	0.050
K ₂₃ (min)	1.38	0.01	0.001	1.38	0.01	0.001	1.38	0.01	0.001	1.38	0.01	0.001	1.38	0.01	0.001	1.38	0.01	0.001
α30 (mm)	25.50	0.50	0.050	25.50	0.50	0.050	25.50	0.50	0.050	25.50	0.50	0.050	25.50	0.50	0.050	25.50	0.50	0.050
Non reactive milk samples (%)	63.50	0.50	0.050	63.50	0.50	0.050	63.50	0.50	0.050	63.50	0.50	0.050	63.50	0.50	0.050	63.50	0.50	0.050

Statistical analysis was performed by ordinary one-way ANOVA. P-values are shown in the table. P-values are not shown if P-values are not significant. The same group contains the same samples as they would be for SCC 400 CFU/ml.

Quality Milk Production Services



Cellular Immune System Somatic Cells in Goat Milk

Cell Type	"Normal" Milk	"Mastitis" Milk
Total Cells	270,000-2,000,000 cells/ml	659,000-4,213,000 cells/ml
Macrophage	15-41%	8-18%
PMN	45-74%	71-86%
Lymphocytes	9-20%	5-11%
Cytoplasmic Particles	71-306,000 particles/ml	98-231,000 particles/ml

J Dairy Sci 88B: Suppl 1:607-608
© The International Dairy Federation, 2001

Milk Somatic Cells and Lactation in Small Ruminants

W. J. Pezet, Bernard Ponsard, J. Antonio Contreras, J. Juan C. Moreno and A. V. Caporaso

Cell type	Normal milk	Mastitis milk
Total cells	< 100,000	>> 250,000
Leucocytes	>85%	>99%
Macrophages	35%	99-100%
PMN	25%	99-100%
Lymphocytes	25%	99-100%

Cows & Sheep

Cellular Immune System Somatic Cells in Milk

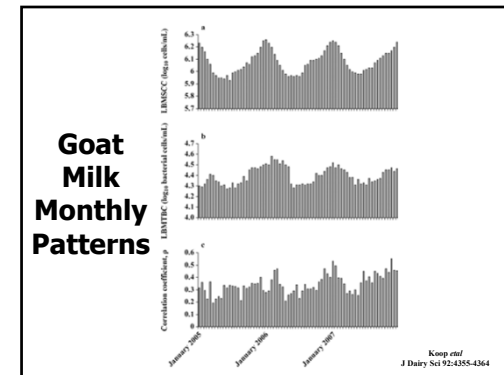
Cell type	Normal milk	Mastitis milk
Total cells	< 100,000	>> 250,000
Leucocytes	>85%	>99%
Macrophages	35%	99-100%
PMNs	25%	99-100%
Lymphocytes	25%	99-100%
Epithelial cells	<15%	<1%

Cellular Immune System Somatic Cells in Milk

Sources of Differences in Somatic Cells

- Immune Responses to infections
- Parity
- Stage of lactation
- Season
- Milk yield
- Stress

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Breed Differences in Goat Somatic Cell Count

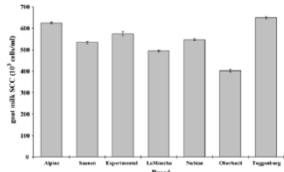


Fig. 7. Effect of breed on composite MSCC for goats. Alpine, n = 9653 goats; Saanen, n = 4619 goats; Experimentel, n = 1185 goats; LaMancha, n = 2851 goats; Nubian, n = 4819 goats; Oberhasli, n = 659 goats; Toggenburg, n = 2641 goats. Mean (± standard error) MSCC are shown.

Page 601
Small Ruminant Research 68(2007)114-125

Regional Differences in Goat Somatic Cell Count

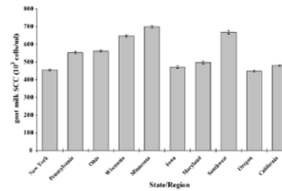


Fig. 9. Herd level composite MSCC for goats by state and region of the United States during 2000-2004. NY, n = 3465 goats; PA, n = 1592 goats; OH, n = 2929 goats; WI, n = 3002 goats; MN, n = 1602 goats; IA, n = 1414; MD, n = 1173; SouthWest, n = 1145 goats; OR, n = 3484 goats; CA, n = 4768 goats. Mean (± standard error) MSCC are shown.

Page 601
Small Ruminant Research 68(2007)114-125

Somatic Cell Count



www.easterndairy.ca



farmfirstdairycooperative.com

California Mastitis Test (CMT)

SQUIRT...

