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LETTER TO THE EDITOR

Five minutes in the diluent still believed to be better than 20 minutes

DEAR SIR:

We noted with interest the recent paper by Hartman and Weber, "Holding times of raw milk dilutions: a reassessment." They are quite correct that the geometric means are a better estimator of changes with time than the arithmetic means we tabulated in the paper they refer to. (Huhtanen et al. 1972. "Effect of Time of Holding Dilutions on Counts of Bacteria from Raw Milk," *J. Milk Food Technol.* 35:126-130). The arithmetic means in this paper were erroneous due solely to an oversight on the part of one of us (C.N.H.) and were correctly listed by Hartman and Weber. Our analysis-of-variance of the data, however, was on log₁₀ transforms and perforce was a test of significance of the geometric rather than the arithmetic means. Our geometric means were for 0, 5, 10, 15, and 20 min, respectively: 16988.95, 17900.74, 18538.22, 18631.08, and 18836.32. The percentage changes from 0 time were 5.37, 9.12, 9.66, and 10.87 for the 5- to 20-min holding times. These figures differ from those of Hartman and Weber. The analysis-of-variance showed a highly significant linear trend indicating that the counts steadily increased to 20 min. On this basis we recommended that the dilutions be held no longer than practical (5 min).

Hartman and Weber did not use statistical tests for sig-

nificance of the geometric means or of their "percentage differences" means and used only point estimates for their conclusions. Their "percentage difference" method would have been improved if all changes were calculated from 0 time and an analysis-of-variance done on these differences. Our analysis-of-variance showed highly significant interactions which point estimates would not take into account. We feel that for data such as these, the F test provides a more reliable indicator of change. The F test, however, does not provide a quantitative estimate of the differences. If we accept a total change of around 10% based on geometric means over a 20-min holding time (and agree that we can live with a 10% error), then the 20-min interval between diluting and plating would be satisfactory. We would recommend, however, that if practical, the plating be done within 5 min.

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