

# thrive



## Postbiotics: The Next Evolution in Companion Animal Health

June 2022

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## Deven Vespi

Business Development, Equine, Cargill Health Technologies



## Brian Hamilton

Business Development, Pet; Cargill Health Technologies

The science and practice of fermentation has been around for thousands of years...intentional or otherwise.







Cargill  
Animal  
Nutrition



Cargill  
Health  
Technologies



Cargill  
Aqua  
Nutrition

Cargill Animal Nutrition & Health

# Cargill Health Technologies: Animal

*The science of creating more healthy days for people, animals and our planet*

## Improving companion animal digestive and immune health



Based in Minnesota,  
Manufactured in Iowa

since  
**1943**

### Science-based Technology



Over **385** controlled  
research studies

Over **160** peer-  
reviewed publications

More than  
**500**  
Nutrition  
Science  
Professionals

### Expertise Across Disciplines



- Nutrition
- Fermentation
- Immunology
- Microbiology
- Genetics

# Today's Agenda

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Postbio....WHAT?!

1

Defining Postbiotics

Key Differentiator: Stability

2

Consistent Delivery & Manufacturing Flexibility

Key Differentiator: Proven Benefits

3

Species Specific Research

Key Differentiator: Consumer Centric

4

Meeting Pet Parent and Horse Lover Expectations

Kickstarting the Process

5

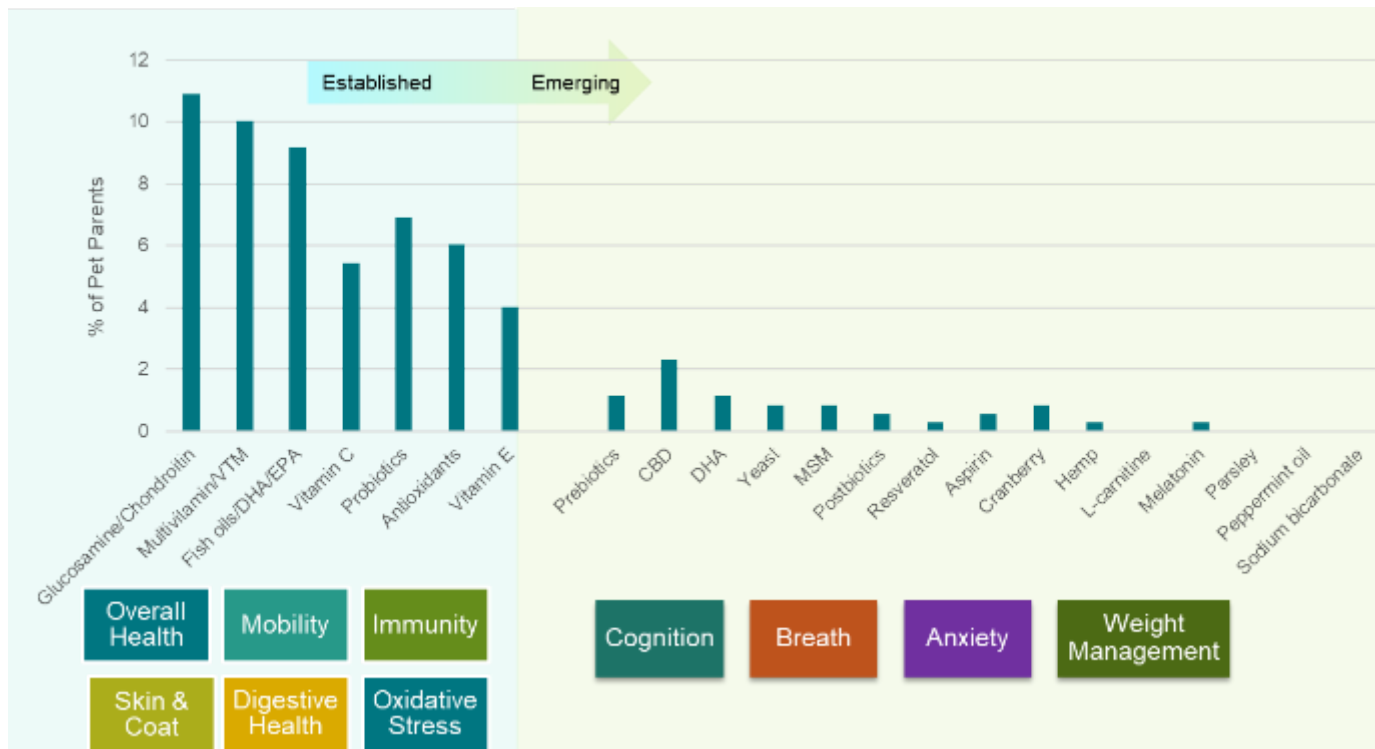
How to Start

# Postbi- What?...

*Postbiotics Defined*



# Why Do We Need Another “Biotic”?



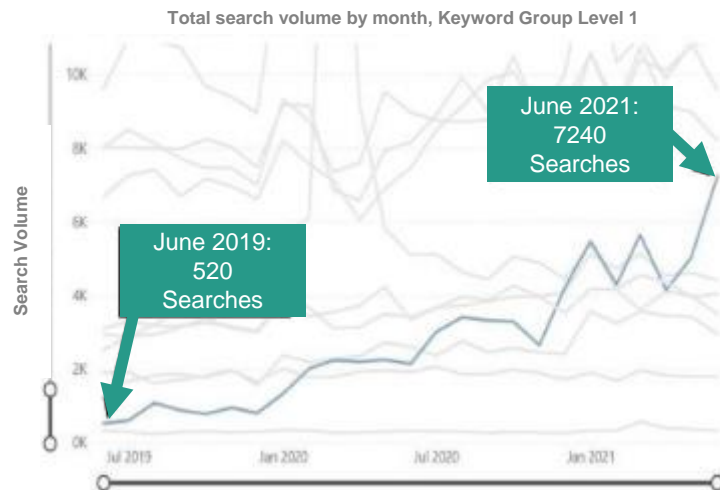
Source: Pet parent feedback regarding ingredients they look for in pet supplements. In-Home Concept & Usage Study (Cargill, Inc., 2021)

