



# Probiotics in Baking

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The trend of healthy gut and digestive wellness is on the rise, with more consumers seeking out products that support their digestive health. As a result, probiotics have become increasingly popular as a way to promote digestive health and overall wellness, as consumers become more conscious of the connection between gut health and general well-being. Poor gut health has been correlated to adverse effects on mood, sleep, allergies, and immune function.<sup>1,2,3</sup>

By incorporating probiotics into food, bakers can tap into this growing trend and offer consumers a new range of products that not only taste delicious but also provide significant health benefits. This requires an awareness of the latest trends and emerging technologies in the food industry, such as probiotics, to remain competitive and meet the demands of consumers who prioritize their health and wellness.

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**Bake with  
SEB LBSC**

- ✓ Heat- and shelf-stable, spore-forming *Bacillus coagulans*
- ✓ Shown in clinical trials to promote gut and immune health



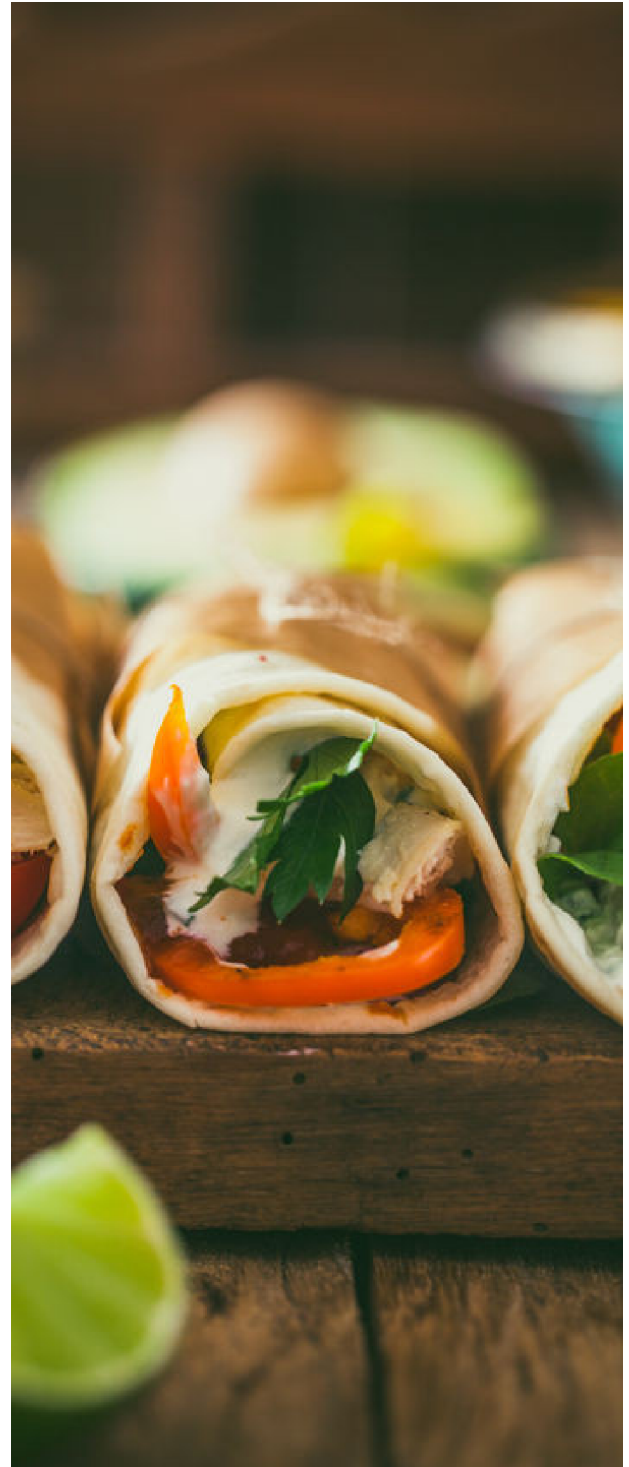
# Food Applications for Probiotics

Probiotics are live microorganisms that provide health advantages when ingested. Two types of probiotics are commonly used in food.

Non-spore-forming probiotics have good probiotic activity but are heat-sensitive and have low survival rates. They are typically used in refrigerated food and are not appropriate for baked products.

On the other hand, spore-forming probiotics have elevated survival rates and are heat-stable, shelf-stable, and can function in a wide temperature and pH range, making them ideal for use in various food products, including baked goods.

