Probiotics™
AUSTRALIA
Untapping every *body's* potential

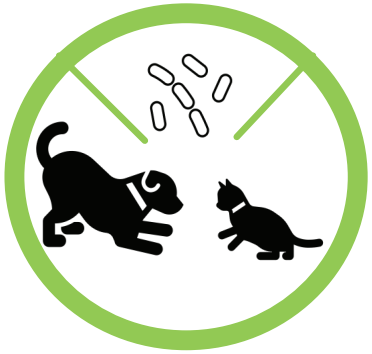
An Overview

Probiotics Australia
Ormeau (GC), QLD

FOR DAILY USE FOR ALL PET TYPES
PetWater Plus

Topics for today

- Introduction to Probiotics Australia
- Probiotics
- Postbiotics
- Pet probiotics
- PA products offered for pets
- PET WATER+



Probiotics™ AUSTRALIA
Untapping every *body's* potential

Probiotics Australia, the beginning of a new chapter of our story

Probiotics Australia was born through a small family run business which started in 2009, when the founding company began to set roots as a bio-fermentation specialist and probiotic contract manufacturer.

Having developed proprietary bio-fermented processes the quest for further studies and development into the field of probiotics started with in vitro studies through leading universities.

The successful outcome of these studies motivated continued growth of the business within the probiotic industry and highlighted the major role microbes play and can play in human health.

Humans are a unique reservoir of a heterogeneous and vivacious group of microbes, which together forms the human-microbiome superorganism. The human gut serves as a home to over 500 to 1000 different microbial species, which primarily modulate the host internal environment and thereby, play a major role in host health.

As our passion for probiotics developed through years, so did our commitment to human health and the importance of bringing research discoveries to life.

Biological products are very complex and hard to make which explains why biotech manufacturing plants are large and expensive to build.

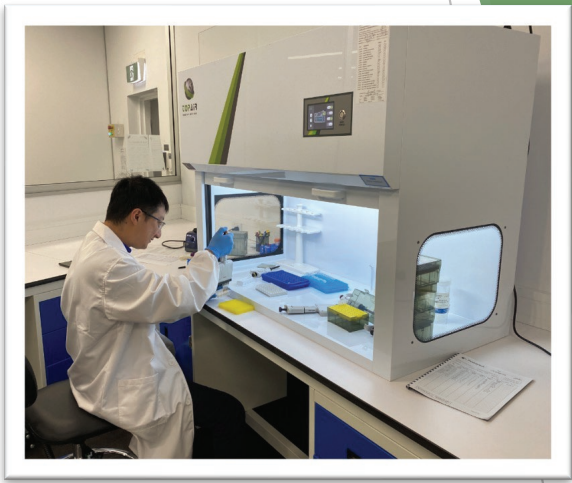
Through collaborations with leading industry experts and organisations, the need to develop and manufacture Australian made biotherapeutics became evident.

Australia is home to some of the best minds and universities in the world, and now with our vision, we are able to commercialise technologies that have long been sitting on research intuitions shelves.

Our state of the art biomanufacturing plant has come to life and we can now also cater for the next generation of biotechnologies and advancing our goals of bringing the biotech revolution to more people and other industries around the world.

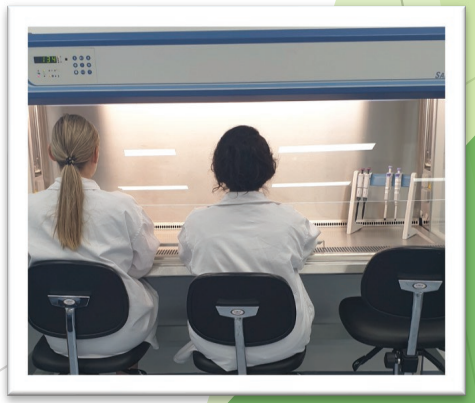
PA's Development Timeline

- **2009 – Probiotics Australia Pty Ltd founded**
  - Probiotics herbal beverage fermentation
  - Probiotics complementary medicine formulation development
  - Probiotics complementary medicine manufacturing
- **2018 – Probiotics API manufacturing facilities construction**
  - Production facilities and Laboratory construction
  - TGA certification process for API manufacturing
- **2019 – First probiotics API manufacturing under TGA cGMP licence**
  - API manufacturing
  - Next-gen Probiotics R&D centre
  - Personalised medicine R&D centre



PA's Capability

- Freeze-dried probiotics powder, as APIs and food ingredients
  - PA's strains
  - Customised multi-strain probiotic blends
  - Contract manufacturing others' strains
- Fermented liquids
- Strain development and commercialisation
- Development of new raw ingredients



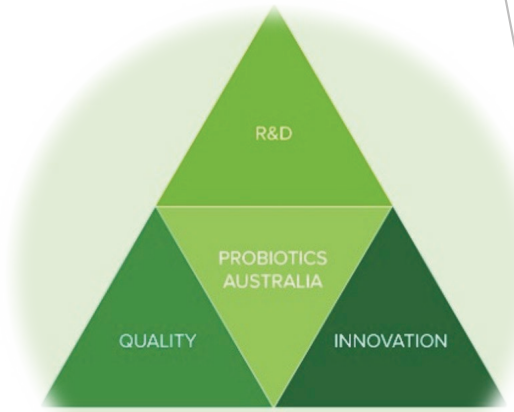
PA's Technical Departments

- API Production Department
- TGA certified QC Laboratory
- Product Development R&D Laboratory
- Microbiome Genomic Laboratory

Innovation Centre

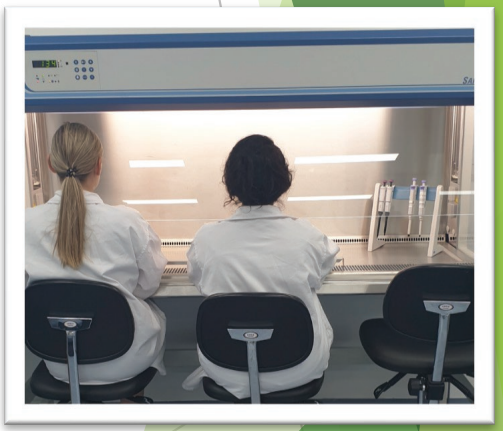
Research and development is part of our founding ethos and is part of who we are and what we do.

Within our facility on Queensland's Gold Coast, Probiotics Australia operates dedicated R&D laboratories, equipped with the latest in bio-fermentation production and genetic analysis, all staffed by experts trained at local, interstate and international universities.



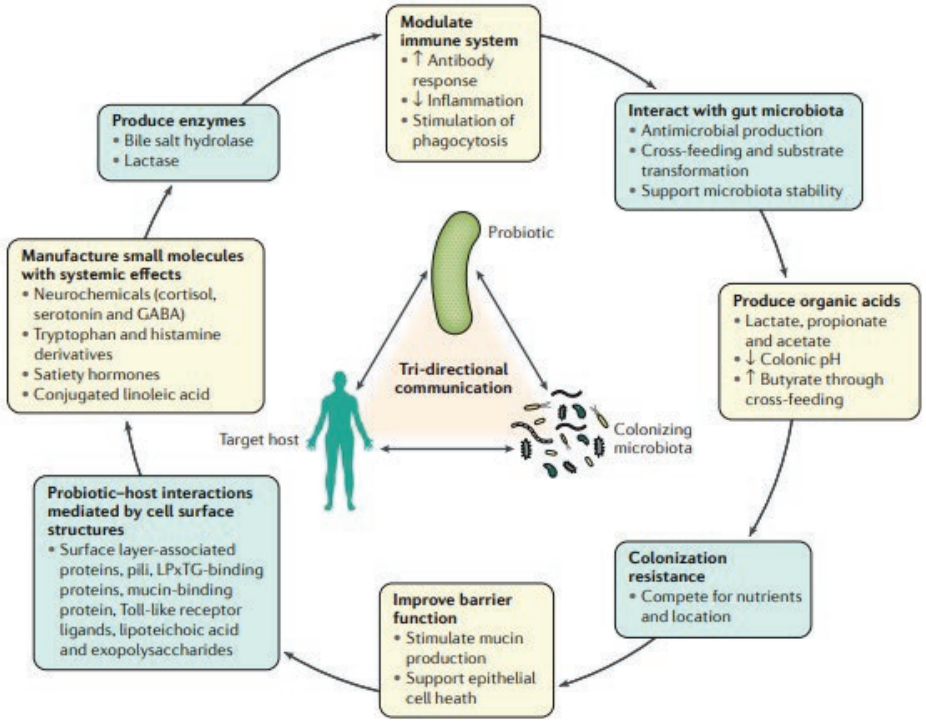
Our research is primarily focussed on three areas:

1. Expanding the evidence base for probiotics and other microorganisms in human health
2. Innovation in delivery methods and product formats for probiotics
3. Collaboration with partners to bring their microorganism based products to market

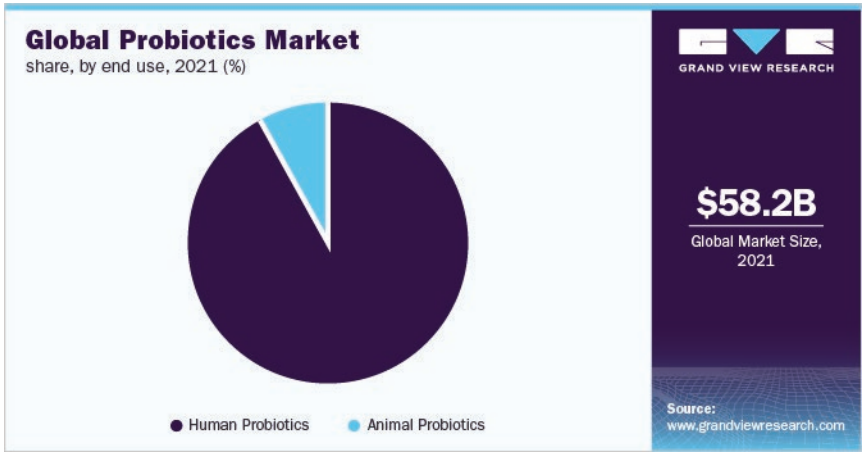


Probiotics

- Live micro-organisms that confer a beneficial or functional effect
  - Key Genera
    - *Lactobacillus*
    - *Bifidobacterium*
    - *Lactococcous*
    - *Enterococcus*
    - *Streptococcus salivarius*
    - *Saccharomyces*
    - *Bacillus*



Probiotic



What are the factors driving the probiotics market?