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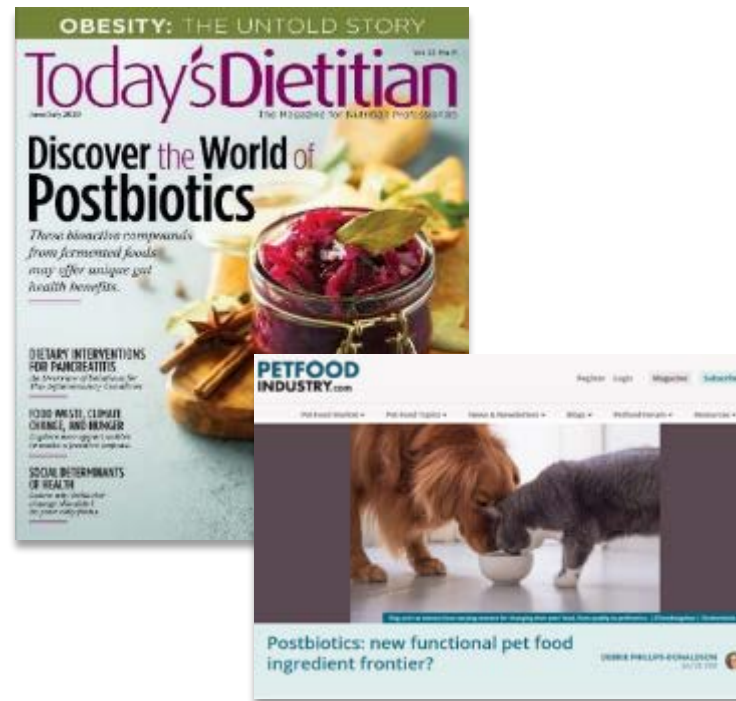


# The Word is Out on Postbiotics...

## Google Searches for Postbiotics Has Increased by 1,300%



Source: Lumina Intelligence / <https://www.nutraingredients.com/Article/2021/08/02/Postbiotics-see-1-300-increase-in-Google-searches>



# Postbiotics Defined

## Postbiotics

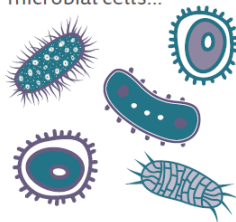
A postbiotic is a preparation of inanimate microorganisms and/or their components that confers a health benefit on the host.



INTERNATIONAL  
SCIENTIFIC ASSOCIATION  
OF  
PROBIOTICS AND PREBIOTICS™

### COMPONENTS OF A POSTBIOTIC:

Postbiotics may contain  
intact inanimate  
microbial cells...



and/or microbial cell  
fragments/structures...



Cell walls, membranes,  
exopolysaccharides, cell-wall  
anchored proteins, pili, etc.

with or without  
metabolites/endproducts



Organic acids, peptides, secreted  
proteins, enzymes, bacteriocins, etc.

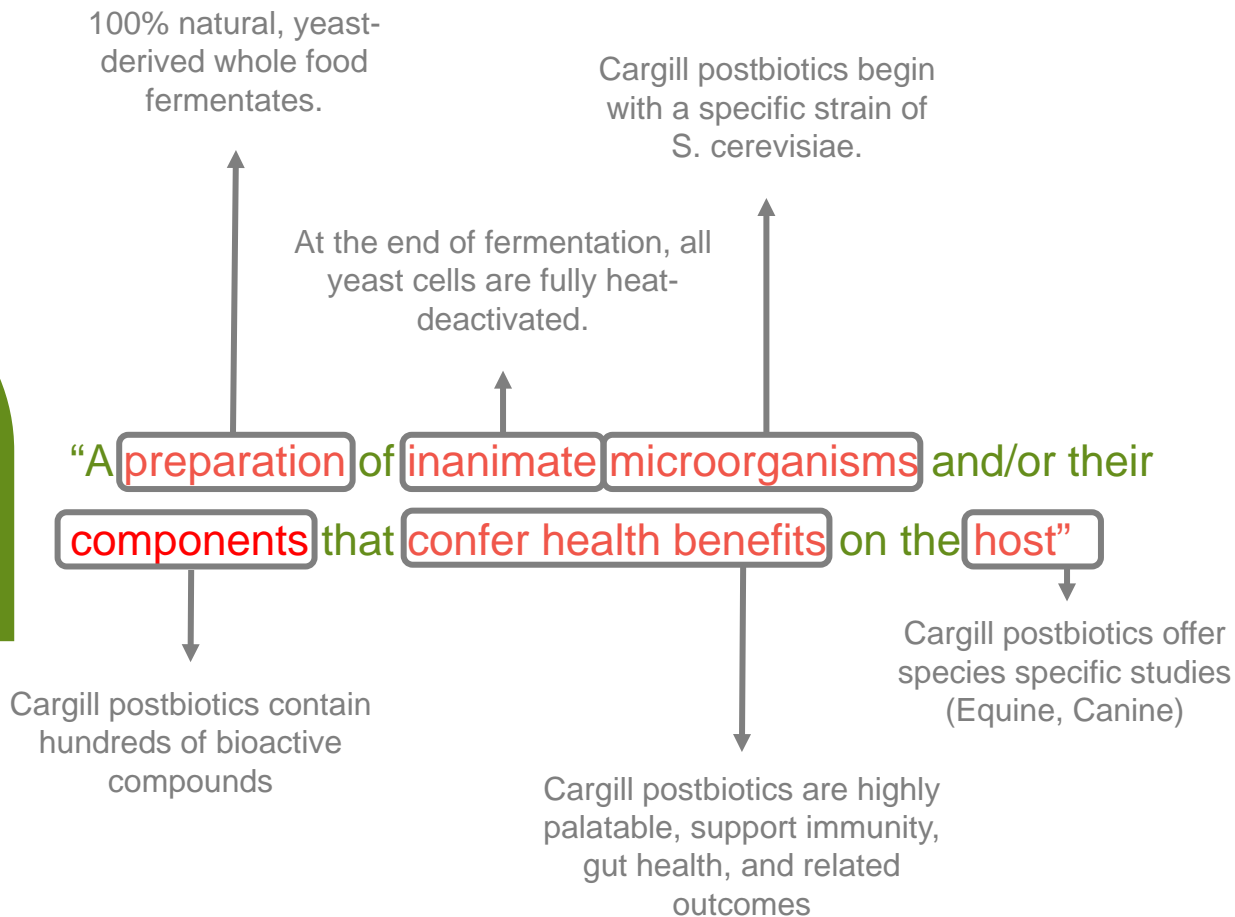
Source: Salminen, S., Collado, M.C., Endo, A. et al. The International Scientific Association of Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics. Nat Rev Gastroenterol Hepatol (2021).

## Postbiotic Definition

“A preparation of inanimate microorganisms and/or their components that confer health benefits on the host”

Salminen, S., Collado, M.C., Endo, A. et al. The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics. *Nat Rev Gastroenterol Hepatol* (2021).

# Cargill Postbiotics





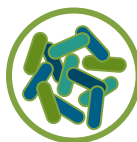
# Postbiotics are not....

