PETFOOD FORUM ASIA

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Postbiotics: Unlocking new clinically-backed pet health benefits

29 October, 2025
Bangkok, Thailand

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Adrian Kerester, Senior Director of Growth at Kingdom

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Kingdom

Postbiotics: Unlocking new clinically-backed pet health benefits

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October 29, 2025 | Pet Food Forum x Pet Fair South East Asia

Introductions

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Co-founder &
Chief Science Officer

Adrian Kerester

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Kingdom

SUPERCULTURE®
INGREDIENT

Important disclaimers before we begin

- This presentation is intended for professional audiences and not consumers
- You are responsible for claims on your end product, and you should consult with regulatory and legal professionals that have country and region-specific expertise
- See the first slide of this presentation for a full disclaimer

What you should expect in this session

Topics

- The case for clinically-validated postbiotics, globally and specifically in Asian markets
- The science and clinical data behind Superculture® ingredients
- How brands can use clinically-validated postbiotics to differentiate and win in APAC

Key takeaways

- Pet parents want benefits they can see, backed by science they can trust
- Superculture® ingredients enable brands to deliver noticeable, clinically-validated outcomes
- Oral and immune health are high-impact, high-growth opportunities globally, with accelerated growth potential across APAC

Meeting evolving pet parent needs in Asia

The case for clinically-validated postbiotics

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Oral and immune health are top pet parent concerns worldwide

Bad breath & oral health
90% of dogs & cats over 2 have some form of periodontal disease [1]

Skin health & itching
Consistently a top reason dogs go to the vet [2]

Digestive & gut health
> 90% of dog owners say gut health is important to their pet's overall health [3]

Behavioral health
>80% of dogs in Japan, South Korea, and the U.S. have moderate to severe behavior issues [4]

Metabolic health & weight
> 60% of cats and >50% of dogs are overweight or obese [3]

Sources: 1. World Small Animal Veterinary Association Global Dental Guidelines (2020) 2. Veterinary Practice News 3. Veterinary Practice News 4. Journal of Veterinary Behavior, The Journal of Veterinary Medical Science, Texas A&M Veterinary Medicine & Biomedical Sciences, 5. Purina Institute

In APAC, three market-specific factors amplify several of these pet health concerns

Dense urban living

Indoor lifestyles are associated with more digestive health, weight management, and metabolic health issues [1]

Humid tropical climates

Year-round moisture exacerbates skin irritation and itching [2]

Small dog & cat dominance

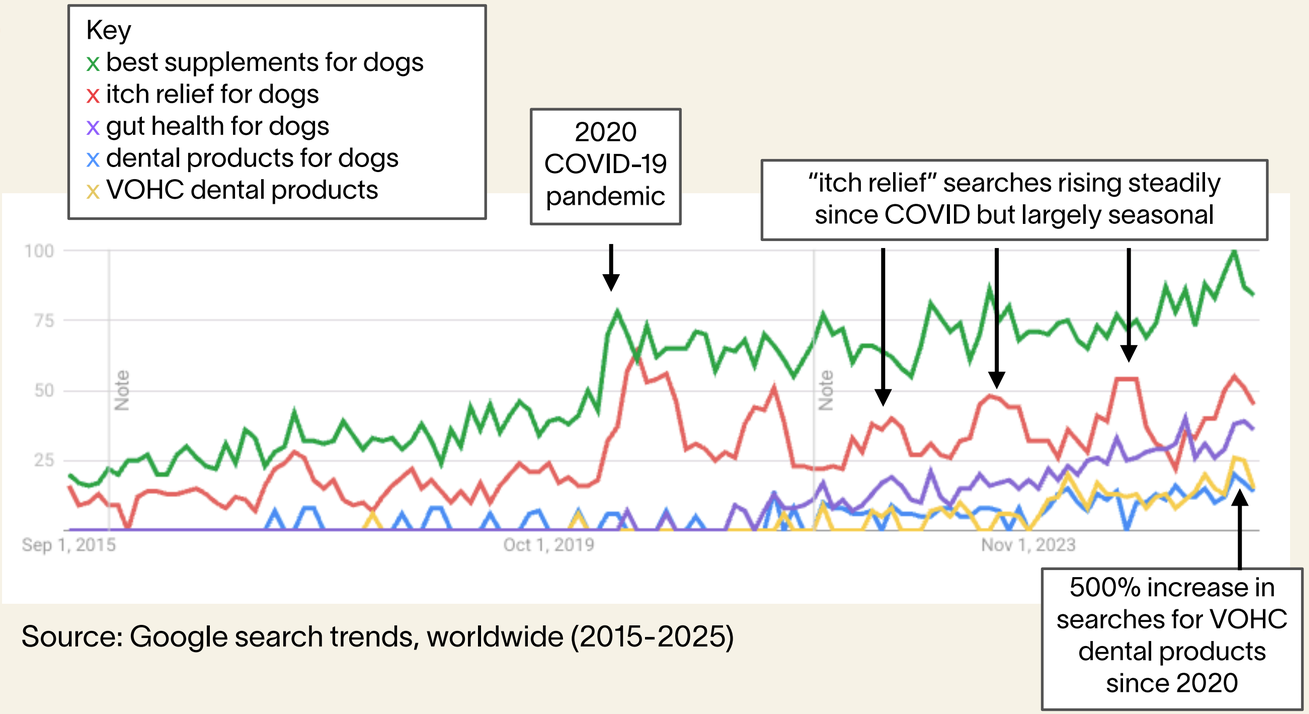
Small dogs and cats face higher rates of digestive upset and periodontal disease due to compact anatomy [3]

Sources: 1. Texas A&M University study, Cornell University College of Veterinary Medicine 2. World Allergy Organization Journal, Veterinary Dermatology, Vet Times 3. Cornell University College of Veterinary Medicine, International Journal of Biological Sciences

Pet parents recognize the importance of addressing these health challenges, and are seeking out solutions online

Growing importance placed on pet health

- 95% of pet owners globally consider their pet a part of their family [1]
- Over 80% of pet parents consider their pet's health to be as important as their own [2]
- Pet parents are seeking out solutions online, driving significant increases in Google searches for the best solutions to top pet health concerns [3]
  - Best supplements for dogs
  - Itch relief for dogs (seasonal)
  - Gut health for dogs
  - Dental products for dogs
  - VOHC dental products (↑500% since 2020)



Source: Google search trends, worldwide (2015-2025)

Sources: 1. Human Animal Bond Research Institute 2. BENEO , global survey 3. Kingdom analysis of Google search trends, worldwide from 2015-2025

But existing solutions are falling short, leaving pet parents disappointed and searching for science-backed, outcome-driven products

Existing oral health products come with many drawbacks

- Temporarily mask the issue
- Work only superficially
- Disrupt the microbiome with harmful side effects

→

Pet parents are frustrated by the lack of noticeable benefits [1]

"It has a fresh, minty smell to it but I don't find an appreciable difference on my dog's breath."

