

CoPulsationtm

Milking System

The only humane way to milk an animal with a machine

Dairy Industry History

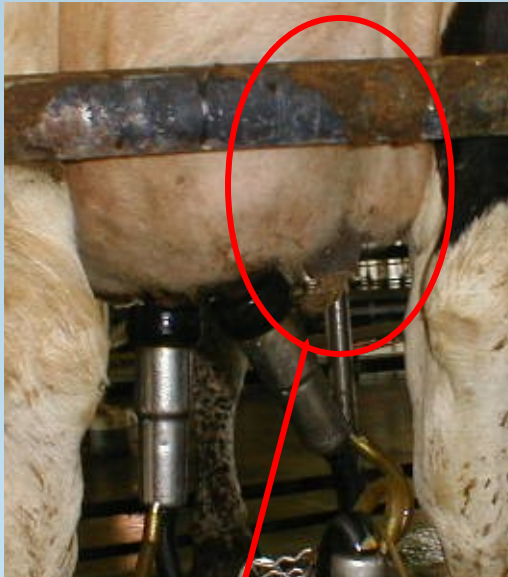
- Electric pulsation introduced in the '60s
- Increasing mastitis and milking problems
- Attempts made to solve problems
 - Pulsation change
 - Alternating (originally designed for 50/50 front, 60/40 rear)
 - 60 ppm – increased from 50 ppm
 - More vacuum pump capacity
 - larger pumps
 - larger airlines, milklines and hoses
 - Automatic take-offs
 - stop hand stripping
- Focus on management and cleanliness by NMC
 - Impact: US cull rate had doubled in 50 years
 - Average animal life = 1.8 lactations

No reduction in the high cost of mastitis and udder health problems

Conventional milking machines proven to cause problems

- Teat damage & teat swelling
 - Irish studies show conventional milking systems cause teat swelling and physical damage (references 1, 2)
- One in four teat canals remain open during the dry period per Randy Dingwell, Atlantic Vet. College
- Teats wetted with milk and bacteria
 - “Since the milking machine is one of the best washing machine ever built, the teats are bathed with milk during the milking process.” Dr. Andy Johnson, NMC meeting 2000
- More mastitis with alternating pulsation (Dr. Reitsma)
- Teat ends pinched during liner closure (Dr. Forbes)

Cows damaged by conventional milking machines



Dead teat, blind quarter from mastitis



Uneven udders caused by mastitis and teat canal damage

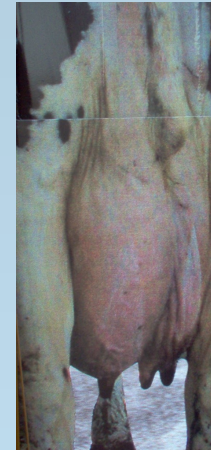
Recognize Damage



Cow at Eurotier 10



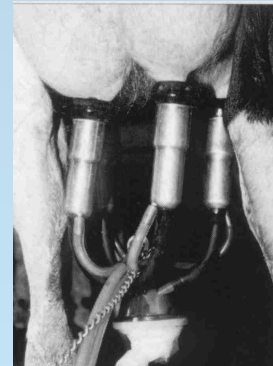
From website for conventional milking machine company



Cow featured in ad for California Dairy



Cow shown in Progressive Dairyman article, obviously lame



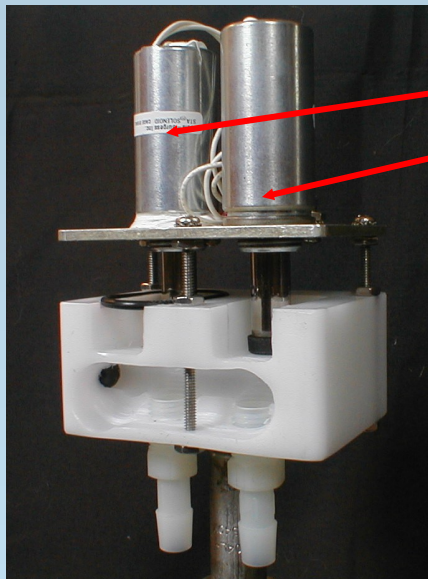
Boumatic Advertisement – udder damage obvious

Lameness caused by udder pain causing cow to walk with feet further apart

CoPulsation™ Milking System

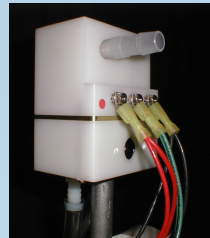
- Innovative pulsator design
 - Moves air in and out of the shell 2 to 3 times faster than a conventional pulsator
 - Prevents connections to air and vacuum being open at the same time
- Liner closes on the full length of the teat
 - Provides a gentle compressive massage
 - Eliminates liner pinch and reverse milking
 - Eliminates liner crawl and squall
 - Eliminates back flow of milk preventing contagious mastitis