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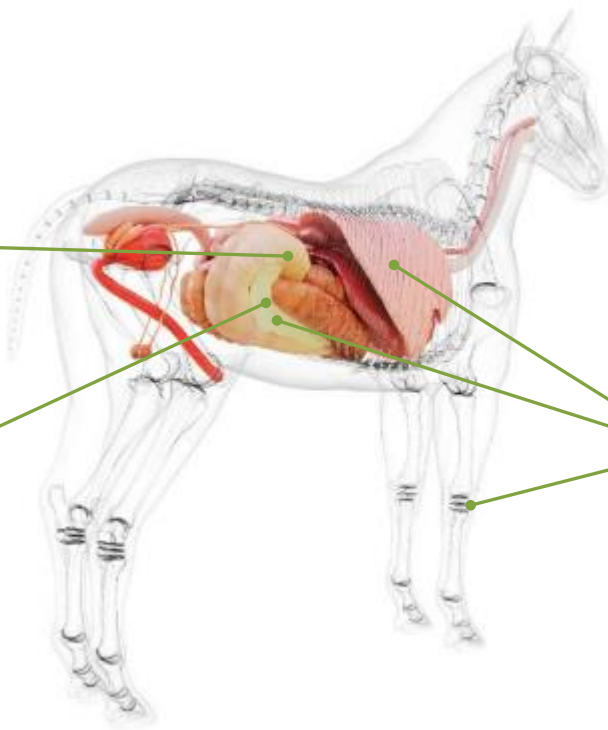


# How Do We Validate our Understanding?

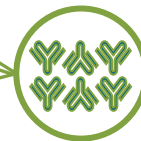
Measure microbiomes  
(population description; e.g.  
diversity) with sequencing



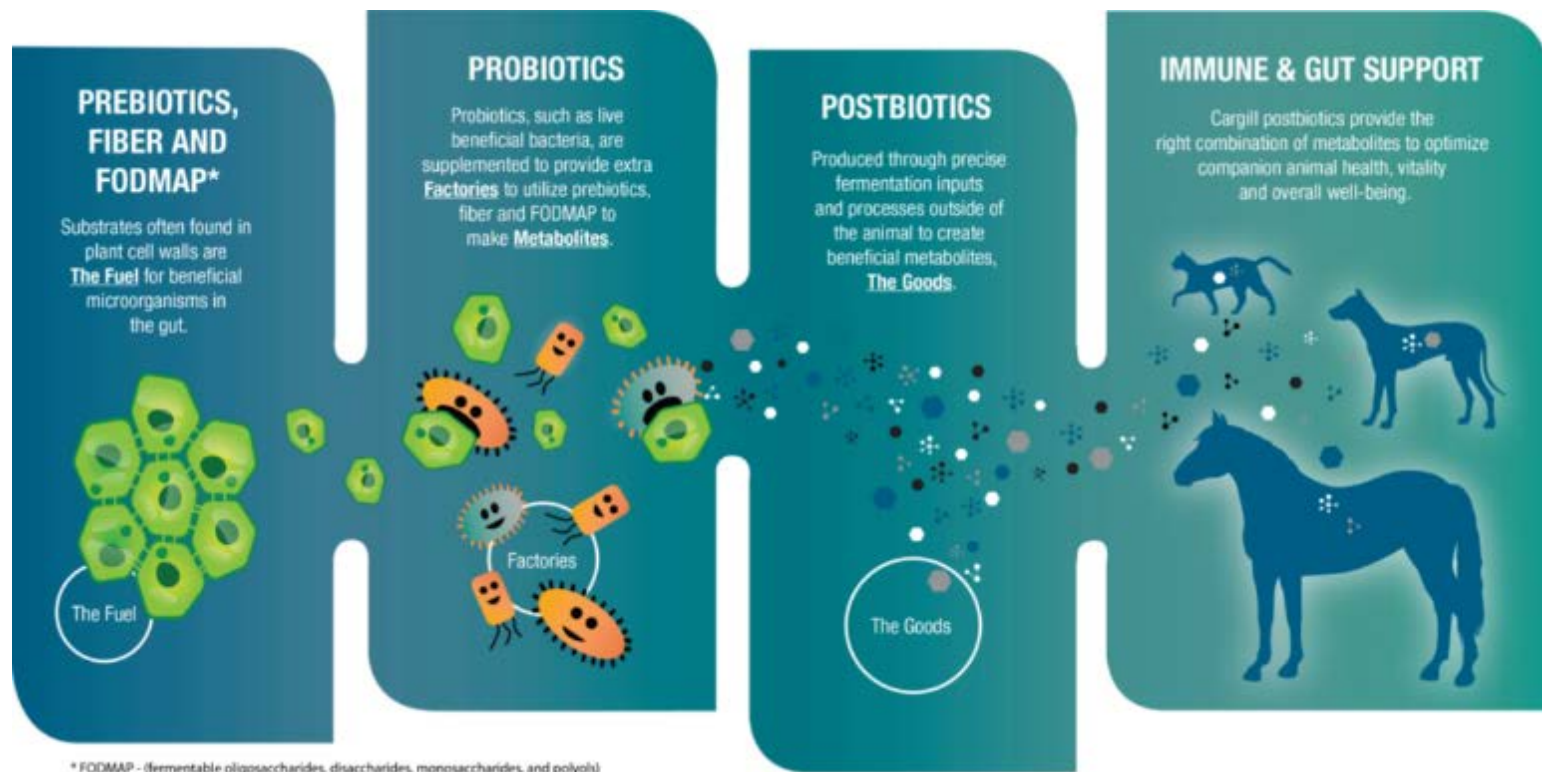
Quantify fermentative by-  
products like VFAs using  
metabolomics



Directly test for immune system  
changes such as immune cell  
numbers, function and cytokines



# What's the Difference: Pre, Pro and Postbiotics



\* FODMAP - (fermentable oligosaccharides, disaccharides, monosaccharides, and polyols)

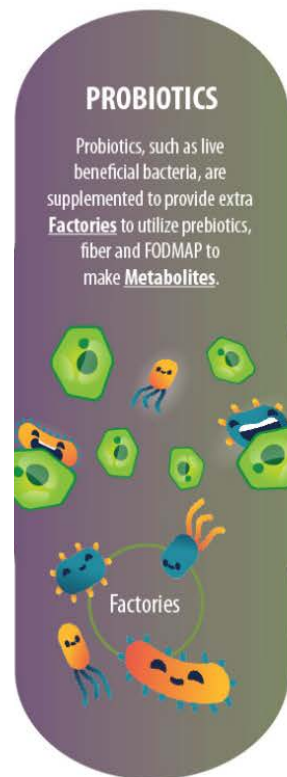
# Postbiotic Differentiator: *Stability*