SLURP...
... equal parts CMT solution and milk

SWIRL...
... for 10 – 20 seconds.



California Mastitis Test

CMT	Cells/ml
N (negative)	0 – 200,000
T (trace)	150,000 – 500,000
1 (Weak Pos)	400,000 – 1,500,000
2 (Positive)	800,000 – 5,000,000
3 (Strong Positive)	> 5,000,000

How Do We Determine What Organisms Are Causing Mastitis?

Bulk Tank Screening



Individual Animal Samples



- Cow ID
- Sample Type
- Date

Label vial

Sanitize and wipe dry

Use 70% alcohol
Gauze must be moist, not soaked
Allow teat to dry 15 seconds before sampling

Angle vial

Post-dip

Cool promptly

Aseptic Milk Sampling

Milk Cultures

- Within 24 hours of collection or thawing, set-up tests
- After 48 hours, final identification

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Common Mastitis Pathogens

Contagious Agents

- Staphylococcus aureus*
- Streptococcus agalactiae*
- Mycoplasma bovis*

Environmental Agents

- Escherichia coli*
- Enterobacter aerogenes*
- Klebsiella sp.*
- Streptococcus dysgalactiae*
- Streptococcus uberis*
- Streptococcus sp.*
- Staphylococcus sp.*
- Pseudomonas aeruginosa*
- T. pyogenes*
- Serratia*
- Pasteurella*
- Proteus*
- Yeast

Major Pathogens
* Some response to treatment

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Mastitis Management

There are no intramammary antibiotics that are labeled for use in sheep or goats for the treatment of mastitis. Therefore, all treatment of mastitis for sheep and goats is considered extra-label and must be done on the advice and under the supervision of a veterinarian. Extra-label is the use of any drug that is used for something that is not specifically listed on the label and is only permitted under the written orders of a veterinarian. Does and ewes with clinical mastitis can be very ill and often require other supportive care. The use of intramammary dry off treatment can help with treatment of mastitis during the dry period but **must be done under the direct recommendation and supervision of a veterinarian** as there are no dry treatment antibiotics labeled for sheep and goats.

Michigan State University
<https://www.carr.msu.edu/news/mastitis-in-sheep-and-goats>

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Selective Dry Treatment

- 72.5-79% cure rates of infected quarters with dry treatment
- Selective dry treatment recommended
- Blanket treatment recommended if high prevalence of subclinical mastitis (>30-40%)

Figure 2. Effect of selective or systematic treatment with antibiotics at dry-off on average bulk tank milk SCS (CMSCU) for eight herds for two consecutive lactations. Herds 1 to 4 received selective antibiotic treatment; herds 5 and 8 received systematic treatment. Light bars = lactation during 1997 to 1998; dark bars = lactation during 1998 to 1999. *Significantly lower ($P < 0.0001$) than CMSCU in lactation 1997 to 1998. Adapted from Lourenco et al. (unpublished data).

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What should you examine to prevent mastitis?

- Average claw vacuum at peak flow
- Pulsation under load
- Unit alignment scoring
- Milking routine timing
- Milk flow rate analysis
- Milking efficiency and throughput timing
- Strip yields
- Teat scoring
- Teat-end cleanliness
- Udder cleanliness

Equipment

People

Animals

Perform full NMC evaluation if >6 months since previous

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Main Equipment Components

• The Six Basic Parts of a Milking Machine

- Vacuum Pump
- Regulator or Controller
- Receiver/bucket
- Pulsator
- Milking units (claw, cups and inflations)
- Vacuum Lines



Quality Milk
Production Services

Basic Machine Function

Differential vacuum between claw and pipeline vacuum moves milk through the long milk tube to milk line.



Air pushes milk to milk line in a slug up the long milk tube.

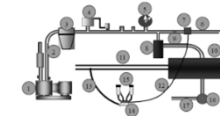


Air vent lowers vacuum in claw relative to milk tube

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Basic Machine Function

- Milk flows in milk line by gravity, not air movement
- Milk line must have a slope of 1% to get the milk to flow to the receiver jar.
- Once in Receiver Jar, milk is pumped across into the Bulk Tank, going from the vacuum to atmospheric pressure.

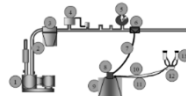


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1 Vacuum pump 2 Vacuum gauge 3 Receiver 4 Pulsator 5 Milking unit 6 Receiver 7 Pulsator 8 Receiver 9 Receiver 10 Receiver 11 Receiver 12 Receiver 13 Receiver 14 Receiver 15 Receiver 16 Receiver 17 Receiver

Basic Machine Function

- Vacuum line from the bucket is plugged into a vacuum source.
- Vacuum is placed on the bucket system to operate the pulsator and apply vacuum to the milking unit(s).