While many types of spore-forming probiotics work well in food applications, *Bacillus coagulans* is an example of a commonly used spore-forming probiotic known for its stability, resilience, and effectiveness in a broad spectrum of food and beverage applications.<sup>4,5</sup>



Looking for ways to add probiotics? A powerful spore-forming probiotic that is thermo, shelf and low acid pH-stable, SEB LBSC performs in all baked goods. *Bacillus* species form endospores that show a high survival rate and stability in dietary supplements, foods, and the human gut. [Learn more here.](#)

## Probiotics in Bakery Products

Several bakery products with probiotic and prebiotic ingredients have been successfully developed in recent years, which meet specific physical quality parameters and have good sensory acceptance. This has led to the emergence of probiotic-based functional food products, accounting for 60 to 70% of the functional foods available today.<sup>6</sup>

Commercially available probiotics can be made dormant through various procedures such as freeze-drying and micro-encapsulation. When incorporating probiotics into baked goods, it is important to attain a uniform distribution of the probiotics in the food. This can be achieved by premixing them with the dry ingredients or water before mixing them into the dough or batter, rather than adding them to the finished product.<sup>7</sup>

To help the survival of probiotics in bakery products, they are sometimes applied to a high-fat solid carrier, such as chocolate, which can protect the probiotic cultures.



At Enzyme Innovation, we specialize in the development and manufacture of probiotic strains from the *Bacillus* species. *Bacillus* species form endospores that show a high survival rate and stability in dietary supplements, foods, and the human gut—partner with us for safe, stable, and effective probiotics. [Get started here.](#)

## Survival Rates & CFUs of Probiotics

The survival rate of probiotics in baked goods can vary depending on the type of probiotic strain, the baking temperature, and the baking duration. Some strains of probiotics, such as *Lactobacillus acidophilus* and *Bifidobacterium lactis*, may have reduced or no viability after baking. However, other strains, such as *Bacillus coagulans*, have been found to have higher survival rates due to their ability to form protective spores that can withstand harsh environmental conditions.<sup>4,5</sup>

An example of spore-forming probiotics is SEB LBSC from Enzyme Innovation, which has been shown to survive such baking processes and can be used in products stored at room temperature conditions.

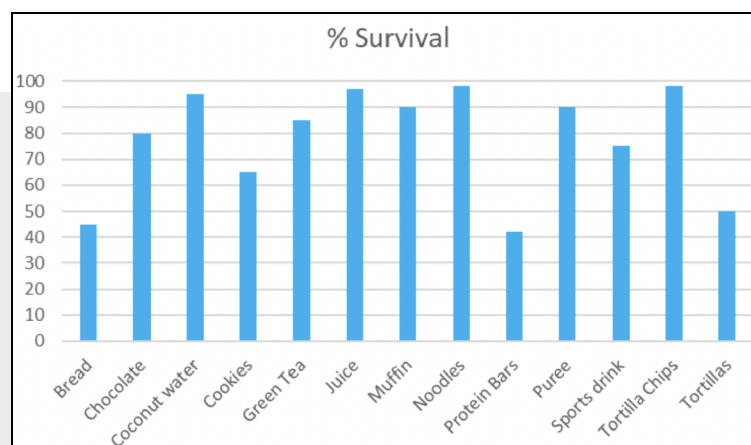
CFU stands for Colony Forming Unit, a unit of measurement used to quantify the number of viable microorganisms in a sample. It is commonly used to estimate the potency of probiotics that provide health benefits when consumed in adequate amounts. The CFU/serving count represents the number of individual cells or colonies capable of growing and reproducing under specific conditions per serving size.

For example, a probiotic supplement may be labeled as containing 10 billion CFUs/serving, indicating that each serving contains at least 10 billion viable microorganisms.

An alternate method of labeling is CFU/g. CFU/g refers to the number of colony-forming units per gram of a sample, such as for the declared potency of a probiotic product. This measurement is more commonly used in the food industry. The CFU count is crucial because it indicates the number of viable microorganisms in a sample, which is essential for ensuring the efficacy of probiotics or other products containing live microorganisms.

### Survival rates of SEB LBSC in different food applications:<sup>8</sup>

*Survival rates may vary depending on the specific formula and process used.*



## Steps to Use Probiotics in Baked Goods<sup>9,10,11,12</sup>

Probiotics have various applications, from conventional options like drinks and yogurts to baked goods like pizza crust, bread, muffins, and cereal. Selecting a probiotic strain involves looking for one approved as Generally Recognized as Safe (GRAS) by the FDA and working with manufacturers that have obtained NSF certification. This indicates that the manufacturer has gone the extra mile to ensure product safety.

