

It's the "little things" that add up!

Bob James  
Dept. of Dairy Science



---

---

---

---

---

---

---

---

Calving environment

If you were a cow where would you want to calve?



---

---

---

---

---

---

---

---

Colostrum management



Not colostrum again!

---

---

---

---

---

---

---

---

## Colostrum Management

- Quality, quantity, quick and clean
- >85% of 1<sup>st</sup> milking colostrum over 50 g/liter
- Using Brix Refractometer
  - Not temperature sensitive
  - More durable than colostrometer
  - Readings > 22 indicate good quality colostrum
  - RID values > 50mg IgG/mL



---

---

---

---

---

---

---

---

## Clean colostrum

It's a race between bacteria in the environment or the initial feeding and the antibodies in colostrum.



---

---

---

---

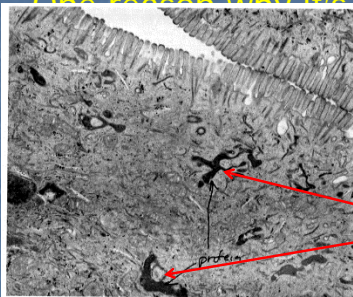
---

---

---

---

## One reason why it's important



Early consumption of colostrum by exposure to ??

Colostrum pro

FIG. 4. Bull epithelial cells from a calf which had received colostrum prior to *E. coli* were analyzed cytoelectronically. Dark aggregations of colostrum protein were in the apical tubular system of the cells (approximately 14,000 $\times$ ).

---

---

---

---

---

---

---

---

## One reason why it's important!

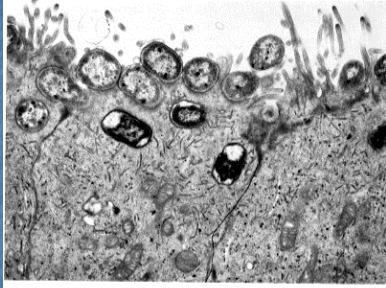


FIG. 2. Apical ends of several ileal epithelial cells from an *E. coli*-exposed calf which had received no colostrum. The inclusions were roughly about the size of *E. coli* attachments. *E. coli* were also within the apical cytoplasm (approximately 16,000x).

Early exposure  
to *E. coli* with  
colostrum in

---

---

---

---

---

---

---

---

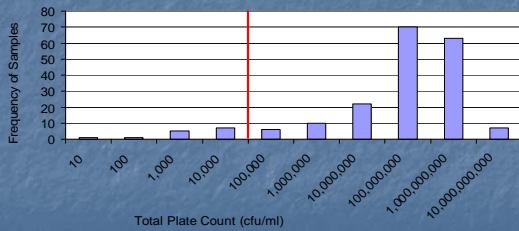
## Total Bacteria Counts in Minnesota Colostrum

(Swan et al. 2007, JDScl. 90)

Median TPC = 615 million cfu/ml (73 to 104 billion)

93% of samples > 100,000 cfu/ml TPC

"We are feeding 'fat-laden' manure" Rob Trembley, 2006



From - S. Godden

---

---

---

---

---

---

---

---

## Pasteurization of colostrum

- **Batch** pasteurize: 60 °C x 60 min
  - No viscosity changes
  - No change in colostrum IgG (mg/ml)
  - Significantly reduce or eliminate *M. paratuberculosis*, *Salmonella*, *Mycoplasma bovis*, *E. coli*, *Listeria*

(McMartin et al. JDScl. 2006. 89:2110  
Godden et al., JDScl. 2006. 89:3476)