The key factors that are driving the probiotics include growing consumption of fermented food and probiotic dietary supplements on account of its gut health benefits and rising use of probiotics as an alternative to antibiotics in animal feed.

Regional Insights

Asia Pacific led the global market with a revenue share of over 40.0% in 2021. The region is witnessing a substantial rise in consumer awareness due to competitive strategies adopted by the global players. Strong demand from countries, such as India, China, and Australia, is contributing to the overall growth.

North America is expected to witness considerable growth over the forecast period. Continued investments from manufacturers in the food and beverage and pharmaceutical industries are anticipated to contribute to the regional market growth.

Probiotics have also been receiving considerable attention from researchers with respect to animal nutrition over the past few years. This development is attributed to the increasing focus on alternatives for conventional growth promoters, such as antibiotics, to improve animal health.

Postbiotics

- "Bioactive compounds produced during a fermentation process (including inactive microbial cells, cell constituents, and metabolites) that support health and/or well-being."
- "Postbiotics, particularly heat-killed bacteria, have been widely used in various applications, including foods, cosmetics, and pharmaceuticals. Although the exact mechanism of their action is still not fully understood, their immune-modulating effects are undeniable" Malagón-Rojas et al. 2021
- Probiotics Australia's is leading the way in Australia in promoting this segment with HK postbiotics.

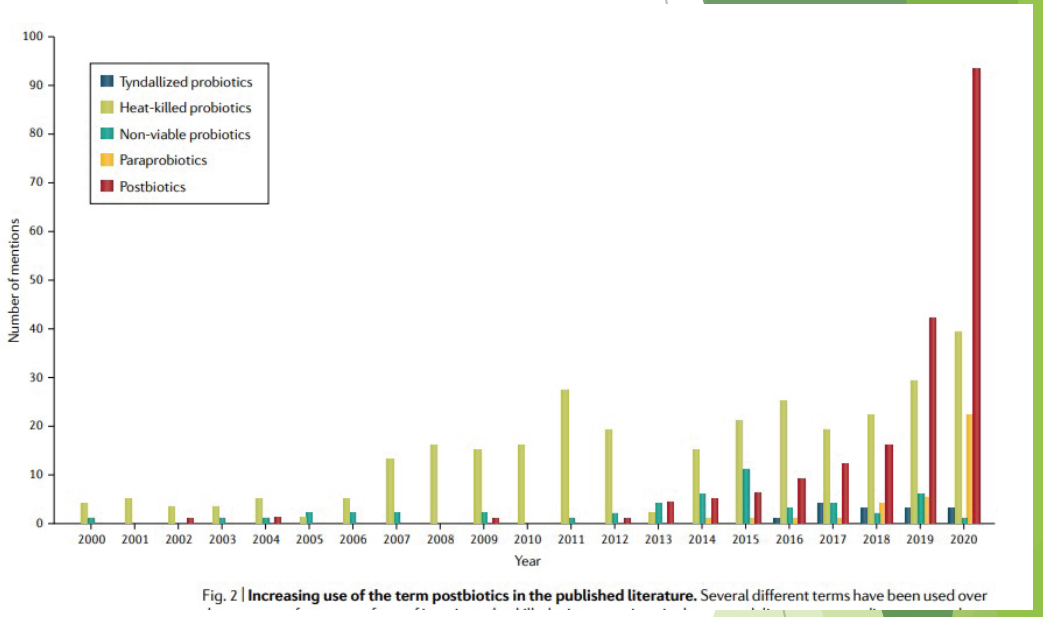


Fig. 2 | **Increasing use of the term postbiotics in the published literature.** Several different terms have been used over

Seppo Salminen et al. 2021

Zoonatant™

Our *Zoonatant*™ consists of the metabolites and compounds that our probiotics generate upon being cultured with our unique growth media. *Zoonatant*™ created by such strain specific probiotics enriches the probiotics' beneficial properties that in turn may improve your pet's health. These metabolites can also be used by the vast pre-existing microbiome for improving their growth and confer health benefits to your dear pets!

EXPLAIN

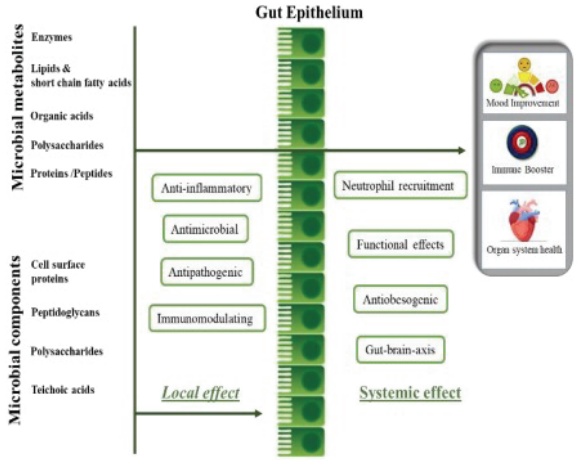
THE INNOVATION:

Postbiotics AUSTRALIA

Comparison of immune modulating effects of probiotics and postbiotics on viability of and cytokine production by isolated human immune cells.