"I see no difference in my pup's breath. Been using for two months"

"My dog loves these, but don't notice a huge difference in freshness of breath"

"Dogs seem to chew them in seconds, and these are supposed to be chewed on for a while to help scrape the teeth clean. There is no noticeable difference in their teeth."

"This product made my dog throw up. The ingredients are too harsh."

→

Pet parents are willing to spend on more efficacious products

- 59% of pet owners globally said they would spend more money on their pet's care [2]
- Outcome-driven buying is on the rise, with nearly 1 in 3 US pet parents seeking clinically proven solutions [3]

Sources: 1. Kingdom analysis of customer reviews from top-selling oral health products on Amazon (Oct 2025), 2. Human Animal Bond Research Institute 3. MarketPlace

The gap between existing product efficacy and pet parent expectations is worth billions (USD)

By the numbers

- Globally, pet parents spend < $150B on pet food and supplements [1]
- APAC represents $30B of this market and is growing at nearly 2x the global rate [2]
- The opportunity within APAC:
  - Immediate: $12B mature markets where premium product segment is well established and functional ingredients are a key driver of purchase decisions
  - High potential: $18B across emerging markets—growing 2-3x faster [3]

Three primary market segments within APAC

Segment	Mature, High-Value	Rapid Growth, Emerging Premium	High Growth, Early Stage
Countries	Japan, South Korea, Singapore, Australia, New Zealand	China, Thailand, Malaysia	India, Indonesia, Vietnam, Philippines
Market Size $B USD	$12B	~$14B	~$4B
Growth Rate (% CAGR)	4.1%	9.0%	15.0%
Commercial pet food adoption	High, near saturation	Significant transition underway	Early adoption
Premium product penetration	Well-established; growing	More newly established, rapidly growing	Nascent but fastest-growing segment
Functional ingredient adoption	Very high; key driver of purchase decisions	Medium-High	Low-Medium; functional supplements still emerging category

Sources: 1. Grand View Research, Towards FnB 2. Euromonitor 3. Kingdom country level analysis

Pet parents want benefits they can see, backed by science they can trust.

How can brands capitalize on this opportunity?

Pet parents want benefits they can see, backed by science they can trust.

How can brands capitalize on this opportunity?

Postbiotics are the key to unlocking new levels of efficacy and marketing claims across a wide range of companion animal products

Clinically-validated postbiotics deliver consumer-relevant benefits and superior stability profiles, enabling formulation flexibility, consistent efficacy, and claim integrity

The realm of 'biotics

Prebiotic – "the fuel"

Substrates that are selectively utilized by host microorganisms conferring a health benefit

Probiotic – "the factory"

Live microorganisms that, when administered in adequate amounts, confer a health benefit on the host

Postbiotic – "the goods"

Inanimate microorganisms that confer a health benefit on the host, directly delivering beneficial metabolites to the desired site of action

Differentiated benefits of postbiotics

- ✓ Enhanced shelf-stability
- ✓ Wider formulation options
- ✓ Direct health benefit delivery
- ✓ Consistent performance
- ✓ No CFU counting challenges

But not all postbiotics are created equal; to ensure consistent real-world efficacy and protect your brand equity, it is critical to seek out and verify the data

Checklist for brands and manufacturers

- ☐ **Clinical backing:**
  Peer-reviewed *in vivo* trials at the intended dose
- ☐ **Process compatibility:**
  Stability through the specific heat, moisture, and pressure profile of your end-product
- ☐ **Shelf-life in matrix:**
  Verified in your actual product, in market-relevant conditions
- ☐ **Partner support:**
  Ongoing QC data and troubleshooting

In the U.S., brands are launching efficacious, science-backed products powered by a new class of clinically-backed postbiotics: Superculture® ingredients; customer feedback is overwhelmingly positive

Pup Gum

4.6 stars

"Great product! My dog loves them, and her breath seems better already. We aren't even through the first package! "

GutWell Clean Breath

4.9 stars

"This product has drastically changed my dogs breath. Due to financial reasons, we have not been able to get my dogs teeth cleaned in a couple of years. This product took his breath from totally unbearable to bearable again."

Doggy Dental Mix

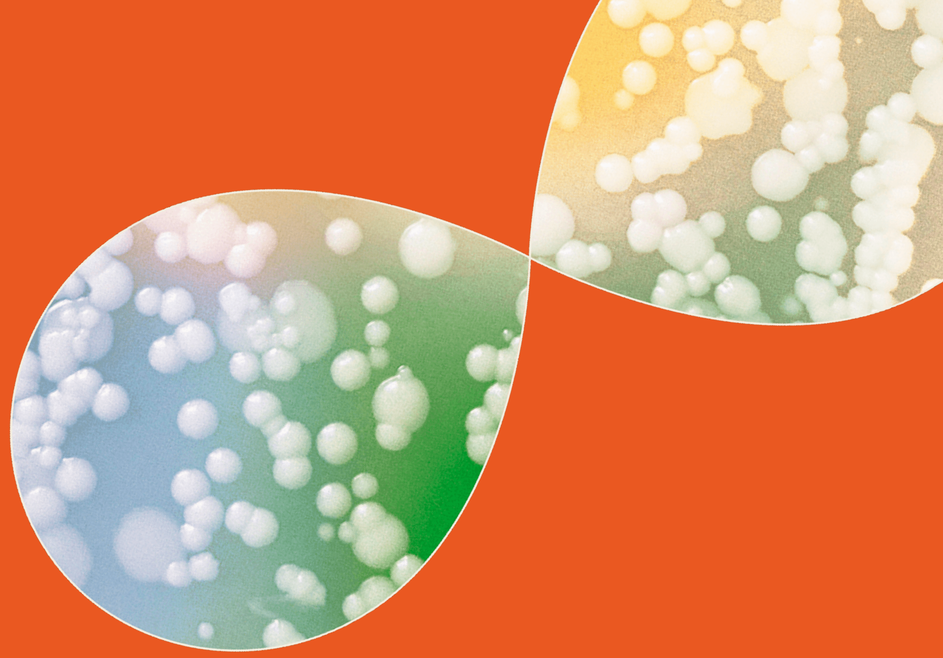
4.6 stars

"Many dog dental products claim they work. This one actually does! Mouth smells fresher and teeth are white"

Inner Stellar Itch Relief

4.8 stars

"Even my vet asked what changed. Bruce's coat looks shinier and the itching is gone. Highly recommend."



