

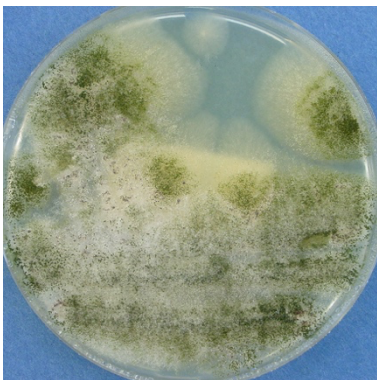
APPLICATION NOTE

Microbial Growth Surviving Heat Treatment



Routine control must be adjusted to include heat resistant microorganisms

By heat treatment – flash or tunnel pasteurization – microorganisms in the product are destroyed and the shelf-life of the product is extended. Commonly used procedures are optimized for the typically occurring microorganisms. In breweries, the settings for time and temperature are aiming to inactivate yeasts and bacteria. Nevertheless, live microorganisms reach the product – why does this happen?



The Problem

The effect of thermal processes is stated as reduction of the microbial count in decimal values. During heat treatment at a defined temperature over a determined time, typically a certain percentage of present microorganisms is killed. The conditions of heat treatment as well as the killing rates are depending on the composition of the treated product, but another crucial factor is the species of the microorganism to be destroyed. The killing rate should ideally be 100%, but usually this rate is not achieved. On one hand the heat distribution often is not equal and so a part of the product may not be exposed to the theoretical dosage. On the other hand some microorganisms may resist considerably high temperatures – higher than the treated product itself does. For these reasons, routine control has always to cover heat resistant microorganisms, especially for those products which are containing fruit and sugar.

The Solution

If microorganisms survive the heat treatment, then either the pasteuriser had an error, or its settings were wrong – or there were heat resistant microorganisms present which are common on fruit and plants. These include typical spore producing bacteria as *Bacillus* species or *Clostridia*, but also heat resistant molds as some *Penicillius* species, *Byssochlamys*, *Neosartorya*, or *Talaromyces*. Through heat treatment usually the vegetative forms are killed, but the spores survive. These are awakened by the impact of heat, they germinate and further proliferate, producing spoilage in the finished product.

The detection of those microorganisms in raw materials and before heat treatment is difficult if vegetative cell material is not present in a detectable amount – the spores themselves are hardly detectable. In juice and soft drink production analysis, such procedures which start with a heat treatment of the sample before the actual analysis by enrichment begins are state-of-the-art: The spore germination is induced and after that their detection is possible.

Breweries which more and more are producing mixed drinks have to follow, for them today there are no established routine methods available. We combine our experiences from microbiology in fruit drinks with our knowledge from the brewery analytics and can support you both with quick analyses as well as in the planning and establishing of analysis procedures for your products in your own lab.