Summary

Postbiotics have been garnering increasing interest in recent times as new evidence of their benefits emerge. Live probiotic bacteria have certain limitations for commercial use due to requirement of viability retention in storage and processing. **Probiotics Australia** have developed strain specific postbiotic products and blends which have been validated independently by the **Mucosal Immunology Research Group at Griffith University, Gold Coast**. These postbiotics are shown to be non-cytotoxic to the host. Postbiotic type probiotics modulate immune response similarly or better than their probiotic counterparts. Due to increased stability, temperature and pressure tolerances, postbiotics have significant shelf-life benefits when compared to live probiotics, and can be used for immunomodulation in functional foods, cosmetics, therapeutics and agricultural biomacromolecules.



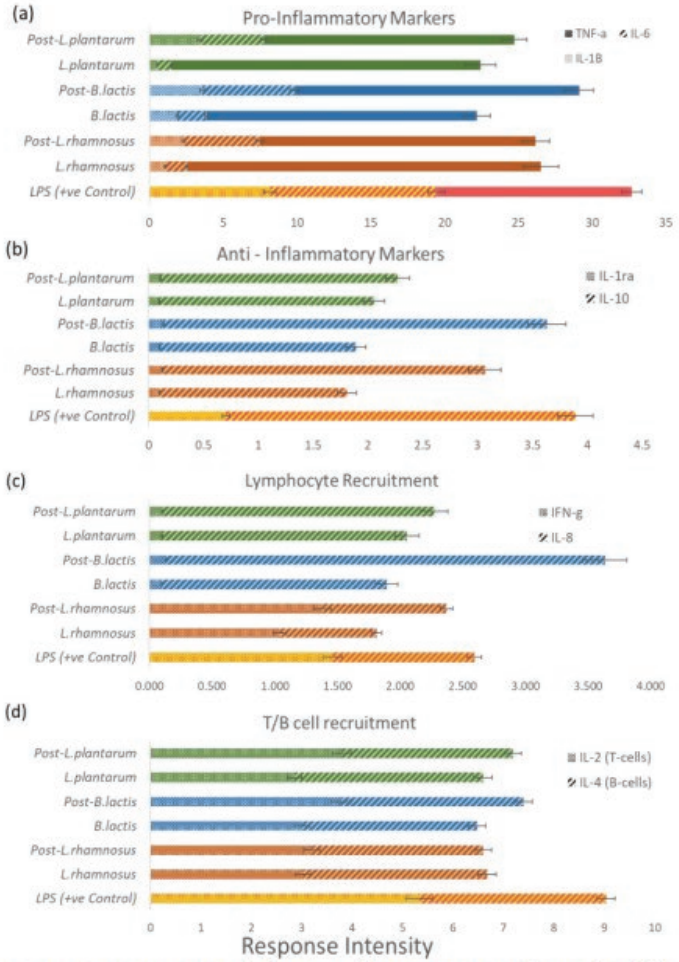


*Figure 3: **Immunomodulatory effects on PBMC from healthy subject.** Probiotics, corresponding postbiotics, E.coli LPS (as positive control) tested on PBMCs for inflammatory markers (a, b) and immune system recruitment (c,d).*