Case Studies

Understanding the science behind clinically-backed postbiotics

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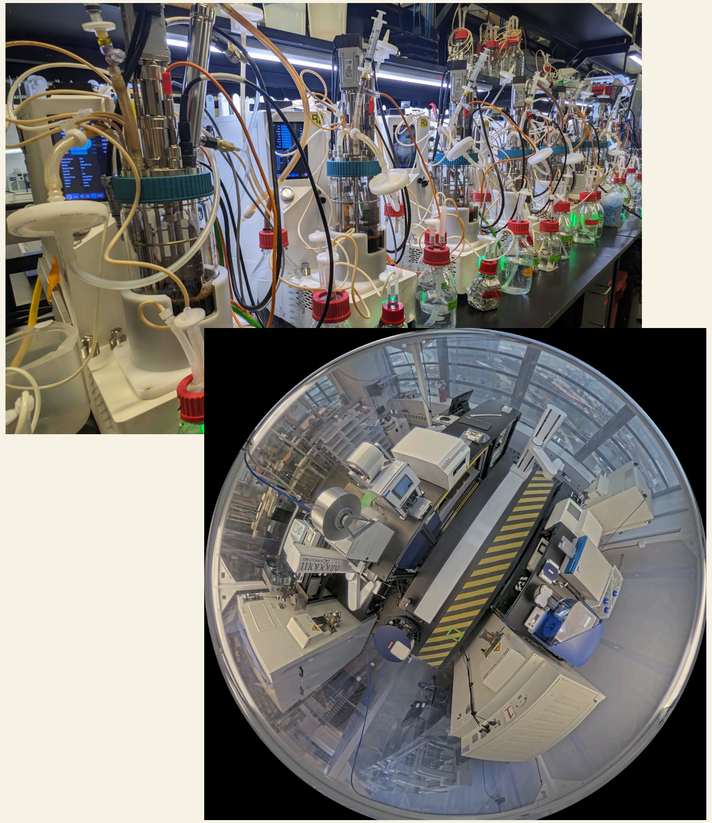
At Kingdom, we make Superculture® ingredients – an entirely new class of postbiotics that target the root cause of unmet pet health needs



What sets Superculture® ingredients apart

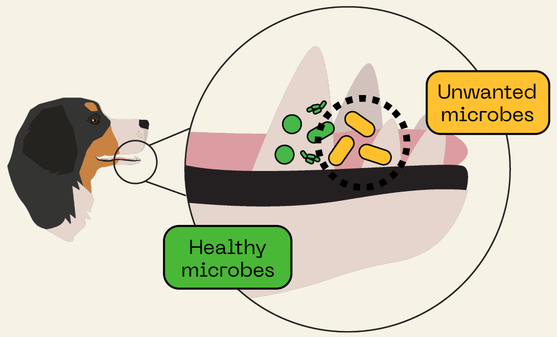
- 10 clinical studies completed or in-progress on our ingredients by the end of 2025
- Peer-reviewed research published in the industry-leading journal, Animals
- Patent-pending and designed specifically for pets not humans or production animals
- Made from proprietary microbial strains selected for their exceptional capabilities
- Natural, non-GMO, made in the USA

Our Superculture® ingredients enable pet brands to launch next-generation products that deliver real health benefits – validated by science, noticed by pet parents

At Kingdom, we anchor our scientific process around delivering specific health benefits that consumers will notice

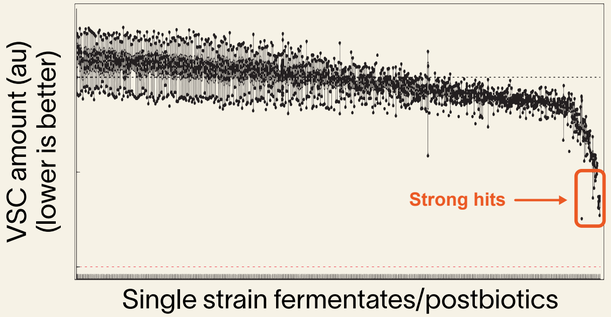
(1)

Deeply understand the biology of the unmet consumer need



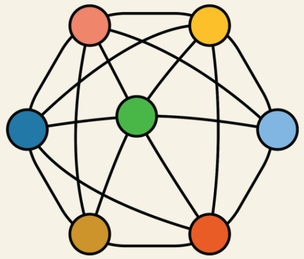
(2)

Develop assays & screen for strains with exceptional functionalities



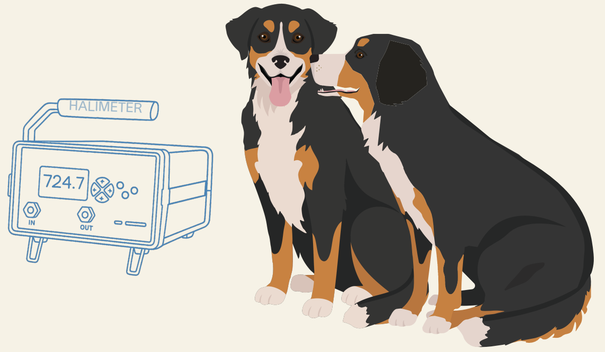
(3)

Select optimal combination & optimize fermentation for impact

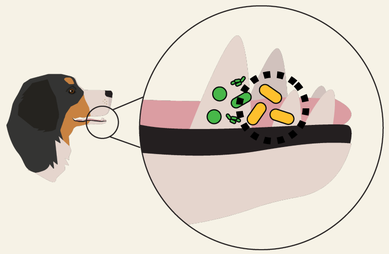


(4)

Conduct extensive in vitro and in vivo validation



We have developed and clinically-validated two breakthrough postbiotics for oral and immune health in pets that drive industry-leading efficacy and unlock fresh marketing claims for brands