  
**Cargill**



# The 'Biotics': What's the Difference?



**Probiotics Definition:**  
*“Live microorganisms that, when administered in adequate amounts, confer a health benefit on the host.”*

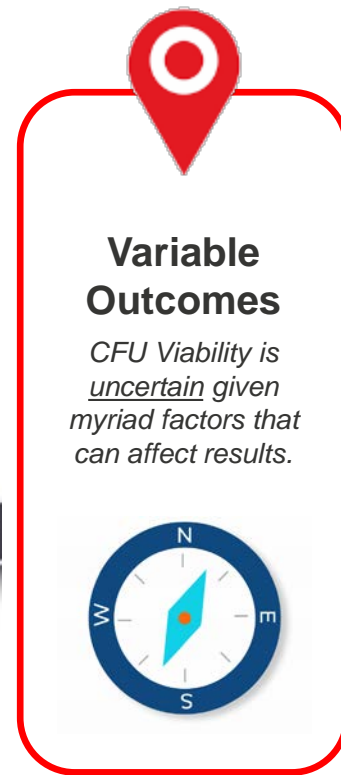
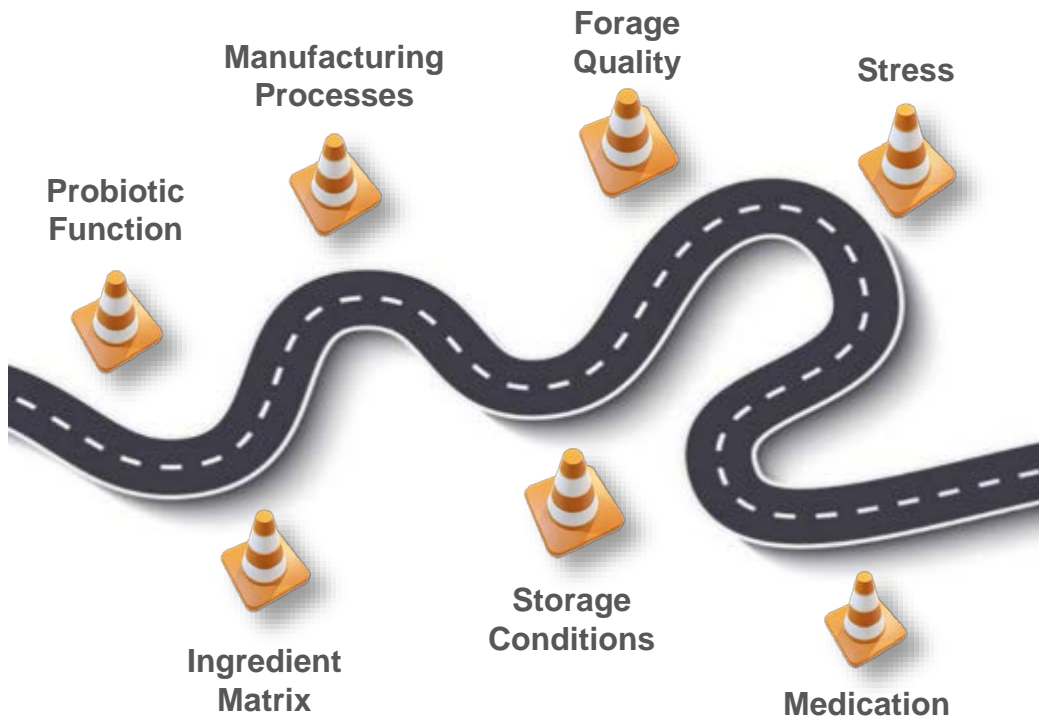
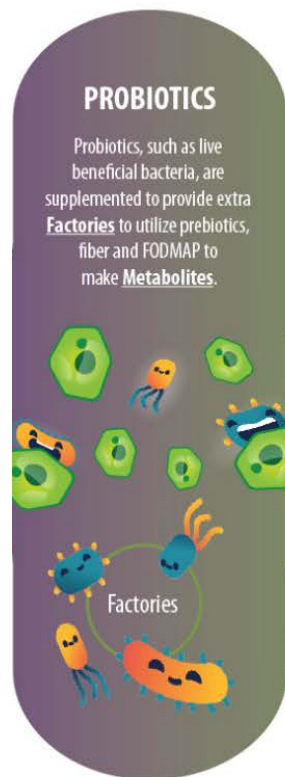


## Fermentation Functional Metabolites:

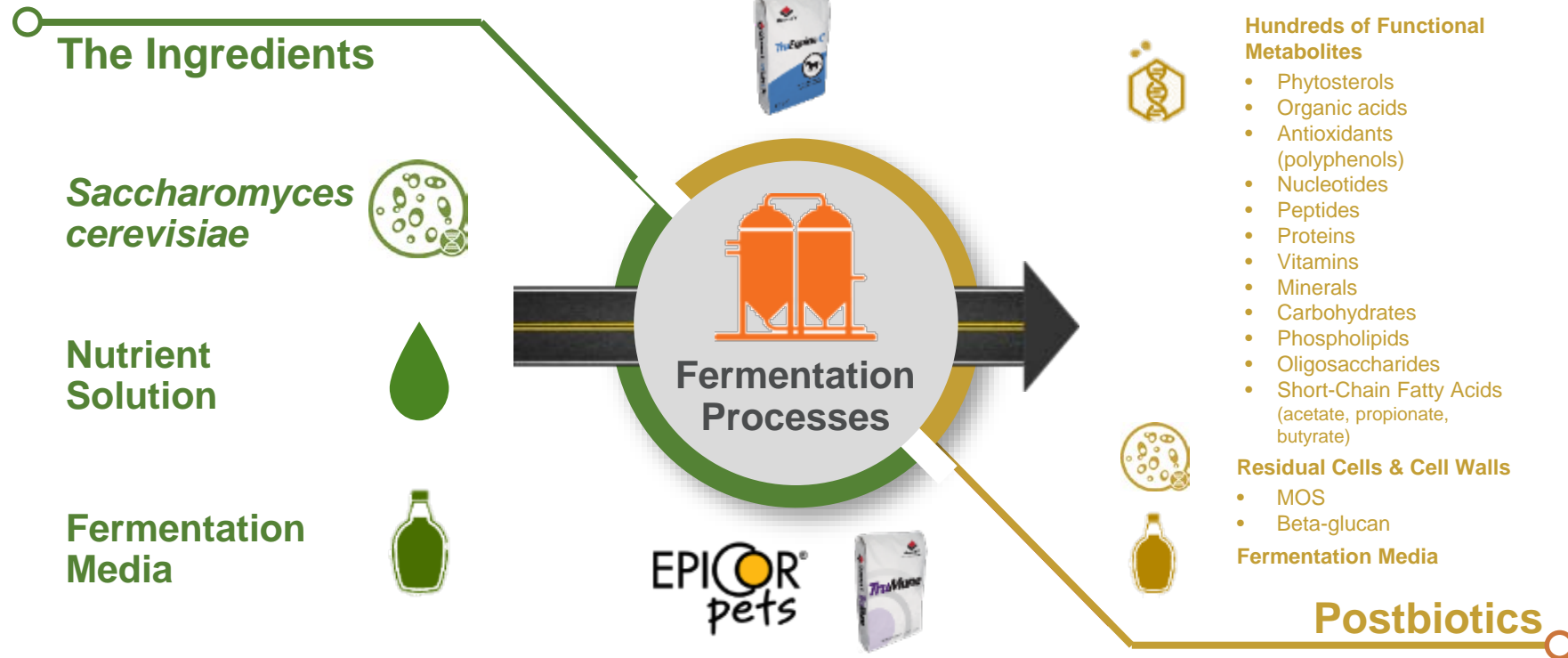
Generated by Pre and Probiotics, The Goods that support health, such as amino acids, vitamins, short chain fatty acids and more.



