



R & F[®] *Bacillus cereus* Group Enrichment Broth

**A Nutritive Selective Enrichment Broth that Promotes the
Growth of *Bacillus cereus* Group Species for Culture-Based
Isolation and Detection**

Bacillus cereus group species have been associated with foodborne outbreaks, especially in dried food products involving rice flour, potato flakes, dried milk ingredients, insect flour, and dried cereals. These food types, after rehydration, allow for the propagation of pathogenic *B. cereus* group species when subjected to temperature abuse. The infective dose for causing disease has been reported to be as low as 500 cells per gram. However, the infective number of cells can be substantially lower, especially when consuming 50-100 grams of a contaminated, temperature-abused food product. *Bacillus cytotoxicus*, a member of the *B. cereus* group, produces the highly potent Cyt-K1 toxin in rehydrated food products, such as powdered infant formula, when subjected to temperature abuse. Since Cyt-K1 is more toxic than the Cyt-K2 toxin found in *Bacillus cereus sensu stricto*, a detection threshold of 100 cells per gram in direct enumeration tests may be insufficient to ensure food safety. Therefore, an enrichment broth is required to isolate *B. cereus* group species at lower detection levels (<100 cells per gram) in order to ascertain the overall microbial safety of these food products. This is crucial for protecting sensitive populations, such as neonates, infants, and immuno-compromised individuals, from diarrheal *B. cereus*/*B. thuringiensis* and the more pathogenic *B. cytotoxicus*.

The R & F[®] *Bacillus cereus* Group Enrichment Broth was developed to enhance the growth of *B. cereus* group species when present at low concentrations in foods. After enrichment at 30°C for 24-28 hours, *B. cereus* group species can reach at least 5.0×10^6 cells per gram using this enrichment broth, which can be easily isolated using the R & F[®] *Bacillus cereus* Group Chromogenic Plating Medium.

**Growth response of *Bacillus cereus* group species and other microorganisms in
R & F® BCG Enrichment Broth incubated at 30°C for 24-28 h.**

Organism	# of strains	Growth response
<i>Bacillus anthracis</i>	1	++++ ^a
<i>Bacillus cereus</i>	6	++++
<i>Bacillus thuringiensis</i>	1	++++
<i>Bacillus cytotoxicus</i>	1	++++
<i>Bacillus weihenstephanensis</i>	2	++++
<i>Bacillus toyonensis</i>	8	++++
<i>Bacillus wiedmannii</i>	2	++++
<i>Bacillus pseudomyoides</i>	2	++++
<i>Bacillus mycoides</i>	3	++++
Gram (-) bacteria ^b	12	0
Gram (+) bacteria ^c	8	0
<i>Listeria</i> sp.	4	++++
<i>Bacillus licheniformis</i>	2	++++
<i>Bacillus subtilis</i>	1	++++
<i>Enterococcus faecium</i>	1	++++
<i>Staphylococcus aureus</i>	1	++++
<i>Bacillus pumilus</i>	1	++++
<i>Bacillus stearothermophilus</i>	1	++
<i>Paenibacillus alvei</i>	1	++++
<i>Paenibacillus macerans</i>	1	++++
<i>Bacillus circulans</i>	1	++++
<i>Candida albicans</i>	1	++

^a Symbols: +++++, cell density greater than 3.0 x 10⁶ cells/ml; +++, cell density between 5.0 x 10³ to 3.0 x 10⁶ cells/ml; ++, cell density at the inoculum level; +, 1 to 1.5-logs below the inoculum level but greater than 100 cells/ml; 0, cell density less than the detection limit of 1.0 x 10² cells/ml.

^b *Shigella* sp. (2), *E. coli* (2), *Citrobacter freundii* (1), *Enterobacter* sp. (2), *Klebsiella pneumoniae* (1), *Morganella morganii* (1), *Salmonella* sp. (2), and *Pseudomonas aeruginosa* (1).

^c *Bacillus mojavensis* (1), *Bacillus licheniformis* (1), *Pediococcus cerevisiae* (1), *Bacillus megaterium* (2), *Streptococcus gordonii* (1), *Lysinibacillus sphaericus* (1), *Brevibacillus agri* (1), and *Bacillus clausii* (1).

ADVANTAGES:

- 100% inclusivity of *Bacillus cereus* group species tested.
- Inhibits growth of interfering Gram-negative bacteria, yeast, and some Gram-positive bacteria when isolating of *B. cereus* group species.
- Propagates *B. cereus* group species from food products from <100 cells/gram to concentrations greater than 3.0 x 10⁶ CFU/g after 24 h at 30°C.
- Easy to prepare with no outside supplements or ingredients required.
- The complete enrichment broth (with supplements) has a 45-day shelf-life when stored at 2-8°C under dark conditions.

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ORDERING INFORMATION

M-2100 R & F® *Bacillus cereus* Group Enrichment Broth Powder

M-2110 R & F® *Bacillus cereus* Group Supplement for Enrichment Broth

M-2150 R & F® *Bacillus cereus* Group Enrichment Broth Detection System