Superculture® Pet Oral

- Most clinically-validated oral health postbiotic on the market with three completed clinical trials
- Unparalleled efficacy across bad breath, biofilms, and oral microbiome categories
- Delivers metabolites directly to the mouth to work even under short contact times

Commercially available as of March 2025,
nine brands with end products already in market

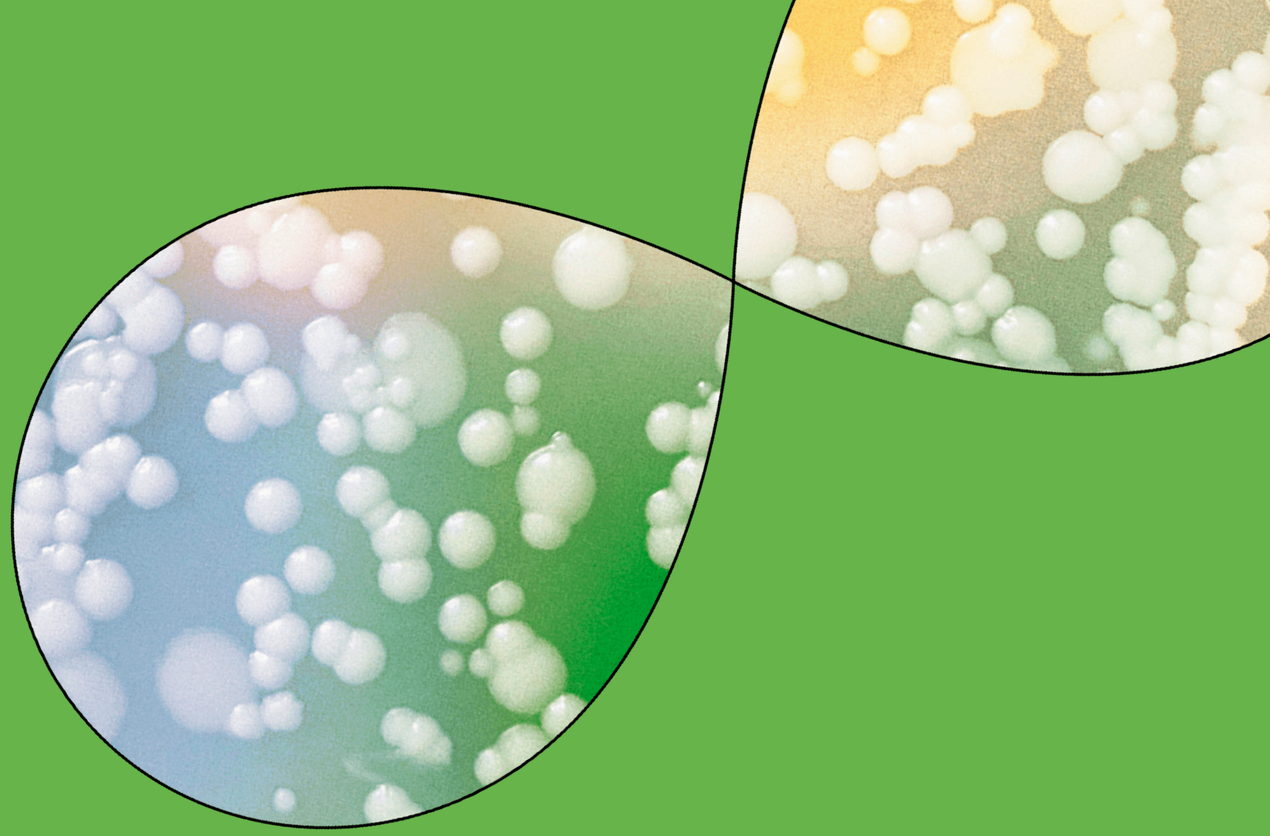
Superculture® Pet Immune

- Clinically-validated immune health postbiotic with two completed clinical trials; +3 in-progress
- Delivers unparalleled efficacy across itching, skin health, stool quality, and gut microbiome categories
- Delivers beneficial compounds directly to the gut

Commercially available as of June 2025,
first brand launched in October

Superculture® ingredients come with key certifications that meet the highest safety standards and consumer expectations

Ingredient certifications and specifications
✔ Microbial strains are AAFCO/EU QPS-listed, natural, non-GMO
✔ No corn, no soy, no wheat
✔ No artificial flavors, colors, or preservatives
✔ Made in the USA
✔ Palatable to dogs
✔ Extensive safety analysis, exceeding industry standards
✔ Patent-pending



Case Study: Canine Oral Health Postbiotic

A clinically-backed oral health postbiotic for companion animals

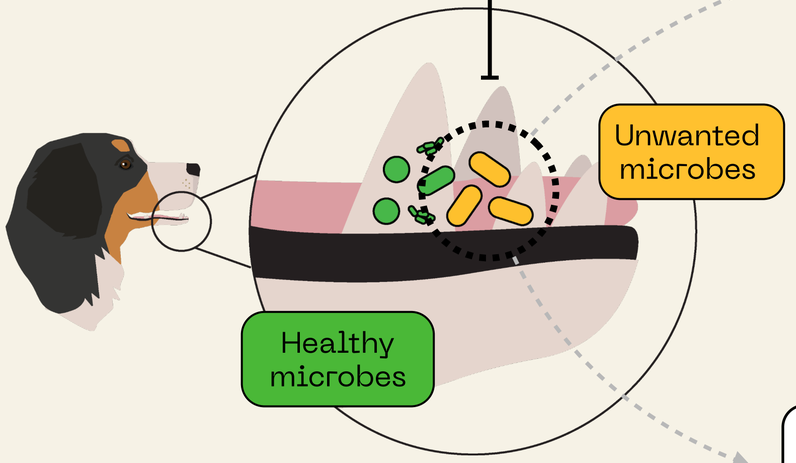
Kingdom

We designed the Canine Oral Health Postbiotic to work through two mechanisms of action, thus targeting poor oral health at its root

Canine Oral Health Postbiotic

(1) Suppress unwanted microbes

(2) Disrupt oral biofilms



VSCs

Biofilms, plaque

Tartar

Poor oral health

Bad breath, gingivitis, periodontal disease, and other issues

This Canine Oral Health Postbiotic delivers clinically-validated efficacy across the three key oral health endpoints that consumers care about most

(1) Bad breath and bad breath compounds (VSCs)

