

# De probióticos a postbióticos: ampliando horizontes en el uso de microorganismos funcionales

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Universidad Nacional del Litoral, Santa Fe



INLAIN

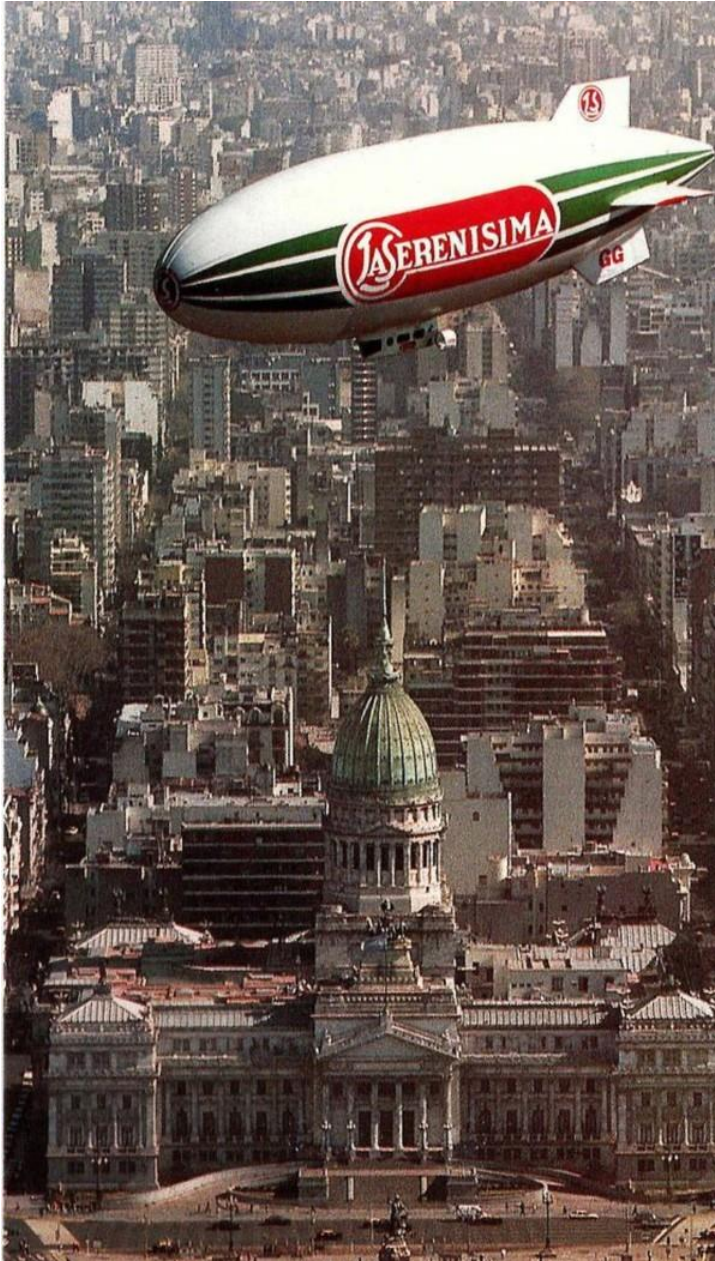


## DECLARACIÓN DE CONFLICTOS DE INTERÉS

Actividades de vinculación tecnológica (capacitaciones, asesoramientos, desarrollo de productos, controles de calidad, disertante) con empresas productoras de alimentos fermentados, sucedáneos de leche materna, fórmulas infantiles, probióticos y postbióticos.

Miembro de la junta directiva de la Asociación Científica Internacional de Probióticos y Prebióticos (ISAPP) [www.isappscience.org](http://www.isappscience.org)

# ERAN LOS AÑOS 90...





**Córdoba**  
**1 - 4 de Octubre 2001**

**Microorganismos vivos que, cuando son administrados en cantidades adecuadas, otorgan un beneficio a la salud del consumidor (FAO/WHO, 2002).**

# Requisitos mínimos: ni colonizar ni sobrevivir al estómago

Microorganismos vivos que, cuando son administrados en **cantidades adecuadas**, otorgan **un beneficio a la salud** del consumidor

