THE EFFECTS OF POST-MILKING POSITIVE PRESSURE MASSAGE ON TISSUE CONGESTION RELIEF

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Abstract
Introduction and Purpose

The purpose of this experiment is to quantitatively measure the tissue congestion relief provided by a post-milking massage. Our group will record the amount of the tissue congestion in each teat tested through the use of skin fold calipers and ultra-sound imaging. Using different pressures for each test we will determine what pressure (if any) provide the optimum tissue congestion relief.

Theory

The use of a massage to relieve congestion in the teat of a cow is a technique that is already implemented in current milking machines during the milking process. Unfortunately, this massage increased the amount of time required for milking and is accompanied by the unfavorable vacuum pressure used to pull milk from the cow's teat. Rather than manipulate the milking cycle or pressure fluctuations during, we will focus on relieving tissue congestion post-milking, using a very low pressure vacuum to keep the teat cup attached to the cow, and a positive pressure massage. However, prior to implementing this new technique we must determine the value of such a positive pressure massage.

Each experiment (using a different pressure) will be performed on a sample of five cows. Each cow will have two teats that receive a post-milking positive pressure massage and two teats that will not. Skin fold calipers will be used to measure the thickness of the teat end (i.e. the relative amount of congestion in the teat) before milking, immediately after milking, immediately after the massage, and at one and two hours after the massage. We will first try a positive pressure massage of about 14 kPa above the touch point (approximately 30 kPa of positive pressure total). We will then adjust the pressure up or down depending on our results. Once we find a pressure that significantly relieves tissue congestion after milking, we will use ultra sound to get a more accurate reading of the teat canal wall thickness.

Experimental Procedure

Experiment 1 (n=5 cows)
- Measure teat end thickness using skin fold calipers prior to milking
- Perform regular milking routine
- Record milking time and volume of milk extracted
- Measure teat end thickness immediately after milking
- Apply 14 kPa positive pressure massage to 2 teats
- Measure teat end thickness of all teats again immediately after massage
- Measure teat end thickness at one and two hours after the massage

Experiment 2 (n=5 cows)
- Measure teat end thickness using skin fold calipers prior to milking
- Perform regular milking routine
- Record milking time and volume of milk extracted
- Measure teat end thickness immediately after milking
- Apply XXXX positive pressure massage to 2 teats
- Measure teat end thickness of all 4 teats again immediately after massage
- Measure teat end thickness at one and two hours after the massage

Experiment 3 (n=5 cows)
- Measure teat end thickness using skin fold calipers prior to milking
- Perform regular milking routine
- Record milking time and volume of milk extracted
- Measure teat end thickness immediately after milking
- Apply XXXX positive pressure massage to 2 teats
- Measure teat end thickness of all teats again immediately after massage
- Measure teat end thickness at one and two hours after the massage

Experiment 4 (n=5 cows)
- Perform ultrasound pre-milking and record thickness of teat canal wall
- Perform regular milking routine
- Record milking time and volume
- Perform ultrasound post-milking and record thickness of teat canal wall
- Perform post-milking massage on 2 teats utilizing the optimial kPa of positive pressure found
- Perform ultrasound post-massage and record thickness of teat canal wall
- Perform ultrasound and record thickness of teat canal wall one and two hours after the massage

Results

Experiment 1

Positive Pressure (kPa):14
Time (min):
Volume (xxx):

Teat	Cow 1				Cow 2				Cow 3				Cow 4				Cow 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-milking thickness (mm)																				
Post-milking thickness (mm)																				
Post-massage thickness (mm)																				
1hr post massage thickness (mm)																				
2hr post-massage thickness (mm)																				

Experiment 2

Positive Pressure (kPa):XXXX
Time (min):
Volume (xxx):

Teat	Cow 1				Cow 2				Cow 3				Cow 4				Cow 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-milking thickness (mm)																				
Post-milking thickness (mm)																				
Post-massage thickness (mm)																				
1hr post massage thickness (mm)																				
2hr post-massage thickness (mm)																				

Experiment 3

Positive Pressure (kPa):XXXX
Time (min):
Volume (xxx):

	Cow 1				Cow 2				Cow 3				Cow 4				Cow 5			
Teat	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-milking thickness (mm)																				
Post-milking thickness (mm)																				
Post-massage thickness (mm)																				
1hr post massage thickness (mm)																				
2hr post-massage thickness (mm)																				

Experiment 4

Positive Pressure (kPa):XXXX
Time (min):
Volume (xxx):

	Cow 1				Cow 2				Cow 3				Cow 4				Cow 5			
Teat	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-milking thickness (mm)																				
Post-milking thickness (mm)																				
Post-massage thickness (mm)																				
1hr post massage thickness (mm)																				
2hr post-massage thickness (mm)																				

Conclusions: