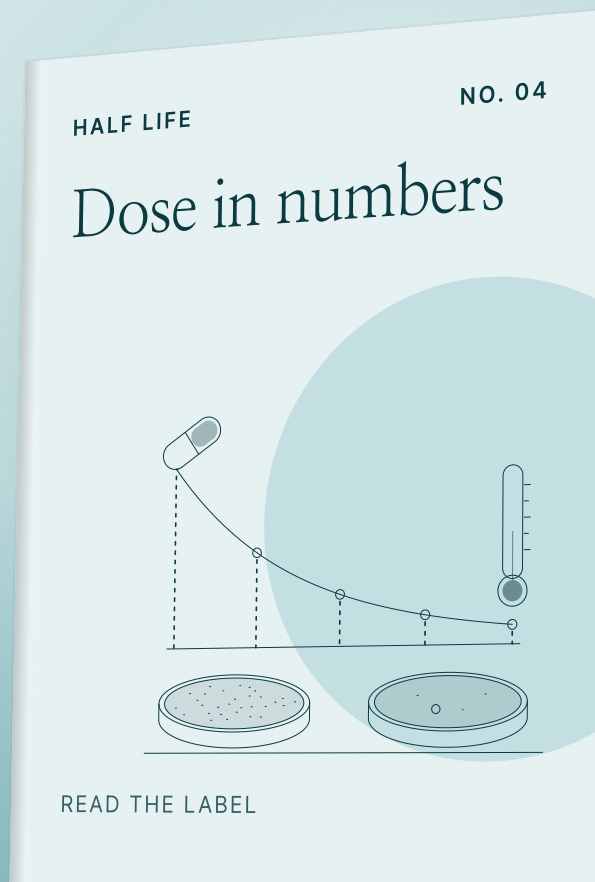




MONOGRAPH · DOSING

Probiotics without the billion CFU guesswork

You already compare milligrams and forms before you buy anything else. This guide applies that same pharmacology logic to probiotics, from strain codes to viable counts to storage loss.



Code matters

Strain identity connects a capsule to an actual trial dose.



Counts fade

Viability falls with heat, moisture and time after packing.



Forms differ

Capsules, powders and liquids lose potency in different ways.

By Katherine Warren · Updated Jul 31, 2026 · 10 min read

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Two bottles sit in your cart with matching front panels and matching billion counts. One prints complete strain codes with a through expiry number and a temperature range. The other prints species names and a number from the day it was made. This guide shows how to interpret that gap, weigh trial doses against label doses, and judge when a fermented food makes more sense.

01

Parse the strain table as dose identity

A probiotic label carries three identifiers: genus, species, then strain. *Lactobacillus rhamnosus* GG serves as the classic illustration, since GG denotes the strain. Species alone names the wider group, not the studied form. Only the strain designation links the product to the culture assessed in bench work and in human trials catalogued on PubMed and summarized by Examine.

Nomenclature has been revised, so current and older bottles can describe an identical microbe in separate terms. Updated naming may show *Lactocaseibacillus rhamnosus* where *Lactobacillus rhamnosus* once appeared, and *Lactiplantibacillus plantarum* where *Lactobacillus plantarum* once appeared. *Bifidobacterium lactis* can also appear as *Bifidobacterium animalis* subsp. *lactis*, with examples such as HN019 and BI-04 or BI-04. *Bifidobacterium infantis* can appear as *B. longum* subsp. *infantis* with example 35624. Additional codes worth recognizing include 299v, BB536 and NCFM, each tied to a documented strain lineage.

This distinction controls dosing logic. Labeling guidance issued by FAO and WHO in 2002 calls for genus, species and strain for every strain, plus a minimum viable quantity for each strain at end of shelf life in CFU, along with serving size, storage directions and contact information. Surveys in Washington DC found 45 percent of supplement products omitted strain designations and 45 percent omitted end of shelf life potency, while only 35 percent could be matched to evidence by strain and dose. Lacking the third identifier plus a through expiry figure, a label cannot be tied to a study.

FROM THE EDITORS

Two bottles can carry identical genus and species yet hold separate strains with separate records. Genus and species work like family name and first name, while strain names the particular isolate.

02

Read CFU as viable dose, not billions

CFU means Colony-Forming Unit and denotes live and active microbes per serving as measured by laboratory assay. It quantifies viable organisms, not powder weight. Weight in milligrams cannot define exposure, because an equal mass of powder may contain sharply different numbers of living cells based on strain, fermentation and drying process, and post encapsulation handling of the batch.

The time point attached to the figure changes its meaning. A figure at manufacture reports what entered the bottle. Treat the figure through expiry as a claim about what should remain when storage directions were followed. Industry guidance states probiotics are frequently produced with overages so the declared count at end of shelf life is met under directed storage. That surplus at filling offsets anticipated decline across shipping and home use.