**Identidad:** género, especie, **cepa:**

*Lactobacillus rhamnosus* GG

*Lactobacillus rhamnosus* CRL1505

*Lactobacillus reuteri* DSM17938

*Bifidobacterium lactis* Bb12

*Bifidobacterium lactis* HN019

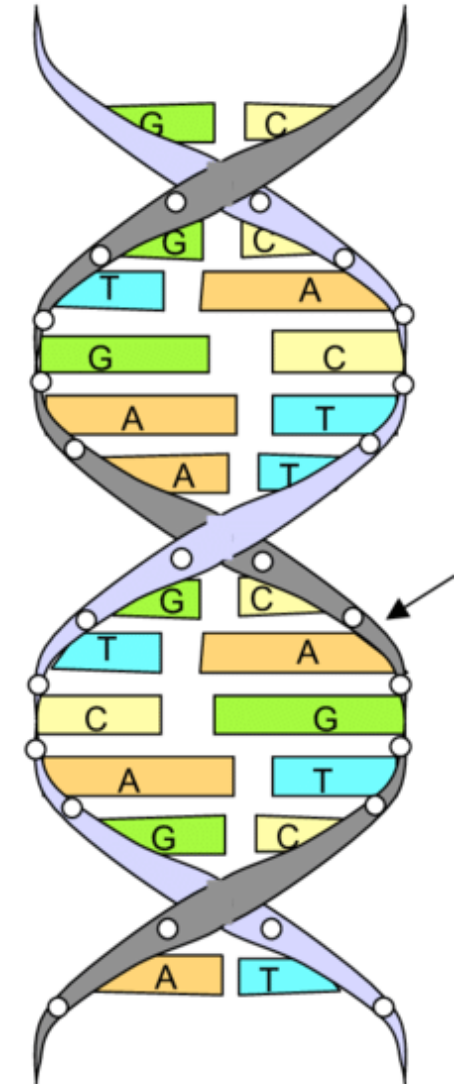
**Viabilidad:** UFC/g ó UFC/mL

**Seguridad y eficacia demostrada:** estudio clínico ( $10^9$  UFC totales ó 1 billón)

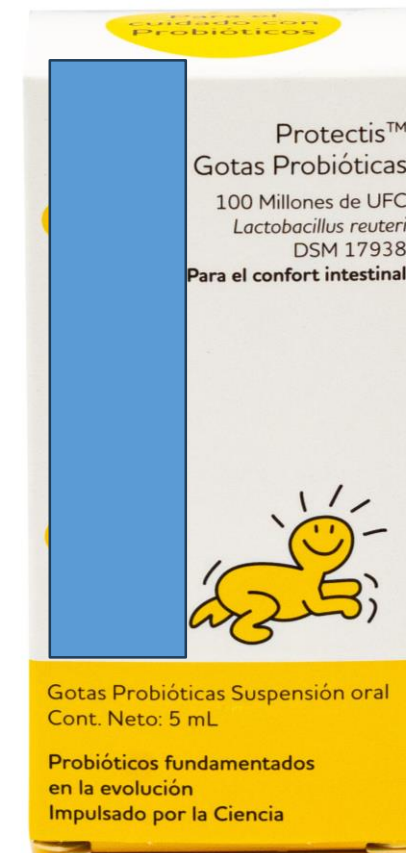
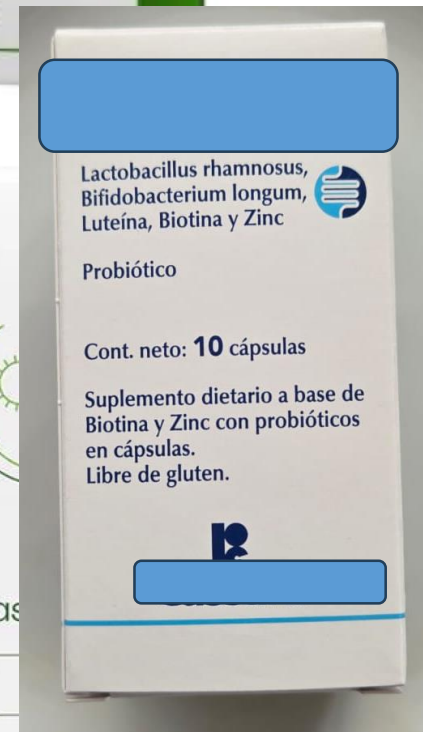
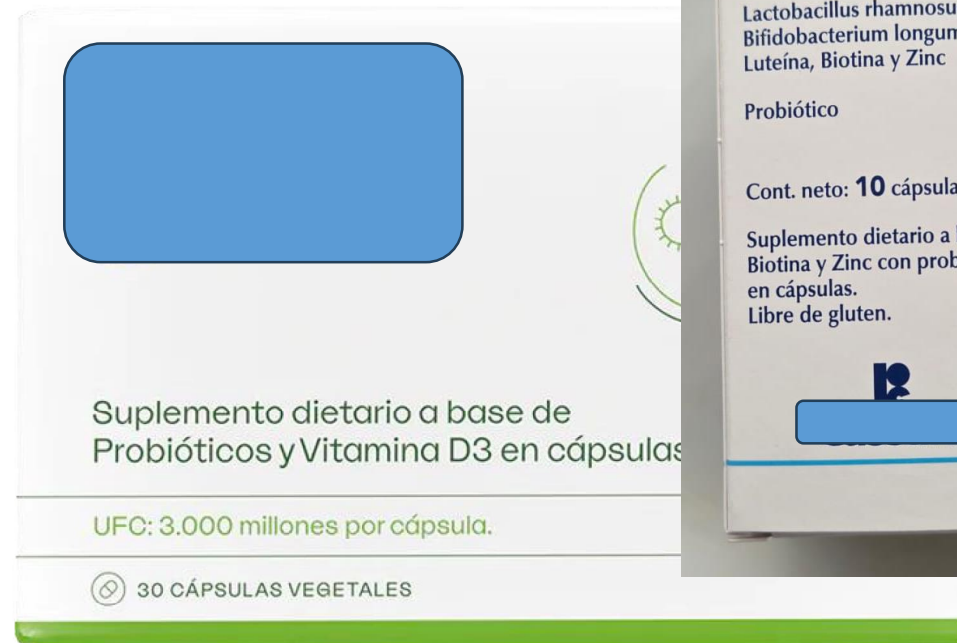
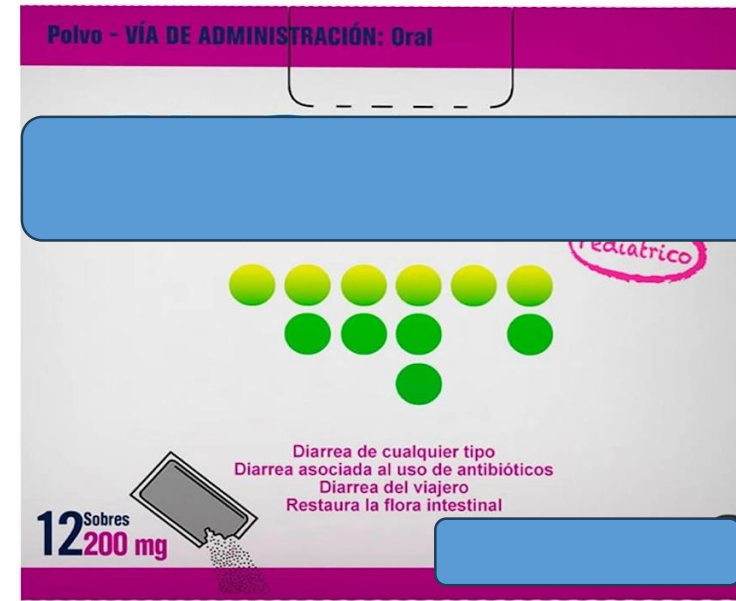
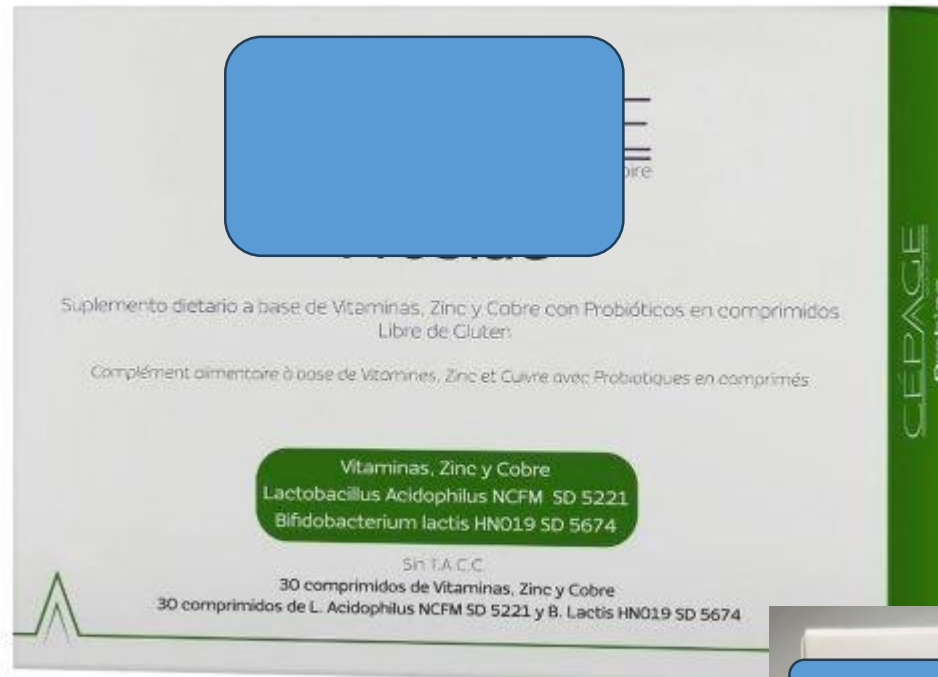
Randomized Controlled Trial > *Nutrients*. 2020 Jun 5;12(6):1693. doi: 10.3390/nu12061693.

## *Lactobacillus rhamnosus* GG (ATCC 53103) for the Management of Infantile Colic: A Randomized Controlled Trial

Francesco Savino <sup>1</sup>, Paola Montanari <sup>2</sup>, Ilaria Galliano <sup>2</sup>, Valentina Daprà <sup>2</sup>, Massimiliano Bergallo <sup>2</sup>



# Suplementos probióticos



# Yogures con probióticos en Argentina

*B. lactis* DN173-010

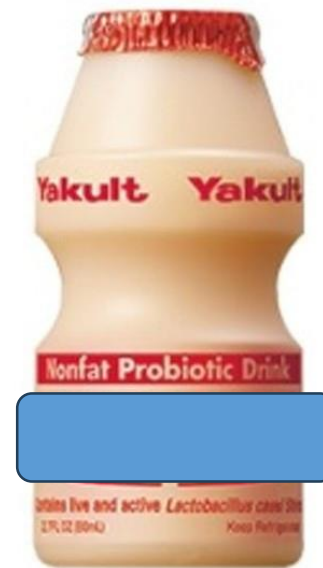


*L. casei* DN114-001



*L. rhamnosus* CRL1505

*L. casei* Shirota



*L. rhamnosus* GG



*L. casei* DN114-001  
*B. lactis* DN114-001

# Quesos con probióticos en Argentina



# Houston, we've got a problem!

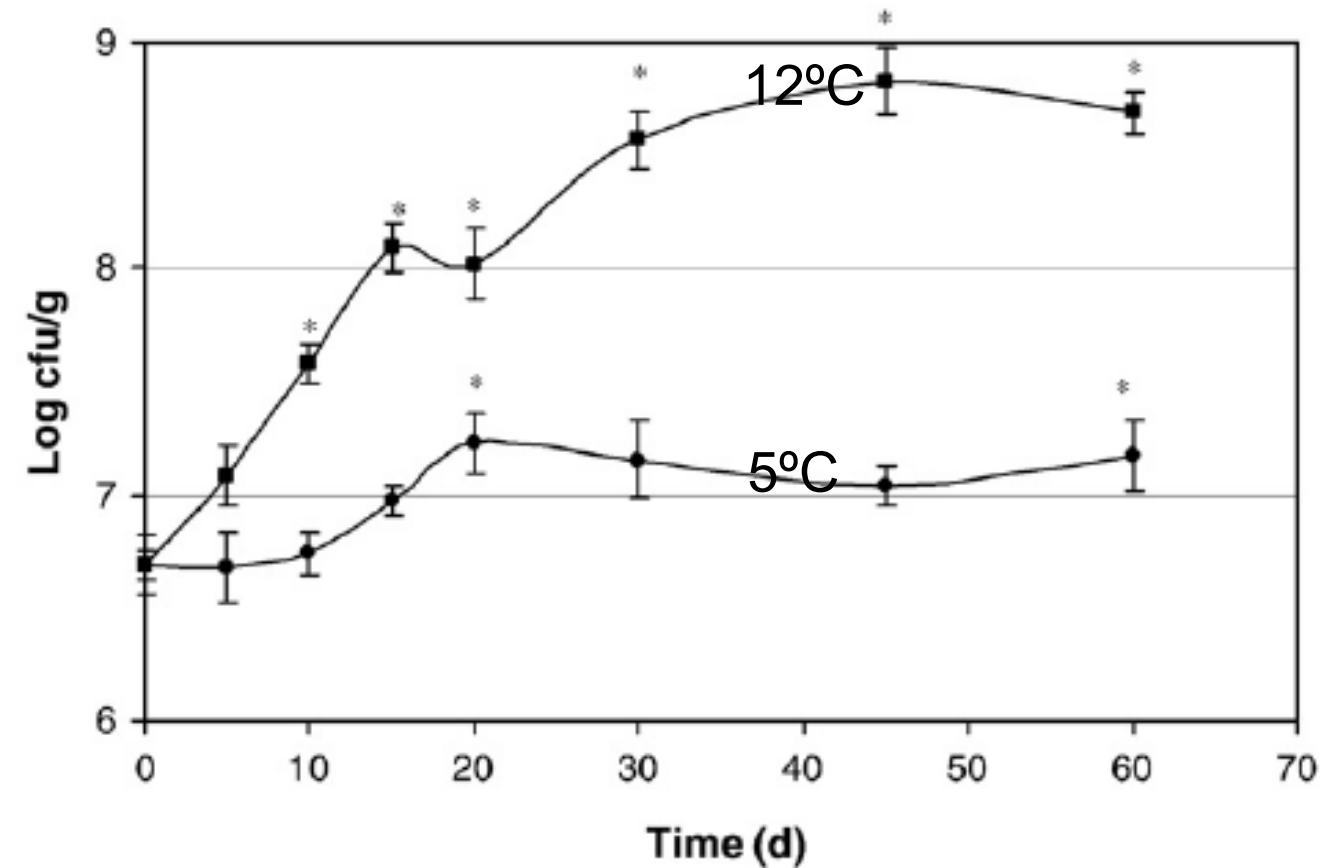


Fig. 2. Growth of *L. paracasei* A13 during the refrigerated storage of Argentinian probiotic fresh cheese at 5 °C (●) or 12 °C (■). \* Significantly different from the colony count at time 0 ( $P < 0.05$ ).

