Milk Quality; Opportunities and Challenges

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Milk Quality matters for whom?

	Poor Quality milk	Good Quality Milk
Consumer	Switches brands	Sticks to the brand
Processor	Does not buy in flush	Look after the farmer
Farmer	1. Production loss 2. Higher vet. Cost	1. Increase Production 2. Lower vet. Cost

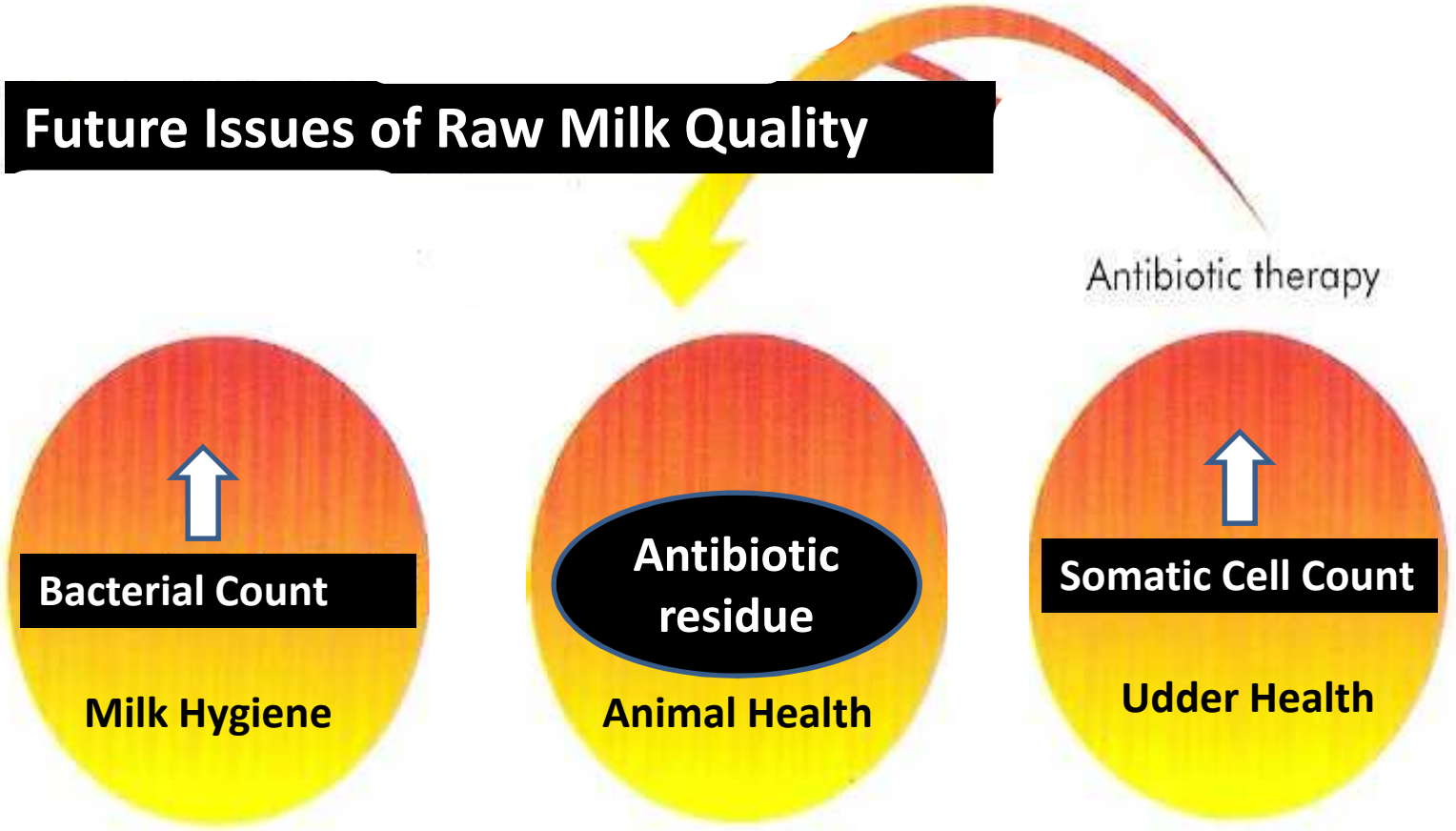
Basics of Milk Quality

- Quality raw milk is required to make Quality dairy products.
- Once raw milk is unpleasant
  - it cannot be improved during processing
  - Unpleasantness often become more obvious