CoPulsation™ Milking System

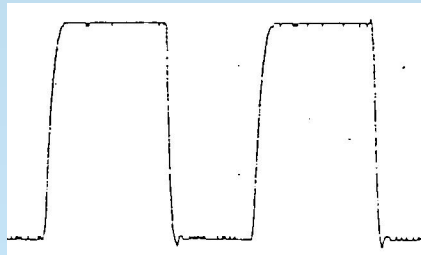


Vacuum solenoid

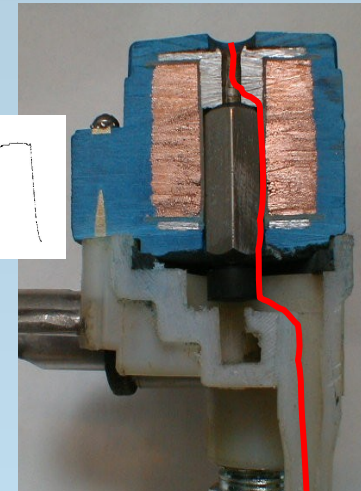
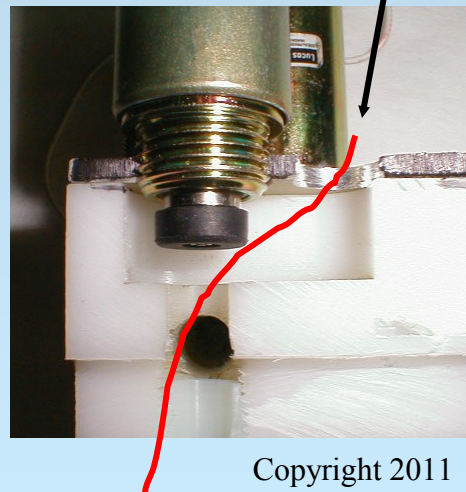
Fresh air solenoid



Fresh air path



Pulsation graph at the shell



Conventional pulsation comparison

Two co-dependent solenoids coordinate air and vacuum to prevent mixing of air and vacuum. Fresh air flows through the pulsator with much less obstruction.

Scientific Evidence

- University study (Journal of Dairy Science)
 - 16:1 reduction in new Staph aureus infections
 - Biased against CoPulsation with initial distribution of infected cows placing more infections in CoPulsation group
 - Study duration too short to evaluate environmental mastitis, more time required to improve teat canal health
- Multi-year side-by-side study (Int'l Dairy Topics)
 - University based data
 - SCC levels reduced 75% with CoPulsation™
 - Overall mastitis levels reduced 50% with CoPulsation™
 - Contagious mastitis virtually eliminated with CoPulsation™
- Teat condition study (Int'l Dairy Topics)
 - No teat swelling caused by CoPulsation™
- Milk flow study (Int'l Dairy Topics)
 - Peak flow rate maintained for about 2/3 of milking duration to only 1/3 of duration for conventional
 - Milking time about 15% faster with CoPulsation™

Dr. Derek Forbes Research

- Milk sampled from cows over several weeks
 - Samples of milk from teat end
 - Samples of milk extracted from teat sinus with syringe
- Milk from teat end contained non-motile bacteria, teat sinus milk bacteria free for several weeks
- Liner pinch shown to push bacteria up canal into sinus to cause infections

Conclusion: liner pinch causes contagious mastitis infections

Objective Evidence

- **Conventional**

- Teat condition
 - Milk wetted teats
 - Swollen/congested teats
 - Red/pink
- Liner pinch
- Flow never stops
- 140 msec C phase

- **CoPulsation™**

- Teat condition
 - Dry
 - No swell, smaller
 - normal color
- Liner massage
- Flow stops during rest
- 60 msec C phase

You can see and feel the difference

Performance benefits

- Compressive liner action massages teat for a gentle, pain free milking
 - No teat swelling, no canal damage, no milk wetting of teat
- Eliminates teat end pinching by liner, prevents reverse milking action by not forcing bacteria up teat canal
 - Calm cows, no liner crawl/squall
- Milk flow fully stops during rest phase allowing tissue around the teat canal to rest
 - No teat canal damage, canals close quickly
- No milk back flow
 - Prevents bacteria contamination of teat
 - Teats dry when machine is removed
- Efficient milk let down
 - Long duration at peak let down
 - Quick completion of milk out works well with auto-detachers