Vinderola, G., Prosello, W., Molinari, F., Ghiberto, D., & Reinheimer, J. (2009). Growth of *Lactobacillus paracasei* A13 in Argentinian probiotic cheese and its impact on the characteristics of the product. *International journal of food microbiology*, 135(2), 171–174.

# Houston, we've got a problem!

**Table 1**

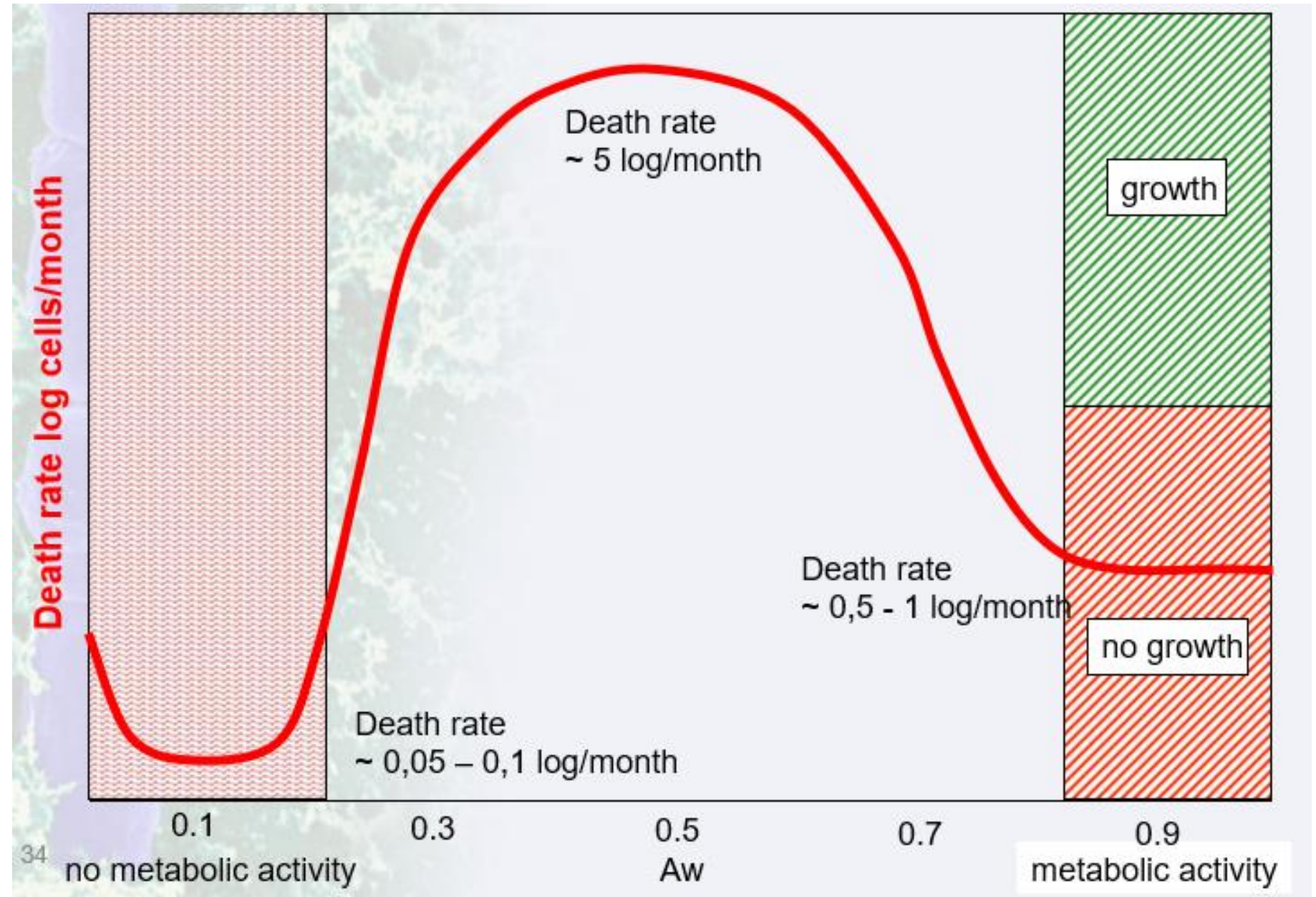
Sensorial properties of Argentinian probiotic fresh cheese maintained for 60 day at 5 °C and 12 °C.

Attribute	Temperature of storage	
	5 °C	12 °C
Color	Yellowish and bright white.	Pale and opaque white-beige.
Aroma	Soft, lactic, like ripened cream.	Strong, acid, like fermented cream, slightly rancid.
Taste	Lactic, creamy, slightly acid, somewhat bitter and spicy.	Very bitter, acid and rancid.
Texture	Creamy, slightly elastic and sticky, poorly-melting and soluble.	Easily splittable, grainy, rough, unstable, a bit plastic, melting and soluble.
pH	5.16 ± 0.12	4.61 ± 0.09

# Características de alimentos adecuados para probióticos

*Lactobacillus*  
*Bifidobacterium*  
*Saccharomyces*

1. Consumo frecuente
2. Propiedades sensoriales
3. Viabilidad celular



# Características de alimentos adecuados para probióticos

*Bacillus*





ELSEVIER

International Dairy Journal 9 (1999) 497–505

INTERNATIONAL  
DAIRY  
JOURNAL

[www.elsevier.com/locate/idairyj](http://www.elsevier.com/locate/idairyj)

# Culture media for the enumeration of *Bifidobacterium bifidum* and *Lactobacillus acidophilus* in the presence of yoghurt bacteria

C.G. Vinderola, J.A. Reinheimer\*

*Programa de Lactología Industrial, Facultad de Ingeniería Química (Universidad Nacional del Litoral), Santiago del Estero 2829, 3000 Santa Fe, Argentina*

Received 8 January 1999; accepted 14 May 1999

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ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

## International Dairy Journal

journal homepage: [www.elsevier.com/locate/idairyj](http://www.elsevier.com/locate/idairyj)



### Review

# The enumeration of probiotic issues: From unavailable standardised culture media to a recommended procedure?

Gabriel Vinderola <sup>a,\*</sup>, Jorge Reinheimer <sup>a</sup>, Seppo Salminen <sup>b</sup>

<sup>a</sup> Instituto de Lactología Industrial (INLAIN, UNL-CONICET), Facultad de Ingeniería Química, Universidad Nacional del Litoral, Santiago del Estero 2829, 3000, Santa Fe, Argentina

<sup>b</sup> Functional Foods Forum, Faculty of Medicine, University of Turku, Turku, Finland



# Desarrollo del área de interés

Arch Argent Pediatr 2021;119(1):56-61 / 56

## Alimentos fermentados y probióticos en niños. La importancia de conocer sus diferencias microbiológicas

*Fermented foods and probiotics for children. The importance of knowing their microbiological differences*

Arch Argent Pediatr 2020;118(4):278-285 / 278

## Ecosistema intestinal en la infancia: rol de los “bióticos”


*Gut ecosystem during infancy: The role of “biotics”*

*Dra. María del C. Toca<sup>a</sup>, Dr. Fernando Burgos<sup>b</sup>, Dra. Adriana Fernández<sup>c</sup>,  
Dr. Norberto Giglio<sup>d</sup>, Dra. Marina Orsi<sup>e</sup>, Dra. Patricia Sosa<sup>f</sup>, Dr. Omar Tabacco<sup>g</sup>,  
Dra. Florencia Ursino<sup>h</sup>, Dr. Federico Ussher<sup>i</sup> y Dr. Gabriel Vinderola<sup>j</sup>*

## Artículo especial

Arch Argent Pediatr 2023;e202202851

## Escenarios lácteos y microbiota intestinal en los primeros 1000 días

*Guadalupe Benavidez<sup>a</sup> , Ingrid Gerold<sup>b</sup> , Omar Tabacco<sup>c</sup> , Gabriel Vinderola<sup>d</sup> *

Arch Argent Pediatr 2022;120(1):59-66 / 59

## Intolerancia a la lactosa: mitos y verdades. Actualización

*Lactose intolerance: myths and facts. An update*

*M. del Carmen Toca<sup>a</sup> , Adriana Fernández<sup>b</sup> , Marina Orsi<sup>c</sup> , Omar Tabacco<sup>d</sup> ,  
Gabriel Vinderola<sup>e</sup> *

## **Pauta para el desarrollo de lácteos con**

**probióticos** cultivados con adecuada identificación de la cepa.

Utilizar cepas con evidencia trazable ([www.pubmed.com](http://www.pubmed.com)).

