Certified Reference Materials and other materials, such as those distributed in proficiency testing, must be sufficiently homogeneous. Formal tests are crucial for the production of these materials from food matrices, which are complexes and heterogeneous. This study aims to evaluate the performance of the statistical methods proposed for the assessment of homogeneity in ISO Guide 35:2005, in ISO 13528:2005 and in IUPAC International Harmonized Protocol for the Proficiency Testing of Analytical Chemistry Laboratories (2006). Data were simulated by the Box-Muller transformation, with normal distribution. Sets of twenty data were generated representing 10 reference materials analyzed in duplicate, with errors ranging from 1.0 to 50.0%, including the variation between and within bottles. For each studied error, twenty replications of the sets of data were produced. ISO Guide 35:2006 asserts homogeneity when standard uncertainty is between the values of the variance between groups and the sum of variances between and within. ISO 13528:2005 compares the standard deviation between samples and proficiency assessment. IUPAC contrasts the variance of the samples to a critical variance. Heterogeneity of the simulated data was detected by the ISO 13528:2005 method starting from 7.5% to 50.0% of error for all replications and by the ISO Guide 35:2006 method from 2.5% to 50.0% of error for some of the replications in each error. Lack of homogeneity was not detected by the IUPAC (2006) method. Although these results indicate higher potency of the ISO 13528:2005 method, caution should be taken, considering that the principles of the compared methods are distinct.

Financial Support: FAPEMIG e CAPES.