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1 Vacuum pump 2 Vacuum gauge 3 Receiver 4 Pulsator 5 Milking unit 6 Receiver 7 Pulsator 8 Receiver 9 Receiver 10 Receiver 11 Receiver 12 Receiver 13 Receiver 14 Receiver 15 Receiver 16 Receiver 17 Receiver

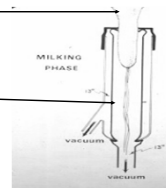
Basic Milking Machine Function

- Vacuum removes milk from teat.

Vacuum differential =
The pressure difference between pressure in the teat and vacuum level in inflation

Positive Pressure inside teat

Vacuum inside inflation

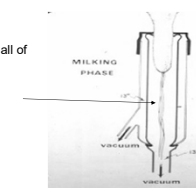


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Basic Milking Machine Function

- Vacuum removes milk from teat.

If we kept the vacuum constant in the claw for all of the milking, what would happen?




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Basic Milking Function

- Vacuum removes milk

Teats would swell due to tourniquet effect, and milk flow stops!





MILKING PHASE


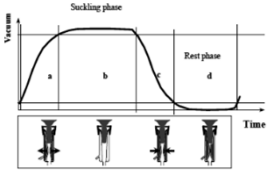


Teat-end Vacuum Levels


<u>Low Line System</u> 34-36 kPa (10.05-10.6" Hg)	<u>Bucket System</u> 44-48 kPa (12.9-14.0" Hg)
<u>High Line System</u> 36-38 kPa (10.6-11.2" Hg)	

Pulsation


THE PULSATION OF MILKING MACHINES
DESIGNED BY HENRI DE VRIES
© 1952
MADE IN THE U.S.A.
BY F. J. C. B. & CO. INC.



Sheep & Goat Milking System Characteristics

- Pulsation rate: 90-120 pulsations/minute
- Pulsation ratio: 60:40
- 40 kPa/11.8" Hg