Utilizar cepas con evidencia en la matriz láctea.

No mezclar cepas con evidencia con cepas sin evidencia.

No mezclar cepas con evidencia obtenida en estudios diferentes, o para efectos benéficos diferentes o en matrices diferentes.



# Probióticos

1

## Conceptualización:

Bacterias y levaduras  
vivas que causan efectos  
benéficos en salud

1

**Término:**  
Probióticos

1

## Definición:

Microorganismos vivos  
capaces de otorgar un efecto  
benéfico cuando son  
administrados en cantidades  
adecuadas

# El "metaverso" de los postbióticos

3

conceptualizaciones

9

Términos

8

Definiciones

# Postbióticos: 3 conceptualizaciones

Metabolitos  
producidos por  
probióticos que  
confieren un  
beneficio

Tsiliringi y Rescigno,  
2012



**Microorganismos  
no viables que  
confieren un  
beneficio a la  
salud**

Metabolitos  
producidos por la  
microbiota  
intestinal

# Aclarando el concepto y la definición



frontiers | Frontiers in Microbiology

TYPE Perspective  
PUBLISHED 10 January 2024  
DOI 10.3389/fmicb.2023.1324565

Review

## The Concept of Postbiotics

Gabriel Vinderola<sup>1,\*</sup>, Mary Ellen Sanders<sup>2</sup> and Seppo Salminen<sup>3</sup>

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<sup>2</sup> International Scientific Association for Probiotics and Prebiotics, Centennial, CO 80122, USA; maryellen@isappscience.org

<sup>3</sup> Functional Foods Forum, Faculty of Medicine, University of Turku, 20014 Turku, Finland; sepsal@utu.fi

\* Correspondence: gvinde@fiq.unl.edu.ar; Tel.: +54-9-3426-31-1943

**Abstract:** The scientific community has proposed terms such as non-viable probiotics, paraprobiotics, ghostbiotics, heat-inactivated probiotics or, most commonly, postbiotics, to refer to inanimate microorganisms and/or their components that confer health benefits. This article addresses the various characteristics of different definitions of ‘postbiotics’ that have emerged over past years. In 2021, the International Scientific Association for Probiotics and Prebiotics (ISAPP) defined a postbiotic as “a preparation of inanimate microorganisms and/or their components that confers a health benefit on the host”. This definition of postbiotic requires that the whole or components of inactivated microbes be present, with or without metabolic end products. The definition proposed by ISAPP is comprehensive enough to allow the development of postbiotics from different microorganisms, to be applied in different body sites, encouraging innovation in a promising area for any regulatory category and for companion or production animals, and plant or human health. From a technological perspective, probiotic products may contain inanimate microorganisms, which have the potential to impart a health benefit. However, their contribution to health in most cases has not been established, even if at least one probiotic has been shown to confer the same health benefit by live or inanimate cells.

**Keywords:** postbiotics; inanimate; probiotics; International Scientific Association for Probiotics and Prebiotics; ISAPP; non-viable probiotics; heat-inactivated probiotics; microorganisms



Citation: Vinderola, G.;



### OPEN ACCESS

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RECEIVED 19 October 2023

ACCEPTED 28 November 2023

PUBLISHED 10 January 2024

#### CITATION

Vinderola G, Sanders ME, Cunningham M and Hill C (2024) Frequently asked questions about the ISAPP postbiotic definition. *Front. Microbiol.* 14:1324565. doi: 10.3389/fmicb.2023.1324565

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## Frequently asked questions about the ISAPP postbiotic definition

Gabriel Vinderola<sup>1\*</sup>, Mary Ellen Sanders<sup>2</sup>, Marla Cunningham<sup>3</sup> and Colin Hill<sup>4</sup>

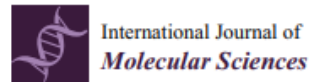
<sup>1</sup>Instituto de Lactología Industrial (CONICET-UNL), Faculty of Chemical Engineering, National University of Litoral, Santa Fe, Argentina, <sup>2</sup>International Scientific Association for Probiotics and Prebiotics, Centennial, CO, United States, <sup>3</sup>International Scientific Association for Probiotics and Prebiotics, Brisbane, QLD, Australia, <sup>4</sup>APC Microbiome Ireland, University College Cork, Cork, Ireland

The term postbiotic was defined by the International Scientific Association of Probiotics and Prebiotics (ISAPP) as “a preparation of inanimate microorganisms and/or their components that confers a health benefit on the host.” Although the ISAPP definition is widely cited, some concerns were aired after publication, and alternative definitions of postbiotic, as well as different terms for inactivated microbes, have been previously suggested. This paper addresses questions about the ISAPP definition that have been raised in different forums, including scientific meetings, social media commentary and personal communications. We focus on the rationale, scope, wording, composition and commercial implementation, as well as what is expected of postbiotics regarding safety, efficacy, quantification and mechanisms of action. We hope that exploring these questions will further clarify the definition and its scope and support a common understanding of the concept of postbiotics.

#### KEYWORDS

postbiotics, International Scientific Association for Probiotics and Prebiotics, ISAPP, biotic, inanimate microorganism

# DEMASIADOS TÉRMINOS EN USO PARA MICROORG. NO VIABLES



Review

## Postbiotics and Their Potential Applications in Early Life Nutrition and Beyond

Carrie A. M. Wegh<sup>1</sup>, Sharon Y. Geerlings<sup>1</sup>, Jan Knol<sup>1,2</sup>, Guus Roeselers<sup>2</sup> and Clara Belzer<sup>1,\*</sup>

Review

## Health Benefits of Heat-Killed (Tyndallized) Probiotics: An Overview

Núria Piqué<sup>1,2,\*</sup>, Mercedes Berlanga<sup>1</sup> and David Miñana-Galbis<sup>1</sup>



Commentary

## Para-probiotics for Preterm Neonates—The Next Frontier

Girish Deshpande<sup>1,2</sup>, Gayatri Athalye-Jape<sup>3</sup> and Sanjay Patole<sup>3,\*</sup>

*A lyophilized and inactivated culture of Lactobacillus acidophilus increases Helicobacter pylori eradication rates*

F. CANDUCCI\*, A. ARMUZZI\*, F. CREMONINI\*, G. CAMMAROTA\*, F. BARTOLOZZI†, P. POLA‡, G. GASBARRINI\* & A. GASBARRINI‡

Departments of \*Internal Medicine; †Medical Pathology; and ‡Hygiene, Catholic University of Rome, Italy

Accepted for publication 8 August 2000

## Ghost probiotics with a combined regimen: a novel therapeutic approach against the Zika virus, an emerging world threat

Vivek K. Bajpai, Vishal Chandra, Na-Hyung Kim, Rajni Rai, Pradeep Kumar, Kangmin Kim, Abhinav Aeron, Sun Chul Kang, D. K. Maheshwari, MinKyun Na, Irfan A. Rather & Yong-Ha Park

> *Int Immunopharmacol.* 2015 Apr;25(2):474-84. doi: 10.1016/j.intimp.2015.02.006. Epub 2015 Mar 2.

## Non-viable Immunobiotic Lactobacillus Rhamnosus CRL1505 and Its Peptidoglycan Improve Systemic and Respiratory Innate Immune Response During Recovery of Immunocompromised-Malnourished Mice

Yanina Kolling<sup>1</sup>, Susana Salva<sup>1</sup>, Julio Villena<sup>1</sup>, Gabriela Marranzino<sup>1</sup>, Susana Alvarez<sup>2</sup>

Journal of Applied Microbiology

Journal of Applied Microbiology ISSN 1364-5072

REVIEW ARTICLE

## Bioactives from probiotics for dermal health: functions and benefits

L.-C. Lew and M.-T. Liong

School of Industrial Technology, Universiti Sains Malaysia, Penang, Malaysia

Cell fragments

> *Probiotics Antimicrob Proteins.* 2021 Dec;13(6):1539-1545. doi: 10.1007/s12602-021-09785-5. Epub 2021 Apr 11.