- Clinically proven to lower bad breath compounds 26% more from baseline compared to placebo *(see figure on right)*
- Clinically shown to significantly reduce bad breath compounds after only 7 days*
- Clinically proven to reduce the unwanted microbes responsible for bad breath
- Reduces bad breath compounds by an average of 85% *in vitro*

Reports: Study #1, #2, #3, In vitro
Reports available under NDA

(2) Oral biofilms, plaque, and tartar

- Clinically proven to reduce the unwanted microbes that generate biofilms and plaque in just 7 days

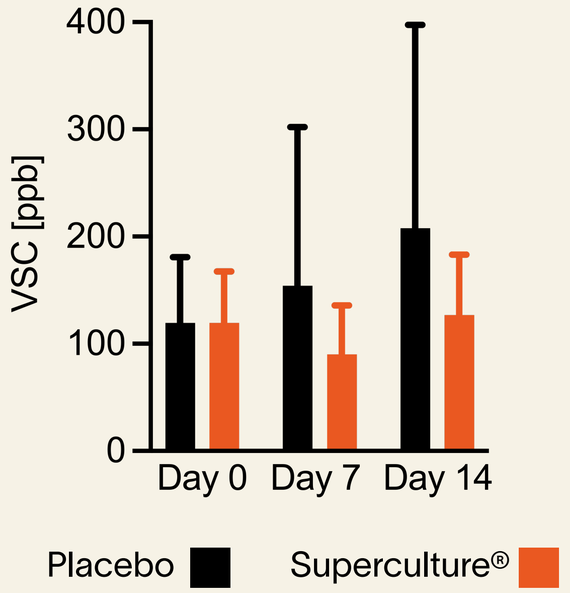
Reports: Study #1, #2
Reports available under NDA

(3) Oral microbiome

- Clinically shown to reduce *P. cangingivalis*, a microbe closely linked to periodontal disease
- Clinically shown to promote a healthy oral microbiome (as evidenced by reducing unwanted taxa and increasing species evenness)

Report: Study #2
Reports available under NDA

Sample VSC data:
Average VSC levels across sampling timepoints, by group



Clinical study #2

Publication

* In the same study, human perception of bad breath was correlated with bad breath compound measurements

Even when delivered as a powder topper, it substantially outperforms the market-leading dental chews in reducing bad breath

Clinically-backed Oral Health Postbiotic ingredient VSC reduction performance vs. market-leading chew

Superculture® dose	Reduction performance vs. leading dental chew **
150 mg	1.55X
250 mg	1.83X

Key Takeaways

- After 14 days, this Canine Oral Health Postbiotic reduced bad breath compounds across multiple clinical studies* substantially more than leading dental chews**
- This is a particularly impressive result, given that the postbiotic was delivered as a single ingredient powder topper, whereas leading dental chews combine the mechanical action of a specifically-designed chew, the extended contact time of a chew, and many different oral health actives

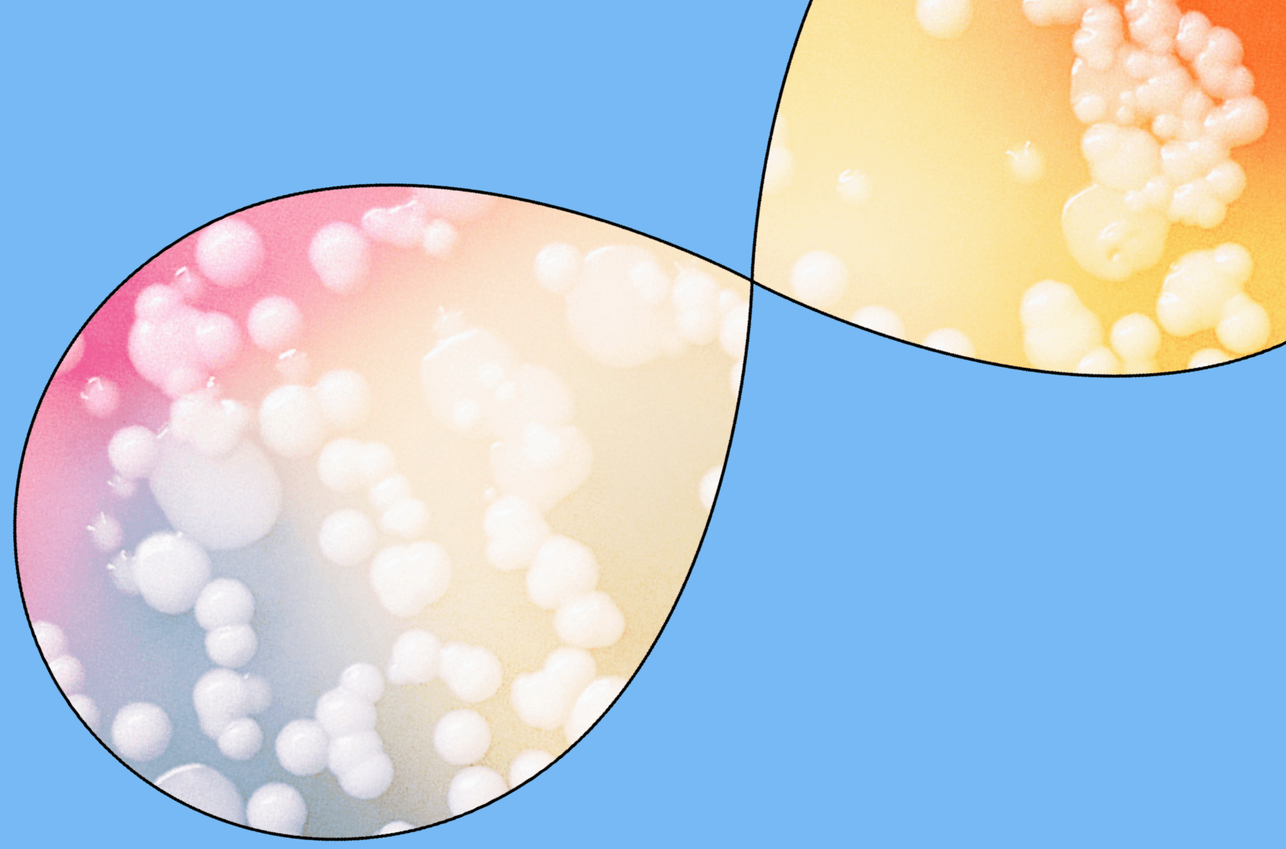
* Study #2 (250 mg) and Study #3 (150 mg)
** Comparison to clinical data collected in study with comparable power and VSC measurement; Carroll et al. J Animal Sci (2020)

