

Comparison efficiency of medium, median and geometric medium at evaluation of microbiological analysis results of foods

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One of the important problems of microbiological food control is how to evaluate microbial loads of sample units and /or how to evaluate analytical results of repeated measurements in the same sample unit. In cultural or direct count methods, initially sample is homogenized and all the microbial cells are randomly distributed in the sample mass. In this case, probability of microbial densities in the analytical portion of sample unit, obey the poisson distribution. However, distribution of microorganism densities, in food lot is somewhat larger than poisson distribution and in food lot is accepted as log-normal distribution. In log-normal distribution, geometric mean of microbial loads of sample units is more representative for population mean rather than arithmetic mean. Therefore, in calculation of sample unit load from analytical repeated measurements arithmetic mean is used and geometric mean of the load of sample units is used in calculation of microorganism concentration of the lot. When distribution of population loses symmetry, median become better for representing of real mean of the population.

In this study, it is intended to investigate the efficiency of medium, median and geometric mean in

1. Calculation of sample unit mean concentration from repeated measurements,
2. Calculation of lot mean concentration from sample units.

The data, used in this study, are produced by simulation regarding to real data held in the microbiological control studies. In this study, it is supposed that distribution of densities of repeated microbial count in Petri dishes (cultural count) and in microscopic fields (direct count) obey poisson distribution, and distribution of densities of microbial loads of samples units taken from same lot obey log-normal distribution. Microsoft Excel2007 is used for random number generation for simulation. Simulated repeated counts and sample unit microbial loads are evaluated by calculation arithmetic mean, median and geometric mean. Then, values of these three parameters are investigated for representing core values. It has been a general observation in this study that, in proportion with population average, when standard deviation rises and/or average value approaches to 1, the representability of the median gets better than arithmetic mean, however, in these cases generally geometric mean is more successful.