

COLONY FORMING UNITS

SERIES ONE: IDENTIFYING BACTERIA



CFU on a product label stands for Colony Forming Units and is expressed per serving, per ml product or per capsule.

Most probiotic products would list a CFU of at least 10^8 bacteria, or 100 million bacteria, either per capsule or per ml product.

The number of live (or viable) bacteria in the product are normally calculated by growing a dilution series on rich media on agar plates and counting the number of colonies growing. Each colony corresponds to a single bacterium in the inoculum.

Since there are billions of bacteria present in each ml of product, they can only be counted if they are diluted first.

Newer methods, including flow cytometry, may well supersede culture methods in the future. Any method adopted must differentiate between live and dead bacterial cells.

Probiotic activity is based on the presence of live bacteria. Thus, products should indicate the anticipated CFU count at the end of the shelf-life (or on the Best Before date), not at the time of manufacture, since there will always be some cell death during storage.

In mixed products the CFU count for each strain should be counted and stated separately.

The CFU listed on food product labels should correspond to bacterial numbers that have been shown to provide health benefits in human studies. More information on this point is available on the International Scientific Association for Probiotics and Prebiotics website.¹

Example:

Genus	Species	Strain
<i>Lacticaseibacillus</i> (L.)	<i>paracasei</i>	Shirota

There are at least 20 billion (2×10^{10}) live cells of *L. paracasei* Shirota per 65ml bottle of Yakult, at end of shelf life, when refrigerated.

GLOSSARY

CFU	Colony Forming Units. The number of live bacteria in the product capable of growing into bacterial colonies on a suitable agar plate. CFUs can be specified per g or per ml, or per serving.
Commensal bacteria	The microbial community normally residing in or on the human (or animal) host that performs important functions and helps to maintain health.
Inoculum	The aliquot of live bacteria used to start the growth of a new culture of bacteria.
Flow cytometry (FC)	In food microbiology, Flow Cytometry is used to detect and count bacterial cells. The sample containing cells or particles are labelled with a fluorescent marker, suspended in a fluid and injected into the flow cytometer instrument which uses laser light to detect the presence (count) and size of the cells. FC allows measurement of intrinsic and/or extrinsic fluorescence in cells and thus has the capacity to assess cell viability, discriminating between dead or damaged and live cells.
Gastrointestinal tract (GIT)	The complete digestive tube running through the body from mouth to anus.
Identification	In taxonomy, identification is the process of assigning a correct scientific name to a new strain, using specific, appropriate criteria.
Morphology	Related to the form, structure or shape of organisms and colonies.
Nomenclature	The official set of rules of how to scientifically and correctly name bacteria (or any other form of live organism)
Phylogeny	Entails the calculation and visualisation of the evolutionary development of a species or a group of species. In most cases palaeontological findings and/or molecular markers (preferably DNA-based) are used to determine common ancestral species [e.g. between <i>Homo sapiens</i> (man) and <i>Pan troglodytes</i> (chimpanzee)]
Taxonomy	Taxonomy is the science of categorizing living organisms into classification schemes based on a set of formal rules, the nomenclature. Taxonomy uses markers which can be genetic, phenotypic or morphological in nature.

¹ <https://isappscience.org/for-consumers/infographics/>

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