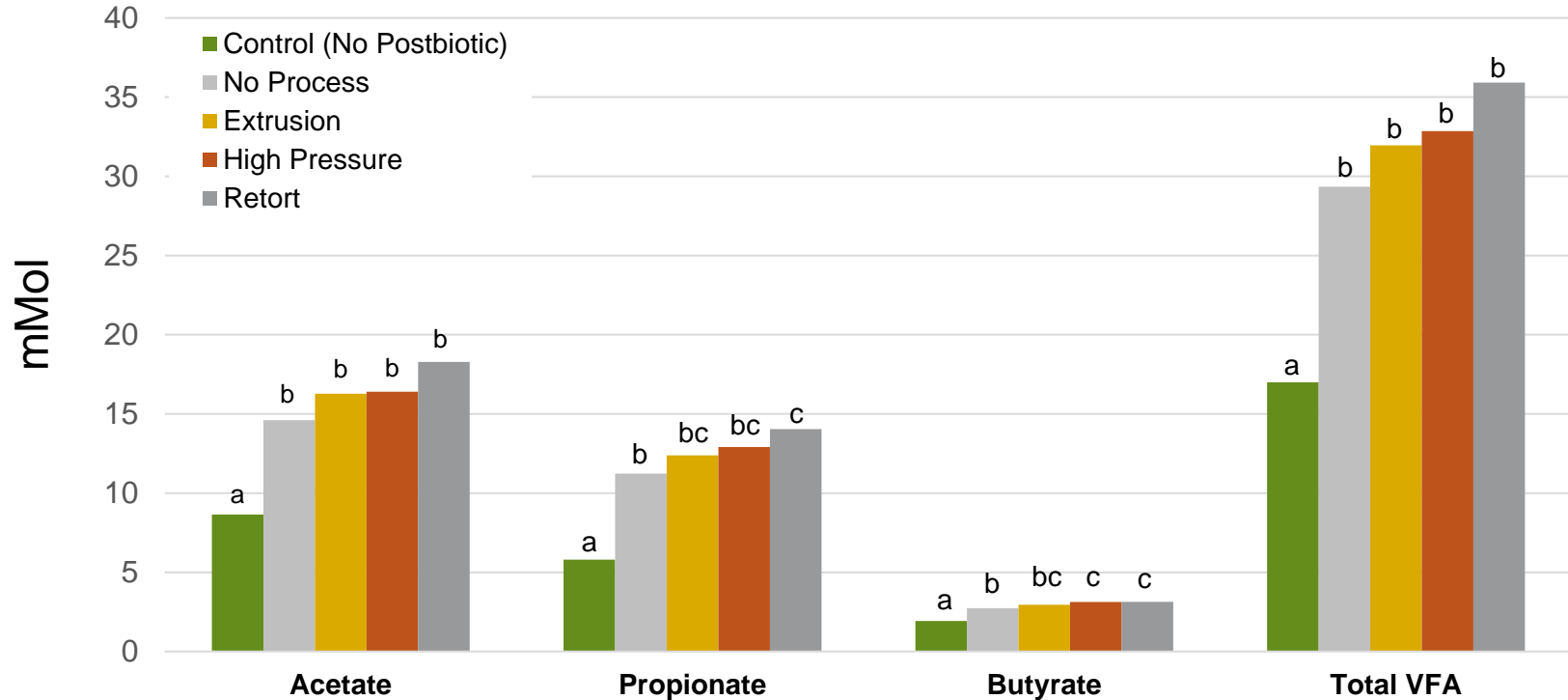
# Probiotics: The Challenge is Viability



# The Postbiotics Pathway: Straight and True



# Stability Ensured: Cargill Postbiotic Post-Process VFA Production



Diamond V Research Innovation Center, 2020 (Internal Report)

abc Means within a column without a common superscript letter differ by  $P \leq 0.05$ .

Saccharomyces cerevisiae Fermentation-Based Postbiotic (SCFP)



# Postbiotic Differentiator: *Proven Research*



**Cargill**

# A Growing Body of Corroborating Evidence

| Species<br>(# of studies) | Immune Health          |                      |                   | Digestive Health       |               |                                 |                    |                    | Relevant Outcomes |                 |                      |                            |                        |
|---------------------------|------------------------|----------------------|-------------------|------------------------|---------------|---------------------------------|--------------------|--------------------|-------------------|-----------------|----------------------|----------------------------|------------------------|
|                           | Immune Cell Population | Immune Cell Function | Barrier Integrity | Nutrient Digestibility | Fecal Quality | Fecal Fermentation End-Products | Fecal Metagenomics | Fecal Metabolomics | Growth            | Feed Efficiency | Exercise Performance | Assessed Health & Wellness | Vitality & Performance |
| Dairy & Beef (175+)       | ●                      | ●                    | ●                 | ●                      | ●             | ●                               |                    | ●                  | ●                 | ●               | ●                    |                            | ●                      |
| Poultry (80+)             | ●                      | ●                    | ●                 |                        |               |                                 |                    |                    | ●                 | ●               | ●                    |                            | ●                      |
| Swine (75+)               | ●                      | ●                    |                   |                        | ●             |                                 | ●                  |                    | ●                 | ●               | ●                    |                            | ●                      |
| Aqua (25+)                | ●                      | ●                    | ●                 | ●                      | ●             |                                 | ●                  |                    | ●                 | ●               | ●                    |                            |                        |
| Human (15+)               | ●                      | ●                    | ●                 |                        |               |                                 | ●                  | ●                  |                   |                 |                      | ●                          | ●                      |
| Equine (16+)              | ●                      | ●                    |                   | ●                      |               | ●                               | ●                  |                    | ●                 | ●               |                      |                            | ●                      |
| Pet (13+)                 | ●                      | ●                    | ●                 | ●                      | ●             | ●                               | ●                  | ●                  |                   |                 | ●                    | ●                          | ●                      |

