

What is *Bacillus cereus*?

Bacillus cereus (*B. cereus*) is a spore forming bacteria found naturally in a wide range of food. Normally it forms only a small part of the microflora of a food product.

When a food is heated under normal cooking conditions, the *B. cereus* cells are normally destroyed, however the spores of *B. cereus* are much more resistant to cooking temperatures and can remain in the food.

After cooking, rapid chilling of foods can prevent spores from germinating and growing.

What are the common sources of *Bacillus cereus*?

- *Bacillus cereus* spores are naturally found in soil. This is why *B. cereus* can be found in a wide range of foods of both animal and plant origin.
- *B. cereus* spores can also be found in dry products such as dry soups, spices, dried dairy products, infant formula and seasonings.
- Fried rice is a common cause of food poisoning due to *B. cereus*. Fried rice may contain high levels of *B. cereus* because of the long period between boiling the rice and consumption after frying.

Under what conditions will *Bacillus cereus* grow?

Bacillus cereus prefers to grow at temperatures between 30°C and 37°C, although it can grow at temperatures up to 55°C and in some cases down to 5°C.

In some situations, *B. cereus* can grow in acidic conditions, down to pH 4.3 at 30-35°C.

What are the symptoms?

There are two types of food poisoning that are associated with *B. cereus*: diarrhoeal illness and emetic illness.

Diarrhoeal illness

Diarrhoeal illness will produce symptoms of abdominal pain and watery diarrhoea. Nausea and vomiting can occur but are less frequently seen with this type of poisoning. These symptoms will be seen 8 to 16 hours after ingestion of the food, and last for 12 to 24 hours.

Emetic illness

The primary symptoms of emetic illness are nausea and vomiting lasting between 6 and 24 hours.

Onset is typically a lot quicker than the diarrhoeal illness with symptoms being present 0.5 to 5 hours after consumption. This quick onset of symptoms is due to a pre-formed toxin being present in the food, caused by the bacterial growth in the food. Heating a food that contains *B. cereus* toxin will not destroy the toxin.

This type of emetic food poisoning is often associated with starchy foods, such as rice and pasta that have been incorrectly cooled after cooking.

How can the risk of infection with *Bacillus cereus* be minimised?

- Keep prepared foods under refrigeration (5°C) until you are ready to serve.
- Keep hot foods at a temperature greater than 60°C.
- Try to avoid preparing foods too far in advance.
- For heated products that are going to be eaten at a later time ensure that the product is correctly cooled after cooking.

The **Food Standard Code** requires food businesses to cool the food:

- From 60°C to 21°C within two hours, and
- From 21°C to 5°C within a further four hours.

Cooling cooked food in shallow containers, with good airflow around each container, will help achieve this.

- Wash your hands with hot soapy water and dry thoroughly before preparing food.
- Keep utensils and kitchen clean.

What else can I do?

Education and training are important control tools for *B. cereus*.

Being aware of the risks and conditions that permit germination and growth will greatly assist in the control of *B. cereus*.