Teat Study

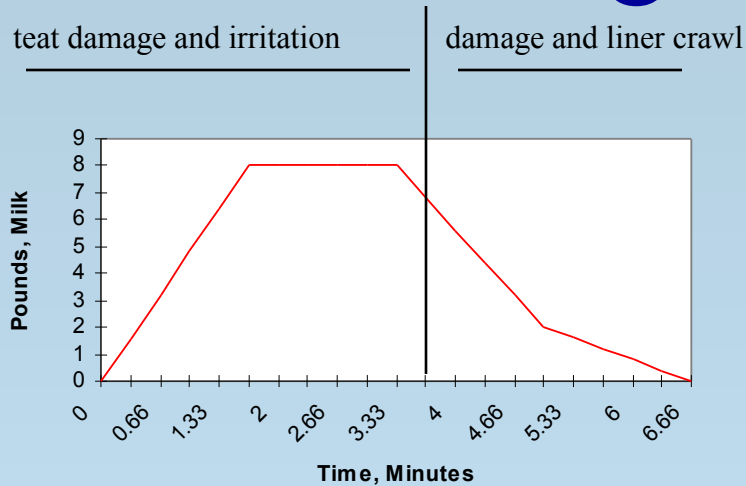


Before milking: 1.2 inches



After milking: 1.0 inches

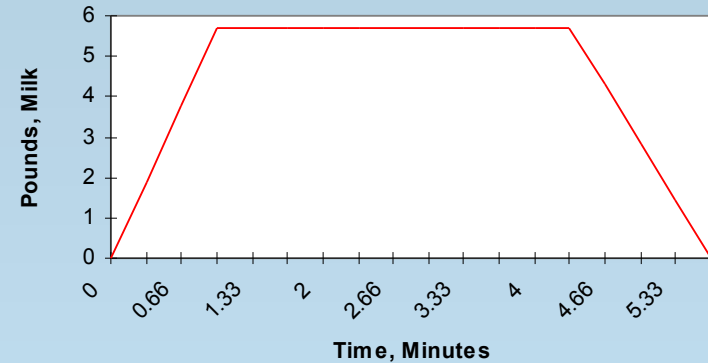
Milking Performance



Conventional

25.7 pounds yielded

The short peak let down of a conventional system is higher because there is no rest for the teat, just a nearly constant sucking that results in pain, swelling and teat congestion. This quickly irritates the teat and causes a reduction in let down about half way through the milking process. This causes the total milking time to be longer even with less total production.



CoPulsation™ Milking System

27.1 pounds yielded

Liner Wear Evaluation



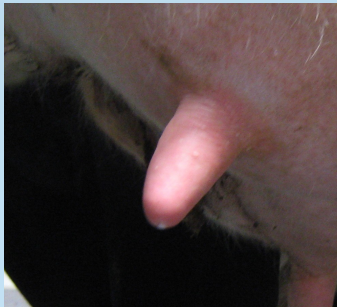
Left two liners used with CoPulsation[™], right liner used with conventional pulsation

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Note: The milk flow stops during the rest phase!

Cows milked with CoPulsation™



Even udders that remain high and not dropped down

Healthy teat end, small canal opening.

Prior to milking and prep

Conventional milking machine impact on consumers

- Staph aureus: thousands of Japanese consumers sickened by Staph aureus endotoxin in June/July 2000, reference 3
- Methicillin-resistant Staph aureus (MRSA) transmitted to humans by dairy milk (US CDC)
- Antibiotics, udder creams contaminate milk
- Inhumane treatment (teat swelling, pain) of dairy cows during milking process, reduced life expectancy for cows (high cull rate)

Studies Proving Problems

- R. Dingwell – teat ends do not close
- Teagasc – teat swelling, canal damage
- U of Wash., Fox – Staph a. spread
- G. Mein – flow rate slow down
- Forbes – reverse milk action
- U. WI – increase mastitis, lameness w/robot
- Udder dissection video

Questions to ask

- How will you cut antibiotic use by 50%?
- How will you increase the average life of a dairy cow by 2 lactations?
- How will you prevent udder and teat damage?

References

- 1 Machine Milking, Irish Veterinary Journal, Volume 56, January 2003, author: Dr Eddie O' Callaghan, Teagasc, Moorepark, Fermoy, Co Cork, Ireland
- 2 Effect of liner design, pulsator setting, and vacuum level on bovine teat tissue changes, Irish Veterinary Journal, Volume 57, May 2004
- 3. Fluid Dairy Product Quality, Boor, Journal Dairy Science 84:1-11
- See CoPulsation.com website and click on “Mastitis Conference Information & Research”

CoPulsation™ Milking System

Making quality
milk a priority!