Probiotics Australia Collaterals

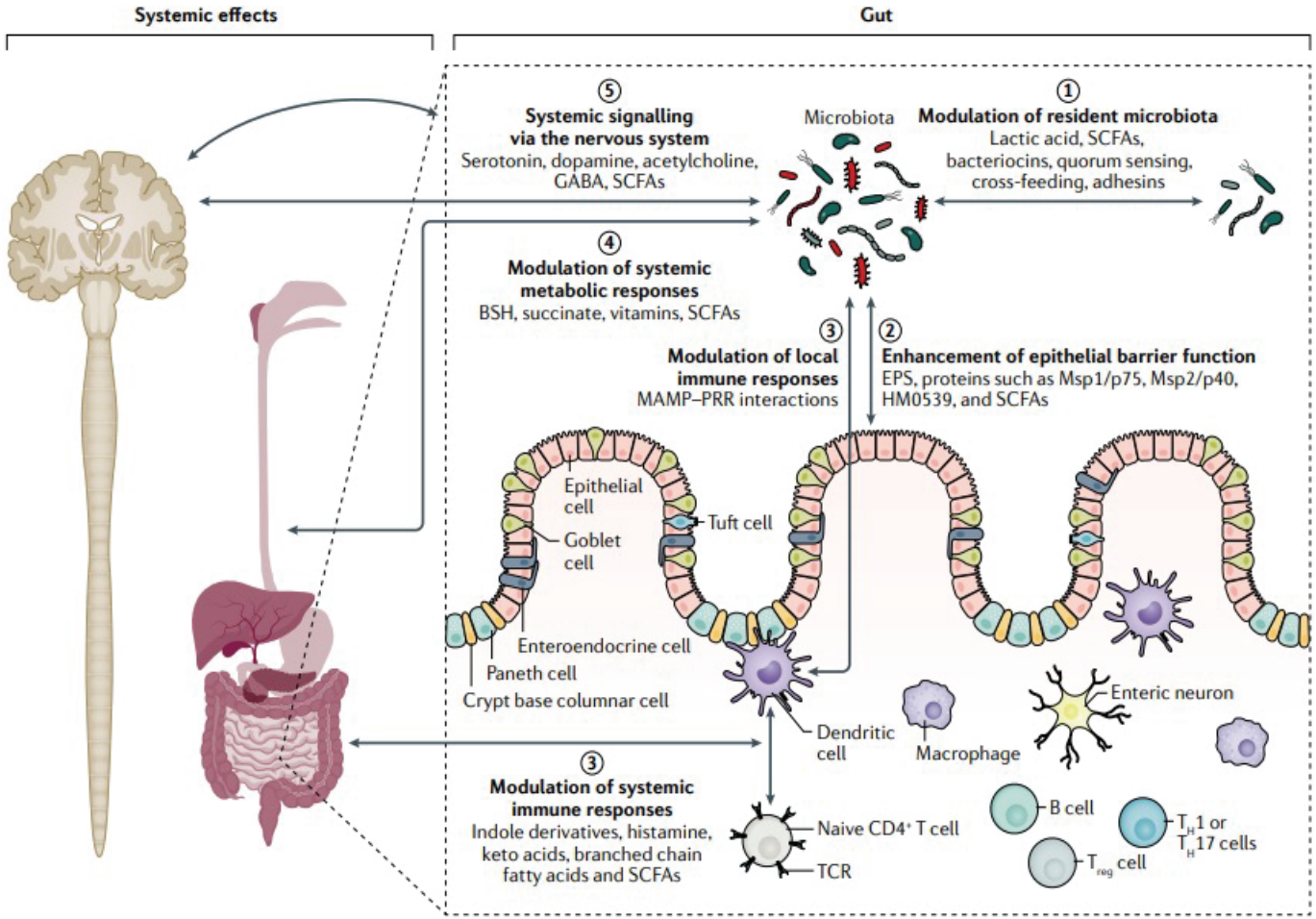


Fig. 4 | **Postulated mechanisms of postbiotics and example effector molecules utilized by them.** Five mechanisms