This Canine Oral Health Postbiotic outperforms the two top oral health postbiotics validated in canines, with best-in-class data across bad breath, oral microbiome, and in vitro biofilm reduction

Ingredient (Manufacturer)	Ingredient category	Clinical study(s)	Clinical improvement in plaque, tartar & gingivitis	Clinical improvement in bad breath (VSC)	Clinical improvement in bad breath (human perception)	Impact on oral microbiome	*In vitro* biofilm reduction
Superculture® Pet Oral **(Kingdom)**	Postbiotic	24-dog clinical study over 14 days Sordillo et al., Animals 2025 Also see Superculture® Pet Oral clinical studies #1-3 reports	84-day study in progress	• 27% VSC reduction after only 7 days (p=0.004) • VSC reduction demonstrated across multiple clinical studies	• 2x as many dogs in the Superculture® Pet Oral group had improved breath at day 7 • Superculture® Pet Oral drove a decreasing trend in perceived malodor (-10%, p=0.21); placebo did not (0%, p=0.5)	Increase in microbiome diversity (evenness) by 5.8% at day 14 (p=0.003) and reduction of biofilm-forming, VSC-producing, and pathogenic microbes	Clinically proven to reduce the unwanted microbes that generate biofilms and plaque in just 7 days
Market alternative #1 ($B ingredient company)	Postbiotic	60-dog clinical study over 57 days Florit-Ruiz et al., Animals 2025	• No statistically significant between-group intervention effect on plaque, tartar, or gingivitis over 57 days • Plaque dose-related effects were inconsistent	Trend for increase in VSCs compared to placebo	No bad breath perception data	No change in microbiome diversity; overall microbiome data demonstrates increase in one taxa (but only observed in low dose group)	Reduction in canine biofilm formation observed after 2-24 hour contact time, which is too long to be relevant for the canine oral cavity
Market alternative #2 ($B ingredient company)	Postbiotic	348-dog at-home clinical study over 60 days (unpublished)	No plaque, tartar, or gingivitis data	No VSC data	"By day 60, dogs in postbiotic group were significantly more likely to have less breath odor" (211% higher odds, p=0.007) Broad health survey covering 13 areas was utilized.	No oral microbiome data	No biofilm reduction data

Key Takeaway

To our knowledge, Superculture® Pet Oral has substantially stronger demonstrated performance on oral health outcomes in dogs compared to the two leading market alternatives

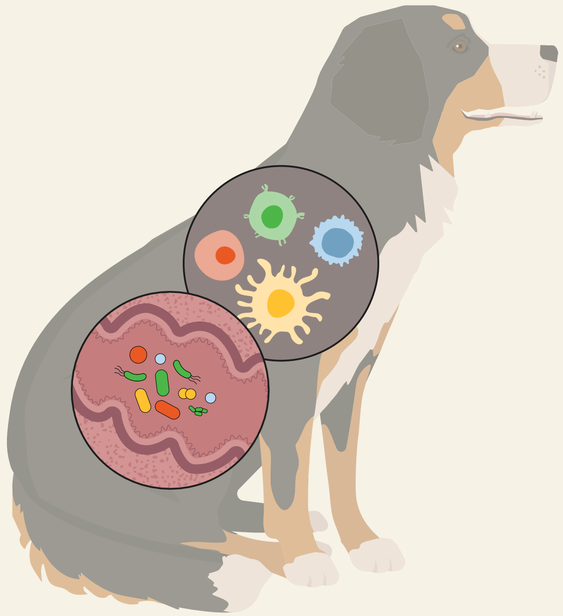


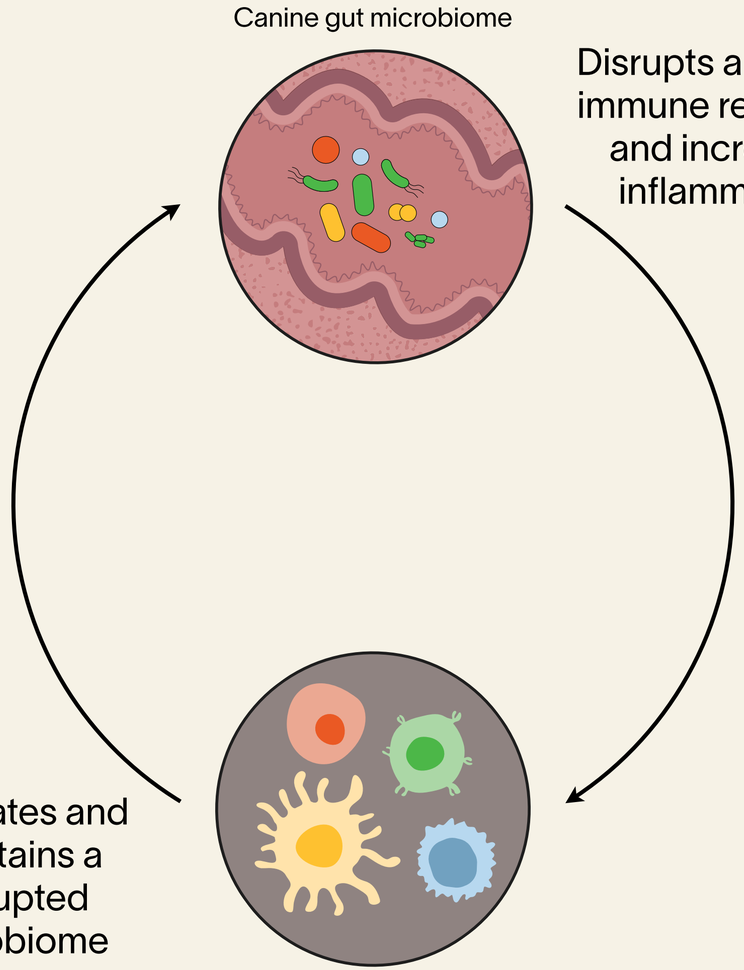
Case Study: Canine Immune Health Postbiotic

