

ONE INGREDIENT, **INFINITE** POSSIBILITIES

Differentiate your brand
with the proven power
of TruMune™



Cargill®



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This document is intended to provide information to businesses and pet food industry professionals. It is not intended for consumers of finished consumer goods. Any labeling, marketing, and substantiation decisions regarding your products is your responsibility, and Cargill assumes no responsibility for such decisions. We recommend you consult regulatory and legal advisors familiar with all applicable laws, rules, and regulations regarding your product labeling, marketing, and substantiation.

INTRODUCTION

Pet parents have never had more options to consider when choosing food for their pets.

The global pet food market is not just getting bigger, it is diversifying to keep up with expanding consumer expectations. The days of simply providing a tasty, balanced, and complete diet to retain customers may be in the past. Modern pet food brands are juggling more channels, new product formats, evolving product claims, elevated mealtime experiences, etc.

As the global pet industry and consumer expectations expand, brands are under more pressure to keep an eye on the future with a fully stocked innovation pipeline while delivering on today's bottom line.

In a rapidly-evolving market, strategic partners and solutions that can help brands solve problems and attain their innovation goals are more important than ever – and there's no time to waste.

TruMune™ (also known as TruPet™ in some markets) was made specifically to help modern pet food brands stand out. It's an industry-leading postbiotic that delivers the science-proven health benefits pet parents are seeking within a single easy-to-use ingredient that works in any food format.

Read on to see how TruMune can give brands a scientific edge to cut through the market clutter and help pets live more healthy and active days.



46 New Product Developments

may occur today around the globe and by the end of this month, that could grow to

1,400

and balloon to

16,000+

within the next year.¹

1 - Innova Market Insights, New Product Development Database, January 2024.

#1

SCIENTIFIC EDGE

SCIENCE FOR PETS

Support the gut with consistent postbiotic metabolite delivery.

BENEFIT FOR BRANDS

Differentiate with a unique gut health story while simplifying production lines.

The gut is a key command center for overall health and wellness.

More than **70% of the immune system** is found within the gut, so when the gut microbiome is at its best, pets are at their best. (fig. 1)

A high functioning gut is better equipped to manage the daily stresses that pets face, such as exercise, travel, and diet changes. (fig. 2)

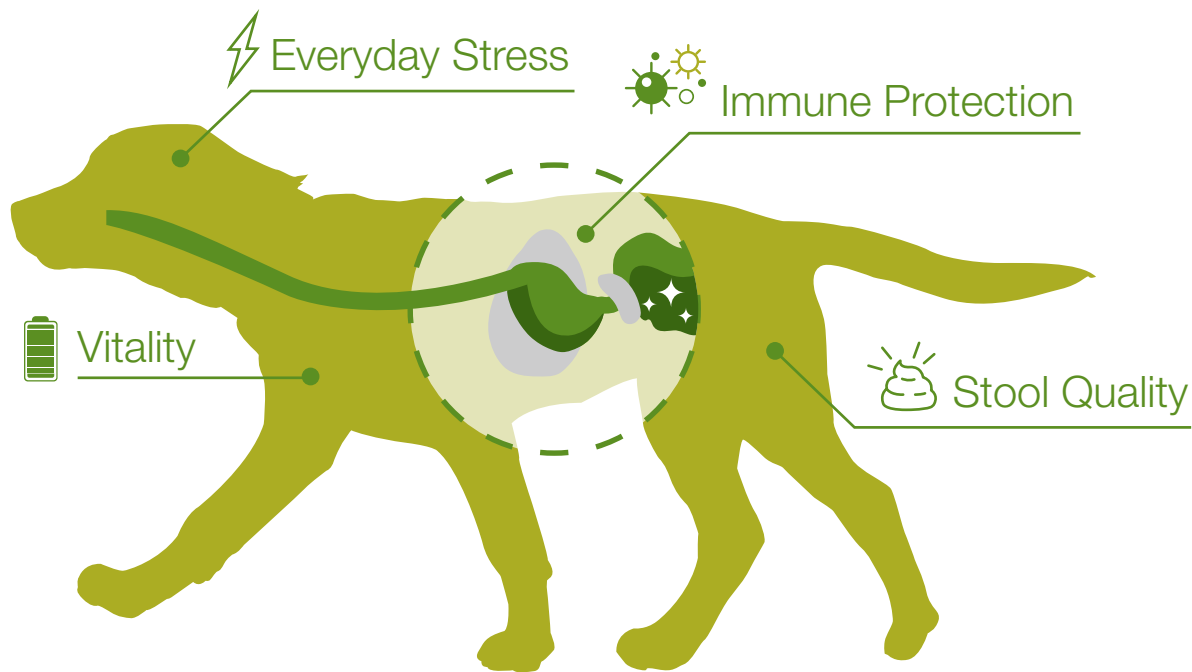
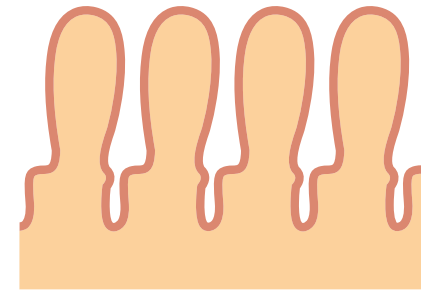
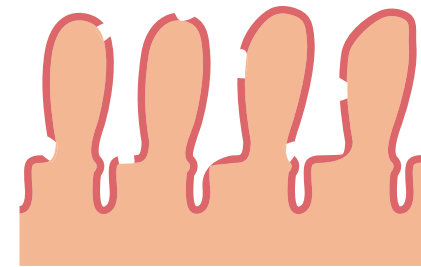


Figure 1: The pet's gut is a command center for overall health and wellness. TruMune™ fuels the gut so pets feel good from the inside out.



Healthy Gut

Normal, tight junction



Stressed Gut

Leaky and Inflamed

Figure 2: A resilient gut is better equipped to keep pathogens out. The postbiotic technology behind TruMune is proven to support proper villi development so pets can power through stress.

Are you telling a differentiated gut health story?

Gut/digestive health is the leading proactive health claim across pet food, treat, and supplement new product development with no sign of slowing down.

Over the past several years, nearly early a quarter of new product developments in North America and Western Europe have included a gut/digestive health claim.¹

2020 2021 2022 2023



¹- Innova Market Insights, New Product Development Database, January 2024.

Take gut resilience to the next level with the real hero – postbiotic metabolites.

When it comes to gut health, ‘biotics’ get a lot of the credit, but postbiotic metabolites are the unsung heroes in this story. Prebiotics “feed” probiotics (live microorganisms) and the probiotics ferment inside the gut to produce postbiotic metabolites – the “currency” that is used for energy and other biological functions. A key role ‘biotics’ play is to deliver postbiotic metabolites to the gut. (fig. 3)

Postbiotic metabolites are health-regulating compounds produced via probiotic fermentation.

TruMune™ contains multiple classes of postbiotic metabolites that serve many key biological functions.

| Postbiotic Metabolite Class | Function |
|-----------------------------|--|
| Amino acids | Immune development and function Protein synthesis and nutrition |
| Amino acid catabolites | Modulation and development |
| Volatile fatty acids | Gut integrity, cellular metabolism, anti-microbial effects |
| Neurotransmitters | Modulate gut motility and inflammation Gut-brain axis |
| Nucleotides/nucleobases | Immune development and function |

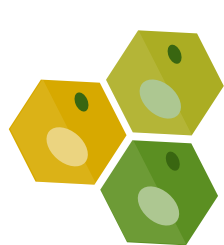
And many more...

Pet foods and treats with TruMune inside can gain a competitive edge by delivering a consistent and precise combination of hundreds of postbiotic metabolites efficiently to the gut in every serving.

SCIENTIFIC EDGE #1: A DIFFERENTIATED GUT HEALTH STORY



'BIOTICS' INTERACTIONS IN THE PET'S GUT.



PREBIOTICS

Fibrous substrates that serve as the food for live microorganisms (probiotics)



PROBIOTICS

Live microorganisms that ferment to create metabolites needed for energy and other functions



POSTBIOTICS

Produced from probiotic fermentation, the beneficial metabolites needed for energy and other functions

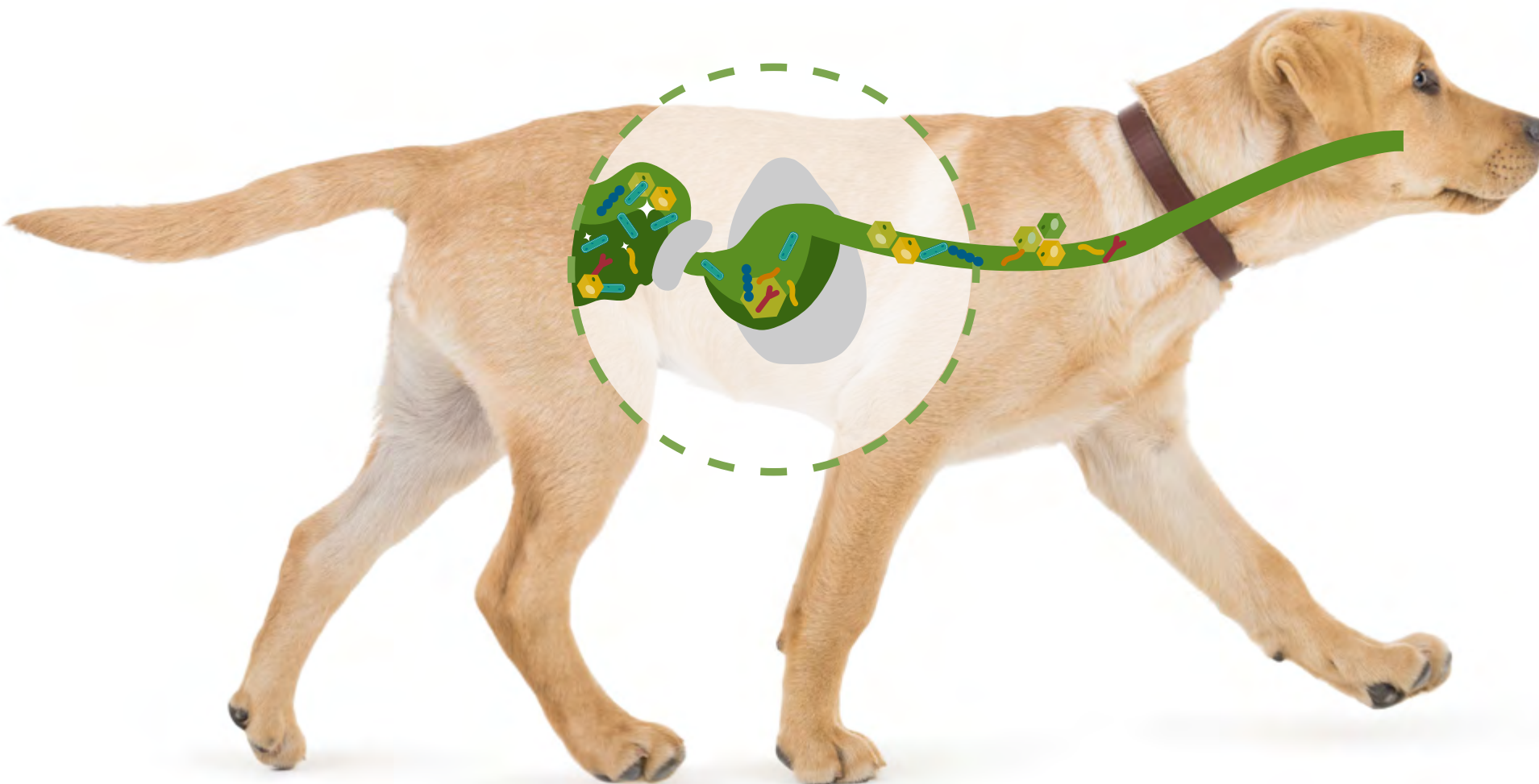


Figure 3: Pre-, pro-, and postbiotics each play a specific role in the pet's gut with the end goal being to deliver postbiotic metabolites.

POSTBIOTICS ARE A STREAMLINED WAY TO NOURISH THE GUT.

Typical pet food processing conditions such as extrusion, retort and high pressure pose significant challenges for live microorganisms, often requiring additional steps in the production line to apply, if they can be used at all. Survivability challenges can persist once microorganisms are consumed by the pet, as animal stress, antibiotics, and the harsh GI tract all pose additional issues for live microorganisms. Survivability challenges during microorganism's journey from manufacturing to the pet's gut can lead to inconsistent postbiotic metabolite delivery and subsequently an under-performing gut. (fig. 4)

Nourishing the gut without the hassle of live microorganisms is possible with TruMune™. TruMune is non-viable, so manufacturers do not need to account for microorganism survivability challenges. This opens the door for innovation and new product development possibilities because it's an ingredient that can be used in any food format while retaining efficacy.

How it works: We recreate the natural fermentation process already happening within the pet's gut. Our process starts by nourishing live microorganisms (*Saccharomyces cerevisiae* probiotic) which are then transformed into complete postbiotics via a proprietary fermentation system. The result? A unique combination of hundreds of postbiotic metabolites that, when added to pet food formulas can be delivered directly and consistently to the gut. (fig. 5)

The goal:

consistent postbiotic metabolite delivery



What may really be happening:

variable postbiotic metabolite delivery



Figure 4: Numerous factors can influence postbiotic metabolite delivery to the gut.

Figure 5: Harnessing the power of fermentation to help pets live more healthy and active days.



#2

SCIENTIFIC EDGE

SCIENCE FOR PETS

Proven compatibility with the unique biology of dogs and cats.

BENEFIT FOR BRANDS

Peace of mind that product claims are rooted in pet-specific science.

Leading the way in pet-specific research.

Animal and human research is important, but we believe pet-specific research is the gold standard for any ingredient used for pet diets. That's why we've spent 35 years perfecting our postbiotic technology for pet formulas. TruMune™ is highly palatable, seamlessly incorporates into any modern pet food formula and is backed by multiple pet-specific peer-reviewed studies. (fig. 6) With TruMune inside at the recommended level, pet food manufacturers have peace of mind that their formulas will consistently deliver the intended on-pack health claims.

Under-researched ingredients can expose brands to higher risks that their finished products may not deliver their intended health response. With pet parents taking a closer look at the ingredients in their pets' diets than ever before, backing your brand with specific and credible pet-specific research has never been more important.

Figure 6: TruMune is backed by multiple dog and cat studies evaluating a wide range of biological and performance responses.



Immune response



Nutrient digestibility



Serum chemistry and hematology



Fecal quality & metagenomics



Exercise performance



Palatability



Stress markers



BOOST YOUR BRAND WITH THESE SCIENTIFICALLY SUBSTANTIATED BENEFITS WHEN TRUMUNE IS INSIDE:

Support the gut for a difference pet parents can see (and smell).

The pet's gut plays a central role in keeping pets healthy because it influences both nutrient absorption and immunity. Studies in dogs and cats show that TruMune™ helps the gut work smarter by supporting gut function and microbiota diversity – it's a difference pet parents can see (and smell). (fig. 7)^{2,3}

Support a healthy and balanced gut microbiome.

Support 'good' microorganism populations

2.6x

More Bifidobacterium² than control diet

1.7x

More Prevotella² than control diet

21%

Fewer Fusobacterium² than control diet

Help manage 'bad' microorganism populations

Increased microbial diversity and species richness observed in cats over a 42-day period vs. control

Support stool quality and consistency.

More pleasant 'pick-ups'



Phenols & Indoles, key components responsible for fecal odor

Less messy litter box



Stool firmness and consistency

Fecal moisture and fecal odor

Figure 7: TruMune supports a thriving gut microbiome - a difference pet parents can see (and smell) for themselves.

2 - Ching-Yen Lin, Celeste Alexander, Andrew J. Steelman, Christine M. Warzecha, Maria R. C. de Godoy, and Kelly S. Swanson. 2019. Effects of a Saccharomyces cerevisiae fermentation product on fecal characteristics, nutrient digestibility, fecal fermentation end-products, fecal microbial populations, immune function, and diet palatability in adult dogs. J. Animal Sci. 2019.97:1586-1599, doi: 10.1093/jas/skz064.

3 - Norton, S. A. et al. Saccharomyces cerevisiae Fermentation Product Influences Indicators of Gut Health and Function in Healthy Adult Cats. ASAS (2023). Norton et al. Publication pending.

Support a balanced immune system

If the pet's body is like a castle then the immune system is its army. The primary purpose of the immune system is to keep invaders out. But sometimes enemies breach the walls and that's when the immune system's defense team steps in. The goal is to encourage a balanced combination of defenders - enough to defeat the enemy but not so many that they wreck the castle.

Key defenders of the castle (fig. 8):



Monocytes

Encourage presence of monocytes to identify invaders sooner.



Lymphocytes

Encourage presence of lymphocytes for more precise attack of invaders.



Neutrophils

Control neutrophil production to attack invaders without creating additional cellular damage.



TNF- α

Keep TNF- α levels in check to reduce the likelihood of an over-active immune response.