Seppo Salminen et al. 2021

Differentiating the types

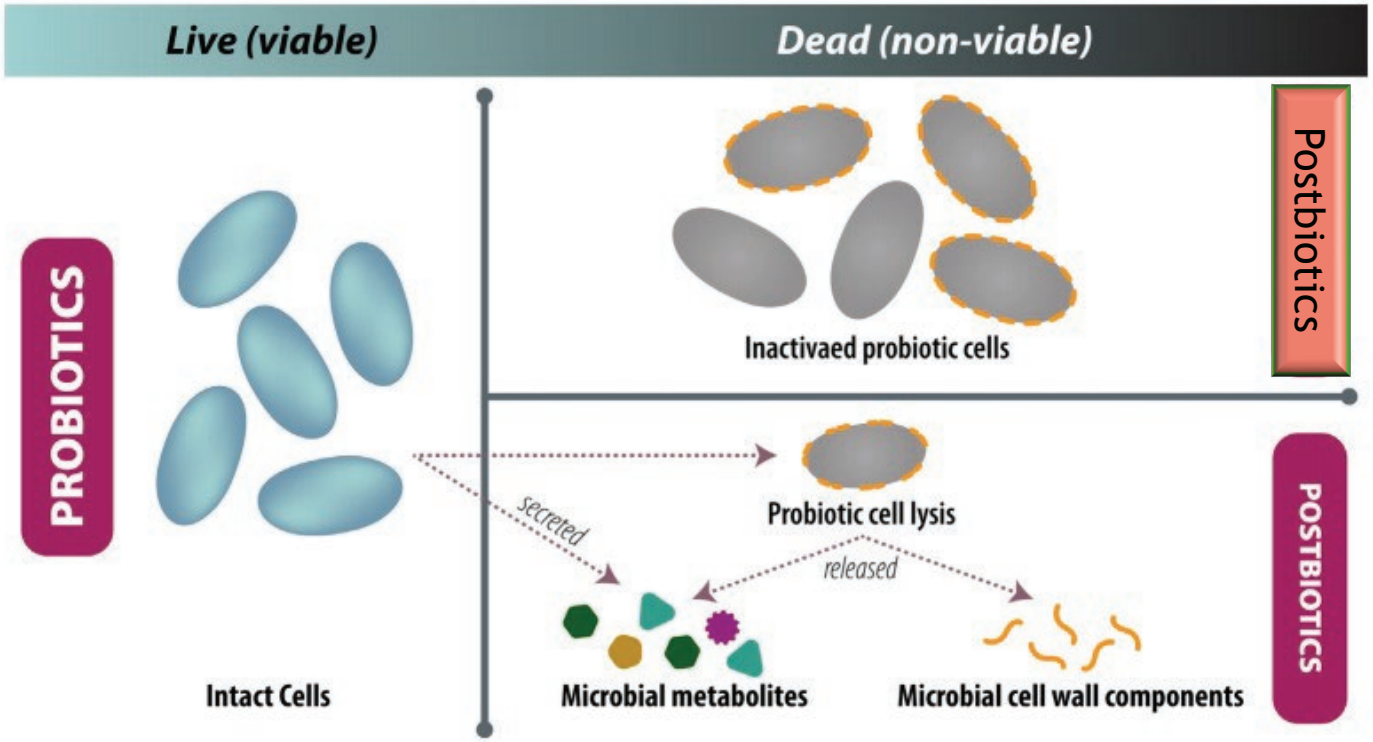
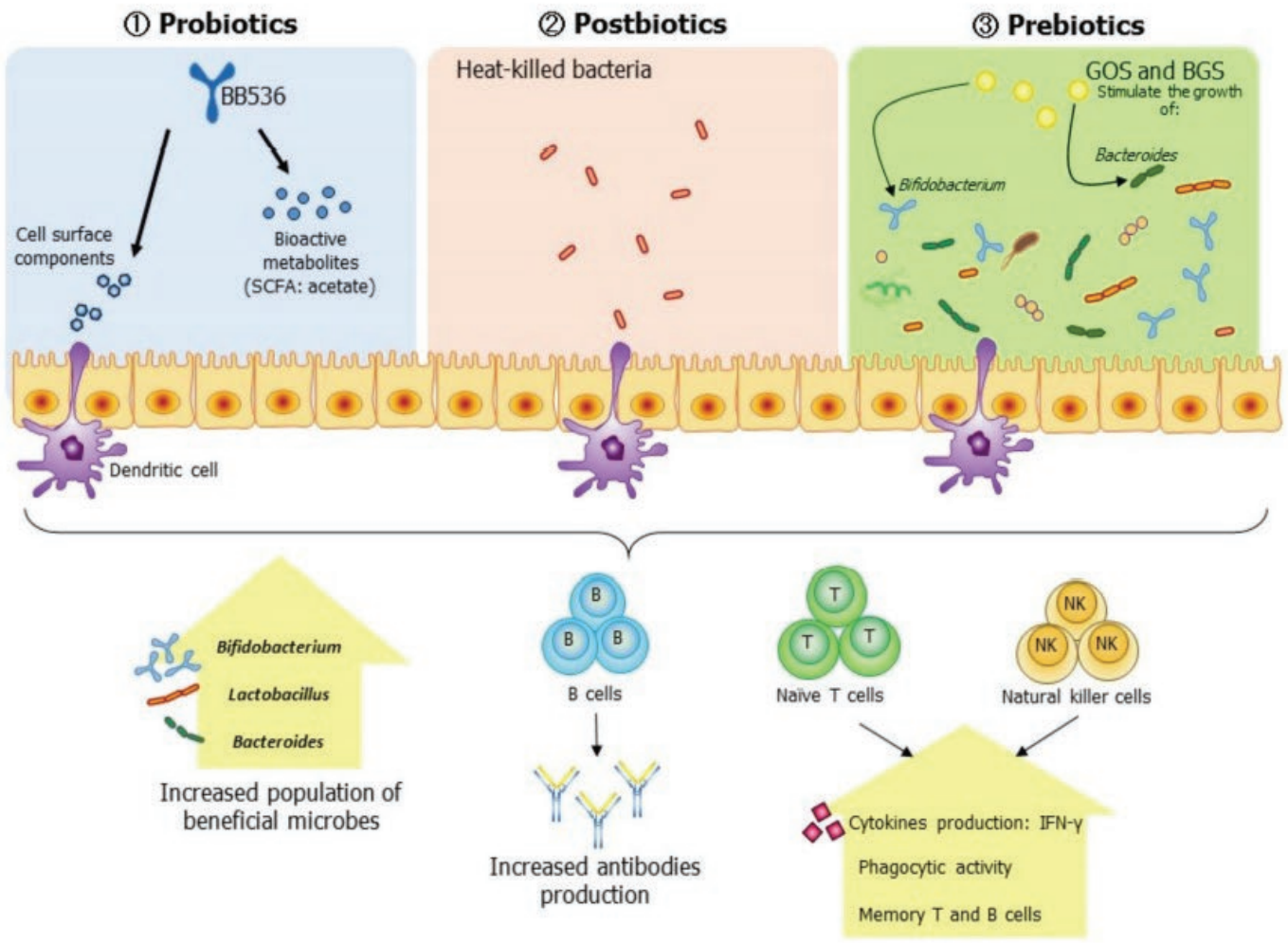


Fig. 1. Conceptualization of paraprobiotic and paraprobiotic terms.

P.F. Cuevas-González, et al., 2020



Hiroyasu Akatsu, 2021

Probiotics for Pets

- **Health benefits**
  - Immunomodulation
  - Gut microbial balance – aids
  - Allergy prevention
  - Blood parameters – lipids, cholesterol

- *Lactobacilli* – reduces gastrointestinal distress, abdominal pain
- *Bifidobacterium* - Balances gut flora, prevents growth of *Clostridium sp.*
- Others – *Enterococcus sp., S. boulardii*
- Human probiotics work similarly or with varying efficacy in animals, regardless they are QPS.