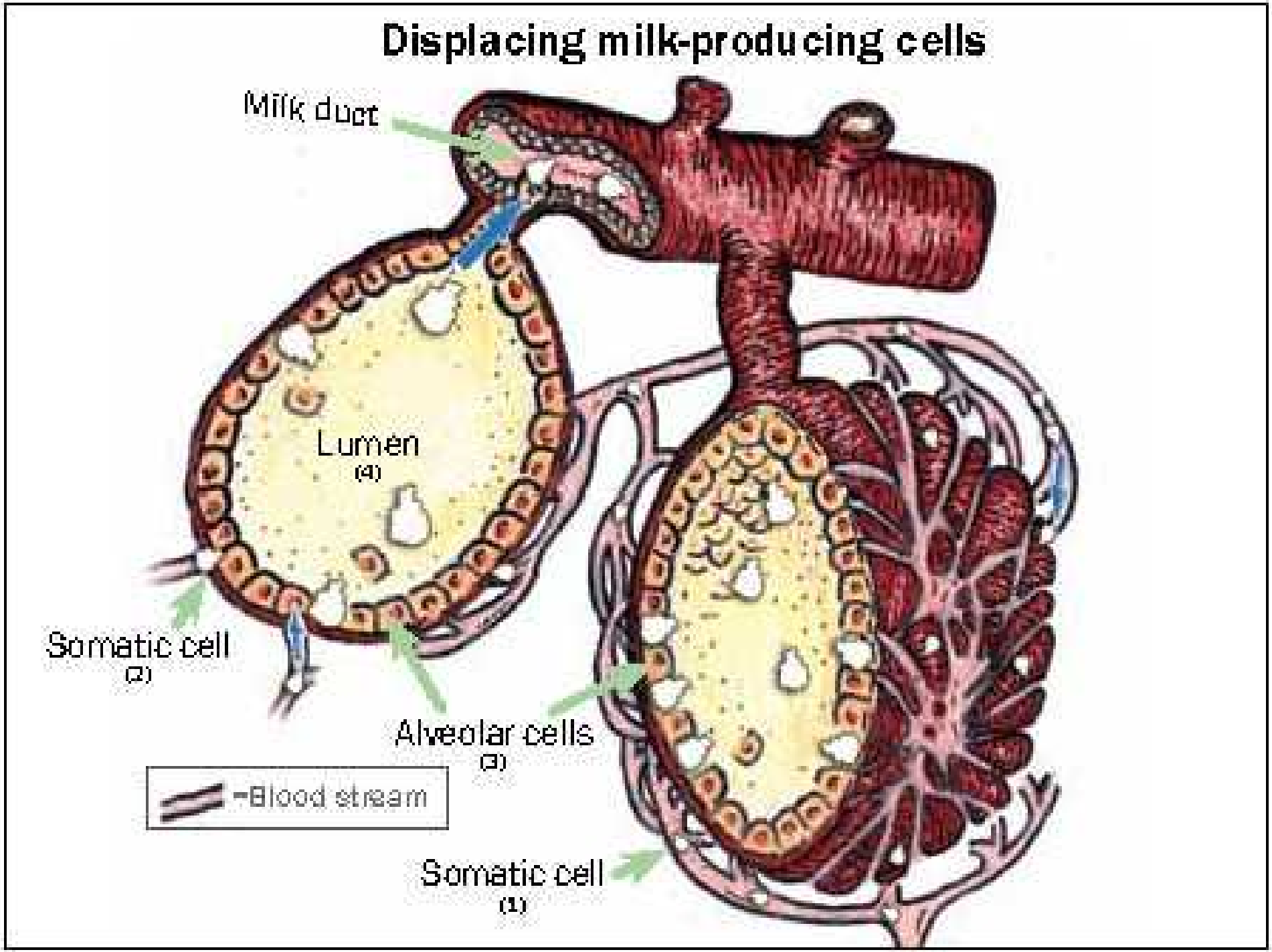
Bec:

- **Contamination cannot be removed once it has occurred**

Future Issues of Raw Milk Quality

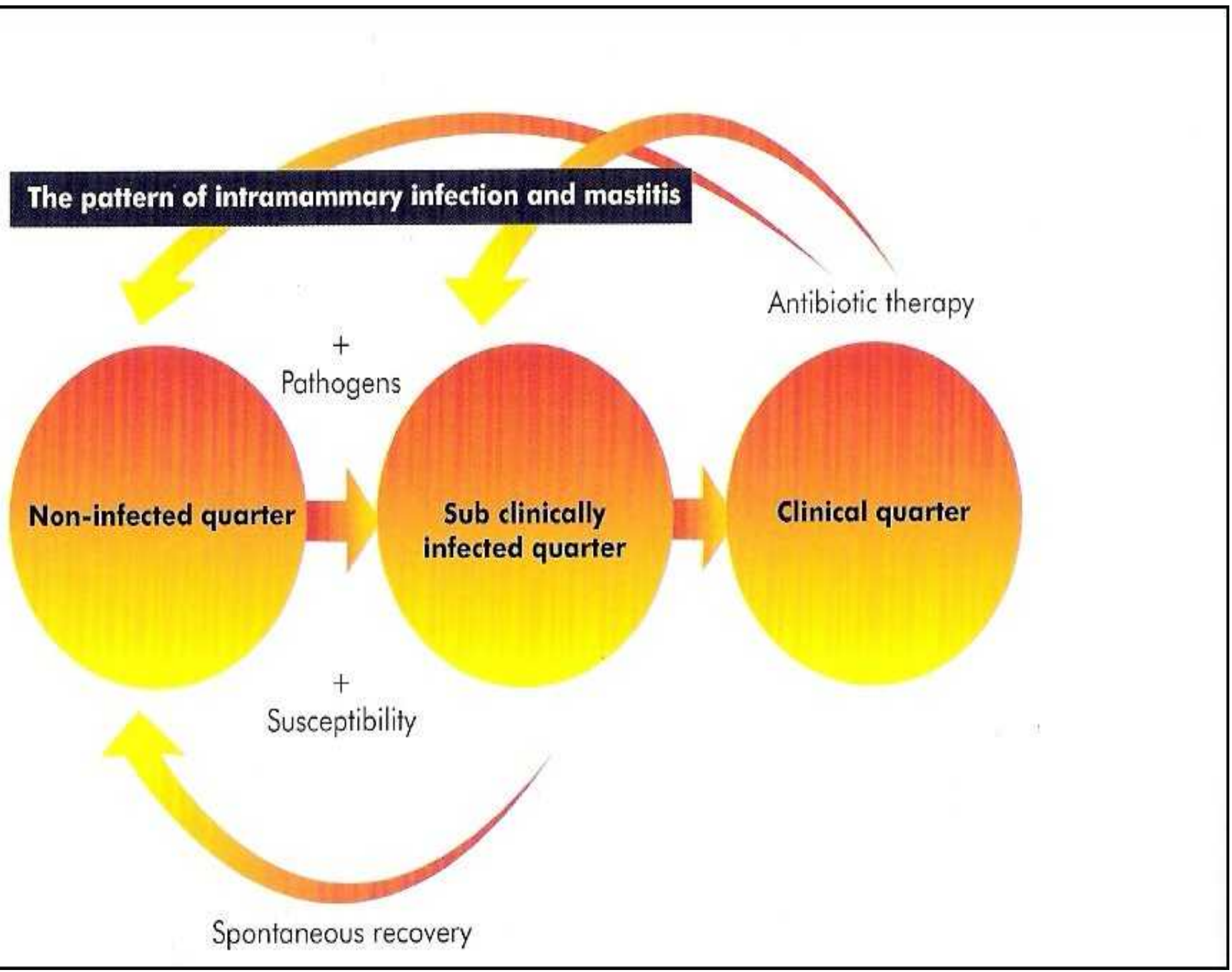


Environment **Cow** **Udder**


Displacing milk-producing cells
Milk duct
Lumen
(4)
Somatic cell
(2)
Alveolar cells
(3)
=Blood stream
Somatic cell
(1)