## Comparison of Cytokine Expression in Human PBMCs Stimulated with Normal and Heat-Shocked Lactobacillus plantarum Cell Lysate

Marzieh Sanaei<sup>1,2</sup>, Mehdi Mahdavi<sup>3</sup>, Neda Setayesh<sup>2</sup>, Ahmad Reza Shahverdi<sup>1,2</sup>, Zargham Sepehrizadeh<sup>1,2</sup>, Mohammad Hossein Yazdi<sup>4,5</sup>

# OBJETIVOS DE ISAPP

**Unificar los diferentes términos utilizados para referirse a microorganismos no viables:** *non-viable probiotics, heat-inactivated probiotics, inactivated probiotics, heat-treated probiotics, heat-killed probiotics, tyndallized probiotics, postbiotics, paraprobiotics, ghost probiotics, cell lyzates, cell fragments*

**Proponer una definición consenso para el término**

**MAY 4TH, 2021**

➤ **110,000 ACCESSES**

**MORE THAN 1 YEAR OF DISCUSSION AMONG PANEL MEMBERS**

**CITED MORE THAN 800 TIMES SO FAR**

# CONSENSUS STATEMENT

**OPEN**



## The International Scientific Association of Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics

Seppo Salminen<sup>1</sup>✉, Maria Carmen Collado<sup>2</sup>, Akihito Endo<sup>3</sup>, Colin Hill<sup>4,5</sup>, Sarah Lebeer<sup>6</sup>, Eamonn M. M. Quigley<sup>7</sup>, Mary Ellen Sanders<sup>8</sup>, Raanan Shamir<sup>9,10</sup>, Jonathan R. Swann<sup>11,12</sup>, Hania Szajewska<sup>13</sup> and Gabriel Vinderola<sup>14</sup>

*A preparation of inanimate microorganisms and/or their components that confers a health benefit on the host.*

# UN POSTBIÓTICO

Preparación de microorganismos **inanimados**  
y/o sus componentes que confiere un **beneficio**  
para la salud del huésped

Salminen S, Collado MC, Endo A, Hill C, Lebeer S, Quigley EMM, Sanders ME, Shamir R, Swann JR, Szajewska H, Vinderola G. The International Scientific Association of Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics. Nat Rev Gastroenterol Hepatol. 2021 Sep;18(9):649-667

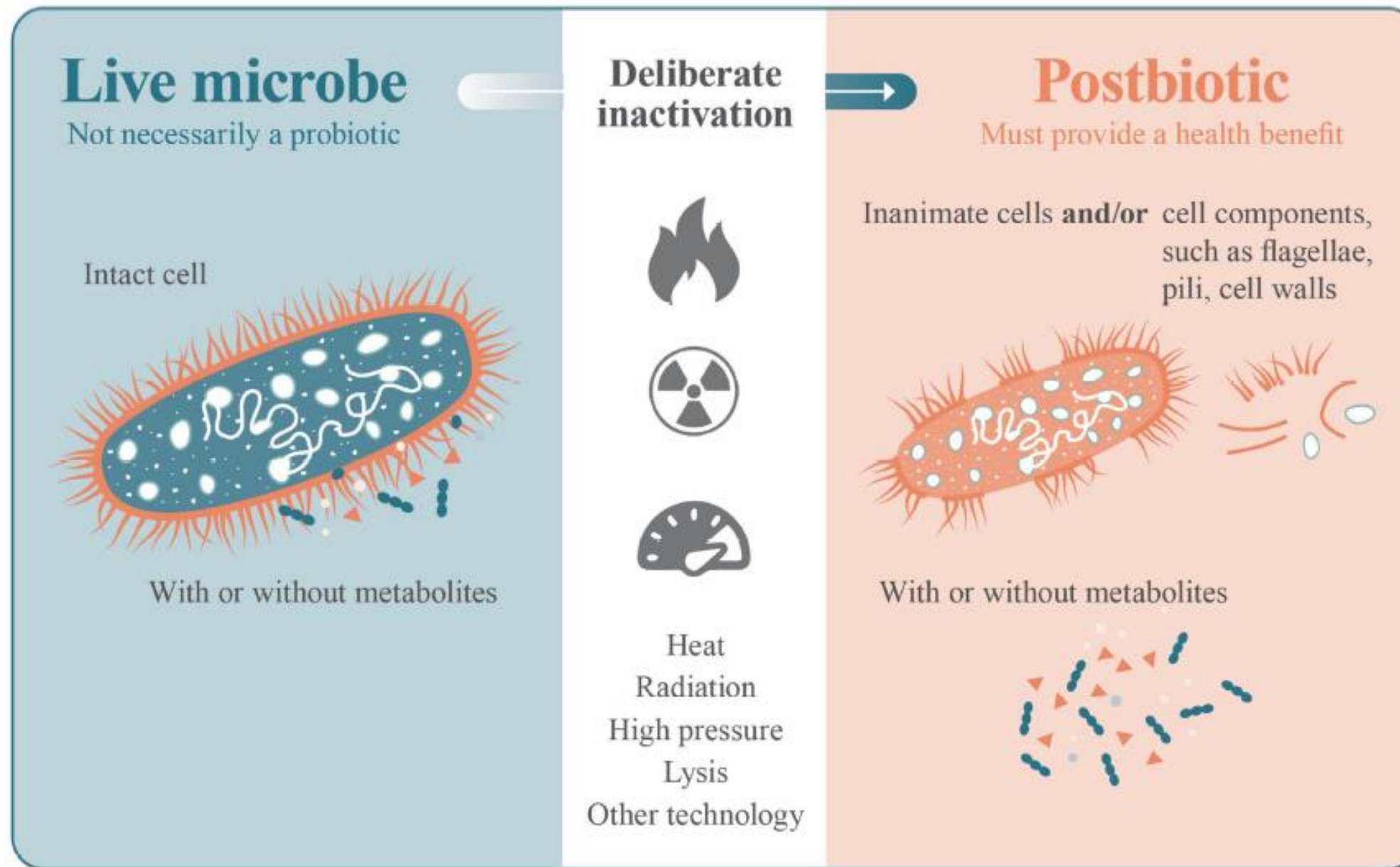
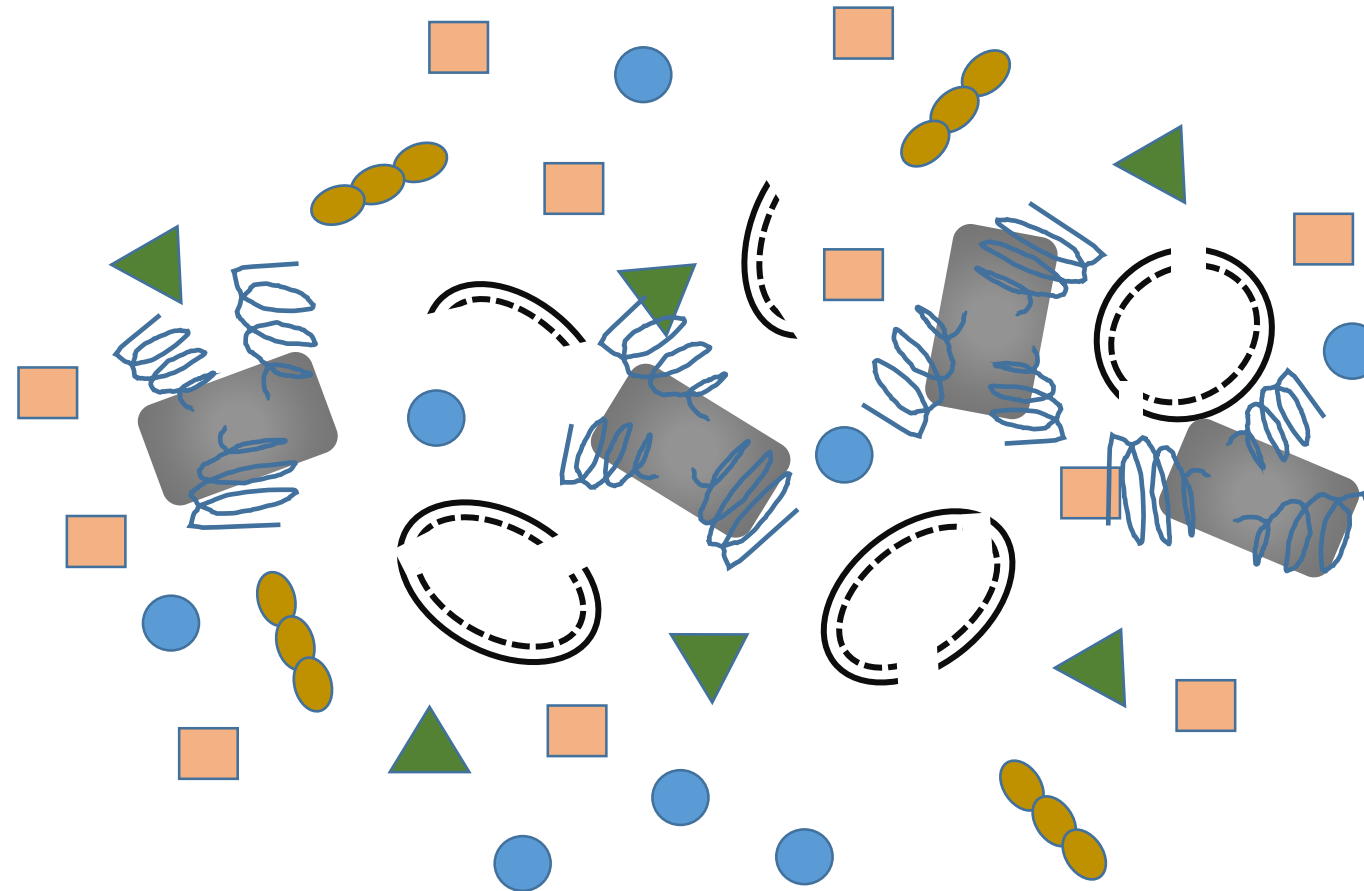


FIGURE 1

A deliberate process of viability termination (such as heat, radiation, high pressure or lysis) is applied to a live microbe as part of the manufacturing process of a postbiotic. The inactivation step may leave intact inanimate cells, cell components or a mixture of intact inanimate cells and cell components. The progenitor microbe does not necessarily have to be a probiotic.