Research in dogs and cats suggests that TruMune™ helps support a balanced immune system.^{4,5}

4 - Wilson SM, Oba PM, Koziol SA, Applegate CC, Soto-Diaz K, Steelman AJ, Panasevich MR, Norton SA, Swanson KS. Effects of a Saccharomyces cerevisiae fermentation product-supplemented diet on circulating immune cells and oxidative stress markers of dogs. J Anim Sci. 2022 Sep 1;100(9):skac245. doi: 10.1093/jas/skac245. PMID: 36044986; PMCID: PMC9433306.

5 - Lin C. et al. Saccharomyces cerevisiae fermentation product modulates blood cell counts and gut immunity in healthy adult cats. ASAS (2023). Norton et al. Publication pending.

Figure 8:
Understanding the key defenders
in the pet's immune system*



*These statements are provided for general educational purposes only. They are not intended to be or implied as product claims.

More energy for active lives

Energy is used to sustain life, engage in physical activity, and to maintain health and wellness. Pets have a finite amount of energy available each day so they must use it wisely. Pets fed TruMune™ have been shown to manage daily stressors like exercise and transport like pros. This means fewer “off” days and more time for life’s adventures.⁶

3.2%
faster

15%
more active

Help manage stress

TruMune has been shown to support oxidative stress and antioxidant capacity.

6-Patricia M Oba, Meredith Q Carroll, Kelly M Sieja, Juliana P de Souza Nogueira, Xiaojing Yang, Tammi Y Epp, Christine M Warzecha, Jessica L Varney, Jason W Fowler, Craig N Coon, Kelly S Swanson, Effects of a *Saccharomyces cerevisiae* fermentation product on fecal characteristics, metabolite concentrations, and microbiota populations of dogs subjected to exercise challenge, *Journal of Animal Science*, Volume 101, 2023, skac424, <https://doi.org/10.1093/jas/skac424>.

#3

SCIENTIFIC EDGE

SCIENCE FOR PETS

Multiple health benefits and a taste they love.

BENEFIT FOR BRANDS

An ingredient made to help modern pet brands thrive.

TruMune™ is a formulator's best friend because:

It's packed with pet-specific science inside:

Formulate with confidence with a novel ingredient that was made specifically for use in premium and super-premium pet formulas.

A little goes a long way:

TruMune only requires a fraction of one percent of the formula to deliver multiple proactive health benefits.

It's one smart, hard-working ingredient:

With TruMune you get multiple proven health benefits rolled into a single ingredient. Plus, palatability trials show that dogs and cats love it.

It's label friendly:

TruMune seamlessly fits into ingredient labels and meets natural requirements as defined by AAFCO and FEDIAF.

It's stable and effective in any processing condition:

TruMune's efficacy is not contingent upon microorganism survivability, so it can consistently deliver its intended benefits regardless of processing conditions.



CARGILL POSTBIOTICS: A SOLUTION FOR EVERY PET FORMULA



TruMune™ (also known as TruPet™ in some markets) is a natural* complete postbiotic ingredient. It's a single low-inclusion ingredient that supports multiple trending health benefits and retains efficacy in any modern pet food processing condition.

Market availability**

TruMune: North America, Central America, South America

TruPet: Europe, Middle East, Africa, Asia, Asia Pacific, Oceania



EpiCor® Pets is a human-grade natural* complete postbiotic ingredient. It's trusted by people in their own diets and is proven effective in pets, too. EpiCor Pets is a highly concentrated super ingredient that can be added to any pet nutrition formula while retaining efficacy.

Market availability**: Global

| Product | Recommended Product Types | Recommended Daily Feeding Rate | Claim Spaces Backed by Pet Specific Research |
|---------------------|--|--|---|
| TruMune™ TruPet™ | <ul style="list-style-type: none"> • Functional, Premium, Super-Premium, and Veterinary Diets • Extruded, retort, high-pressure • Pet treats • Meal toppers and mixers | <ul style="list-style-type: none"> • Dog: 100mg/kg body weight • Cat: 150mg/kg body weight | <ul style="list-style-type: none"> • Digestive health • Gut microbiome • Immune health • Vitality |
| EpiCor® Pets | <ul style="list-style-type: none"> • Pet Supplements • Human-Grade pet foods, treats, meal toppers and mixers | Dog & Cat: 7mg/kg body weight | <ul style="list-style-type: none"> • Digestive health • Gut microbiome • Immune health • Everyday stress management • Breath freshness |

*Natural as defined by AAFCO

**Trademark, product registration, and product availability varies by market. Contact a Cargill representative to see what products are available in your market.



Cargill[®]