---

---

---

---

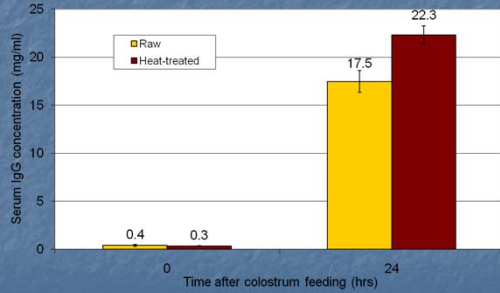
---

---

---

---

### Serum IgG levels were significantly higher in calves fed heat-treated colostrum



Godden et. al, 2006

---

---

---

---

---

---

---

---

### Recent UMN Field Study

M. Donahue, S. Godden

- 1,000 calves / 6 herds
  - ½ fed raw and ½ fed heat-treated colostrum
- Colostrum total plate count and serum IgG – **negative**
- Colostrum IgG concentration – **positive**
- Heat treatment – **positive** – independent of Total plate count
- Colostrum Total Coliform Count and risk of scours – **positive**.

11

---

---

---

---

---

---

---

---

### Disconnect between critical control points! -

- Location
  - Calving area
  - Fresh cow milking
  - Calf housing
- People – who is responsible?
  - Fresh cow milking?
  - Colostrum handling?
  - Calf feeding

12

---

---

---

---

---

---

---

---

## Disconnect cont'd

### Quality

#### Colostrum handling –

- Feed immediately or cool as soon as possible
- Rapid cooling – frozen Coke bottles in bucket.
  - 6 hours at room temp = 6,000,000 cfu/ml

#### Clean containers

- Luke warm water rinse
- Hot soapy water
- Sanitizer
- SPC / sq. in. < 1,000



13

---

---

---

---

---

---

---

---

## Two recent herd visits

### Dairy 1

- >25,000,000 /ml SPC, >15,000 coliform /ml, E. coli - TNTC
- 8 calves < 7 days - serum protein – 3.9 – 4.6 g/dl.

### Dairy 2

- >25,000,000/ml, >15,000 coliform, E. coli TNTC -
- 9 calves < 7 days – serum protein 3.9 – 5.2 g/dl

14

---

---

---

---

---

---

---

---

## Newborn calf protocols

- Facilities for calving to obtain calves as soon as possible
- Clean calving environment
- Colostrum handling protocols – feed or cool ASAP
- Feed calves by bottle as soon as possible as much as they will drink! 2 – 3 quarts
- Esophageal feeder as last resort

---

---

---

---

---

---

---

---



VTDairy—Home of the Dairy Extension Program at Virginia Tech

## Waste milk – benefits and risks!

Bob James

Virginia Tech Virginia Cooperative Extension

---

---

---

---

---

---

---

---

### Quality of incoming milk

Location	PrePasteurization - Aerobic plate count		Fat %		Protein %	
	Low	High	Low	High	Low	High
East	300,000	$1 \times 10^8$	1.5%	4.5%	2.7%	3.8%
West	26,000	$5.9 \times 10^6$	1.2%	12.1%	2.7%	4.7%
WI	6,000	$7.2 \times 10^7$	2.8%	4.7%	2.9%	5.1%

---

---

---

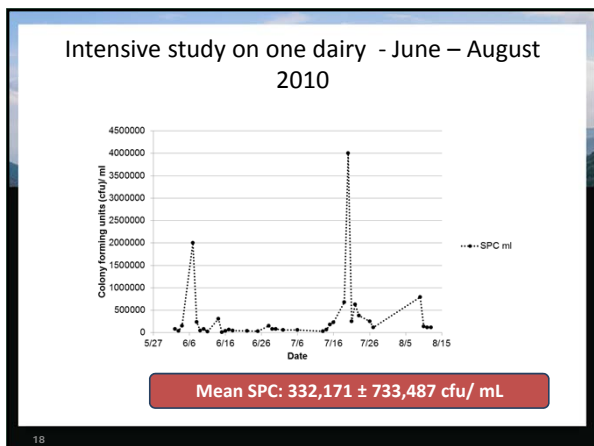
---

---

---

---

---




---

---

---

---

---

---

---

---

### Factors influencing microbial growth in waste milk

- **Exposure** of milk to flies, manure, dirt
- **Cleanliness** of storage tanks and length of **time** milk is held prior to pasteurization.
- **Temperature** of milk during storage
- **Cleanliness** of pasteurization equipment
- **Cleanliness** of bottles, tanks, buckets receiving pasteurized milk.
- Microbial content of milk from the cow

---

---

---

---

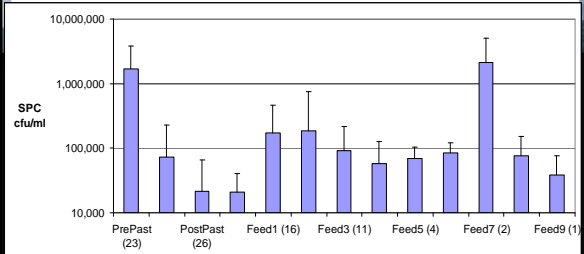
---

---

---

---

### Post pasteurization quality control Sample obtained prior to an every 20 minutes



Aerobic plate counts on 10 western operations

---

---

---

---

---

---

---

---

### Pasteurizer cleaning

- Rinse – **warm** water
- Caustic detergent
- Sanitize with acid cleaner
  
- Never allow HTST unit to run dry. Commercial machines have automatic flow sensors to prevent “cooking” of milk between plates.
- Cleaning “batch” pasteurizers?

---

---

---

---

---

---

---

---

## Cleaning of feeding devices



Cleaning of hoses and nozzles  
Equipment which lends itself to effective cleaning

---

---

---

---

---

---

---

---

---

---

## Cleaning of feeding devices



Manual cleaning of tanks  
can be a challenge!

Gasoline nozzles are not  
Recommended!

23

---

---

---

---

---

---

---

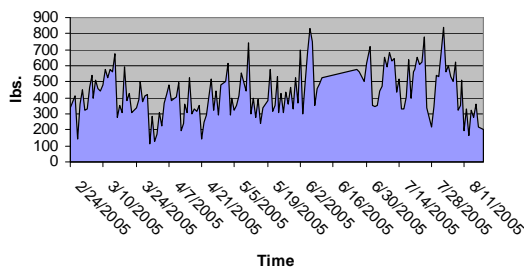
---

---

---

## Farm a

### Daily Variation in Waste Milk Supply



---

---

---

---

---

---

---

---

---

---



## Options to meet shortfall in waste milk supply

### Compromise between nutrition of calf and expense

1. Additional saleable milk from bulk tank
2. Supplement waste milk by adding solids from milk replacer, whey protein and/or fat supplements
3. Switch calves to milk replacer.

28

---

---

---

---

---

---

---

---

## Pasteurizer Conclusions

- Pre Past storage is key
  - Cooled, agitated
- Post Past handling important
  - Automatic tank washers
- Timing is important
  - Milking, storage, pasteurization, feeding
- More waste milk per calf on west coast
- Hot water supply/protocols for employees

---

---

---

---

---

---

---

---



## Little things in feeding calves



---

---

---

---

---

---

---

---

## Variation in Milk Replacer Feeding

- Where does variation arise?
- How big is a cup?
- How full is the cup?
- How much water is added?
- What temperature is the water?
- What is water quality?
- How to reduce variation?

---

---

---

---

---

---

---

---

## Reducing variation?

- Replace cups with scales?
- 12.5% solution = 1.25 lb. powder/8.75 lb. water = 10 lb. final volume.
- Water temperature – finger or thermometer?

---

---

---

---

---

---

---

---

## Water Management

Clean and plenty  
of it!



---

---

---

---

---

---

---

---

## The "little" things are "big" things!

- Dry cow appetite and basic nutrient needs met.
- Calving environment
- Facilities and protocols for colostrum management
- Consistency in liquid feeding program
  - DM% and volume
- Water and calf starter intake to promote early weaning.

---

---

---

---

---

---

---

---