# De una preparación de microorganismos inanimados...



...a una molécula definida y con nombre propio: butirato (no es un postbiótico)

# Health Canada está considerando el término

**Postbiotics**

- ISAPP “preparation of inanimate microorganisms and/or their components that confers a health benefit on the host” definition published 2021
- Still debate regarding the definition
- Public understanding of the term still lacking
  - CBC news article 2022 – Health Canada has not approved any NHP with postbiotics as the “recommended use or purpose”
  - American survey found many did not properly understand the term and the health benefits.

**NNHPD requirements for postbiotics (in development)**

- Some probiotic specifications may apply (i.e. strain identification, contact with priority allergen, antibiotic resistance, etc.)
- Information regarding to how cells were inactivated /confirm cell are inactivated
- Quantification using “mg”. CFUs are not acceptable
- Clinical trial demonstrating health benefit (product specific)

HEALTH CANADA - 11

Brian McNeill, officer Health Canada

# The China Institute of Food and Drug Control

## Postbiotics quantification: China health foods association rallies firms to draft industry standards

By Tingmin Koe

24-Jan-2024 - Last updated on 24-Jan-2024 at 01:44 GMT



Notice on the establishment of a group standard drafting working group for the "Guidelines for Counting and Detection of Postbiotic Inactivated Cells"

Release date: 2024-01-18

# Australia, Reino Unido, Singapur, Suiza



**Australian Government**

**Department of Health and Aged Care**

Therapeutic Goods Administration

## Requirements for microorganism characterisation in Listed Medicines and Registered Complementary Medicines

Guidance for applicants

Version 1.0, February 2023

### Overview

This guidance provides information for applications relating to microorganisms as active ingredients for use as new substances in listed medicines, or as active ingredients in registered complementary medicines (RCM). Listed medicines and RCM containing microorganisms as active ingredients are generally referred to as probiotics or **postbiotics**.

This document provides tailored guidance that is not covered in the [Australian Regulatory Guidelines for listed medicines and RCM](#) and ensures that microorganisms, when identified and characterised, are safe for their intended use in keeping with modern best practice.

### Scope

For the purpose of this guidance, microorganisms are whole and intact cells of bacteria and fungi (including yeasts) that are live or non-viable. This guidance is intended for the pre-market assessment of new live and whole/intact non-viable microorganisms potentially used as probiotics and **postbiotics** and should be considered in conjunction with the [Mandatory](#)

# DISCUSSION GROUP, ISAPP MEETING 2024, CORK, IRELAND: INDUSTRY SCIENTISTS AND ACADEMICS





## OPEN ACCESS

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# Postbiotics: a perspective on their quantification

Gabriel Vinderola<sup>1\*</sup>, Andrzej Benkowski<sup>2,3</sup>, Marion Bernardeau<sup>4</sup>, Empar Chenoll<sup>5</sup>, María Carmen Collado<sup>6</sup>, Ultan Cronin<sup>7,8</sup>, Erik Eckhardt<sup>9</sup>, Justin B. Green<sup>10</sup>, Ignacio R. Ipharraguerre<sup>11</sup>, Rober Kemperman<sup>12</sup>, Christophe Lacroix<sup>13</sup>, Junichi Minami<sup>14</sup>, Martin Wilkinson<sup>8</sup>, Mary Ellen Sanders<sup>15</sup> and Seppo Salminen<sup>16</sup>

## A preparation of inanimate microorganisms

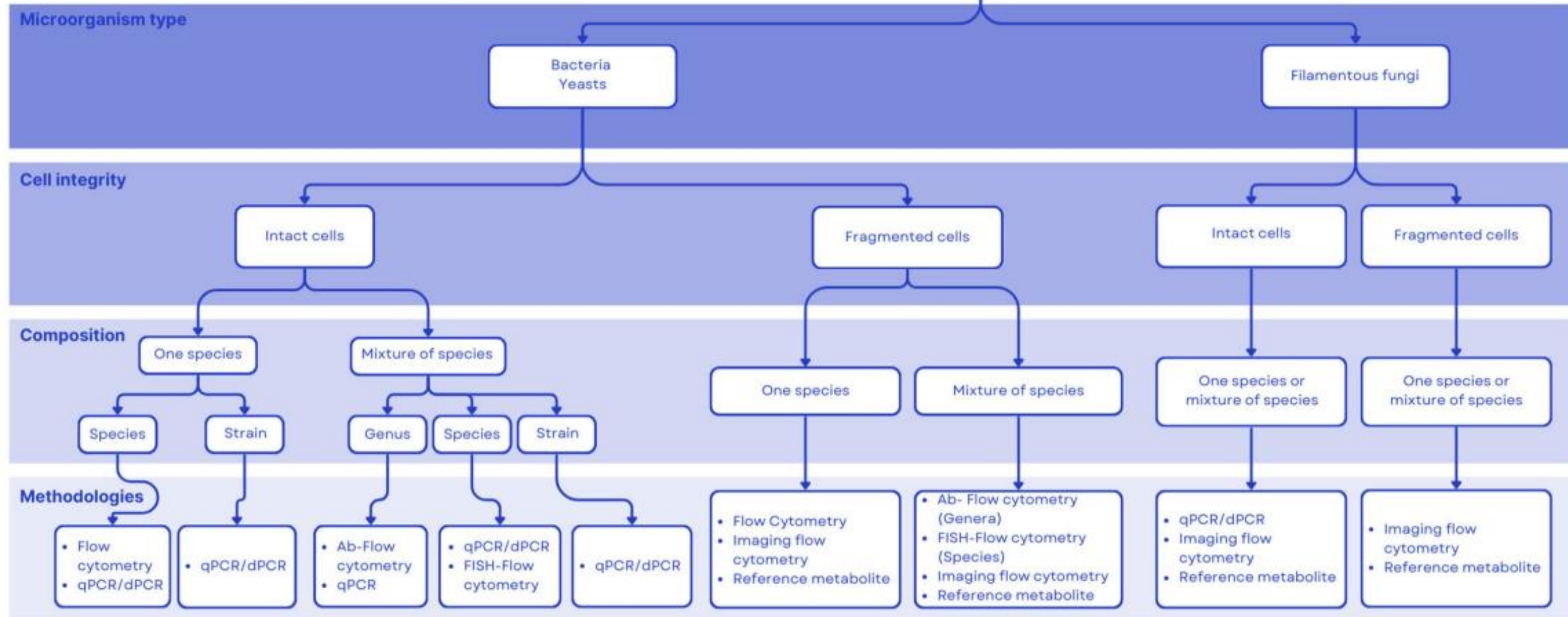


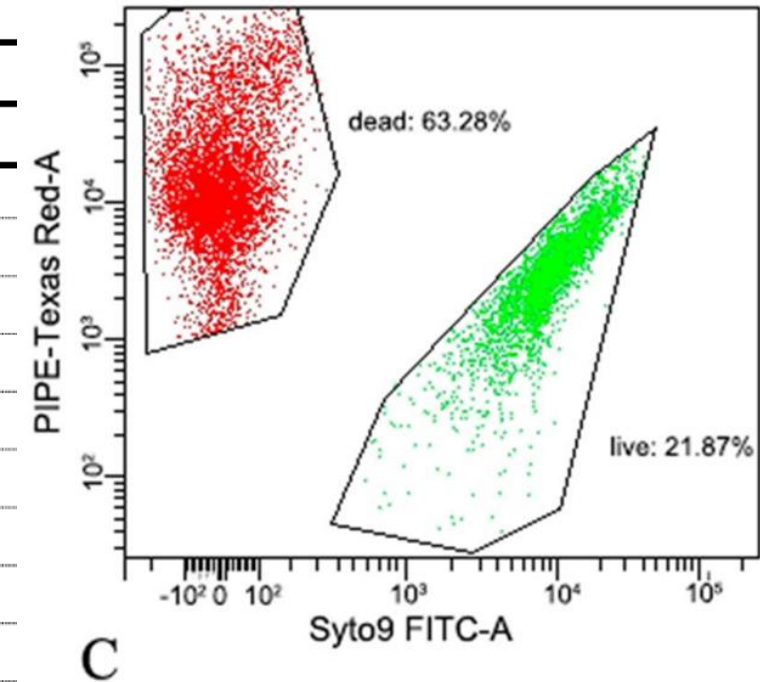
FIGURE 1

Decision tree to help decide among different quantification approaches for postbiotics.

## SPECIFICATION

<b>PRODUCT NAME</b>	Probiotics powder	<b>PROBIOTICS TYPE</b>	<i>Akkermansia muciniphila</i> AH39
<b>PRODUCT FORM</b>	Freeze dried powder	<b>PACKAGE SIZE</b>	1/5kg
<b>INNER PACKING</b>	Aluminum Foil & PE Bag	<b>OUTER PACKING</b>	Foam Box & Carton

TEST ITEMS	SPECIFICATIONS	TEST METHODS
Cell count (cells (TFU)/g)	$\geq 1.0 \times 10^{11}$ (100B)	ISO 19344 IDF232
<b>Physical &amp; Chemical Properties</b>		
Color	Off-white to beige	GB/T 29602
Aspect	Powder	GB/T 29602
Odor	No abnormal odor	GB/T 29602
Moisture %	$\leq 5.0$	GB 5009.3
Water activity	$\leq 0.2$	GB 5009.238
<b>Heavy Metals</b>		
*Lead (Pb) ppm	$\leq 0.05$	GB 5009.12
*Arsenic (As) ppm	$\leq 0.5$	GB 5009.11
*Cadmium (Cd) ppm	$\leq 0.05$	GB 5009.15
*Mercury (Hg) ppm	$\leq 0.02$	GB 5009.17
<b>Microbiology</b>		
Aerobic mesophilic total count (CFU/g)	$\leq 500$	ISO 4833-1



# Akkermansia muciniphila strain ATCC BAA-835

Compositional guideline for Akkermansia muciniphila strain ATCC BAA-835 permitted for use in listed medicines

**Last updated:** 27 September 2024

Non-viable <i>Akkermansia muciniphila</i> cell count	Ph Eur 2.7.24 <sup>[3]</sup>	$2.5 \times 10^{10} - 2.5 \times 10^{12}$ TFU/g (equating to 34 billion non-viable cells of pasteurised <i>Akkermansia muciniphila</i> )
Viable <i>Akkermansia muciniphila</i> cell count	Plated cell count method <sup>[4]</sup>	Not more than 10 CFU/g

## Yili launches first ambient drinking yogurt with large pieces of fruit using Tetra Pak technology

By Jim Cornell *CF*

22 Jun 2018 - Last updated on 22 Jun 2018 at 09:03 GMT



BIOZYME  
INCORPORATED

ADDITIVE

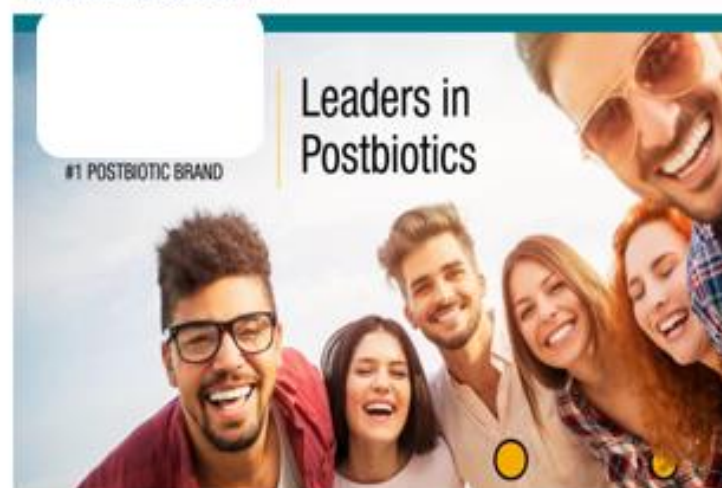
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## Aspergillus oryzae: A Toolbox for Animal Health

Posted: September 28th, 2021

Aspergillus oryzae is a multi-cellular, filamentous fungi that has deep roots in Chinese and Japanese culture, where it has been used for centuries to make sake, soy sauce and other fermented foods. Now, A. oryzae is making its mark on animal agriculture, too. It all started back in the 1940s when H.E. Kistner discovered, and subsequently patented, a direct-fed microbial produced from a select strain of A. oryzae, which would come to be known as Amaferm®, now a registered trademark of BioZyme®, Incorporated.

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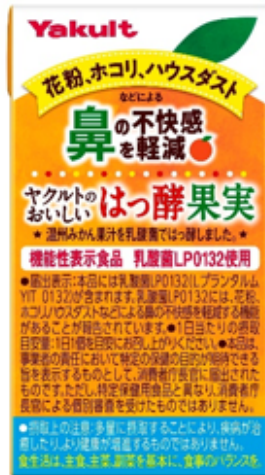


MORI-NU PLUS

LAC-SHIELD™ & POSTBIOTICS



## Fermented orange juice for alleviation of allergies (FFC)



launched in 2018  
by Yakult  
(containing pasteurized  
40 billion  
*L. plantarum*  
cells/bottle 125mL )

Functional active  
component

### Health claim

It has been reported that *L. plantarum* LP0132 has the function of alleviating nasal discomfort caused by pollen, dust, and house dust.

## Fermented skim milk for better sleep quality (FFC)



launched in 2024  
by Asahi Soft Drinks  
(containing pasteurized  
10 billion *L. gasseri*  
cells/bottle 200 mL)

### Health claim

*Lactobacillus gasseri* CP2305 has been reported to alleviate psychological stress, improve sleep quality (by promoting deeper sleep), and regulate the intestinal environment.

- Harima-Mizusawa N et al. Citrus juice fermented with *Lactobacillus plantarum* YIT 0132 alleviates symptoms of perennial allergic rhinitis in a double-blind, placebo-controlled trial. *Benef Microbes*. 2016 Nov 30;7(5):649-658.
- Suzuki S, et al. Effect of *Lactobacillus plantarum* YIT 0132 on Japanese cedar pollinosis and regulatory T cells in adults. *Allergy*. 2020 Feb;75(2):453-456.
- Kakiyama S, et al. Effects of citrus juice fermented with *Lactobacillus plantarum* YIT 0132 on Japanese cedar pollinosis during probiotic consumption: an open study. *Biosci Microbiota Food Health*. 2020;39(3):137-144.

- Nishida K, et al. Para-psychobiotic *Lactobacillus gasseri* CP2305 ameliorates stress-related symptoms and sleep quality. *J Appl Microbiol*. 2017 Dec;123(6):1561-1570.
- Nishida K, et al. Health Benefits of *Lactobacillus gasseri* CP2305 Tablets in Young Adults Exposed to Chronic Stress: A Randomized, Double-Blind, Placebo-Controlled Study. *Nutrients*. 2019 Aug 10;11(8):1859.

Cortesía Akihito Endo, Tokyo University of Agriculture, Hokkaido, Japón.

## Fermented skim milk to alleviate nasal discomfort (FFC)



launched in 2025  
by Asahi Soft Drinks  
(containing pasteurized  
20 billion *L. acidophilus*  
cell/bottle 200 mL)

### Health claim

*L. acidophilus* L-92 has been reported to support the function of plasmacytoid dendritic cells (pDCs) and help maintain immune function in healthy individuals. It has also been reported to alleviate nasal discomfort caused by house dust and other allergens.

- Ishida Y, et al. Clinical effects of Lactobacillus acidophilus strain L-92 on perennial allergic rhinitis: a double-blind, placebo-controlled study. J Dairy Sci. 2005 Feb;88(2):527-33.
- Kanzato H, et al. Lactobacillus acidophilus strain L-92 induces apoptosis of antigen-stimulated T cells by modulating dendritic cell function. Immunobiology. 2008;213(5):399-408.
- Inoue Y, et al. Effects of oral administration of Lactobacillus acidophilus L-92 on the symptoms and serum cytokines of atopic dermatitis in Japanese adults: a double-blind, randomized, clinical trial. Int Arch Allergy Immunol. 2014;165(4):247-54.

Cortesía Akihito Endo, Tokyo University of Agriculture, Hokkaido, Japón.

## *L. lactis* strain Plasma (Kirin) to maintain immune function (FFC)



launched in 2025  
by Noevir  
(containing 100 billion *L. lactis*  
cell/sachet)



launched in 2023  
by Japan Coca Cola  
(containing 100 billion *L. lactis*  
cell/bottle)



launched in 2021  
by Kanro  
(containing 100  
billion *L. lactis*  
cell/bag)


### Health claim

*L. lactis* strain Plasma has been reported to act on plasmacytoid dendritic cells (pDCs) and help maintain immune function in healthy individuals.

- Khor et al. Lactococcus lactis Strain Plasma Intake Suppresses the Incidence of Dengue Fever-like Symptoms in Healthy Malaysians: A Randomized, Double-Blind, Placebo-Controlled Trial. Nutrients. 2021 Dec 16;13(12):4507.
- Fujii et al. Effects of Heat-Killed Lactococcus lactis Strain Plasma on Skin Homeostasis-Related Genes and the Skin Microbiome among Healthy Adults: A Randomized Controlled Double-Blind Study. Microorganisms. 2021 Sep 25;9(10):2029.