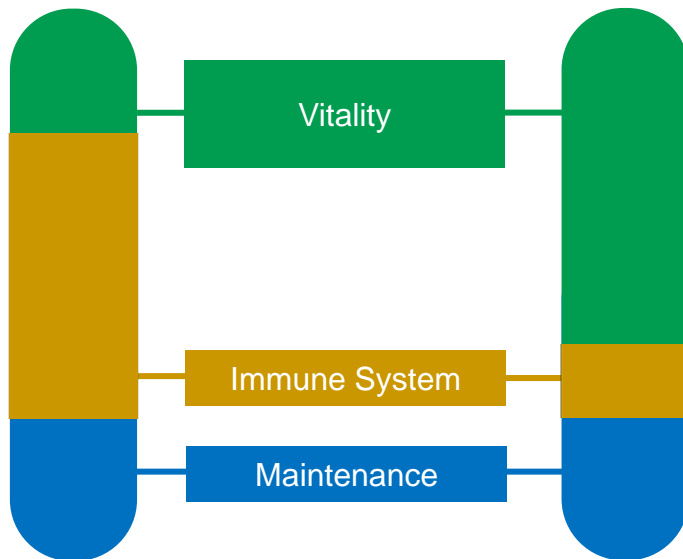
Controlled  
Study  
Results:  
*Canine*



# The Goal: Happy, Healthy Pets

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**Under  
Stress**



**Healthy &  
Happy**

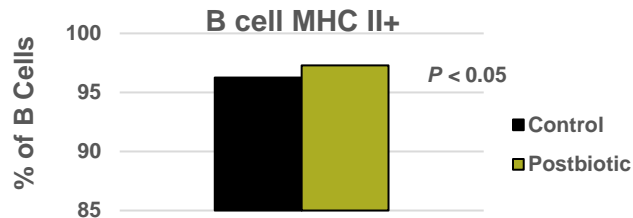


# Canine Immunity Benefits



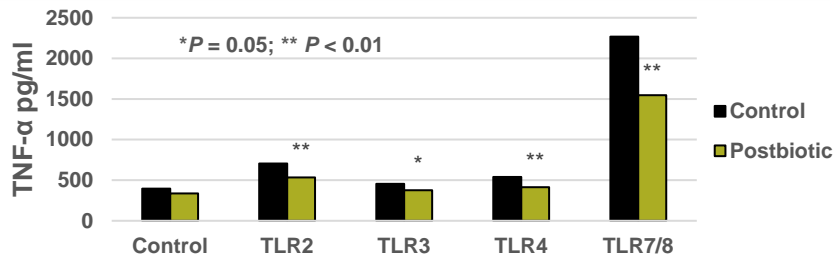
## Efficient Surveillance

Increased number of cells expressing MHC Class II+ receptors which stimulate T helper cells.



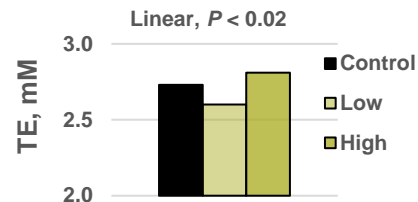
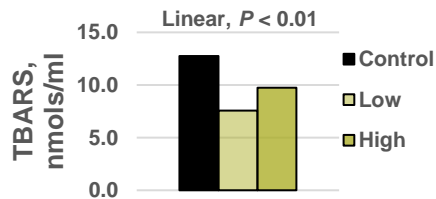
## Improved Responsiveness

Decreased production of TNF- $\alpha$  in response to TLR agonist stimulation, indicating an anti-inflammatory effect and balanced immune response to challenges.



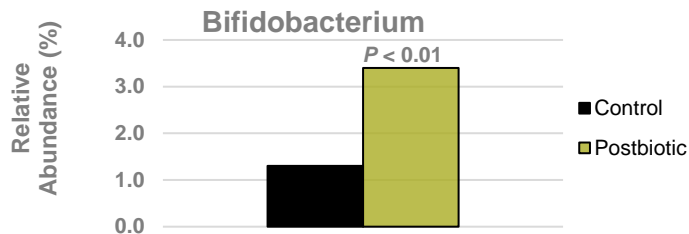
## Protection Against Oxidative Stress

Lower indications of oxidative stress and improved antioxidant capacity in exercise stressed dogs.

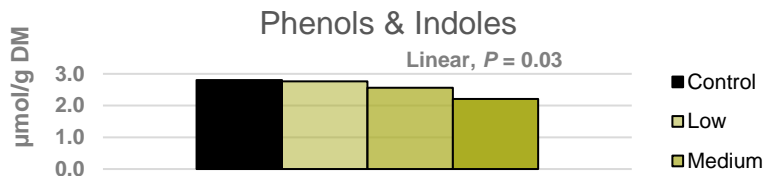




# Canine Gut Health Benefits



Supports favorable shifts in gut microbial populations



Decreased putrefactive compounds that result in fecal odor & which may be indicative of dysbiosis



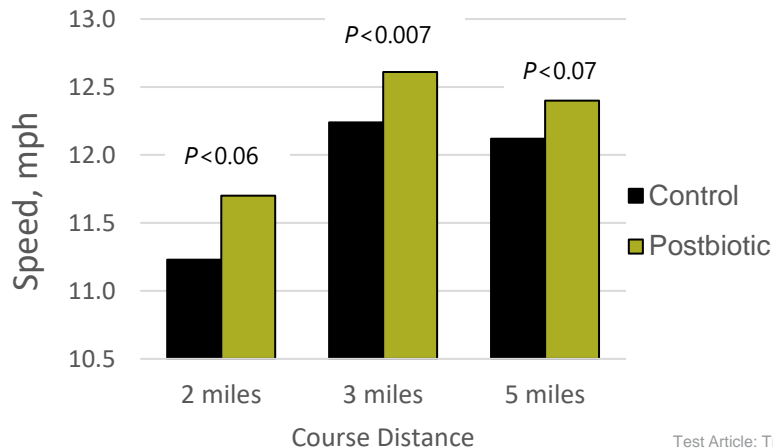
Maintains optimal stool quality under stress and non-stress conditions

