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The purpose of this study is to evaluate two competitive ratio estimators, often called the mean of ratios and ratio of means, when a systematic sample of size  $n$  with a random start is used. For example, in stereology this might be the ratio by volume of mitochondria in a liver cell or the proportion of a mineral in a sample of a rock. Since there is no explicit formula for the variance of a ratio estimator in such cases, several current variance estimators are presented and compared using simulated objects. Two new approaches are also suggested. The first new method is basically a bootstrap estimate using a non-linear additive regression technique. A Monte-Carlo simulation is done using the predicted values from the fitted model to find estimates for the variances. The second method is based on finding the best linear unbiased estimator of the slope assuming a non-constant variance. These new approaches seem to have high accuracy and to behave very well in terms of variance and bias or mean square error. (Received September 27, 2005)