Human research with probiotics commonly tests 1 to 20 billion CFU, and effective quantities vary across health outcomes. A 2012 meta-analysis in PLoS ONE covering randomized controlled trials in eight gastrointestinal diseases calculated a pooled relative risk of 0.58 with 95 percent CI 0.51 to 0.65 in favor of probiotics. The same review reported significant effects for six conditions including pouchitis, infectious diarrhea, irritable bowel syndrome, *H. pylori*, *C. difficile* disease and antibiotic associated diarrhea, while traveler diarrhea and necrotizing enterocolitis showed no such signal. The pattern reinforces that benefit is strain and dose specific, and a larger CFU total is not inherently stronger. Align the investigated strain and quantity and maintain a consistent schedule, instead of presuming extra billions add extra effect.

What remains unknown is the precise strain and CFU quantity suited to a particular individual or health aim, because responses are strain and dose specific and frequently warrant clinician guidance. Also unknown is whether a specific bottle retains its labeled viable count on the day of use, unless the label assures CFU through expiry and storage instructions were followed.

Weigh survival by delivery form

After ingestion, a probiotic encounters acid, bile, heat, moisture and elapsed time. Delayed release or enteric capsules, microencapsulation and spore forming *Bacillus* strains are presented as approaches that support persistence beyond stomach acid and bile. One source places survival of certain strains at only 10 to 20 percent through stomach acid, and cites up to 96 percent loss in some cellulose coated capsules upon acid exposure. Sources diverge by format, with one liquid brand source preferring acid adapted liquids and capsule brand sources preferring protected capsules for gastric survival. Form by itself does not assure arrival in the colon.

Capsules plus stable dry powders

Capsules limit oxygen and handling exposure and permit delayed release coatings. Probiotic powders hold freeze dried bacteria that usually do not have a protective capsule coating, which raises susceptibility to heat and moisture while stored. Controlled powder production is described as below 25 C and below 30 percent relative humidity, with water activity at 0.2 or lower to preserve viability. Fermented powders in stick packs and drink mixes obey the same principle: drier and cooler surroundings sustain viability longer.

Cold liquids plus fermented foods

Lacto-fermentation generates lactic acid and retains vitamins, minerals, enzymes and amino acids without heat, according to a liquid probiotic source. Refrigerated liquids and foods begin hydrated, so pH, oxygen and temperature govern viability differently than in a dry powder. Retail refrigeration is advised for highly unstable strains, including most of the *Bifidobacterium* genus. Certain fermented foods sold as probiotic carry undefined microbial content and lack studies on health effects, and might instead be described as containing live, active cultures. That wording indicates living microbes without specifying defined strains at defined doses.

FORMAT	WHAT IT IS	VIABILITY PRESSURE	WHAT TO LOOK FOR ON THE LABEL
Capsule, delayed release or enteric	Coated capsule holding freeze dried strains	Gastric acid plus bile passage, then dampness once opened	Complete strain codes, CFU through expiry, storage span, lot number
Dry powder or stick pack	Freeze dried strains or fermented powder lacking capsule coating	Warmth, dampness, oxygen exposure, water activity	Dry storage direction or water activity aim, CFU through expiry, sealed sachets
Refrigerated liquid	Chilled fermented liquid or acid adapted cultures	Acidity level, oxygen ingress, cold chain gaps	Keep refrigerated span, viable count plus date, strain roster if probiotic

A trial of probiotic instant coffee containing *Lactiplantibacillus plantarum* subsp. *plantarum* Dad-13 maintained viability above 10 to the 7 log CFU per g during storage under tested packaging and temperatures. The same coffee trial projected about two years shelf life in vacuum aluminium foil at 4 C and about 3 months at 30 C with cell viability treated as the critical parameter. Packaging and temperature define the timeline. The consensus definition quoted in reviews defines probiotics as live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. Adequate amounts returns attention to strain, count and survival, rather than format promotion.

04

Translate storage into half life and demand testing

USP packaging terms define refrigerator as 2 to 8 C, cool as 8 to 15 C, controlled room temperature as 20 to 25 C, warm as 30 to 40 C and dry place as not more than 40 percent average humidity at 20 C. Apply those thresholds to label language. Room temperature on a summer warehouse pallet does not equal controlled room temperature in a stability dossier. A dry place implies humidity management, which counts for powders lacking a capsule coating.

Handling after opening shapes remaining dose. Reseal without delay, retain desiccant where supplied, avoid the bathroom cabinet and the shelf above the stove, and place refrigerated products back at 2 to 8 C following each use. Probiotic powders lacking a capsule coating are described as more sensitive to heat and moisture, so storage performance relies more heavily on packaging and handling. Vacuum foil and glass or metal containers restrict oxygen and moisture more effectively than thin plastic tubs or paper sachets. Where a brand cites a stability program, request evidence showing lot level results through expiry.