# Comparing the effects of yogurt containing Akkermansia muciniphilia postbiotic with yogurt containing Lactobacillus rhamnosus postbiotic on body composition, biochemical indices, appetite, and depression scores in overweight or obese adults: A randomized, double-blind, controlled clinical trial

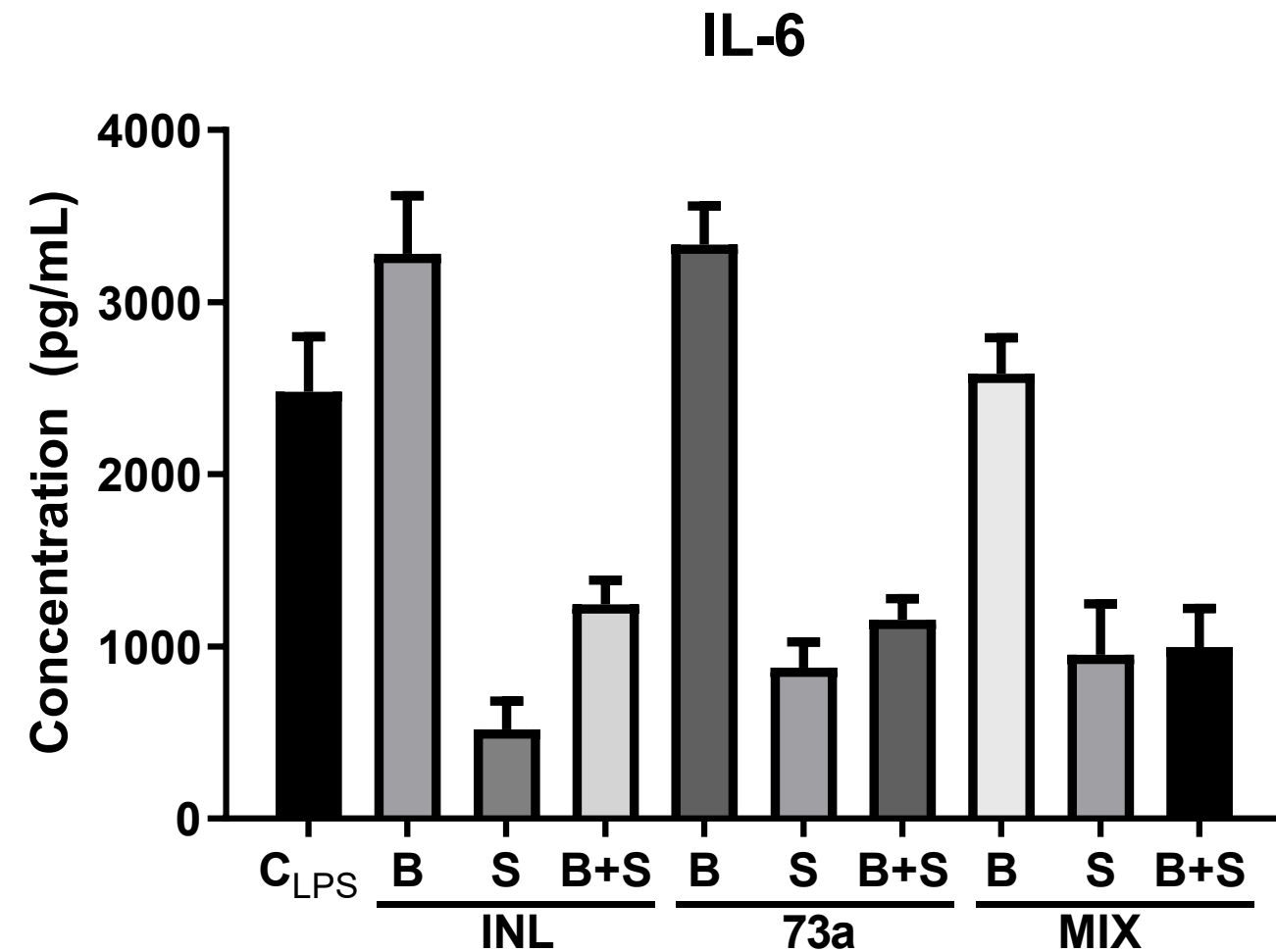
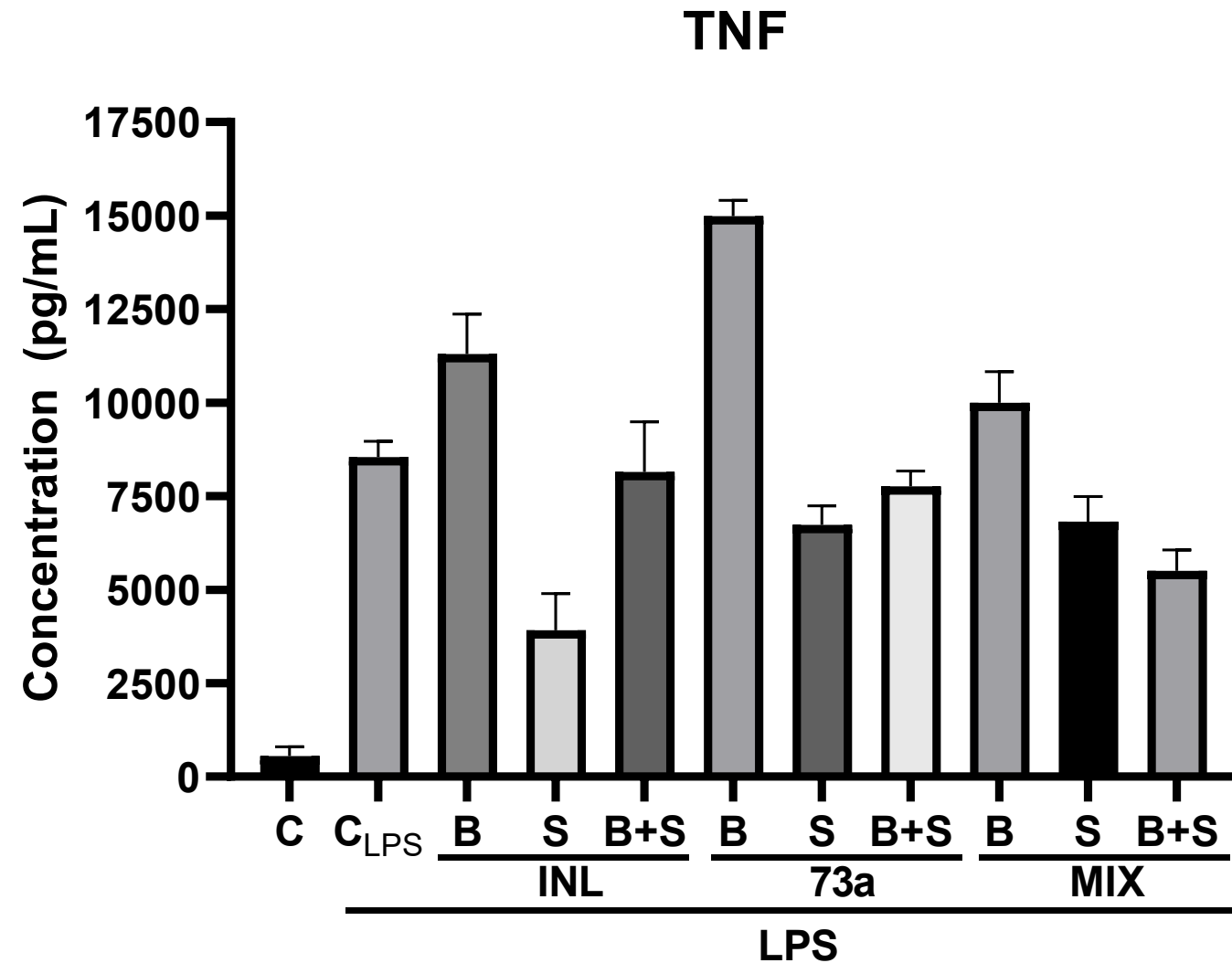
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# TRABAJO EN MARCHA

Postbiotics from human-milk derived *Bifidobacterium lactis* INL1 and *L. plantarum* 73<sup>a</sup>, for atopic dermatitis



# En síntesis

- ✓ Co-existen actualmente al menos tres conceptualizaciones del término “postbióticos”.
- ✓ Para referirse a los microorganismos no viables, se ha usado una diversidad de términos: *non-viable probiotics*, *heat-inactivated probiotics*, *inactivated probiotics*, *heat-treated probiotics*, *heat-killed probiotics*, *tyndallized probiotics*, *postbiotics*, *paraprobiotics*, *ghost probiotics*, *cell lysates*, *cell fragments*.
- ✓ Todos nos beneficiaríamos de un término unificado y una única conceptualización.

# En síntesis

- ✓ La definición propuesta por ISAPP cubre microorganismos no viables, enteros o fragmentados, con o sin la presencia de metabolitos en el producto terminado.
- ✓ Algunas legislaciones están empezando a considerar al término bajo la perspectiva propuesta por ISAPP.
- ✓ Algunos desafíos: cuantificación, desarrollo de productos basados en la ciencia, con evidencia.
- ✓ El tiempo dirá...

**Gracias!!!**

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**I N L A I N**