- The first step in creating a probiotic bakery product is selecting the appropriate strain of bacteria. The choice depends on the desired health benefits and the product type. Health benefits are strain specific, and it is important to look for a strain with clinically proven health benefits, backed by published research studies. This is crucial for developing effective probiotic bakery products
- Probiotics can be added to bakery products using various methods, like incorporating powder or liquid forms into dough, adding probiotic cultures to starters, or applying a probiotic, edible film to crusts. For baked products, probiotics are often added to the dough or batter during mixing for uniform distribution. They can also be added in the filling or topping or as a spray, but caution is essential as these methods may have higher variation.
- Working with a manufacturer who can share stability data on their probiotic can help speed up your product development.
- When testing for survival rates, use the same test method as the manufacturer to get accurate results. Using different test methods could result in very different results.
- If you fail to achieve a specific % survival rate, use different strategies to get around the issue. Adjust the processing conditions (i.e., lower baking temperature or shorter baking time) to increase the survival rate. Add probiotics to an ingredient component that is heated less, such as a filling or frosting, if the product has multiple components. Increased serving size can help achieve the target amount of probiotics while staying within budget restraints.
- Bakers can also use a “Contains Probiotics” claim and include fewer probiotics instead of targeting a specific amount of CFUs.
- After determining how many probiotics to add, ensure the product quality meets all specifications and sensory requirements.
- Studies have shown the sensory properties of products containing micro-encapsulated probiotics are similar to or higher than those containing free probiotics, but it can increase ingredient costs.

## “ Can you use probiotics in sourdough bread?

Yes. Sourdough bread technically starts with probiotics because the starter consists of naturally occurring bacteria and yeasts that are good for your gut. However, once the bread is baked, the bacteria die at high temperatures in the oven, so the bread does not contain live probiotics. Adding live bacteria in the form of an encapsulated ingredient and/or spore-forming bacteria that can survive the baking process can increase the probiotic content of the product and hence, aid in developing a probiotic bread. Another option for using probiotics in baked goods involves their injection as sweet or savory fillings to freshly baked and cooled bread, preserving microbial cultures within the food.

## “ Do probiotic bacteria interfere with fermentation in the dough?

The activity of microorganisms significantly depends on the culture being used. While most bacteria are naturally inert to the fermentation process, sourdough bacteria contribute to the fermentation process. However, they do not survive the baking process. So, it is vital to check with the manufacturer and try smaller batches to ensure the inertness of the culture. There is no clear evidence that probiotic bacteria interfere with fermentation in the dough. They are often used to counteract antibiotic side effects due to the good bacteria being killed along with the harmful bacteria.<sup>13</sup>

## “ How should you store probiotic ingredients?

The storage recommendations for probiotic ingredients can vary depending on the specific type and form of the product. Generally, it is recommended to store probiotics in a cool, dry place away from direct sunlight. Some probiotic supplements may also require refrigeration to maintain their potency and effectiveness. It is essential to follow the storage instructions provided by the manufacturer to ensure the quality and effectiveness of the probiotic product.<sup>14,15</sup>

## “What health claims can you make with probiotics?”

There are a few options. One is to claim that the food or product contains probiotics, which can position it as a “better-for-you” option without specifying the amount of probiotics in the food. Alternatively, a manufacturer can claim a specific amount of probiotics in CFU/g or CFU/serving on a product. It is vital to understand the survival rate during the baking process of the probiotic strain to ensure the product claims in CFU/g or CFU/serving.<sup>14</sup>

Furthermore, it’s important to note that health benefits are strain-specific, so the number of probiotics claimed combined with the strain of the probiotics can give more detailed information on the product’s health benefits. It is crucial to base this on clinical studies of the specific probiotic strain. Some of the common claims that have been studied include improved digestive health, boosted immune system, reduced risks of allergies, improved mental health, and lowered cholesterol levels.<sup>15,16,17</sup>



This BAKERpaper is brought to you by Enzyme Innovation, a research-driven manufacturer with more than 60 years of manufacturing experience, and an unparalleled expertise in industrial probiotics and enzymes. We provide clean-label, eco-safe solutions to more than 25 industries. [Find your baking solutions here!](#)



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