Species	Teat Diameter (mm)	Flow Rate (ml/min)	Flow Rate (l/h)	Flow Rate (gals/h)	Flow Rate (qt/h)	Flow Rate (lb/h)	Flow Rate (kg/h)	Flow Rate (oz/h)	Flow Rate (lb/d)	Flow Rate (kg/d)	Flow Rate (oz/d)
Sheep	10.0	100	6.0	0.8	0.33	0.70	0.31	0.63	1.5	0.68	1.4
Goat	12.0	150	9.0	1.2	0.50	1.10	0.49	1.0	2.3	1.0	2.2
Small Cow	14.0	200	12.0	1.6	0.67	1.40	0.63	1.3	3.0	1.4	3.1
Large Cow	16.0	300	18.0	2.4	1.00	2.10	0.94	2.0	4.5	2.0	4.4
Human	18.0	400	24.0	3.2	1.33	2.80	1.27	2.8	6.0	2.7	6.0
Human (milk)	20.0	500	30.0	4.0	1.67	3.50	1.59	3.5	7.5	3.4	7.5
Human (urine)	22.0	600	36.0	4.8	2.00	4.20	1.88	4.2	9.0	4.1	9.0
Human (blood)	24.0	800	48.0	6.4	2.67	5.60	2.54	5.6	12.0	5.4	12.0
Human (bile)	26.0	1000	60.0	8.0	3.33	7.00	3.15	7.0	15.0	6.8	15.0
Human (saliva)	28.0	1200	72.0	9.6	4.00	8.40	3.78	8.4	18.0	8.2	18.0
Human (sweat)	30.0	1500	90.0	12.0	5.00	10.50	4.73	10.5	23.0	10.4	23.0
Human (tear)	32.0	2000	120.0	16.0	6.67	14.00	6.30	14.0	30.0	13.6	30.0
Human (milk)	34.0	2500	150.0	20.0	8.33	17.50	7.93	17.5	38.0	17.2	38.0
Human (urine)	36.0	3000	180.0	24.0	10.00	21.00	9.46	21.0	45.0	20.4	45.0
Human (blood)	38.0	4000	240.0	32.0	13.33	28.00	12.58	28.0	60.0	27.2	60.0
Human (bile)	40.0	5000	300.0	40.0	16.67	35.00	15.70	35.0	75.0	34.0	75.0
Human (saliva)	42.0	6000	360.0	48.0	20.00	42.00	18.82	42.0	90.0	40.8	90.0
Human (sweat)	44.0	8000	480.0	64.0	26.67	56.00	25.24	56.0	120.0	54.4	120.0
Human (tear)	46.0	10000	600.0	80.0	33.33	70.00	31.56	70.0	150.0	68.0	150.0
Human (milk)	48.0	12000	720.0	96.0	40.00	84.00	37.88	84.0	180.0	81.6	180.0
Human (urine)	50.0	15000	900.0	120.0	50.00	105.00	47.31	105.0	230.0	104.4	230.0
Human (blood)	52.0	20000	1200.0	160.0	66.67	140.00	63.01	140.0	300.0	136.0	300.0
Human (bile)	54.0	25000	1500.0	200.0	83.33	175.00	78.76	175.0	380.0	171.6	380.0
Human (saliva)	56.0	30000	1800.0	240.0	100.00	210.00	94.59	210.0	450.0	203.6	450.0
Human (sweat)	58.0	40000	2400.0	320.0	133.33	280.00	125.45	280.0	600.0	271.2	600.0
Human (tear)	60.0	50000	3000.0	400.0	166.67	350.00	156.31	350.0	750.0	338.8	750.0
Human (milk)	62.0	60000	3600.0	480.0	200.00	420.00	187.17	420.0	900.0	406.4	900.0
Human (urine)	64.0	80000	4800.0	640.0	266.67	560.00	251.02	560.0	1200.0	543.2	1200.0
Human (blood)	66.0	100000	6000.0	800.0	333.33	700.00	314.87	700.0	1500.0	680.0	1500.0
Human (bile)	68.0	120000	7200.0	960.0	400.00	840.00	378.72	840.0	1800.0	816.0	1800.0
Human (saliva)	70.0	150000	9000.0	1200.0	500.00	1050.00	473.57	1050.0	2300.0	1044.0	2300.0
Human (sweat)	72.0	200000	12000.0	1600.0	666.67	1400.00	630.42	1400.0	3000.0	1360.0	3000.0
Human (tear)	74.0	250000	15000.0	2000.0	833.33	1750.00	787.27	1750.0	3800.0	1716.0	3800.0
Human (milk)	76.0	300000	18000.0	2400.0	1000.00	2100.00	945.12	2100.0	4500.0	2036.0	4500.0
Human (urine)	78.0	400000	24000.0	3200.0	1333.33	2800.00	1254.97	2800.0	6000.0	2712.0	6000.0
Human (blood)	80.0	500000	30000.0	4000.0	1666.67	3500.00	1564.82	3500.0	7500.0	3388.0	7500.0
Human (bile)	82.0	600000	36000.0	4800.0	2000.00	4200.00	1874.67	4200.0	9000.0	4064.0	9000.0
Human (saliva)	84.0	800000	48000.0	6400.0	2666.67	5600.00	2514.52	5600.0	12000.0	5432.0	12000.0
Human (sweat)	86.0	1000000	60000.0	8000.0	3333.33	7000.00	3144.37	7000.0	15000.0	6800.0	15000.0
Human (tear)	88.0	1200000	72000.0	9600.0	4000.00	8400.00	3784.22	8400.0	18000.0	8160.0	18000.0
Human (milk)	90.0	1500000	90000.0	12000.0	5000.00	10500.00	4733.07	10500.0	23000.0	10440.0	23000.0
Human (urine)	92.0	2000000	120000.0	16000.0	6666.67	14000.00	6302.92	14000.0	30000.0	13600.0	30000.0
Human (blood)	94.0	2500000	150000.0	20000.0	8333.33	17500.00	7872.77	17500.0	38000.0	17160.0	38000.0
Human (bile)	96.0	3000000	180000.0	24000.0	10000.00	21000.00	9452.62	21000.0	45000.0	20360.0	45000.0
Human (saliva)	98.0	4000000	240000.0	32000.0	13333.33	28000.00	12552.47	28000.0	60000.0	27120.0	60000.0
Human (sweat)	100.0	5000000	300000.0	40000.0	16666.67	35000.00	15652.32	35000.0	75000.0	33880.0	75000.0




People factors on Milk Quality





Components of Udder Prep

- Cleaning teats
- Pre-dip
- Fore-strip
- Drying / Wiping
- (Attachment)
- Post-dip



Components of Udder Prep


- **Cleaning teats**
 - Removes debris and bacteria
 - Releases oxytocin
 - Disinfect
 - Pre-dip
 - Udder wash
- **Pre-dip**
 - Reduces new infections by 50%
 - Pre-dip better coverage compared to spray