# Canine Vitality Benefits



## Faster

Dogs supplemented with a postbiotic ran an average of 3.2% faster across several distance challenges versus control

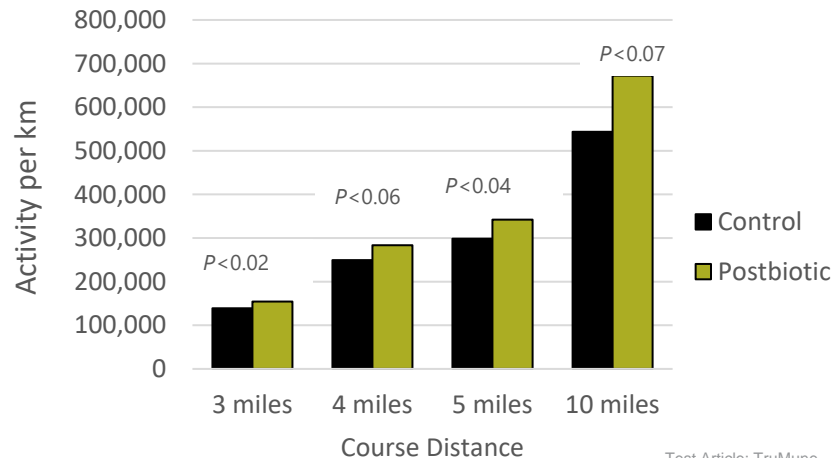


Test Article: TruMune  
Four Rivers Kennel



## More Active

Dogs fed a postbiotic demonstrated 15% numerically greater overall activity compared to control



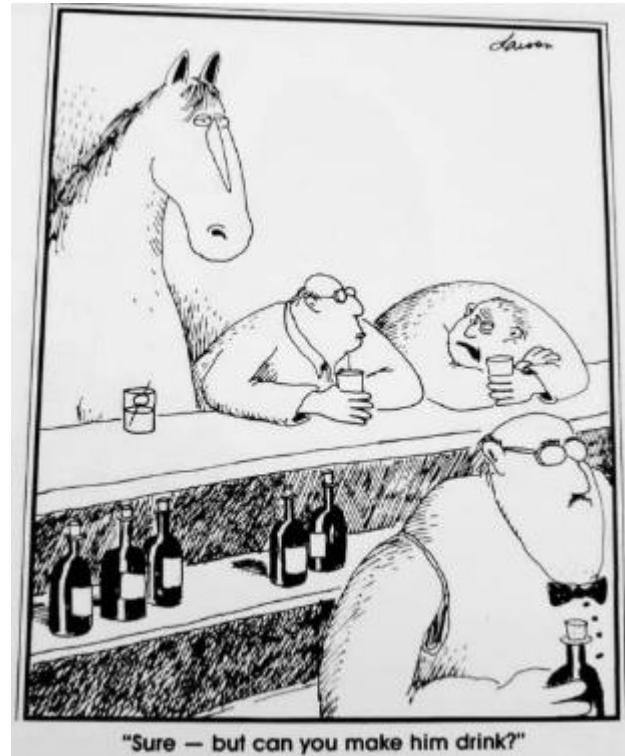
Test Article: TruMune  
Four Rivers Kennel

Controlled  
Study  
Results:  
*Equine*



# Palatability is Essential

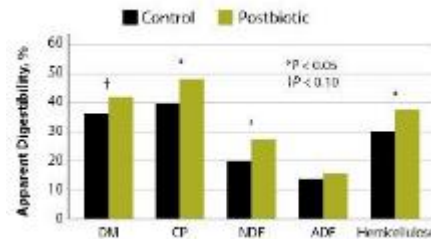
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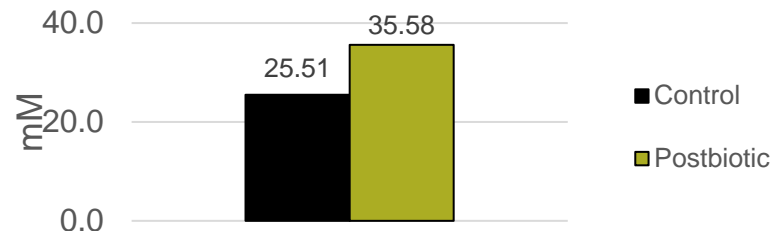
# Equine Gut Health Benefits



**Improves Nutrient Digestibility**

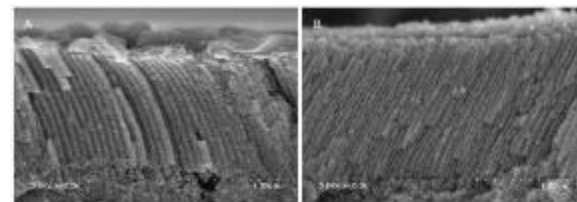


**Increased VFA Production**



**Improvement In Intestinal Villi Characteristics**

Longer, denser villi, better barrier, more absorptive



Control

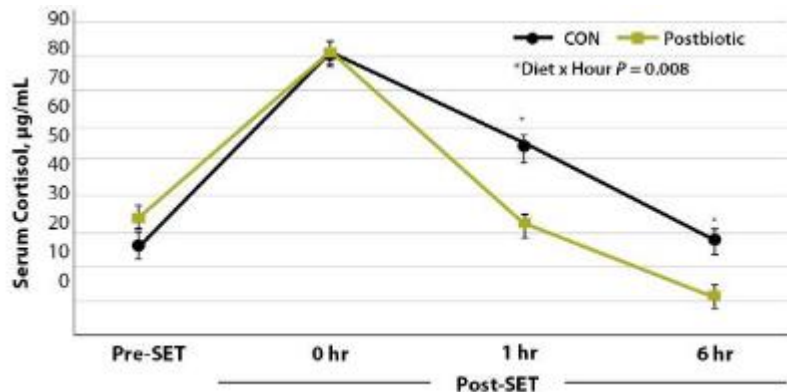
Postbiotic



# Equine Benefits: Stress Management

## Managed Systemic Stress

**TruEquine™ C postbiotic** helps horses to respond appropriately to exercise, while experiencing minimized excessive stress afterwards for faster recovery.



