Bacillus cereus does not grow in sake or during its manufacture

Sake has long been recognized as the safe product free from microbiological hazard. However, amid the consumers’ growing concern over food safety, the discussion about the food safety on scientific basis is important for consumers’ reassurance. Recently, several studies have reported the presence of spores of Bacillus cereus in sake. Accordingly, to confirm the microbiological safety of sake, we investigated the content and growth of B. cereus. First, we examined whether B. cereus spores grew during sake production process through a spore addition test; consequently, we observed no growth or germination of B. cereus spores during sake production process. Next, we conducted a survey to assess the density of B. cereus in various commercial sake products; consequently, we found that the density of these bacteria in sake is less than in other foods and not enough to be infectious, and the emetic toxin produced by B. cereus was not detected in any sake samples. Therefore, we concluded that the safety risk of B. cereus in sake is negligible.

[Explanation of terminology]

Bacillus cereus

Bacillus cereus is a spore-forming bacterium that is commonly found in soil, on vegetables, and in many raw and processed foods (10¹–10⁶/g). Food poisoning of B. cereus is mostly associated with a bacterial cell density at minimum 10⁵/g in food: thus small amounts of B. cereus result in a low risk of food poisoning.

B. cereus cannot grow in sake or during the sake manufacturing process; hence, there is a low risk of food poisoning by B. cereus in sake.
Bacillus cereus does not grow in sake or during its manufacture

Several studies reported the presence of B. cereus spores in sake

We investigated the growth of B. cereus in sake and confirmed its safety for consumers.

Heat deactivation of all but heat-tolerant spores

Growth during the koji making process (Spore addition test)

Rice → Steam → Steamed rice → Koji making → Koji → Fermentation mash → Pressing → Sake

Lactic acid → Yeast → Starter culture

Survey of the concentration of B. cereus spores and toxins

Growth during starter culture making process (kouon-touka-moto)

Density of B. cereus cells during fermentation (Spore and vegetative cell additions)

Initial spore concentrations

Initial water activity

No growth of B. cereus or toxin production was observed during the koji-making process.

As a result of a survey of commercial sake, only a small amount of B. cereus was found compared with other foods, and no toxin was detected.

B. cereus does not grow or produce toxin in sake or during the sake manufacturing process.