

## Teat Health Studies

### *Is your Pulsation working Correctly?*

A study was completed to evaluate the effect of milking machines on teat condition for dairy cows. The study compared the typical conventional US milking machine to the CoPulsation™ Milking System. Lactating Holstein cows were randomly selected from multiple herds to measure exterior teat diameter before and immediately after milking. Teat diameter measurement data was also compared to similar prior studies. This study concluded that teats of cows milked with the CoPulsation™ Milking System do not become enlarged from the milking process, but rather are reduced in size. The study further confirmed the fact that cows milked with a conventional milking machine experience teat swelling as a result of the milking process.

#### Introduction

There have been numerous published studies documenting the effect of milking action on the teat. A study published in the Irish Veterinary Journal<sup>1</sup> documents the damage inflicted on the teat by this process when cows are milked with typical modern milking machines. This study evaluates the changes in the teat structure after being milked with both conventional wide and narrow bore liners and the associated typical US style conventional pulsation and the Irish DairyMaster style pulsation. The results are reported using a teat damage index defined as total teat sinus injury (TSI).

The study discovered that both large bore (DairyMaster) and narrow bore (Westfalia-Surge, Delaval and Bou-Matic) milking systems induced teat damage with varying scores of TSI. The study included the slaughter of some of the test animals to enable a detailed evaluation of the degradation of the teat canal lining. It was noted that varying degrees of damage was present corresponding to the TSI scoring.

Another study published in the Irish Veterinary Journal<sup>2</sup> documents the swelling of the teat induced by the milking process. This study utilized an ultrasound machine to complete detailed measurements of teat features including both external and internal diameters as well as teat length before and after milking. This study also compared the performance of the typical US conventional milking machine and the Irish DairyMaster style.

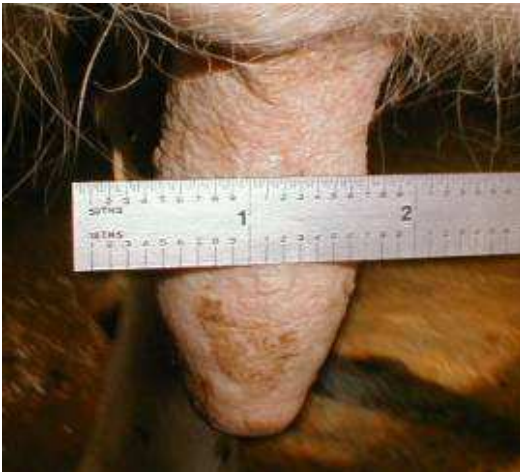
The study discloses the fact that both styles of conventional milking machines cause teat swelling. The percentage of swelling varied with machine type and vacuum level. In all cases the external teat diameter was measurably larger (swollen) following the milking process when compared to the teat diameter prior to milking. The study also noted that the teat canal was also swollen resulting in a reduction in teat canal diameter.

#### Study Test Results

The following table is from the Irish study on teat swelling caused by conventional milking machines. The table shows the amount the teat swells during the milking process by providing the increase in teat size comparing the teat before milking to when the machine comes off. The dimensions are in mm. An increase of 1mm is equivalent to about 3/64 inch. You will note that in all cases the teat diameter is larger after the milking process due to swelling.

	Cluster type			Plant vacuum level			
	WB	NB	s.e.d	40	44	50	s.e.d
Canal length	3.50	3.38	0.24	3.31	3.59	3.42	0.29
Canal length (15min)	3.61 <sup>a</sup>	2.95 <sup>c</sup>	0.26	3.07	3.57	3.20	0.32
Teat diameter	0.46 <sup>a</sup>	1.00 <sup>b</sup>	0.27	0.73	1.11	0.35	0.33
Teat diameter (15min)	0.45 <sup>a</sup>	0.98 <sup>b</sup>	0.18	0.60 <sup>a</sup>	1.10 <sup>b</sup>	0.37 <sup>a</sup>	0.22

### CoPulsation<sup>tm</sup> Milking System teat results



Before milking: 1.2 inches



After milking: 1.0 inches

The above photos show a teat prior to milking and the same teat immediately after the machine was removed. The comparison shows that the teat diameter after milking was smaller by .2 inches. A comparison to the results documented for conventional systems shows that this is a substantial improvement. Cows milked with conventional systems experience teat swelling. **Cows milked with the CoPulsation<sup>tm</sup> Milking System** consistently experience a reduction in teat size because there is **no swelling** and therefore the teat and teat canal are not stressed or damaged by the milking process!

### Results

The measurements of the teats milked with the CoPulsation<sup>tm</sup> Milking System showed that in all cases the external diameter of the teat had reduced. The typical reduction was

on the order of .1 inch. The measurements of the teats milked with the conventional milking systems showed that in all cases the external diameter of the teat had increased. The increase is a result of swelling caused by the conventional (DairyMaster, Delaval, Bou-Matic and Westfalia-Surge) milking systems. This swelling is proof that the teats are stressed and that this is the source of teat canal damage leading to slow milking quarters and mastitis.

The following x-ray shows the teat swelling condition from the another Irish study. This x-ray was taken while the teat was being milked and shows that the teat actually balloons outward during the milk phase. The failure of the rest phase results in the swelling and permanent teat damage.

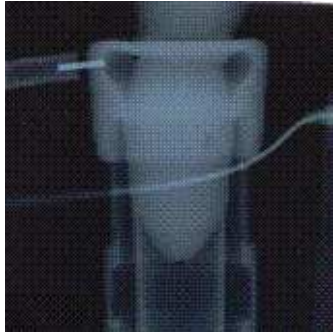


Figure 1

x-ray of large bore liner

**Two Articles Provided By Cornell University.** Cornell University determined that a conventional pulsator causes as many as 15 times more new mastitis cases than CoPulsation™ with James Mingle, Secretary of the Corporation for Cornell declaring “Cornell stands behind the parameters of the study and the accuracy of the results”

Peter Kaever ( Westfalia-Surge researcher ) admits that the “milk cup begins to creep up on the teat” and that “the milking process ends sooner than desired” with their conventional products.

Brandt's Farm Supply ( WestfaliaSurge dealer ) now markets a new WestfaliaSurge pulsator falsely claiming it provides performance identical to ours.

WestfaliaSurge has finally acknowledged the fact that conventional milking systems cause mastitis and poor milking performance. The recent introduction of a modified simultaneous pulsation pulsator with an improved fresh air hole is an attempt to match the proven performance of the CoPulsation™ Milking System. Peter Kaever (Westfalia-Surge researcher) admits that the “milk cup begins to creep up on the teat” and that “the milking process ends sooner than desired” with their conventional products. Brandt's Farm Supply (WestfaliaSurge dealer) falsely claims that their modified single phase pulsator pulsing at a slower rate provides performance identical to ours. This is not possible as our pulsator offers an unrestricted fresh air opening more than 5 times as large while their fresh air still has to squeeze around the plunger.

## Conclusion

The reduction of external teat diameter provided by the CoPulsation™ Milking System is unique and demonstrates that it is possible to milk a cow and not create a stressful environment that leads to teat swelling. All other milking systems will cause swelling and stress the teat causing damage producing slow milking quarters and mastitis.

## References

1 Machine Milking, Irish Veterinary Journal, Volume 56, January 2003, author:

2 Effect of liner design, pulsator setting, and vacuum level on bovine teat tissue changes, Irish Veterinary Journal, Volume 57, May 2004

3 How to eliminate liner slip and improve health, Dr Eddie O' Callaghan, Teagasc, Moorepark, Fermoy, Co Cork, Ireland

The Views and statements on the above article has no bearing on Milking Management

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