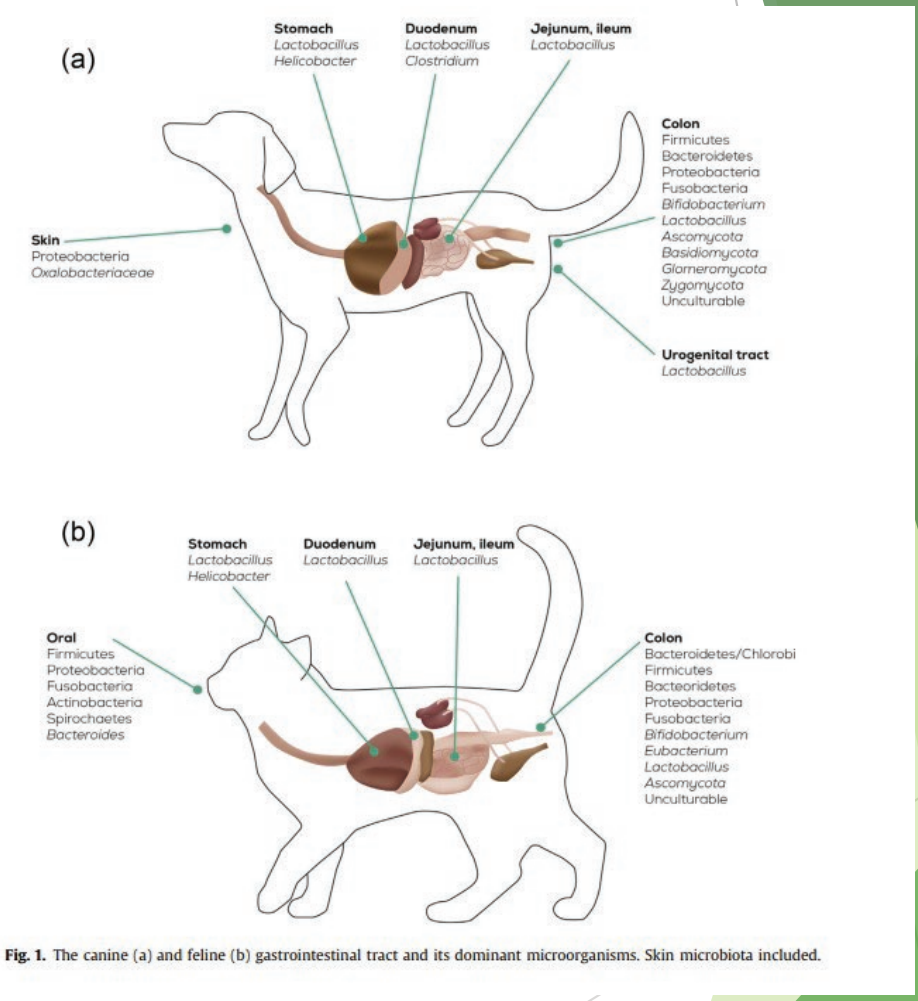
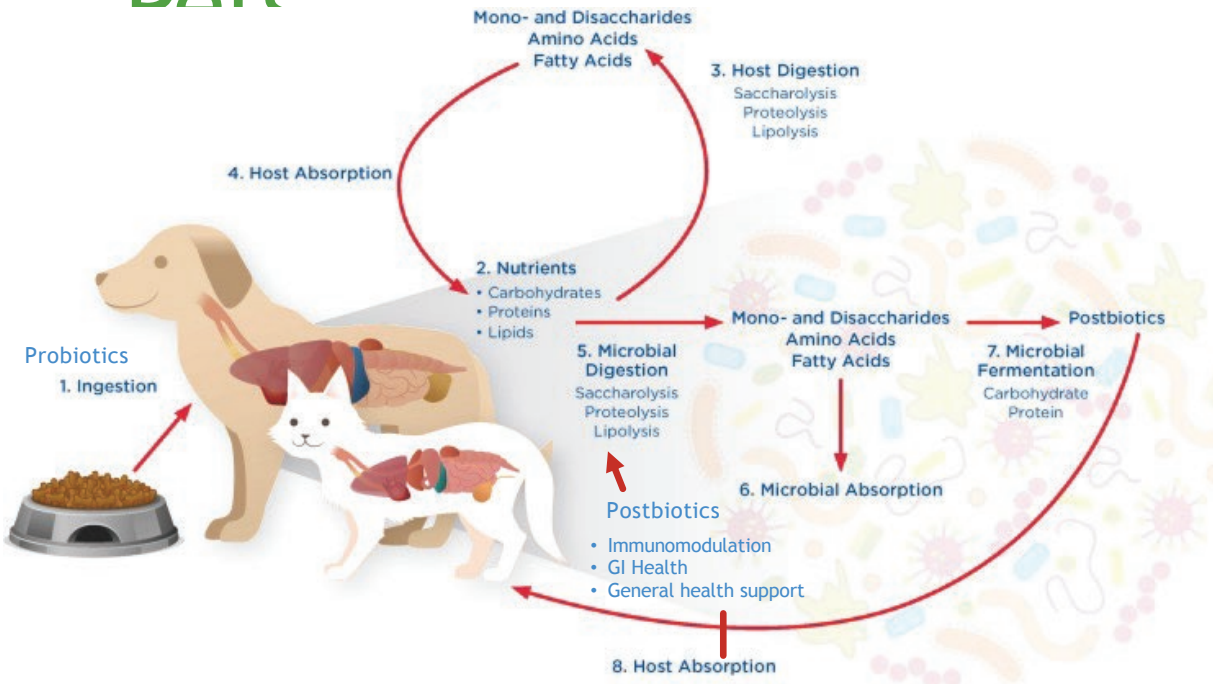


Fig. 1. The canine (a) and feline (b) gastrointestinal tract and its dominant microorganisms. Skin microbiota included.