Somatic Cell Count (SCC)

- Udder Infection (Mastitis); a real challenge
- Bacterial infection;
  - turns on quality defects in milk
    - enzymes associated with the infection
      - These enzymes break down proteins, fats and causes bitterness, rancidity in cheese and pasteurized milk
    - Somatic cells count (SCC) increase
      - Inflammatory process in the cow udder
- SCC exceeding 300,000/ml indicate mastitis in the herd (USA: Legal limit 750,000/ml)


The pattern of intramammary infection and mastitis
Antibiotic therapy
+
Pathogens
Non-infected quarter
Sub clinically infected quarter
Clinical quarter
+
Susceptibility
Spontaneous recovery

Bacterial Contamination

- Bacterial count can increase due to
  - inadequate cleaning of milk equipment
  - poor cooling
  - As a result of mastitis
  - Milk processing
    - Pasteurization and UHT kill a majority of bacteria but Heat-stable enzymes further degrade the processed product
    - Certain bacteria survive pasteurization and can grow under refrigeration, limiting the shelf life of milk products

Antibiotics and Drug Residues

- The most commonly used drugs is the penicillin family
- Antibiotics in milk are a concern due to the
  - risk of allergic reactions
  - development of antibiotic-resistant pathogens
  - Inhibiting dairy starter cultures
- **Chemical** – related enzymes, feed, and health of the cow as well as cleaning chemicals

Sources of Milk contamination

- Somatic Cell Count
  - Milkers' hand and liners of milking unit
  - Wet and unclean bedding
- Bacterial Count
  - Insufficient cleaning of
    - Cow udder and teats
    - Milk transport equipment
- Antibiotic residues
  - More reliance on therapy than management

Effect on BTSCC when removing a high somatic cell count cow from milking. All cows are assumed to produce an equal amount of milk

(Milkproduction.com; 2006)

	Before removal of high SCC cow		After removal of high SCC cow	
Cow	**Cow SCC**	**% of BTSCC**	**Cow SCC**	**% of BTSCC**
1	2,000,000	54	-	-
2	500,000	13	500,000	29
3	400,000	11	400,000	23
4	200,000	5	200,000	12
5	200,000	5	200,000	12
6	50,000	1	50,000	3
7	150,000	4	150,000	9
8	100,000	3	100,000	6
9	75,000	2	75,000	4
10	50,000	1	50,000	3
BTSCC	**372,500**		**191,667**	

Estimated proportion of infected quarters and losses in milk production associated with elevated bulk tank somatic cell counts (BTSCC) (*Eberhart et al.*, 1982)

BTSCC/ml	% infected quarters in the herd	% production loss*
200,000	6	0
500,000	16	7
1,000,000	32	18
1,500,000	48	29

*Relative to BTSCC of 200,000 cells/ml.

Standards for Bulk Tank Milk (per ml)

Parameter	Low	Medium	High
Somatic Cell Count (SCC)	<200,000	200,000-400,000	>400,000
Standard Plate Count (SPC)	<5,000	5,000-10,000	>10,000
Coliform Count	<50	50-100	>100

S. P. Oliver
Extension; Dec. 2010; The University of Tennessee

Quality Check; a management tool

- Regular SCC will help to evaluate
  - Cow health and its resistance
  - Minimize mastitis
  - worker's abilities
- Bacterial Count can help to
  - Get rid of ineffective cleaning practices
  - Assess milk chilling
  - Evaluate worker's abilities
- Antibiotic residues indicate
  - Confidence of the management on their practices

Well Attached fore udder
Possibility of ~ lower SCC

Relatively bulged fore udder
Possibility of ~ higher SCC

How can we improve this situation ?

Carry Home Messages

- **Critical analysis of farm records will help to make viable future decisions**

- **The Ultimate Benefit of Quality Milk prevail over the Costs**

Cornell ensures milk quality
8 000 farms benefit
from ISO/IEC 17025

Clearing feed spill is not everyone's first mental image of what being a professor at the prestigious Cornell University entails.

Prof. Schukken
www.ncbi.nlm.nih.gov.

Thanking for your attention