# An Evaluation of the Efficacy of On-farm Pasteurization of Waste Milk in Seven Western New York Dairies

**Michael Capel,** *DVM*[1]; **Hillary Wentworth**[2]*;* **Brooke Crosier**[2]; **Gerald Welch**[3]; **Ynte Schukken**, *DVM, PhD*[3]
[1]*Perry Veterinary Clinic, Perry, NY*
[2]*State University of Geneseo, Geneseo, NY*
[3]*Quality Milk Production Services (QMPS), Geneseo, NY*



## Introduction

Whole milk has nutritional and economic benefits over milk replacer as a feed source for calves. Waste milk—non-saleable milk from treated cattle—represents the most affordable source of whole milk on the dairy. Despite its benefits, whole milk contains many pathogens and poses a disease risk to calves. Pasteurization has emerged as a valuable and cost-effective method for reducing the number of pathogenic bacteria present in waste milk on farms, and studies have shown numerous health and economic benefits through feeding pasteurized waste milk over un-pasteurized waste milk. There remains a need for identifying how effective pasteurizers are when operating under on-farm conditions. The objective of this study was to evaluate bacterial load in waste milk before and after on-farm pasteurization.

## Materials and Methods

Seven farms in western New York were selected for use in this study. The farms ranged in size from 600 to 4000 cows and had each been feeding pasteurized waste milk for more than one year. Six pasteurizers employed the High Temperature Short Time (HTST Good Nature brand) or continuous-flow method of pasteurization, where milk is heated to 161°F (71.6°C) for 15 seconds, and one farm employed the Low Temperature Long Time (LTLT) (Good Nature brand), or batch method of pasteurization, which heats milk to 145°F (62.7°C) for 30 minutes. No farm had a routine quality control protocol in place for monitoring pasteurizer efficacy. Operator name, batch volume, peak operating temperature and time spent at peak operating temperature were recorded weekly, and waste milk was sampled before and after pasteurization three times per week. Samples were frozen until evaluation, and then quantitative aerobic and qualitative Mycoplasma cultures were performed by the QMPS laboratory in Geneseo, NY.

## Results

The average peak operating temperature was 167°F (74.2°C) for the seven farms, with a range of 160-172°F (70.4-77°C). The average batch volume was 95 gallons for the seven farms, with a range of 45-280 gallons. The average pre-pasteurized sample bacterial load was 82,512 cfu/ml (0-1,220,000). The average post-pasteurized sample bacterial load was 5,182 cfu/ml (0-140,000). Post-pasteurized sample bacterial loads were <1000 cfu/ml in 129 of 195 samples and <10,000 cfu/ml in 170 of 195 samples. The average log reduction of bacteria counts pre- and post-pasteurization was 2.08, with a range of -0.59-6.1, and a standard deviation of 1.39. Nineteen of 195 pre-pasteurized samples were positive for Mycoplasma. Four samples were paired with positive post-pasteurized samples, all from the same farm. Sanitation of waste milk storage containers played a role on this dairy as the same containers were used, unwashed, for pre- and post-pasteurized milk. Gram + and gram- bacilli, and coagulase-negative staphylococci (CNS) appeared to survive pasteurization or be a contaminant after pasteurization, as six of seven farms showed an increase in gram-positive bacilli, and two of seven showed an increase in gram-negative bacilli and CNS. There was a non-significant positive correlation between batch volume and log reduction in bacterial load ($r^2 = .15$). A significant positive correlation was observed between peak operating temperature and log reduction in bacterial load ($r^2 = .35$, $p < .05$).

## Significance

On-farm pasteurization was successful on most farms in reducing the bacterial load of major mastitis pathogens in waste milk. There is a need for routine monitoring to ensure pasteurizer efficacy. Proper handling of post-pasteurized milk is essential for preserving a low bacterial count.