Independent verification confirms identity and viability across shelf life. Strain confirmation employs DNA techniques including species and strain specific PCR, high throughput sequencing and digital PCR for detection and enumeration. Third party certification generally covers GMP audit, document review, stability substantiation, finished product testing and verification of the certificate of analysis. Documented quality failures include products falling short of declared counts, mistaken strain identification and contamination such as *Rhizopus oryzae* linked to an infant death. That record explains why lot numbers and certificates of analysis count. Warning signs include blend only labels carrying a total CFU without per strain counts, absent strain codes, a figure only at manufacture, missing storage range, and absent contact or lot traceability. As Chief Scientific Officer Dirk Gevers, Ph.D., put it: We use systems like SHIME to check whether our probiotics survive the intestinal tract, which is where efficacy is decided.

FROM THE EDITORS

A seal lacking a lot number and date range reveals less than a lot specific certificate naming genus, species, strain, CFU method and storage conditions. A certificate of analysis is the test record for that lot.

05

Match defined dose to food or supplement

Fermentation alters starting material broadly through lactic acid production and creation of other metabolites, with general nutrient access and postbiotic formation but without full composition for each product. Effects of fermentation on every individual raw material stay incompletely documented. Preservation of original strain ratios in multi strain powders across shelf life is also unclear, because robust methods for counting viable individual strains in mixtures remain limited.

That uncertainty frames the food first comparison. Fermented foods with live cultures provide variety and culinary history yet frequently carry undefined microbial content. A defined supplement identifies each strain, declares minimum viable numbers at end of shelf life, and supplies storage and contact details. Where strain and dose connect to evidence, the supplement format allows cleaner comparison. Where they do not, a food with live, active cultures may suit daily use better, while a supplement fits a defined, time limited routine reviewed with a clinician.

Questions to pose before purchase cover the complete strain roster with codes, CFU per strain through expiry, the storage span supporting that date, whether an independent lab tested the count, and how to obtain the certificate for your lot. Follow a consistent routine for 2 to 4 weeks

under directed storage, record lot number and expiry, and retain packaging until the routine finishes. When symptoms or medications enter the picture, direct those records to a professional instead of titrating dose by CFU alone.

06

The checklist

- ☐ Record the complete three part designation for every strain with code
 - ☐ Convert older nomenclature to current taxonomy before side by side review
 - ☐ Seek CFU per strain through expiry, rather than manufacture only
 - ☐ Confirm the quantity sits close to the researched 1 to 20 billion CFU band
 - ☐ Document storage as refrigerator 2 to 8 C, cool, room temp or dry place
 - ☐ Select capsules for barrier cover, powders for dosing ease, liquids for cold chain
 - ☐ Prefer vacuum foil, glass or metal packs that restrain moisture entry
 - ☐ Once opened, close quickly and restore cold items to the fridge
 - ☐ Request lot number plus certificate of analysis showing DNA identity
 - ☐ Reject blend only labels missing per strain counts or codes
 - ☐ Contrast foods with live cultures against defined strain supplements
 - ☐ Track lot, dose and storage daily for 2 to 4 weeks and compare the scoop with the trial
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Sources and further reading

- Probiotic Strains Guide: Strain IDs, Families, Delivery & How to Choose · mtangelvitamins.com
- Study of Viability, Storage Stability, and Shelf Life of Probiotic Instant Coffee Lactiplantibacillus plantarum Subsp. plantarum Dad-13 in V · pmc.ncbi.nlm.nih.gov
- Improving End-User Trust in the Quality of Commercial Probiotic Products · pmc.ncbi.nlm.nih.gov
- Decoding a Probiotic Product Label - International Scientific Association for Probiotics and Prebiotics · isappsience.org
- How to Verify Probiotic Powder Quality · bscg.org
- A Meta-Analysis of Probiotic Efficacy for Gastrointestinal Diseases · journals.plos.org
- What Are CFUs in Probiotics, and How Many Do I Need? · culturelle.com
- Probiotic Supplements: Refrigerate or Not? · ipa-biotics.org

For information only, not medical advice. These statements have not been evaluated by the Food and Drug Administration, and no supplement here is intended to diagnose, treat, cure or prevent any disease. Ask a doctor or pharmacist before starting one, especially alongside prescription medicines, in pregnancy or before surgery.



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Katherine edits the news desk and the monographs at Half Life. She keeps a spreadsheet of every dose she has seen on a label beside the dose used in the trial, and the gap between the two columns is usually the story.