Lukasz grzeskowiak et al., 2015

Probiotics for Pets



<u>Influencing Cat & Dog Health</u>

<u>through changes to the Gut microbiome</u>

(Nutrition, Probiotics, Postbiotics)

- Inflammatory Enteropathies: IBD, CE
- Food allergies
- Constipation
- Oral health
- Obesity and weight management
- Diabetes
- Kidney disease

Wernimont et al. 2020

Popular Probiotics Australia products (For Pet & Animal Use) :

		Probiotics (Series)	Postbiotics (Series)	*Zoonatant*™ (Series)*	Proprietary & Custom blends
Bifidobacterium sp.				PAB™-Z100	(Probiotic) PAB™-M66
	Bifidobacterium animalis ssp. lactis PAB™-121	PAB™-121	PAB™-P121	PAB™-Z121	
Lactobacillus sp.				PAB™-Z200	
	Lactobacillus rhamnosus	PAB™-266	PAB™-P266	PAB™-Z266	(Postbiotic) PAB™-PM66
	Lactobacillus plantarum	PAB™-210	PAB™-P210	PAB™-Z210	
Lactococcus sp.				PAB™-Z300	
	Lactococcus lactis	PAB™-350	PAB™-P350	PAB™-Z350	(Postbiotic + Enriched metabolites) PAB-ZP66
Enterococcus sp.				-	
	Enterococcus faecium	PAB™-461	PAB™-P461	PAB™-461	

FOR DAILY USE | FOR ALL PET TYPES

PetWater Plus

- *Lactobacillus rhamonosus*
- *Lactobacillus plantarum*
- *Bifidobacterium animalis* ssp. *lactis*
- *Lactobacillus salivarius*
- *Bifidobacterium longum*
- *Lactobacilus acidophilus*
- *Streptococcus thermophilus*

10 Billion cells / Litre

Good Gut Bacteria

1B cells Every 100 ml

Powered by

Probiotics AUSTRALIA

Untapping every *body's* potential

FOR DAILY USE FOR ALL PET TYPES

PetWater Plus

- *Lactobacillus rhamonosus :*
  - Promotes Gut health, microbial diversity, healthy stool, Immunity, & other health benefits.
- *Lactobacillus plantarum :*
  - Promotes gut microbial diversity, Shiny coat and skin, & other benefits.
- *Bifidobacterium animalis* ssp. *lactis :*
  - Promotes gut health, healthy stool, microbial diversity, Immunity, & other benefits.
- *Lactobacillus salivarius :*
  - Promotes immunity, helps fight bad breath.
- *Bifidobacterium longum:*
  - Promotes gut health, reduces anxiety, promotes gut diversity.
- *Lactobacilus acidophilus:*
  - Promotes Immunity, healthy stool, & other health benefits.
- *Streptococcus thermophilus:*
  - Promotes gut health, microbial diversity, and immunity

" PET WATER+ has a unique blend of 7 probiotic strains blended as postbiotics to give your pet a natural immunity and gut support while promoting gut microbial diversity.
The strains included are known to help support a shiny coat, oral health, mental health and general wellbeing. "

Powered by

Probiotics AUSTRALIA
Untapping every *body's* potential

All Human Grade Ingredients used

References

- Grześkowiak, Ł., Endo, A., Beasley, S., & Salminen, S. (2015). Microbiota and probiotics in canine and feline welfare. *Anaerobe*, *34*, 14-23.
- Alessandri, G., Argentini, C., Milani, C., Turroni, F., Cristina Ossiprandi, M., van Sinderen, D., & Ventura, M. (2020). Catching a glimpse of the bacterial gut community of companion animals: a canine and feline perspective. *Microbial Biotechnology*, *13*(6), 1708-1732.
- Mondo, E., Marliani, G., Accorsi, P. A., Cocchi, M., & Di Leone, A. (2019). Role of gut microbiota in dog and cat's health and diseases. *Open Veterinary Journal*, *9*(3), 253-258.
- de Almada, C. N., de Almada, C. N., & Souza Sant'Ana, A. D. (2018). Paraprobiotics as potential agents for improving animal health. In *Probiotics and prebiotics in animal health and food safety* (pp. 247-268). Springer, Cham.
- Baillon, M. L. A., Marshall-Jones, Z. V., & Butterwick, R. F. (2004). Effects of probiotic Lactobacillus acidophilus strain DSM13241 in healthy adult dogs. *American journal of veterinary research*, *65*(3), 338-343.
- Kelley, R. L., Minikhiem, D., Kiely, B., & O'Mahony, L. (2009). Clinical benefits of probiotic canine-derived Bifidobacterium animalis strain AHC7 in dogs with acute idiopathic diarrhea. *Veterinary Journal*, *10*(3), 121-130.
- Weese, J. S., & Anderson, M. E. (2002). Preliminary evaluation of Lactobacillus rhamnosus strain GG, a potential probiotic in dogs. *The Canadian Veterinary Journal*, *43*(10), 771.

Probiotics™
AUSTRALIA
Untapping every *body's* potential

Probiotics Australia Pty Ltd
Siddhartha Mahadeva Sarma
Account Manager - Technical Sales Administrator
Phone: +61 7 5670 6466 **Mobile:** +61 466 096 102
Email: info@probioticsaustralia.com.au
Address: 24-30 Blanck Street, Ormeau, 4208 QLD, Australia