Valigura, H., et al., 2021. *J. of Anim. Sci.* 99 (8) 1:11  
<https://doi.org/10.1093/jas/skab199>

## Transport & Head-Tieing Model

During 12-hour head elevation stress challenge:

- **TruEquine™ C** helped beneficially **modulate immune response**
- **TruEquine™ C** beneficially affected the **gut microbiome** of horses under stress via a more stable community structure and a robust functional potential with regards to carbohydrate metabolism



Tench, M., et al., 2021. *J. Equine Sci.* 100 :103503.  
Tench, M. et al., 2021. (ASAS Abstract; 2021)

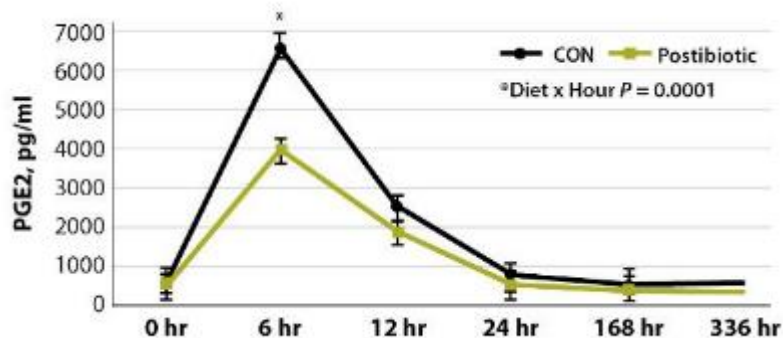




# Equine Benefits: Joint Health

## Improved Joint Health

**TruEquine™ postbiotic** helped appropriately manage PGE2, a joint inflammation marker for **improved joint health**

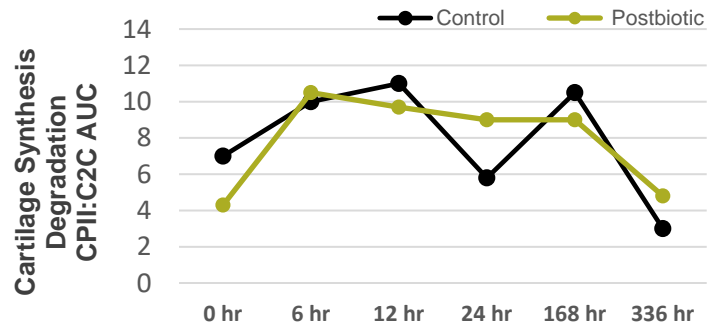


Martinez, R. E., et al. 2021. J. of Anim. Sci. 9 (10): 1-8.  
<https://doi.org/10.1093/jas/skab272>

## Acute Inflammatory Response

Horses fed **TruEquine™ C postbiotic** exhibited **more synthesis vs degradation** of intra-articular cartilage.

The response to acute inflammation injection was **generally less erratic** for horses fed **TruEquine™ C postbiotic vs control horses**.



\* Within time, CON LRS differs from all other treatments ( $P < 0.05$ )

\* Within time, TruEquine C LPS differs from all other treatments ( $P < 0.05$ )

**Postbiotic  
Differentiator:  
*Consumer  
Centric***



  
**Cargill**

# Key Human Market Drivers: “Good for Me!”

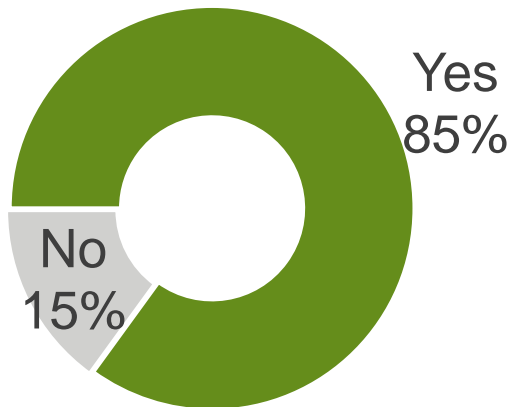
*“Consumers are taking a more holistic, proactive, preventative & personal approach to health. They feel empowered to make their own decisions about what’s healthy & what’s not...”*



# ...Driving the Focus on “Good for My Pet”

## % of US Pet Parents Who Say it is Important to take a Preventative Approach to Protect Pet Health

(Source: Mintel 2021 Treetop Survey)



| <i>Because of Covid...</i>                               | Dog Owners | Cat Owners |
|--|------------|------------|
| Am paying closer attention to my pet's health & wellness | 42%        | 43%        |
| Am especially concerned about my pet's immune system     | 20%        | 21%        |
| Source: Packaged Facts Nov-Dec 2020 Survey of Pet Owners |            |            |

# What Pet Parents Want...

*Without Compromising Safety, Stability or Palatability*

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# Kickstart the Process

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## Cargill Technologies Companion Animal Team



Alissa Wellington



Deven Vespi



Brian Hamilton



Laurence Mills



Lexie Moening

### CHT Commercial Team



Sharon A. Norton, Ph.D.



Briana Kozlowicz, Ph.D.

### CHT Research and Development



Julie Gasper



Haley Corkery

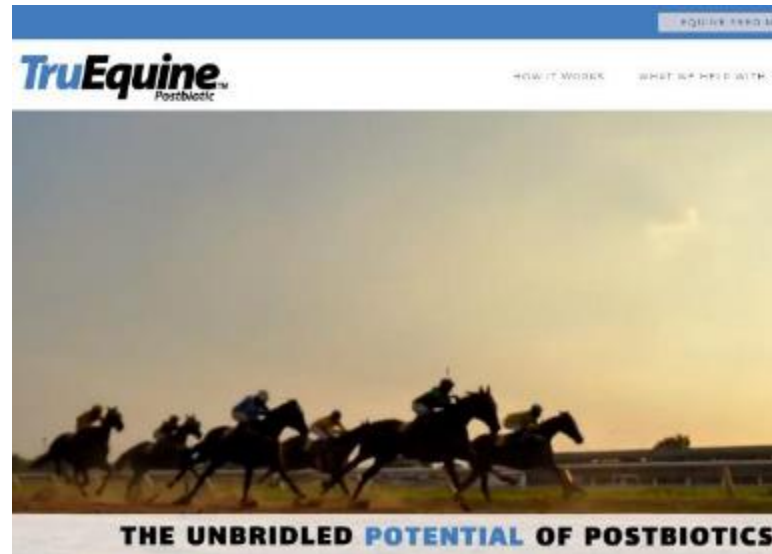
### CHT Marketing and Portfolio Management



# Learn More at our Postbiotics websites



[cargill.com/supplements/epicor-pets-postbiotic-ingredient](https://cargill.com/supplements/epicor-pets-postbiotic-ingredient)



[truequinepostbiotic.com/](https://truequinepostbiotic.com/)

# Any questions?

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Helping the world *thrive*