



MICROORGANISMS IN HONEY

ABSTRACT

Knowledge of the moisture and temperature conditions influencing growth of microorganisms in honey has long been used to control the spoilage of honey. However, the need for additional microbiological data on honey will increase as new technologies for and uses of honey develop. Microorganisms in honey may influence quality or safety. Due to the inherent properties of honey and control measures in the honey industry, honey is a product with minimal types and levels of microbes. Microbes of concern in post-harvest handling are those that are commonly found in honey (i.e. yeasts and spore-forming bacteria), those that indicate the sanitary or commercial quality of honey (i.e. coliforms and yeasts), and those that under certain conditions could cause human illness.

Primary sources of microbial contamination are likely to include pollen, the digestive tracts of honey bees, dust, air, earth, and nectar. These sources are very difficult to control. The same secondary (after-harvest) sources that influence any food product are also sources of contamination for honey. These include air, food handlers, cross-contamination, equipment, and buildings. Secondary sources of contamination are controlled by good manufacturing practices.

The microbes of concern in honey are primarily yeasts and spore-forming bacteria. Total plate counts from honey samples can vary from zero to tens of thousands per gram for no predictable or discernable reason. Most samples of honey contain detectable levels of yeasts. Although yeast counts in many honey samples are below 100 colony forming units per gram, yeasts can grow in honey to very high numbers. This is controlled by standard industry practices. Bacterial spores, particularly those in the *Bacillus* genus, are regularly found in honey; clostridial spores are also found, but less frequently. The spores of *C. botulinum* are found in a fraction of the honey samples tested--normally at low levels.

No vegetative forms of disease-causing bacterial species have been found in honey. Because bacteria do not replicate in honey; high numbers of vegetative bacteria could indicate recent contamination from a secondary source. Certain vegetative microbes can survive in honey, under experimental conditions at cool temperatures, for several years. Honey has anti-microbial properties that discourage the growth or persistence of many microorganisms.

A routine microbiological examination of honey might include several different assays. A standard plate count provides general information. Specialized tests, such as a count of yeasts and an assay for bacterial spore-formers, may also be useful. An indicator of sanitary quality as provided by coliform counts might be included. Additional tests, to explain unusually high counts or address a certain problem, may be needed. The use of honey in products that receive no or limited heat treatment may require additional tests.

The paper that accompanies this abstract is available, upon request, from the National Honey Board, 390 Lashley Street, Longmont, CO 80501.