

## THE THERMAL DEATH TIME OF *BRUCELLA SUI*S

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Studies on the thermal death time of two strains of *Brucella suis* in artificially contaminated milk were based upon two premises which imply that milk-borne *Brucella suis* may be a public health problem.

1. *Results of investigations in recent years suggest that milk contaminated by Brucella suis may be regarded as one of the possible sources of undulant fever.* Porcine strains of *Brucella* have been isolated from the blood stream of undulant fever patients, where contact with infected animals did not appear to be the source of infection. Strains of *Brucella*, believed to be porcine, have been isolated from cattle in dairy herds, incriminated in outbreaks of undulant fever. Cattle, artificially infected by intravenous injection and feeding of *Brucella suis* have shown occasional udder infection. This interhost susceptibility of man and cattle to swine strains of *Brucella* has created a problem in public health, one phase of which is the possibility of a milk-borne, porcine infection in humans.

2. *The possibility of infected cows' milk producing porcine brucellosis in man emphasizes the importance of appraising the value of milk pasteurization temperatures in the elimination of this health hazard.* This

has raised the question as to whether various strains of *Brucella suis* would be killed by pasteurization as routinely conducted in commercial plants. Conflicting data on the thermal death time of porcine strains have presented public health officials with the problem as to the risk involved in the use of *Brucella suis* contaminated milk, although pasteurized, for human consumption. In an effort to appraise the reliability of milk-pasteurization standards in the prevention of milk-borne porcine brucellosis, the results obtained in determining the thermal death time of two strains of *Brucella suis* at the Illinois Experiment Station are given. Since porcine strains appear to be more heat-resistant than bovine strains, the observations here reported may apply to bovine as well as to porcine strains.

#### EXPERIMENTAL DATA

Samples of sterile skim and whole milk, inoculated with varying amounts of a 24-hour growth of strains A and B of *Brucella suis* were heated in 5-cubic centimeter portions in cotton-stoppered tubes or 1-cubic centimeter amounts in hermetically sealed glass tubes. Strain A was isolated from an aborted porcine fetus and strain B from a porcine osteomyelitic lesion. The temperature at which the tubes were heated did not vary more than one degree. Viability of *Brucella* in the heated samples was determined by direct cultural methods.

*Cotton stoppered tubes.*—Strains A and B of *Brucella suis* were rendered non-viable in skim milk, containing approximately 5,000 organisms per cubic centimeter, at 140°, 142°, and 144°F. for 30 minutes (cultural results checked by animal inoculation). Neither strain of *Brucella suis* survived 30 minutes at 144°F. in skim milk containing approximately 50,000 organisms per cubic centimeter. Skim milk, inoculated with approximately 1,000,000 and 10,000,000 organisms per cubic centimeter, heated for 30 minutes at 144°F. did not yield strain A, but strain B survived in samples similarly inoculated and heated. Strains A and B survived 30 minutes at 144°F. in skim milk samples, containing approximately 100,000,000 organisms per cubic centimeter. Sterile whole milk samples, containing approximately 50,000 and 1,000,000 organisms per cubic centimeter, did not yield viable *Brucella suis* after 30 minutes at 144°F. However, both strains survived 30 minutes at 144°F. in whole milk samples, that contained approximately 10,000,000 organism per cubic centimeter.

*Sealed tubes.*—Although strains A and B of *Brucella suis* remained viable in whole milk samples that contained approximately 100,000,000 organisms per cubic centimeter when heated in cotton stoppered tubes for 30 minutes at 144°F., neither strain was viable after 7 minutes at 144°F. in similarly inoculated samples heated in hermetically sealed glass tubes. Both strains, however, survived in sealed tubes for 5 minutes. Whole milk, containing approximately 500,000,000 organisms per cubic centimeter, also yielded viable *Brucella suis* strains A and B after being heated in cotton stoppered tubes for 50 minutes at 144°F. In sealed glass tubes this milk yielded viable *Brucella suis* after 30 minutes at 134°F., 15 minutes at 140°F., 10 minutes at 142°F., and 5 minutes at 144°F. At 140°, 142°, and 144°F. *Brucella suis* strains A and B were killed in 20, 15, and 7 minutes, respectively.

#### CONCLUSION

The results of heating milk, artificially contaminated with two strains of *Brucella suis*, support the following:

- (a) A variance to heat resistance was noted in two porcine strains.
- (b) *Brucella suis* mass contamination in milk, in sealed tubes, was destroyed within the pasteurization range, permitting the inference that pasteurization prevents milk-borne porcine brucellosis.