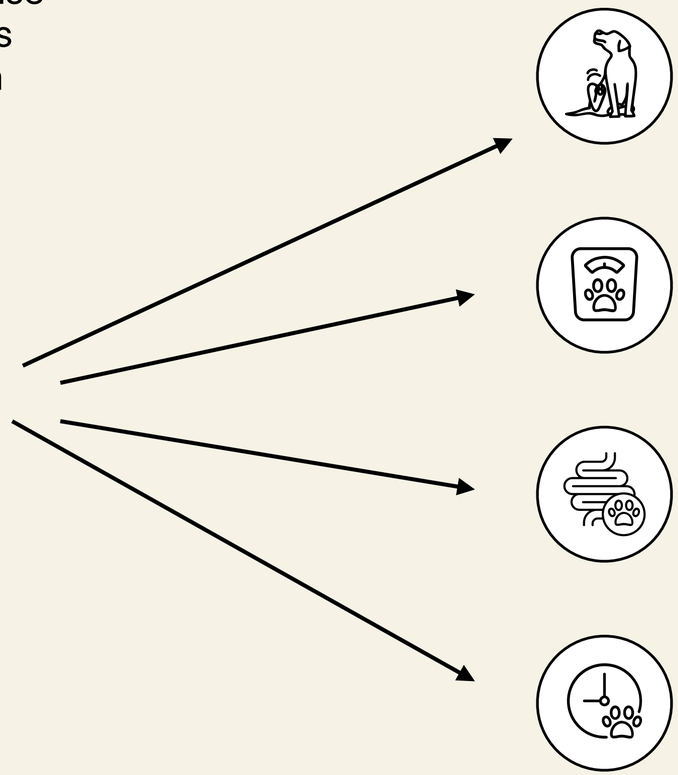
A clinically-backed immune health postbiotic for companion animals

Kingdom

Disruption to the microbiome–immune axis lies at the root of poor immune health in dogs, and results in cascading negative health effects





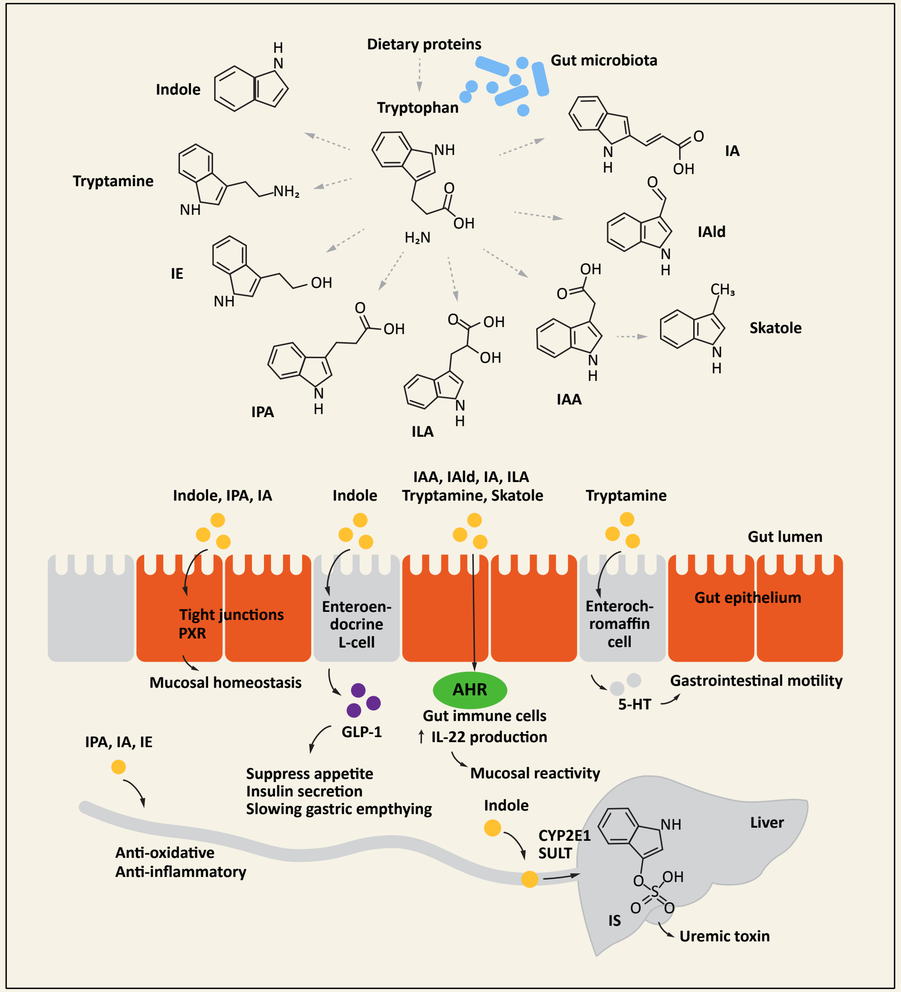


This disruption is at the root of a host of health issues

Sources: Pilla Front. Vet Sci (2020)

Indoles are an underutilized class of metabolites that close these key gaps, and are supported by a wealth of preclinical and clinical evidence

Key attributes for next-gen biotics	Relevant indole characteristics
1) Deliver active compounds that circulate in the body	Class of natural metabolites produced by a healthy gut microbiome, that circulate throughout the body to deliver key systemic immune and skin health benefits
2) Clear modes of action	Well characterized to activate the aryl hydrocarbon receptor (AhR), an important master regulator of immune and inflammatory responses
3) Direct delivery of beneficial compounds to the pet's gut	Can be directly delivered as a postbiotic to ensure consistent efficacy, regardless of varying diets or disrupted microbiomes



Source: Roager et al, Nature Communications (2018)

This Canine Immune Health Postbiotic delivers these key indoles, and demonstrates clinically-validated efficacy across four important immune health endpoints

(1) Healthy immune response

- Shown to activate the canine aryl hydrocarbon receptor (AhR) and attenuate the release of downstream pro-inflammatory cytokines (IFN-γ,TNF-α) *in vitro*
- Readily converted in vitro into the beneficial indole compound, IPA, through commensal gut microbiota

In vitro

(2) Skin and coat quality

- Clinically shown to improve human perception of coat quality after just 14 days, and to improve human perception of coat quality compared to placebo after 28 days (mean difference = 11%)

Study #1

(3) Itching behavior

- Clinically shown to reduce itching behavior by 20% as quantified by a wearable activity monitor
- Clinically shown to reduce human perception of itching behavior (PVAS score) in just 14 days, and reduced it by 27% compared to the placebo after 28 days