Quality Milk Production Services

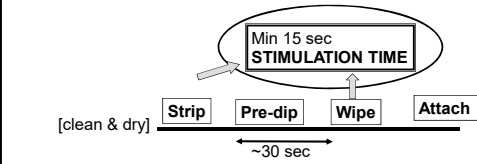
Components of Udder Prep

- **Forestripping**
 - Milk quality
 - Intervene more rapidly
 - Stimulate milk letdown
- **Drying**
 - Disinfects
 - Reduce the risk of liner slips/squawks
 - Focus on the teat end
- **Post-Dip**
 - Reduces new cases of mastitis by ~ 50%
 - >75% coverage is necessary

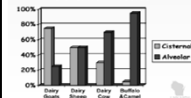


Quality Milk Production Services

Udder Preparation



Proportion of Milk Stored in Cistern / Alveolus



Although the cisternal compartment stores most of the milk produced in small ruminants, the alveol retains the majority of the milk fat secreted, which can be only efficiently removed when milk ejection occurs (Poulsen et al., 2002).


Animal factors on Milk Quality



Quality Milk Production Services

Teat Condition

- Influenced by a several factors:
 - Effects of milking equipment
 - Mechanical forces exerted by vacuum & liner forces.
 - Milking Management
 - Teat dip, over milking
 - Environment
 - Weather,
 - Goat Factors
 - Risk of New Intramammary Infections



Quality Milk Production Services

Teat End Scoring: Normal

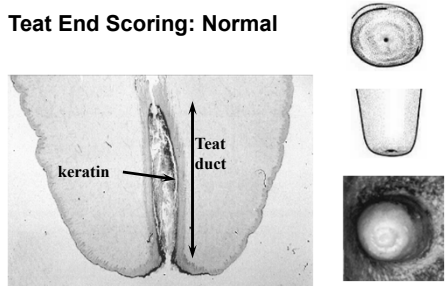


Photo: Utrecht University; Drs A. de Man, Dr Y.H. Schukken & Drs J.P. Koeman

Teat End Scoring: Very Rough Ring

Photo: Utrecht University: Drs A. de Man, Dr Y.H. Schukken & Drs J.P. Koeman

Impact of Teat Lesions

- Increased risk for infection
 - Elevated SCC & Clinical Mastitis
- Decreased milk yield
- Increased milking time

Quality Milk Production Services

A scoring system for teat-end condition (Mein et al. 2001)

Score	Description	Illustration
N(1)	Normal The teat-end is smoothly with a small, even orifice. This is a typical status for many teats soon after the start of lactation	
S(2)	Smooth or Slightly rough ring A raised ring encircles the orifice. The surface of the ring is smooth or it may feel slightly rough but fronds of old dry keratin are not evident	
R(3)	Rough ring A raised, roughened ring with isolated fronds or mounds of old keratin extending 1 - 3 mm from the orifice.	
VR(4)	Very Rough ring A raised ring with rough fronds or mounds of old keratin extending 4 mm or more from the orifice. The rim of the ring is rough and cracked, often giving the teat-end a "flowered" appearance.	

Score Sheet

Teat End Lesion Score Sheet

HERD: Full House Dairy DATE: 12/21/08

SCORER: flw

ID	Quarter				remarks	ID	Quarter				remarks
	LH	LF	RF	RH			LH	LF	RF	RH	
1420	1	1	1	1		1425	1	1	2	1	
1230	2	3	3	2		1355	2	2	2	2	
1399	4	2	2	3		1221	1	2	2	1	
1365	3	3	3	3		1100	2	4	4	1	

Quality Milk Production Services

Teat Cleanliness Score

1 Clean: No manure, dirt or dip

Number of teats scoring 1: _____

Number of teats scoring 2: _____

Number of teats scoring 3: _____

Number of teats scoring 4: _____

Total scores: _____

Percent of teats scoring 3 & 4: _____

Farm Name: _____

Date: _____

UDDER HYGIENE SCORING CARD

Score the udder hygiene on a scale of 1 to 4 using the criteria and pictures below.

Place an X in the appropriate box of the table and count the number of marked boxes under each picture.

lactating cows heifers dry cows

Score 1		Score 2		Score 3		Score 4	
Free of dirt or manure		Slightly covered with dirt/manure (0% of surface area)		Moderately covered with dirt/manure (20-50% of surface area)		Mostly covered with dirt/manure (50-100% of surface area)	
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80

Total number of udder scores: _____

Number of udders score 1: _____

Number of udders score 2: _____

Number of udders score 3: _____

Number of udders score 4: _____

Percent of udders scored 3 and 4: _____

Udders scored 3 and 4 have increased risk of mastitis as compared to scores 1 and 2.

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Questions?



 Quality Milk
Production Services