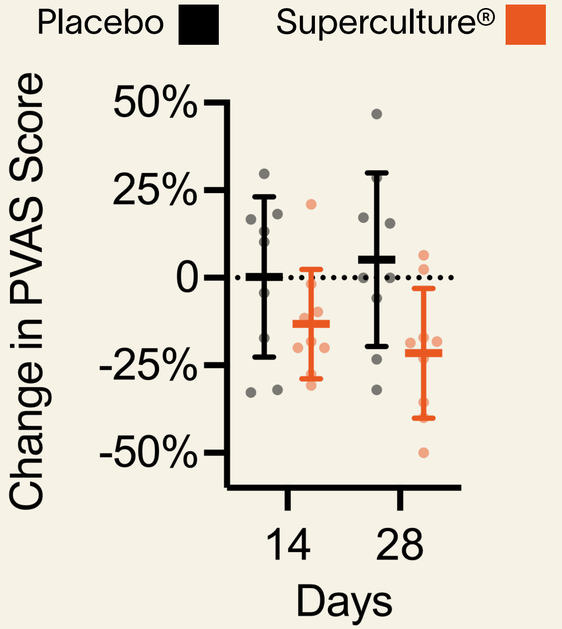
Study #1

(4) Gut microbiome and stool quality

- Clinically shown to promote a healthy gut microbiome and improve stool quality after 28 days
- Clinically shown to increase gut microbiome Shannon Diversity after 28 days and to increase the abundance of ~4x more taxa in the gut microbiome compared to placebo after 28 days
- Clinically shown to increase taxa that support skin, gut, and immune health after 28 days

Study #1, Study #2

Sample itching data:
Change in human perception of itching, by group



Clinical study #1

Publication

This clinically-backed immune health postbiotic delivers comprehensive, best-in-class data on itching, skin/coat, and gut health — a level of evidence not seen with other postbiotics

Key Takeaways

- To compile this table, we extensively surveyed the literature and available company sales materials to better understand Superculture® Pet Immune's clinical differentiation
- To our knowledge, other popular postbiotics either have not collected clinical data in companion animals or demonstrate no clinical effect or a smaller improvement than Superculture® Pet Immune across key benefit areas

Ingredient	Clinical study(s)	Reduction in itching	Improvement in skin & coat	Improvement in gut health & stool quality
Superculture® Pet Immune	Sordillo et al. 2025 Clinical Study #2 (peer review publication in preparation)	• Wearable activity monitor: 20% reduction in itching relative to baseline (p=0.03) • PVAS: 27% reduction in itching from baseline compared to placebo (p=0.02)	Improved perception of coat quality compared to placebo (p=0.01)	• Improved stool quality (p=0.03) • Increased gut microbiome alpha diversity by 4.6% (Shannon, p=0.04) • Shifted gut microbiome composition compared to placebo in 2 studies (~4x and 16x taxa changed vs placebo). • Healthy fecal biomarkers maintained
Market alternative #1 ($B ingredient co)	Unpublished internal study (2011) Hernot et al. 2008	No change (p=0.7)*	Coat quality: no change (p=0.85), shedding: no change (p=0.35)	• No change to stool quality (p=0.99) • Shifted gut microbiome composition (5x taxa vs placebo), no change to alpha diversity
Market alternative #2 ($M ingredient co)	Oba et al. 2023 Oba et al. 2022 Wilson et al. 2022 Lin et al. 2019	No clinical data collected	Skin health: trend only; TEWL (p=0.05)	• Worsened stool quality (p<0.05) • Minor shift to gut microbiome composition in 3 studies, no change to alpha diversity
Market alternative #3 ($B ingredient co)	Koziol et al. 2023	No clinical data collected	No clinical data collected	• Trend toward improved stool quality (p=0.07) • Minor shift to gut microbiome composition, trend toward change in alpha diversity (p=0.09)
Market alternative #4 ($B ingredient co)	Kayser et al. 2024	No clinical data collected	No clinical data collected	• No change in stool quality (p>0.05) • Shifted gut microbiome composition, no change to alpha diversity • Increased fecal propionate (p=0.04), decreased pH (p=0.005)
Market alternative #5 ($B ingredient co)	Wang et al. 2024	No clinical data collected	No clinical data collected	• Data only in felines; only tested in combination with prebiotic fiber • No change in stool quality (p>0.05) • Shifted gut microbiome composition, no change to alpha diversity • Increased fecal IgA (p<0.05), decreased pH (p<0.05)
Market alternative #6 ($M ingredient co)	Lin et al. 2020	No clinical data collected	No clinical data collected	• No change to stool quality(p>0.05) • Trended toward increased *C. perfringens* (pathogen) abundance (p=0.06) • Trended toward increase in fecal IgA (p=0.06)
Market alternative #7 ($B ingredient co)	Wren et al. 2025a Wren et al. 2025b	No clinical data collected	Shifted skin microbiome composition (few taxa)	• No change to stool quality(p>0.05) • Minor shift to gut microbiome composition, no change to alpha diversity
Market alternative #8 ($M ingredient co)	Timlin et al. 2024	No clinical data collected	No clinical data collected	• No change to stool quality(p≥0.37) • Minor shift to gut microbiome composition
Market alternative #9 ($B ingredient co)	Unavailable	No clinical data collected	No clinical data collected	No clinical evidence to support postbiotic claims†

* Not PVAS, custom survey questions
† A quantitative benefit claim was made such as "improves fecal score" or "improves microbiome diversity" but no supporting data in canines could be found

Summary

What we covered in this session

Key learnings

- Postbiotics can deliver beneficial metabolites directly to the gut or oral cavity, reducing variability from pet-specific factors like diet or individual microbiome differences
- Postbiotics' inherent stability profile drives consistent efficacy and claim integrity across product formats that are often not compatible with probiotics
- Not all postbiotics are created equal - it is critical to seek out and verify that data supports efficacy in your end-product

Key takeaways

- Pet parents want benefits they can see, backed by science they can trust
- Superculture® ingredients enable brands to deliver real, clinically-validated outcomes
- Oral and immune health are high-impact, high-growth opportunity areas
- Superculture® ingredients are commercially ready and proven in-market

How can clinically-validated postbiotics unlock
new levels of efficacy and marketing claims for your brand?

Let's talk! Fill out this form and we'll be in touch.

or email us at: info@kingdomsuperculture.com

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